Tony Pay of Imprint and Mike Allmey delve into the history of Cambridge Airport and the Land Rover-based ambulances made there...

We're not sure how many casualties taken aboard a Land Rover Ambulance pause to think they might have been aboard a Unimog if the originator of their mercy-chariot had not played a vital role in the Battle of Britain!

Marshall Special Purpose Vehicles are of course known in MV circles for building the original long-range desert patrol Pink Panthers back in the sixties. The Pinkies were taken on their mysterious errands by Herky-birds, converted for the RAF by the same firm. Although the firm began in 1909 with motor cars, Marshall's first love, and main source of income, is flying. In 1912, Marshall mechanics assisted with repairs to an Army airship which had made a forced landing behind the Marshall garage in Jesus Lane, Cambridge, because of an engine failure; this was the company's first contact with aviation. That said, its main war work in WW1 was on Army ambulances and Rolls-Royce armoured cars. Nowadays, Cambridge Airport *is* Marshalls.

Before WW2, Sir David Marshall developed a system of flying training that staggered the pundits by turning out much better pilots in much larger numbers more quickly than the RAF itself! In effect, he was called upon to direct the entire Flying training programme, and 'his' pilots were instrumental in winning the Battle of Britain. Sir David Marshall died in 1942, but the company is still very much a family firm.

The firm also moved not into aircraft production, but aircraft modification. This work of the war years continued in peacetime, Marshalls working, for example, on the Canberra and V-bombers. In 1960, they forged links with US firms which led to all RAF Hercules, Tristars and Boeing Sentry (AWACS) aircraft being 'parented' by the firm.

The specialist military side parallels this. Avro and Hawker, Vickers and Supermarine have all gone, as has Rover. The more modest Marshall Group thrives in its niche market. Some niche, with over 80,000 vehicles and military shelters produced for the British Army alone!

Before dealing with Marshall's ambulances, it should be noted that in the early fifties, a few airfield crash vehicles were produced on Series 1, 107" chassis. (FV 18005 Truck 1/4 ton Ambulance Special). A little later, some slightly smaller ones went to the Army (FV 18008 Ambulance 2-Stretcher 107 inch).

From about 1960, almost all softskin ambulances for the British forces have been produced by Marshalls, except for those intended for, in effect, civilian work – taking wives to hospital from UK bases, for example, where Ford Transits as used by the NHS simply bore MOD numbers and badging. (Actually, before you buy your own, remember RAF Land Rovers were jacks-of-all trades, and likely to have had more use than those army ones which were kept for operational use and never saw any!)

Four generations of Land Rover-based Marshall Field Ambulances have been sold to the military, primarily the British and Dutch. The Dutch have been avid customers of Marshalls, often pushing for ideas way ahead of anything the British were considering.

First Generation
These had an extended and raised body on the contemporary Series II/IIA (FV 18044) or, less commonly, Series III 109" (FV 18067). They were produced from about 1960 right up to the early Eighties, and some were still in service in the late Nineties. The Dutch also had their own, modified, version of this in some quantity.

Second Generation
These are rebuilt 101FC gun tractors, built 1981-2 from unused 1976 vehicles. They were to supplement, not replace, the main fleet.

Third Generation
Land Rover Special Vehicles produced for the civilian market the "127", an extended 110. (A few 110s were produced for the Navy in 1986, the conversion being similar to the First Generation vehicles.) Marshall and a firm called Locomotors produced ambulance bodies on the 127, Marshall's version keeping the original's rounded styling, Locomotors' being more "flat-pack".

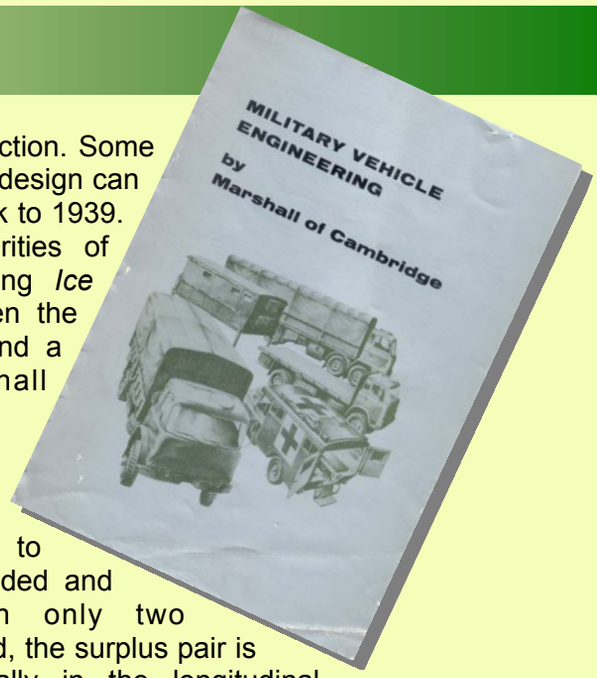
Fourth Generation
Known as the "Pulse", this is based on the military-spec Defender 130, in effect a stretched version of the Wolf, with its sophisticated electronics and full military kit. These have now replaced all earlier generations except possibly a few of the Third Generation.

Series III-based First Generation Marshall Ambulance alongside a TACR1, both with RAF "crash bars" *(Mike Poynton)*

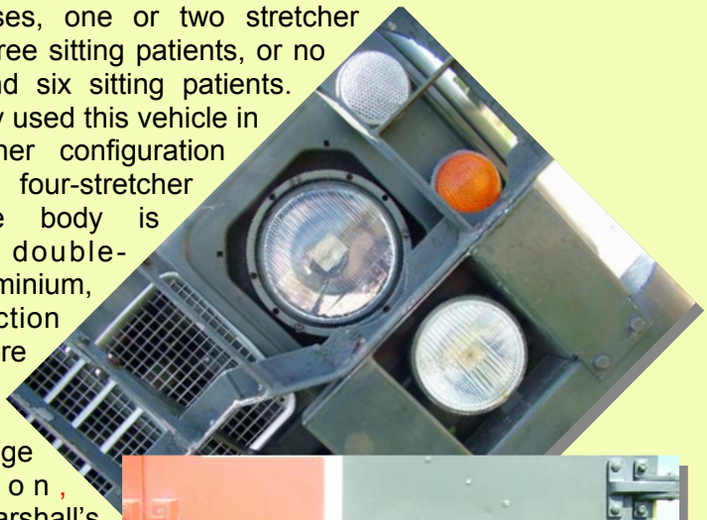
The 109-Inch: First Generation

First Generation internal layout. Earlier SII-based versions has a water container locker above the bulkhead window. RAF versions have the mains input socket (lower right). Unit under attendant's seat contains a sink and the heater matrix. *(Mike Allmey)*

The 109-inch Land Rover, the Long Wheel Base version in Series II, IIA and III format, was used for the first Marshall's ambulance conversions for service use. The original body design by the Mickleover Transport Company was passed to Marshall Military Engineering for completion and production. Some aspects of its internal design can be traced directly back to 1939. (Compare the similarities of design, when watching *Ice Cold in Alex*, between the rear cabin of Katy and a 109"-based Marshall Ambulance!)



They were rear-echelon (so soft-skinned) ambulances to carry up to six wounded and three crew. When only two stretchers are required, the surplus pair is stored either externally in the longitudinal hoods on either side of the roof or internally, folded by the lower racks. This gives numerous accommodation possibilities – two or four stretcher cases, one or two stretcher cases and three sitting patients, or no stretchers and six sitting patients. The RAF only used this vehicle in a two-stretcher configuration despite the four-stretcher design. The body is insulated double-skinned aluminium, a construction method more commonly found in aircraft fuselage fabrication, revealing Marshall's airframe expertise.



Just over a thousand of these first generation ambulances were made, spanning Land Rover's Series II / IIA and III models. Half were for the MoD and almost all of the others were sold to the Netherlands Army.

The vehicles were nicknamed by the Dutch as "Magic Marshalls" - not for their intended abilities, but because of the "magic" way the


During the last 20 years, Marshall of Cambridge have developed a range of Military Ambulance Bodies to suit the majority of light 4 x 4 Chassis used throughout the World. Several thousand Bodies have been fitted to the ¾ tonne 109" wheelbase Land-Rover Chassis. This particular unit was developed to meet the requirements of the British Ministry of Defence for a small ambulance suitable for the evacuation of casualties from forward areas, and in addition was to be airportable. The weight and overall size of the Vehicle was to be kept to an absolute minimum and it has been possible to devise a system to accommodate a Medical Attendant and 2, 3, or 4 stretcher cases; one or two stretcher cases with three sitting cases, or a total of 6 sitting cases. This particular design is now in service with Defence Forces throughout the World.

2/4 stretcher Ambulance Body based on the 109" wheelbase ¾ tonne Land-Rover.

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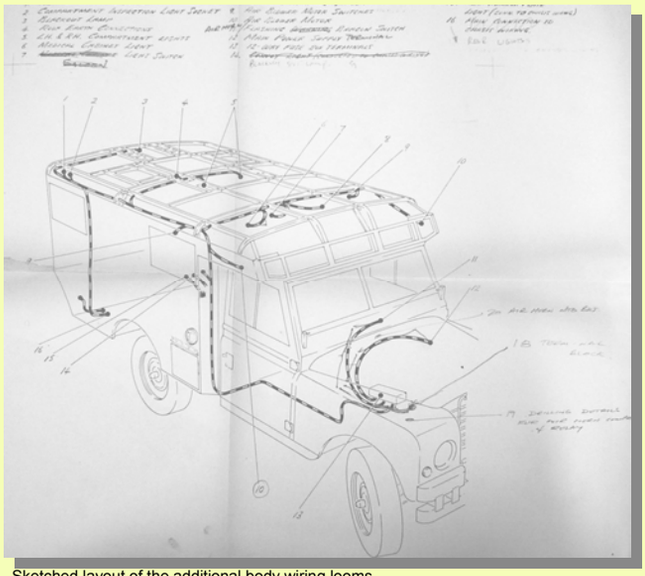
Interior of Ambulance.

1964/5 Series II RAF *(top)* and Army First Generations as depicted in a 1960's "**Marshall Vehicle Engineering**" catalogue *(Marshals / Sean Ryan)*

First Generation details *(Mike Allmey)*



Sketched layout of the additional body wiring looms *(Marshalls / Wayne Davies)*

ambulance can turn four patients and an attendant into five patients in the space of just a few hundred metres, given rough enough terrain! A high centre of gravity and all-up weight of 2.6 tons means cornering involves considerable body roll. This led to the introduction of anti-roll bars during manufacture and their retrofit to all in-service ambulances. Even so, all these vehicles must be driven in a circumspect fashion, especially off-road. They are immensely stable at high speed on tarmac, but only in straight lines. Corners are best tackled by using both sides of the road, and maybe a bit more if you are an editor! (This was never going to be a problem for RAF drivers on an airfield. Given a minimum turning circle of more than fifteen metres, an airfield is probably the best place to drive one.) In addition, the extended rear body considerably impaired all-terrain ability compared to the normal Land Rover, although the idea of chamfering of the rear underbody to improve the departure angles did alleviate some of this shortcoming.

The RAF Ambulance is far less common than its Army counterpart and differs from the Royal Army Medical Corps version by the addition of a front "crash bar" and a mains-powered interior heater and battery charger mounted on the cab bulkhead between the seats. It also has less medical equipment and crew's personal effects, since

Dutch 109 Ambulance in trade exhibition *(Marshalls / Wayne Davies)*

RAF ambulances are intended for "dash and scrape" operations – the recovery of casualties from an airfield incident to the airfield medical centre. On stand-by, the mains connection facility kept the vehicle in an instant-readiness condition by ensuring that the battery was at full charge and the interior at a minimum temperature. All windows (including that between the front and rear cabs) have pull-down blackout blinds and those that open have an additional wire mesh screen to allow ventilation without violating blackout conditions.

Most of the ambulances ordered by the MoD were built between 1963 and 1971 and are based on Series II or IIA chassis. Only 200 Series III-based ambulances were made, perhaps as few as 20 for the RAF. These thirty-year-old workhorses have only been retired comparatively recently as the new Land Rover Defender XD 130 versions are brought in under the contract signed by the MoD with Land Rover and Marshall Military Engineering in early 1996.

The 101 FC Ambulance: Second Generation

Typical 101FC-based Second Generation Marshall *(Mike Allmey)*

The earlier military ambulances, as we have seen, were based on the Series II, IIA and III 109" Land Rover. For various reasons their performance was compromised and their load carrying left much to be desired. Even as these were being produced, however, the solution to these problems was emerging in the shape of the much larger Land Rover 101 FC.

Originally conceived in 1966 as a rag-roofed tractor for the then-new 105mm Light Gun, a 101 fitted with the Marshall second generation ambulance body had all the internal space that the 109" Land Rover just couldn't provide.

The 101FC has been described, not unkindly,

as a vehicle designed by the Army for the Army, using the contents of as many existing Land Rover parts bins as possible. Superfluous bits were removed from Range Rover's V8 engine and the transmission was the same as the Range Rover's except that the transfer box has lower ratios. The Range Rover connection ends, bizarrely, with the use of its drive mechanism for the windscreen wipers.

The chassis is unique to the 101 but follows all Land Rover's design traits, including granite toughness and leaf-spring suspension. The "wheel at each corner" design gave mind-boggling agility over adverse terrain, limited only by the restrictions of axle articulation imposed by the use of parabolic leaf springs. Coil springs were acceptable for the up-market Range Rover: it was some years before the 90 and 110 introduced them to the Land Rover itself.

Pneu-Pac installation in 101 *(Mike Allmey)*

Even without the Marshall body, the 101 is a remarkable vehicle. In its more usual soft-top form, the body was designed to be largely removable to enable the 101 to be airlifted. This wasn't needed for the ambulance, so very little of the original body was kept. Everything behind and above the driver changed.

Rear saloon of the 101 Ambulance. Two-over-two stretcher configuration with mechanised lifts, central storage locker, on-board thermostatically-controlled heating and even a chance to watch where you're being driven to. *(Mike Allmey)*

The Marshall body is about a foot wider and taller, giving a comparatively enormous space within the body for four stretcher cases, or more seated casualties if the stretchers are stowed. The extra room led to a much better environment for both crew and casualties with the introduction of on-board medical facilities. The standard NATO tow-hitch was absent. Unlike its predecessor, the roof acted as a load bed to a limit of 50kg, with an access hatch for loading or unloading without the need for ladders or side steps. It could also serve as an escape hatch.


A special design based on the Bedford Normal Control Chassis.

A special designed based on the 1 tonne Land-Rover Chassis.

From the same 1960s "**Marshall Vehicle Engineering**" catalogue, a 101-based Ambulance specifically for Luxemburg *(Sean Ryan)*

The body itself is again a double-skinned insulated design, borrowing many features from aircraft fuselage fabrication. The Marshall body includes facilities such as a fuel-

powered heating system, mechanised stretcher lifts, a degree of protection from NBC attack by way of tight door seals and metal window blinds, and vastly better headroom than its predecessor.

The design of the 101 body also reflects the changing environment of the battlefield. The First Generation Marshall Field Ambulance was a modern version of what had gone before – a vehicle adapted to carry casualties away from the front line. However, a host of design features in the Second Generation vehicle indicate what had become a major concern by the late 1970s – NBC (Nuclear, Biological and Chemical) warfare.

The rear body of the 101 Ambulance is designed as a sealed box. The rear doors have hinges that run their full height to ensure a tight gas seal and each window has a steel shutter for both blackout ability and flash protection. The cabin has its own air filtration system ("PneuPac"). Incoming air is stored via the onboard compressor in a storage tank, having been drawn in through a series of filters mounted in the front cab (these carbon-based filters also remove oil or water contaminates from the engine-driven compressor). It is then piped to a maximum of four face masks in the rear cabin via the PneuPac control panels.

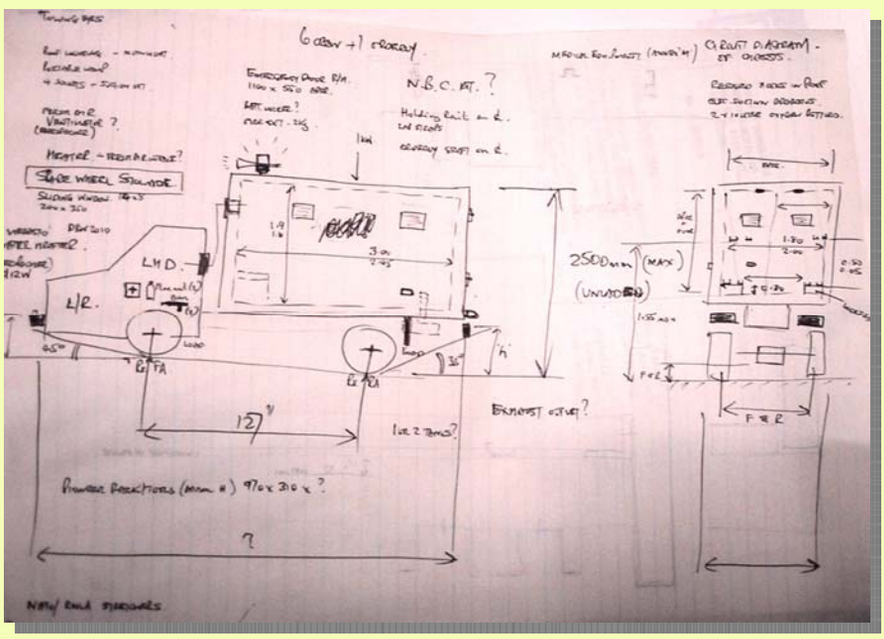
The 101 Ambulance was not introduced until after the end of the 101's comparatively short production run (1972-1978). By the time the Marshall body had been accepted the 101 had already ceased to be made, so Marshalls were allocated a complete batch of already completed 101 GS vehicles in the "GJ" registration range. This act does cause some anomalies in the registration process. "GJ" relates to 1975/6; the vehicles were ordered in 1975/6 (hence the GJ allocation), eventually built by Land Rover in 1978 (101 production was carried out in staged batches to make it a financially viable proposition for Land Rover) and then "re-manufactured" by Marshalls as "new" ambulances in 1981—the bodies were new, even if the base vehicle wasn't. This also means that 101 ambulances are factory-fitted with parts introduced for late Series III Land Rovers built in 1980-82. If not aware this information, 101 ambulance owners may be forgiven for developing symptoms of schizophrenia when trying to date their vehicle. Such are the joys of ownership...

When the Fourth Generation XD130-based ambulances started to become available in 1998/9, all of the 101 Ambulances were released from service comparatively quickly, around 150 in total. The majority were bought and re-sold by John Craddock's in Cannock, who, at one point, had just over 100 of these vehicles in storage awaiting buyers.

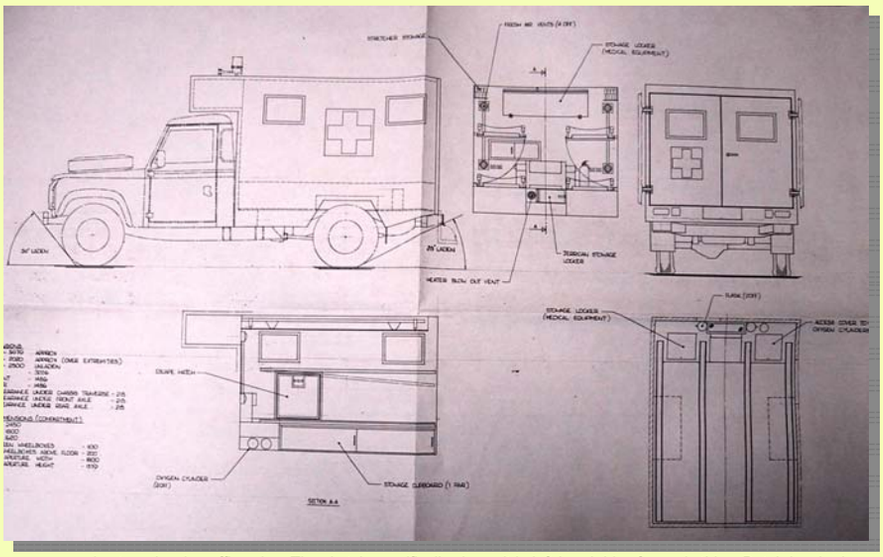
The 127 Ambulance: Third Generation

By the late Eighties the 109-based First Generation ambulances were showing their age and the stop-gap 101-based versions were based on vehicles already out of production; a replacement was required in a hurry.

Fortunately for us, Land Rover had a new platform to offer coachbuilders in the guise of a V8-powered extended 110 chassis. The 127 is a true case of cut-and-shut engineering, as standard 110 chassis were cut between the axles by Land Rover Special Vehicles and a 17" extension section welded in place. (If you ever look underneath a 127, these welds are plain to see on the chassis rails.) These were the first Land Rover-based military ambulances built by Marshalls that weren't based on a military Land Rover—all 127-based ambulances are essentially civilian vehicles painted green with normal switch gear, normal external lighting and normal trim. The 101-based ambulance is, first and foremost, a Land



What the 127 Ambulance might have been—early sketched idea of a truck cab-based ambulance body...
(Marshalls / Wayne Davies)



… progressing to a drawing office plan. The sketch specifically shows it in left-hand drive form—is this a Dutch-inspired idea that never made it off the drawing board?

(Marshalls / Wayne Davies)

Rear saloon of the 127—lots of everything. This is actually a Locomotors body, but the interior is the same for either version.

(Mike Allmey)

Front of the same vehicle showing the slab-front of the Locomotors design, compared to…

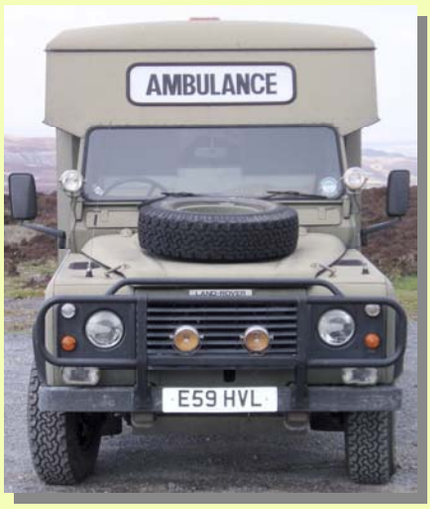
(Mike Allmey)

Rover 101 with an ambulance body bolted on, and a similar rule applies to the 109s. The 127, by contrast, is a n ambulance that just *happens* to be sitting on a Land Rover. Such has the design progressed.

Faced with the longest platform they'd yet had to play with, the designers started from scratch—and presented something that was, externally at least, pleasingly similar to their original design for the 109.

The requirement for four stretchers had been reduced down to three, the emphasis now being on primary care of casualties rather than quantity of them. Such care also needs equipment, so the reduced stretcher requirement and increase in wheelbase enabled a great deal of space for equipment storage and, having a wider track than the 109", much greater headroom in the rear saloon as well. It was at this point that military ambulance crews started to be able to offer something approaching the same level of care to their charges as their civilian counterparts. The small side windows used in the 109 and 101 were replaced by a large smoked-glass window, making the interior considerably more light and airy compared to the earlier designs.

However, like the 101 Ambulance before it, this Third Generation was only intended to be a stop-gap measure. The military fleet was going diesel and there were Wolves lurking.



… the rounded roof of the Marshall design, requiring greater skill to manufacture and build.

(Chris Lovell)

130 "Pulse": Fourth Generation

A hark-back to Magic Marshalls took place in the trials leading to the Fourth Generation. Three firms were involved. The Italian Iveco didn't cut the mustard. The Austrian-designed Pinzgauer was unquestionably the highest price, the highest spec and the best performer. Sadly, its amazing off-road capability was far more than a casualty could take – it's recovery on foot or by helicopter in such terrain. In 1996 Solihull and Marshalls' Pulse won the British Army Field Ambulance contract. But what is a Pulse?

The military TUL/TUM requirement (Transport Utility Light / Transport Utility Medium) had pushed Land Rover into developing the military-only XD (eXtra Duty) variants of the 90 and 110. This also coincided with the general rationalisation within Land Rover that gave the 90 and 110s the Defender brand and added an invisible three inches to the 127 to make it the Defender 130 for sake of roundness of numbers—we all know that the 90 is nothing of the sort, it being actually 92.8" between the hubs after all. Unlike the earlier 127s, the 130s

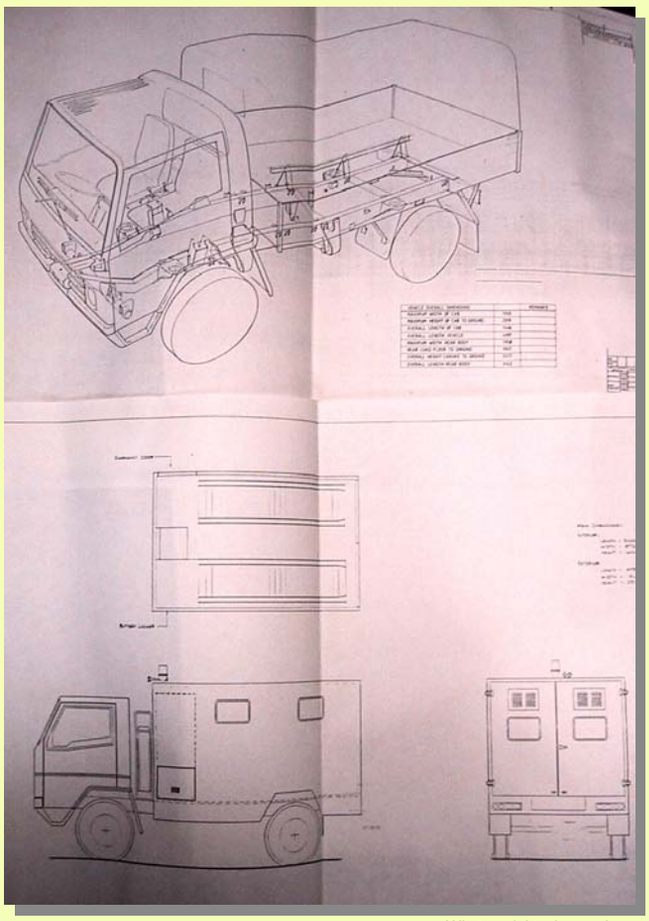
Early production model of the XD130 Pulse Ambulance

are built on a specifically designed chassis, thereby doing away with the need to cut-and-shut them in the factory any more. Also unlike the earlier 127s, the Pulse-based ambulance is built as an out-and-out military vehicle; from the outset there is no mistaking who the end user is going to be.

Land Rover also finally managed to make a version of the 300Tdi engine that electronically satisfied the MoD who were now running an all-diesel fleet. Coupled with the beefed-up “130”-inch chassis, Marshalls were asked to supply a body primarily for ambulance use, but might also lend itself to other applications, rather like the way the 101 body had been morphed into other shapes and sizes.

The Pulse body may be lacking the otherwise trade-mark curves of a Marshall design, and shows a newer style of design that was first in evidence (on paper at least) for the 127-based truck cab conversion, but the finished results exudes quality of construction. Even after several years in service this still holds true, as the days of six-monthly vehicle repainting with IRR black and green are gone and the original factory paint jobs are still on show. For the first time, the rear saloon is accessible from the front cab, which may be even more handy now as the stretcher capacity has gone back up to four. (It’s this requirement that may have prevented the 127 truck cab from progressing further than the drawing board stage.) Catch-all Health & Safety regulations have caught up with the front line to the extent that the stretchers can now be loaded without any manual lifting involved.

Starkly cavernous—and, if you were wounded, it qualifies as first class accommodation! *(Marshalls / Mike Allmey)*



What might have been: Plans for a Llama-based ambulance. Marshalls also offered to re-engine the V8 101 ambulances to 200TDi. This offer was turned down and the Llama forward control chassis cab never made it beyond several experimental models being built. *(Marshalls / Wayne Davies)*

The same body has also been utilised for mobile communications and command centres, again proving that the Marshalls body design and the Land Rover wearing it can be adapted to different roles with a minimum of redesign or construction effort. This comparative ease of design innovation and

adaptability may well go some way to explain why Marshalls have out-lived many of its former competitors.

It is perhaps a tribute to the original ambulance design that things, having changed so much over the last 45 years, have actually changed pleasingly little—the Marshall Land Rover-based military ambulance has changed to exactly the same extent as Land Rover itself has. Whether this is too much or too little depends entirely upon your own viewpoint, and there are as many viewpoints as there are viewers. But then, as some of these sketch plans show, there were ideas being discussed in the background between Land Rover, Marshalls and Marshalls' clients that would, had they come to fruition, left us looking at something really quite different. It would be fascinating to discover at what point these ideas were stopped. The Llama-based ambulance was stopped by the decision to not produce the vehicle by Land Rover themselves, it generating insufficient interest to warrant full-scale production. But at what point did the truck cab-based ambulance body give way to 127-based body used by both Locomotors and Marshalls? Answers on a postcard please.

Most of the ex-military ambulances you see at shows have been converted into camper vans of one form or another, a purpose for which they offer an undeniably excellent starting point. Or you could buck the trend and keep a comparatively expensive vehicle to produce that costs comparatively little to buy in its original condition. Heating, lighting, sleeping for up to four (ideally well acquainted) people—who needs one of those *draughty* old 9x9s?

In the raw: Dutch-spec SIII 109" showing the basic construction details of a Marshall body.
Marshalls / Wayne Davies

military engineering

Marshall first provided logistic support for the British Army in September 1912 when the Army Airship Beta 2 came down in Jesus College grounds in Cambridge, and the Company's Garage workshops were used by Army technicians to repair the 45hp Clerget engine. Today, the Military Engineering Division of Marshall Specialist Vehicles is a world leader in the production of rapidly deployable support equipment, based on the world famous Marshall Matrix Shelter.

Marshall's Military Division has supplied the Ministry of Defence with more than 80,000 vehicle bodies as well as 9,500 DROPS flatracks and 43 DROPS fuelracks for the British Army. Marshall has recently produced four Mobile Bakeries for the British Army which are currently on active service in Kosovo, with each bakery capable of producing 5,000 loaves, bagged and sliced, each day. Marshall Specialist Vehicles is also producing for the British Army six rapidly deployable Power Pack Repair Facilities (PPRF) which, when deployed close to battle areas, will provide vital "in field" repair facilities for its Vickers Challenger, I and II battle tanks, Chieftain tanks, AS90 long range self propelled Howitzers, and Warrior Armoured Personnel Carriers. Each PPRF provides indigenous handling for the very heavy power packs or engines utilising self-propelled high speed cross country specialist Sisu lifting vehicles, wash down/steam cleaning, a diagnostic facility, a full range of modular spares, offices, workshops and a run up test and final inspection facility. The PPRF utilises the Marshall Expandable Shelter which, in its stowed configuration, can be transported by flatbed military truck, trailer, DROPS vehicle, C-130 aircraft, sea transport or as a helicopter underslung load. The Company is also producing four mobile hospitals for the British Army as part of recently announced enhancements to medical services.

Command and Control vehicle

The Marshall Expandable Shelter has a wide range of uses which includes mobile hospitals, washing facilities, Command Control posts, Communication Centres, Kitchens and Mess facilities, as well as fulfilling a wide range of administrative support functions such as mobile simulators for training and conference facilities. To satisfy these requirements for the British Army, Marshall is working closely with Army specialists in the design of the "Expeditionary Campaign Infrastructure" which will provide temporary field accommodation facilities for the Army in the field.

Marshall is also manufacturing for GEC Marconi, a number of L band mobile long range radar spines, and the Company has for many years been the supplier to a number of prime contractors for radar structures and associated equipments.

Similar highly versatile Expandable Shelters and other Shelters are currently in service as mobile workshops with the Royal Air Force Harrier and Tornado forces. Extremely rugged and specifically designed for the harsh rigours of service life, Marshall Shelters have been in military service for more than 30 years and more than 5,000 shelters, in 200 different configurations, have been delivered to date. Marshall Shelters, which can incorporate lightweight anti-ballistic armour, are expected to have a minimum service life of 25 years, and are specially designed to meet the new NATO and United Nations worldwide mobility requirements in support of military operations and humanitarian relief. Marshall, at the leading edge of technology for military and logistic support, is an important world class division of Marshall Specialist Vehicles. Offering an unsurpassed depth and breadth of experience with a wide range of military logistic support, and with the backing of a large and highly capable in-house design department, and unrivalled manufacturing facilities, Marshall is providing exceptional support to military mobility and operations on a world wide basis.

DROPS Flatrack

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The Marshall's 90th Anniversary commemorative booklet—and the EMLRA getting a centre spread!