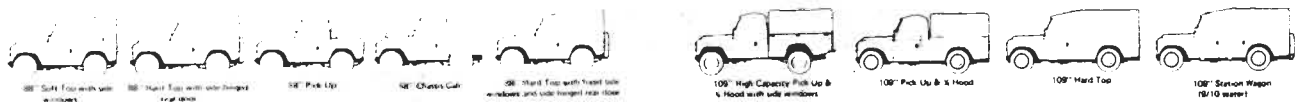


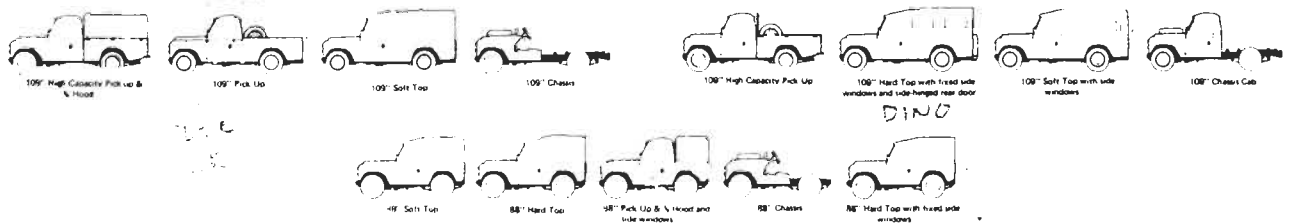
THE LAND ROVER OWNERS ASSOCIATION



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GUS

THE ALUMINUM WORKHORSE

THE OFFICIAL PUBLICATION OF THE LAND ROVER OWNERS ASSOCIATION

VOLUME I, NUMBER III, DECEMBER/JANUARY, 1984 - COPYRIGHT 1984, ALL RIGHTS RESERVED

LROA NEWS

Membership is going up. By now, we're past sixty and still climbing. Word has reached England, and your Editor has received an unsolicited package of magazines from the Editor of the ALL WHEEL DRIVE CLUB'S magazine, ALL WHEEL DRIVER. We're still trying to figure out how Dave Shepherd got the word. We have a contact for the Danish SCANDINAVIAN OFF-ROADERS CLUB, which should yield some interesting stories.

"Scotty" Howat has offered to lead our association on a run through the Black Rock Desert in '85. The date is uncertain, but stand by for further details!

The Christmas party was a great success! We'll carry the story next issue. Some of those who showed up had to brave the snow to get there.

UPCOMING EVENTS

January 12 - Tech session, Jim Allen's garage. See the innermost secrets of a LR engine and learn some tips to get "free" horsepower. Also, learn how to do a paint job that will last as long as your engine.

May 18 & 19 - Trek to the Mendicino forest.

A GRATEFULLY ACCEPTED DONATION

Thanks to the generosity of two good people, the LROA is one Land Rover richer. Through the efforts of "Scotty" Howat, a '61 88" LR was donated by Ron Cain of Hayward. The vehicle was wrecked some years ago and will be parted out and sold. The proceeds will enhance the finances of the Association and make projects, such as decals for our members, much closer to reality.

Ron Cain deserves our heartfelt thanks and has been awarded a free membership as a small token of appreciation. Ron is currently without a Land Rover but has his eyes open for a good deal on one.

Thanks also goes to our old friend Scotty for arranging this deal for us. Scotty has been a big help in getting our Association off the ground, and we owe him much.

Look to the classified section for a list of the parts that will be sold and the prices. We intend to offer good deals on all the parts, so get your orders in early. Remember, the proceeds go to support our Association.



Ron Cain and the '61 Land LR

FROM THE EDITOR

Keep up the good work, folks! Every month more and more people are sending in pictures and stories. Don't stop now! Remember, I will consider anything that pertains to Land Rovers. If you run across some interesting tidbit of information, send it to me and we'll get it into the newsletter.

LETTERS TO THE EDITOR

TECH TIPS FROM #12

I have a couple of tech tips that the rest of the readers may find useful. I've used them both on my rig and it's been better and easier, respectively. The first is to help cure steering box movement. I fabricated a brace to go from the footwell around the box to the bulkhead strut on the drivers side. This helps hold the box against its own torque tendencies. I've found the sheetmetal in the bulkhead a bit thin to really hold the box without it.

The other idea is for the removal of the drop arm on the steering box (pitman arm). I don't have the right B.L. official tool, so I do it this way: I use two 10" vise grips or locking pliers, a soft face hammer, and a piece of 5/16" flat steel. I lay the steel across the end of the shaft and lock each set of pliers to the steel and the tangs on the arm. Then, with plier pressure on the arm, I hit the plate until the arm pops off.

I hope the these tips are useful. Keep up the good work!

Gord'n Perrott #12
Seattle, WA

Thanks, Gord'n, for the ideas. Necessity is the mother of invention, goes the old saying. Actually, your letter goes right with my front end article in this issue. By the way, everyone, Gord'n has perfected a method for gas welding on LR body panels. I hope he'll send us some more information on it.

(Letters to the Editor, continued)

LOCKING DIFFS?

Thanks for your letter-I am impressed with your newsletter! I look forward to the next issue. QUESTION: Do you know of anybody who makes locking (not limited slip) differentials for Land Rovers? I have heard that someone in England does, but who? I have driven Land Rovers in Kenya for years, and a few had locking diffs, i.e. 100% four wheel drive. I was impressed with the traction in the field-it's a big improvement. Any info would be greatly appreciated.

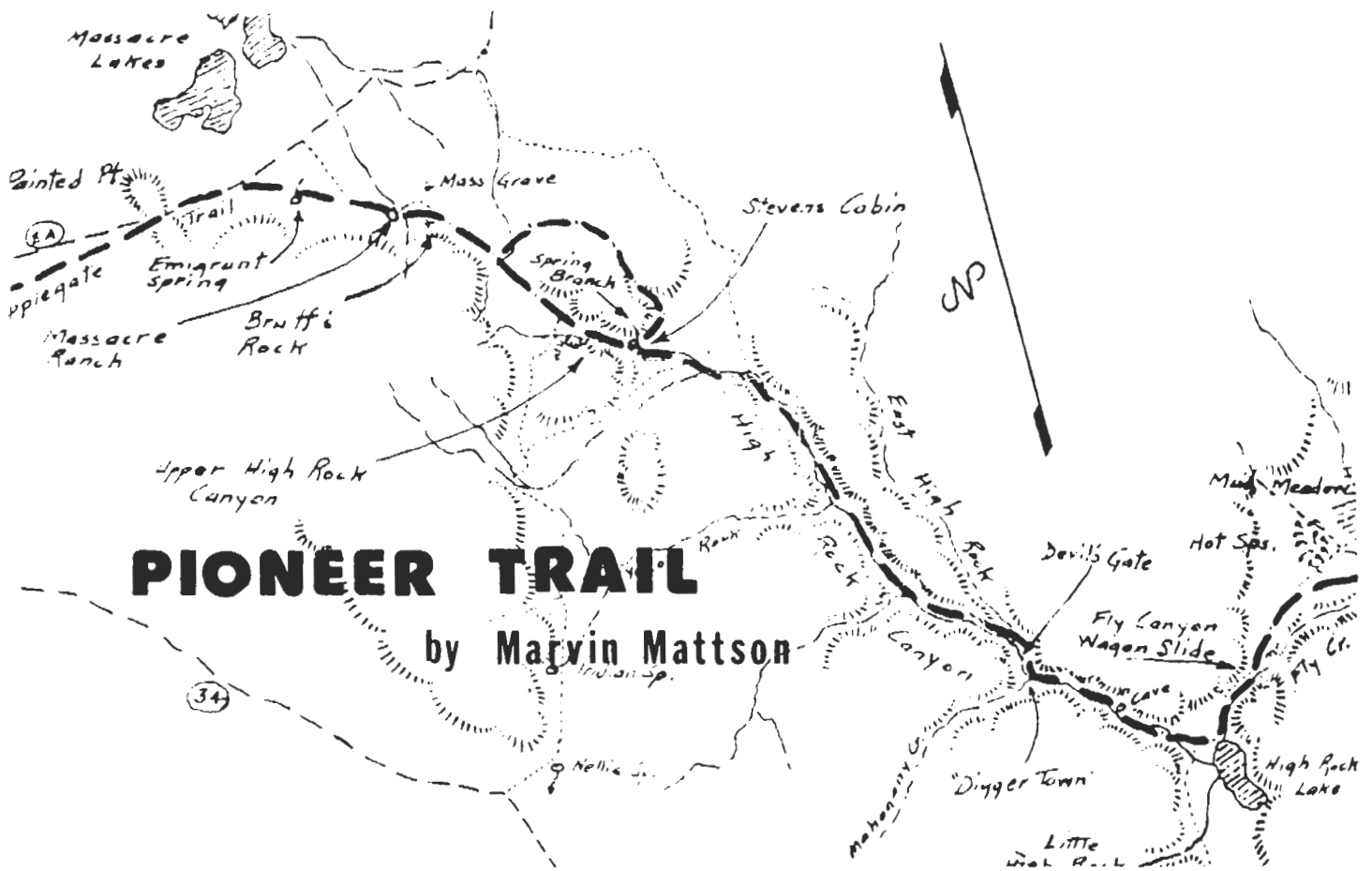
Julian Baker #60
Brookline, MA

Thanks for the kind words, and welcome to the LROA! I honestly haven't heard of a true "locking" diff for a LR. The only difference between a "locking" and a "limited-slip" is the fact that the "limited-slip" allows some slippage to occur before the unit locks up. Usually, this is only a few hundred rpms difference in the speed of each wheel. Without the slippage, the tires will scrub when the vehicle is turned on pavement. In a turning situation, the inside wheel turns slower than the outside wheel. Some race cars I've seen have the spider gears in the diff welded together, thus "locking" the differential. I wouldn't recommend doing this unless your rig was never going to see pavement.

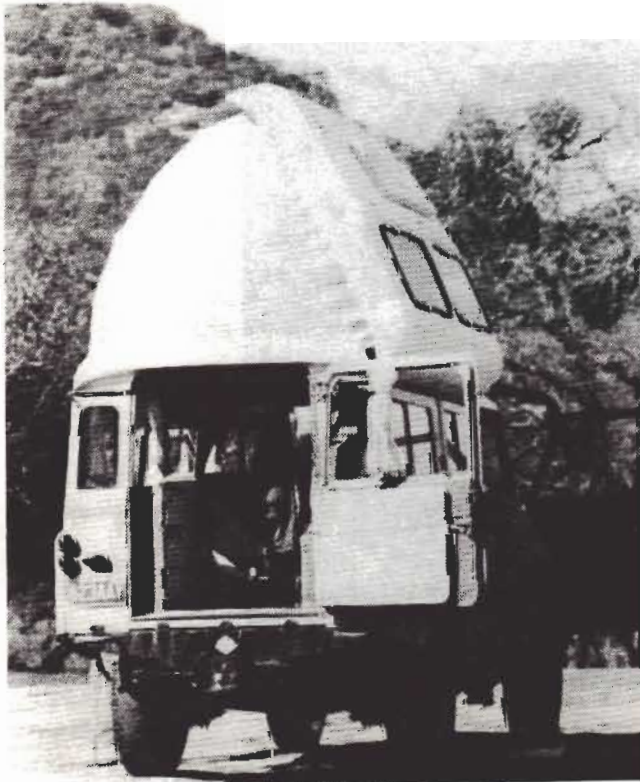
Conventional "limited-slip" differentials use clutches to allow the slippage to occur. This system can be somewhat troublesome from a reliability standpoint, but if properly maintained and operated, the setup works very well. There is another system, the Gleason-Torsen, which uses gears to achieve the same results. It is said to be very reliable. Unfortunately, to my knowledge, they aren't manufactured for Land Rovers at this time. Atlantic British Parts (and maybe some others) offer the clutch-type limited slip for sale at a very reasonable price, Julian. I wouldn't hesitate to install one of these units in my LR. Anyone out there have anything to add?

HOLD THE PRESSES!

I just found an article in the ALL WHEEL DRIVE CLUB magazine, from England, that tells of a manually locked differential made in Australia. No address is given, but the unit is being manufactured there by FOUR WHEEL DRIVES, of Blackburn (a suburb of Melbourne). The device is engaged by a handbrake-like lever and can be fitted to either diff. More on this as the facts emerge!



It was cloudy, and a touch of rain fell as we left Gerlach, Nevada to follow the Pioneer Emigrant Trail on our two day journey. My wife, Nancy and I were driving our '67 Dormobile and our friend, Lea Magee, was in his camouflaged 88". Our destination was High Rock Canyon just north of the Black Rock Desert.



When we topped the summit over Fly Rock Canyon, we stopped and took photos of an area where the pioneers used to lower their wagons down a high cliff using ropes. We were glad to be taking an easier way down!

At High Rock Lake, we found a deserted ranch and did some exploring. After having a little snack, we "pushed" on (the starter on Lea's Land Rover doesn't always work!) to our next destination, Last Supper Cave. Near here, the pioneers of old carved their names into the canyon walls. In one cave, pioneers wrote their names

(PIONEER TRAIL, CONT.)

in axle grease on the cave walls and it has survived to this day.

At the end of the day, we made camp at Dan-the-Pack-Rat's cabin. Dan is a hospitable sort, though a bit shy. It is customary to leave him a tidbit of food in exchange for using his cabin. Many have left notes or business cards on the walls of the cabin in addition to the food. Though he appreciates the chow, notes are lost on him: pack rats cannot read.

For us, setting up camp was easy: simply pop the top of the top on the Dormobile, and, voila. Now, Lea, on the other hand, had to wrestle with a new tent a real dog and pony show! We spent a little time looking for Indian artifacts. The area abounds with such things. I suspect that the vicinity around the cabin was once an Indian village.

The next morning, we rolled up and over Wagon Wheel Pass. Here, the many wagons passing over the trail had worn ruts into the granite. With the Dormobile in the lead we crossed a creek and started up the far bank. All was going well, I thought, until the right rear wheel began to sink. The next thing I knew, the tilt gauge was reading fifty plus degrees. Very carefully, we exited the Dormobile as Lea's voice came over the radio saying "Marvin, what'd ya do to yourself!"

We were fortunate that it was early morning and still cool. We dug a hole and buried our dead-man to winch from. Our trusty eight-thousand pound winch eased us right out of the mud. The trail ahead was not the best and at times, Lea had to hang out on the starboard side to balance the topheavy Dormobile. His 88" had no problems anywhere on the trail, having a little lower center of gravity than my Dormobile.



"MARVIN, WHAT'D YA DO TO YOURSELF"!



(ABOVE)

DIVE! DIVE! DIVE!
Lea Magee's 88" fording a creek.

(RIGHT)

Lea using body english to keep the 109 upright.



The trip was fun, in spite of the little problems along the way. It was a trip I'd recommend to any of you! I hope you enjoyed my story and pictures.

WELCOME ABOARD!

NEW MEMBERS

- #42-Daniel Felmly, Sacramento, CA
'64 88"
- #43-Richard Brengman, Alviso, CA
'69 88"
- #44-Bill Davis, Salt Lake City, UT
'60 88", '66 109"
- #45-Steve Neil, San Francisco, CA
'63 109"
- #46-Laine Fluckinger, Portland, OR
wants 109" S.W.
- #47-Ron & Bernie Mowry, W. Lebanon, MN
'71 88", '72 88"
- #48-Steve & Jean Ganley, Alexandria, VA
'71 88"
- #49-ROVER OWNERS ASSOCIATION OF MICHIGAN
'75 Range Rover (John Russell)
- #50-Jim "Scotty" Howat, Concord, CA
'67 Ex-NATO 109
- #51-Fred Sisson, Norcross, GA
'67 109"

- #52-John F. McDonald, El Monte, CA
'71 88"
- #53-Jerry & Rose Goode, Bridgeport, CT
'72 88"
- #54-Bob Bernard, Los Altos, CA
Let us know what you drive, Bob!
- #55-Wes Newcomer, Beaumont, TX
'73 88", '66 109"
- #56-William Clark, Boise, ID
'73 88"
- #57-Brad Blevins, Concord, CA
'67 109
- #58-Eric & Michaela McKay, Concord, CA
'69 109"
- #59-ROVER REGISTRY, Basking Ridge, NJ
(Charles Woodruff)
- #60-Julian Baker, Brookline, MA
'68 88"
- #61-James B. Rowley, Midland, TX
'66 88"
- #62-Pete Cummings, Omaha, NE
'60 109"
- #63-Ron Cain, Hayward, CA
looking for LR

**Racer Rover
Hover Rover
Shunter Rover
Hunter Rover**

LAND ROVER



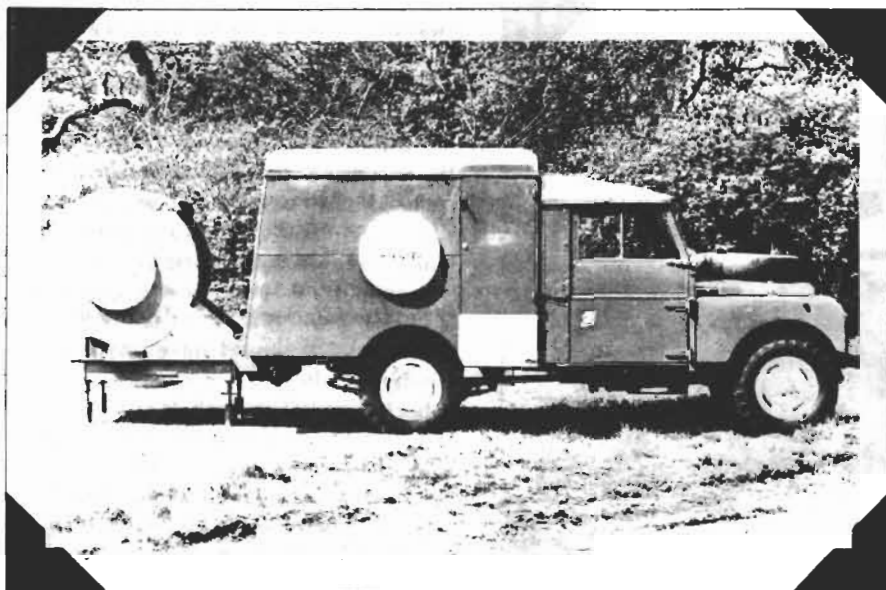
BY L.J.K. SETRIGHT

• There have been a lot of Land Rovers. The millionth was built in the summer of 1976, the half-millionth ten years earlier, the quarter-millionth in November 1959, more than eleven years after the first Land Rover was delivered. Out of all that number, something like 40 percent have been bought by governments, not necessarily for military duties, although these have figured in orders from 140

countries, while Rover reckons that there is no country in the world where at least one has not been delivered in civilian guise. Government jobs are sometimes civilian in nature: Britain's Forestry Commission, for example, has some specials with enormously wide axles and great bloated tires on them—but the variety of specials has been so fantastic over the years that the Logger Rover is by no

means out of the ordinary. What started out as "a Rover for the farmer" has been a fire engine, an ambulance, a personnel carrier, a soil-test rig, a dust cart, a hydraulic platform, a tractor for a small articulated vehicle, a police highway patroller, a mobile home, and a saluting base for the Queen. It has been raced, hilariously and impertinently, in club handicaps at Silverstone. Its rear power

Continued



The Land Rover tees up.



The Hover Rover's air cushion lightens the load.

takeoff has been used to fling golf balls at high velocity for simulation testing. Short and Harland fitted it up with a 30-caliber Browning gun on a rotating turret projecting over the cab. The Royal Air Force has been known to wrap it in air bags and parachutes and throw it out of an aircraft. You cannot attend a hunt or a horse show without wading through a field full of the things, half of them hitched to horse boxes and the other half simply worn as uniforms by horse people. You cannot hope to see a show of strength put on by even the smallest military power without getting the impression that, as a piece of universal ordnance, the Land Rover ranks roughly level with the hand grenade and second

only to the boot—which it threatens at any time to replace.

Customers have always expected the Land Rover to go anywhere and to do anything. Generally speaking, the Land Rover has obliged; there was just one thing that it could never do, and that was to look decorous. Still, if it is good enough for the Queen...

Probably the most indecorous, and surely the weirdest, of all the Land Rover variants I have driven was the Hover Rover, devised by Vickers Armstrong in 1962. This was an application of the hovercraft principle to the long-suffering clodhopper, enabling it to ride on an air cushion. The object was to reduce the load on the road wheels in order to

increase the traction available from them, the requirement coming from a firm of soil-fertility experts who sought a means of starting fertilization treatment of crops much earlier in the year than was possible with conventional vehicles.

Four-wheel drive and knobby tires are not always enough. Peak tractive effort may be achieved with widely differing loads on the wheels, according to the condition of the soil over which they are driven. For example, dry sandy loam enables the tires to carry a substantial load; and, within practical limits, the greater the load, the better the traction. If the same soil is wet, sufficient wheel grip may only be obtained if the wheels are very lightly laden; the same goes for driving over wet clay.

The Vickers approach enabled the wheel loading to be varied at will. Around the Land Rover was constructed a flexible skirt acting as a plenum chamber, and air was forced into this by a pair of large, engine-driven centrifugal fans. Most of the vehicle's weight was carried by the cushion of pressurized air thus created, leaving a small proportion to be borne by the wheels. The height of the skirt was adjustable so as to control the escape of air and thus the pressure within the plenum chamber; in this way, any proportion of the total weight could be taken off the wheels according to the condition of the ground. The Land Rover could then be driven over waterlogged or other difficult terrain, even carrying a ton of liquid fertilizer, without losing its normal mobility or suffering serious permanent modification, since the conversion in no way interfered with the normal operation of the vehicle and could be taken off as readily as it had been tacked on.

Lifting the skirt was not the only way of varying the cushion pressure; it could also be done by controlling the speed of the fans, and this made it possible to adjust the skirt height according to the roughness of the ground. The fans were driven by a second engine, carried on the platform behind the cab; and I found it a nuisance. The noise of that second engine behind my seat made starting difficult, for the engine under the bonnet could not be heard, and was liable to be stalled as a result. Once under way in bottom gear, however, a smart change to second had the Hover Rover careering over the field at a satisfactory speed. The smoothness of the ride was astonishing, for I deliberately steered at bumps, rocks, and furrows that had previously

Continued

CAR and DRIVER



In the military, second only to the boot.



River Rover

set a normal Land Rover bumping and pitching furiously. The steering was very light because of the reduced load on the wheels, and very remote indeed—curves were taken in a continuous four-wheel drift reminiscent of the Grand Prix cars of the early 1950s, but whoever heard of drifts at four miles per hour? General maneuvering was more like that of a boat than that of a car; however, the thing went where I wanted it to go, over atrocious surfaces that had proved beyond the capabilities of a standard Land Rover.

All this, I might add, was with perfectly ordinary road tires fitted to the wheels, in contrast to the cross-country types fitted to the unmodified vehicle that had

become bogged down. The hovercraft version that I drove had been fitted out for crop spraying, and it was an important virtue that no ruts or indentations were left in the soil. Admittedly, when I went over dry soil, a fair amount of it was flung out at the sides and rear of the skirt, but in general there was very little disturbance created. For the test, Vickers had prepared a particularly soggy horror by digging a long, wide trench, filling it with water, and then piling the soil back in; but in the Hover Rover I sailed over it without any loss of directional stability. The poor old standard Land Rover sank there.

Land Rovers do not often sink. Drop one into the slime and it will usually claw

a way out. Given a free head and a gentle throttle setting, the Land Rover seems to have a mind of its own and an ability to find its own way out of trouble. Put it on an impossible hill and it will climb, demonstrating an astonishing ability to verge on the brink of stalling without actually doing so. Use the same extreme-conditions formula of first gear in low ratio with four-wheel drive engaged, and the Land Rover will creep safely down gradients that would have any horse wondering whether it was going to scar its hocks or break its neck. If you want to drive along the contours rather than down them, the thing will survive being tilted sideways through as much as 45 degrees, depending on the load it is carrying and the ability of the driver to stay in his seat.

Of course you might not be able to do that in the twelve-seater station wagon, but the chances are that you would only want it for surviving the rigors of a building site. Even if you had the little ragtop version, gradient ability might be very low on your list of priorities if you were using it for game-conservation duties in the African savanna. Innumerable other odd jobs might come the Land Rover's way in any of the other 25 basic body styles; and depending on where you are and what you do, the specification might be further varied with a 2¼-liter gasoline or diesel engine or a 2.6-liter six-cylinder gas burner for the long-wheelbase model. "Long" in this context means 109 inches, as an alternative to the 88-inch regular chassis and the 101-inch wheelbase job, which is fairly strictly confined to the military. Already the possible combinations number 240; there are then so many factory-fitted options to choose from that production could continue for five years without two being the same—and production goes at the rate of about 50,000 a year, with factory revisions currently under way to increase that by 10 percent in 1979.

A few years ago, it looked as though the Land Rover itself might be superseded. In June 1970 came the launch of the entirely new Range Rover, which was related to the Land Rover but was mechanically very different. The Range Rover had a 100-inch wheelbase, full-time four-wheel drive, and an attractively styled station-wagon body; what was more, it had the light-alloy 3.5-liter V-8 engine that Rover had bought from General Motors and retooled for production in England, and with the aid of this it had a performance that left the

Continued
CAR and DRIVER



Special adaptations for the most rugged terrain.



Land Rover to the rescue.

fastest of Land Rovers behind by a clear twenty miles an hour or more. The Range Rover was and is an impressive device—but although it does difficult things with more panache than the Land Rover, it does not do impossible things quite as well.

The number of long-range expeditions off the beaten track in which Land Rovers have figured has long passed beyond the numerable. Long-distance treks by Oxford and Cambridge teams publicized its versatility quite early in its history, but there were so many private owners going on amazing expeditions that eventually Rover became very blasé about the whole thing. Trips across Africa, up the Amazon, down Patagonia,

or around the world became everyday affairs, and the Land Rover eventually became the standard means for migrants to make the overland trip to India or beyond to Australasia. The Rover publicity department found the number of applicants for sponsorship embarrassing, and after a while confined its help to advice only—though it was pretty comprehensive advice, based on a tremendous store of experience in the practical business of crossing unknown territory. They published a book called *A Guide to Land Rover Expeditions*, updating it from time to time and filling it with handy snippets of information ranging in subject from the precautions necessary before fording deep water to those necessary after a

snake bite.

However, all looked as though it was going to be made much easier by the advent of the Range Rover—until the British army team running Range Rovers from Alaska to Cape Horn in late 1971 ran into such problems that they had to co-opt a battered old Land Rover (found in Panama) to help them. This poor, tired old wreck, the victim of multiple capsize and repeated bodily assault, served thereafter as pathfinder and Range Rover extricator, and when eventually the army explorers finished their trip in 1972, the Range Rover had been put back into its proper perspective: after all, a Land Rover had done substantially the same trip, driven by a couple of privateers, Richard Bevis and Terry Whitfield—without radio, airborne support, or major sponsorship—way back in 1960.

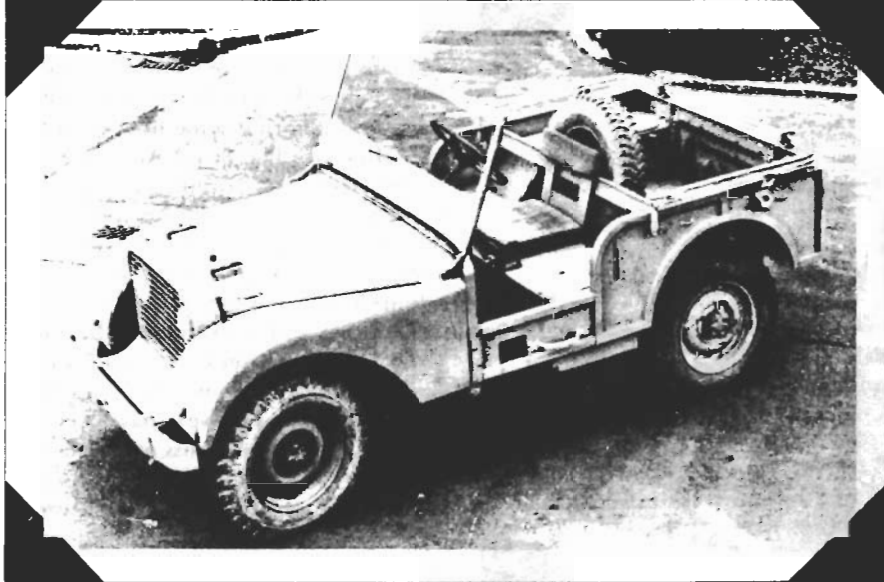
The army people were very brave, very determined, and very strong, but perhaps not very clever, and they treated their Range Rovers badly, overloading them and ignoring some of their tribological needs. The Royal Air Force has traditionally taken a rather dim view of the intellectual accomplishments of the "pongoes" (RAF slang for these khaki-clad professional pedestrians who are also admired for being solid muscle from the neck down and presumed to be solid ivory from the neck up), and when Squadron Leader Tom Sheppard of the RAF led what may prove to have been the last such expedition across unconquered territory in 1972, no mistakes were made. They took the latest Land Rovers.

The route was an intriguing one, across Africa from Dakar on the Atlantic coast to Cairo in the Northeast, a 7500-mile trip that had evidently never before been made. Long stretches of it across the empty quarter of Mauritania were through soft, deep, dragging sand, and across one stage there was no fuel available for 1200 miles; but the trip was completed, neatly and undramatically, in 100 days, during which there was no need to enlist outside help or even to supplement the engine's power with muscle power. All they used was brains and the latest Land Rover, the 101-inch forward-control variant first publicly shown in September 1972 and later confined to the British armed forces. It had the same full-time four-wheel-drive transmission and the same V-8 engine as the Range Rover, but the chassis was different and the body was a simple forward-control pickup type. Perhaps

Continued



The Shunter Rover pulling its own.



The original, with central driving position.

most significant was the rear power takeoff drive, which allowed this Land Rover to be coupled to the latest Rumbery Owen powered trailer, a live-axled two-wheeler that in effect made the articulated combination a six-wheel-drive hinged vehicle capable of going anywhere within the bounds circumscribed by the more respectable of Newton's laws.

It was far removed from the original Land Rover, the prototype of 1947. Apart from the oddity of its central driving position, that one amounted to little more than an Anglicized Jeep, when the only reason for Rover to build itself a four-wheel-drive vehicle was to get the company out of a hole.

Whether the difficulties were of the company's own making, or the government's, or Hitler's, is beside the point. Britain, faced with a decade of pinched and resentful austerity after ending the war badly in debt, had to embark on an export-or-die program, and the government devised sanctions to keep industry pointed in the right direction. In particular, the car industry suffered from a shortage of sheet steel, quotas of raw materials being allocated according to a firm's export sales. This was a particular problem for Rover, which had seldom if ever built the kinds of cars that anybody outside Britain would ever have wanted to buy, and which was reluctant or perhaps unable to make any other

kinds of cars just then. However, it occurred to the reigning Wilks brothers—managing director Spencer and technical chief Maurice—that there was a worldwide shortage of agricultural vehicles (not so much because of the destruction of existing ones but because farmers were raising their standards at long overdue last to get themselves mechanized), and they reckoned that the agricultural market would accept a lot of simple, purpose-built vehicles that could be exported in quantities sufficient to earn Rover all the material quotas it needed.

Choosing the nature of the vehicle was not entirely a matter of simple, objective industrial planning. Maurice Wilks had a house and 250 acres of farming land in north Wales, where, to deal with some of the chores, he had tried a Ford V-8-engined half-track vehicle, given it up as a bad job, and then got hold of a war surplus Jeep that had proved more successful. One day Spencer asked him what he would do when that much-abused little four-wheeler finally expired; and the answer was illuminating. "Buy another one, I suppose. There isn't anything else."

So they decided that there should be. What they proposed in 1947 was a cross-country workhorse, a Rover for the farmer, not just another Jeep but a Jeep-inspired machine of proper agricultural versatility, a source not only of mobility but also of power. It had to be able to drive things, to have power takeoffs everywhere, and to accept all sorts of bolt-on accessories, even to put its shoulder to the plow. Every possible Rover car component was to be used; new tooling was to be kept to an absolute minimum, with no press tools at all for the bodywork, and any panel that could not be formed by simple bending or folding was a panel that could not be contemplated. In the end the 1947 Land Rover prototype was as interesting for its differences from the Jeep—the much-smaller engine, the greater payload space, the four-speed gearbox, the central driving position—as for its similarities such as the suspension, the two-speed transfer gearbox with four-wheel drive in the lower range, and in particular the general dimensions of wheelbase, track, width, and length. Twenty-five pre-production prototypes were built and sent galumphing around the fields, plowing, driving threshing machines, carting, and towing, before the new vehicle was revealed to the public at the



The Cuthbertson Crawler Rover



Old and new. The more things change...

Amsterdam Motor Show in April 1948. In production form the central driving position was abandoned, and originally there was only one pickup body; not until late 1948 was a station-wagon version introduced.

Thereafter the alterations and emendations came thick and fast. The funny little 1.6-liter Rover engine with overhead inlet valve and side exhaust (a peculiarly half-baked configuration that was endorsed by Rolls-Royce) was bored out to give two liters displacement in 1952; the wheelbase was stretched in 1954 and again, by a mysterious two inches, in 1956 to the 88- and 109-inch dimensions that have been standard ever since. Not until 1957 was the reason for

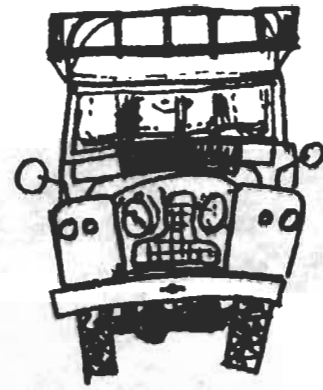
the extra two inches disclosed. When a new overhead-valve two-liter Rover-built engine was offered for the first time, its significant feature being that it was a diesel, the necessary robustness of construction demanded the extra space between the axles. A bored-out 2.3-liter spark-ignition version replaced the original gasoline engine in 1958 when the Series 2 Land Rover came along with some styling features in its body, and in 1961 this became the Series 2A when the diesel engine grew to the same capacity as the gas version. Its announcement was publicized on the railways, when a Land Rover fitted with a set of flanged wheels hauled a train carrying several more new Land Rovers; the British Railways au-

thority was intrigued, but the Shunter Rover never attracted any sales. The forward-control Land Rover was not much more successful after its announcement in 1962, though it did better when Rover's 2.6-liter six-cylinder gasoline engine was installed four years later. The trouble was perhaps that it did not look like a Land Rover, whereas all the other variants were visually very little changed from the earliest production models; not until the spring of 1968, when new legal requirements forced the removal of the headlamps out to the mudguards instead of being tucked neatly and safely into the radiator grille, did the conventional Land Rover begin to look obviously different; but by the end of 1971, when the Series 3 came along with a new, all-synchromesh gearbox as well as new styling, the vehicle was entirely different. The only good analogy might be found in the Volkswagen Beetle: here too, the basic shape, the basic concept, remained unaltered and inviolable, despite the fact that every component (bar a couple of humdrum nuts and bolts) had been altered since the vehicle first went into production.

Like the Beetle, the Land Rover had its military versions, not only the 101-inch wheelbase V-8 of 1972 but also the lightweight half-tonner of 1968. The half-ton designation referred to its payload; the chassis was standard but the body was a special lightweight job, most of which could be removed and packed separately for air transport or helicopter drop. If the body pack was intercepted, or dropped in the wrong place, the chassis could still be driven; the pongoes might be a bit less comfortable, but in the heat of battle they might never notice.

Military adaptations were not the sole prerogative of the company. A conversion specialist by the name of Cuthbertson made a notable contribution to the art by removing the wheels from the four corners of a long-wheelbase Series 2A Land Rover, replacing each wheel by a cluster of three in a triangle circumscribed by a caterpillar track. Short of the Hover Rover, this was just about the ultimate in ground flotation, and with its fifteen-inch ground clearance the Cuthbertson Crawler Rover was the most mobile of them all over really rugged country. The British army wanted it for bomb-disposal work—but there is apparently no truth in the allegation that they disposed of bombs and mine fields by simply driving the Land Rover over them. •

Land-Rover

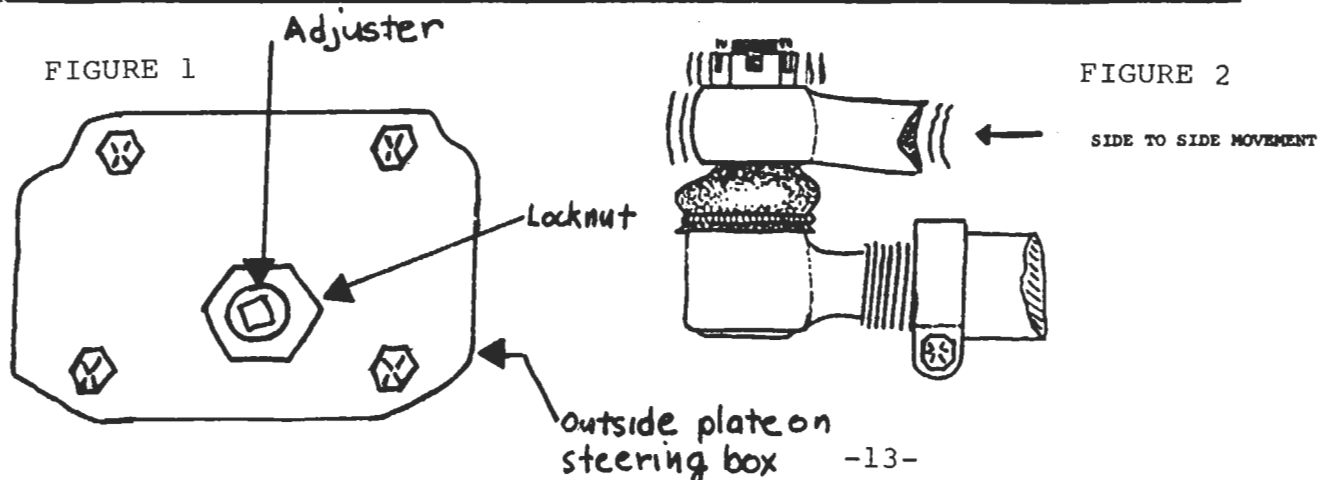


WHEEL ALIGNMENT

Are your front tires wearing abnormally? Does your Land Rover wander all over the road and fairly dance when you encounter bumps in the road at anything more than a crawl? Don't chalk it up to being "normal" for a four wheel drive. You can do something about it yourself, in most cases.

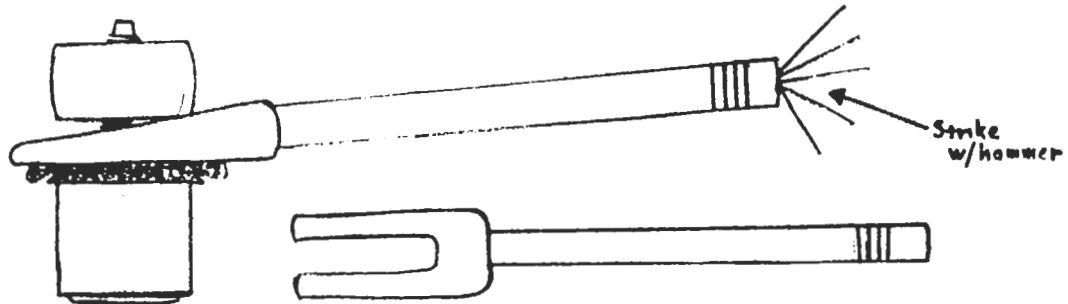
The first step is to determine what your problem actually is. With the Land Rover stationary, turn the steering wheel a little from side to side, while watching a front wheel. There should be only a little slack in the steering and you should be able to see the front wheels move with very little movement of the steering wheel. If you have a lot of steering play and/or a clunk in the steering then you have a mechanical problem in your steering. Slack in your steering can come from three places, the tie rod ends, the steering box, and from components whose bolts have worked loose. A common problem with Land Rovers is the steering box mounting bolts working loose. Usually this problem is accompanied by a clunk. Another problem is the steering lever on the bottom of the swivel pin housings coming adrift. This will also cause oil to leak from the housings and is easy to see. With an assistant working the steering wheel, watch the tie rod that comes off the steering box. This should move with each small movement of the steering wheel. If it doesn't, you need a steering box adjustment.

Adjusting the steering box is easy. If your LR has a cover over the steering box, remove it. On the outside of the steering box, you will see a lock nut and adjuster (see figure 1). Loosen the lock nut and turn the adjuster in until you feel resistance. Usually, it won't take more than 1/4 of a turn to take any slack out. Don't overtighten the adjuster. If you do, you will notice the steering get very hard to turn. If you can stand to drive it that way, you will eventually ruin your steering box. If you simply cannot get the slack out, or have noise or slackness at different positions, you have steering box problems. Consult your manual for steering box overhaul procedures.



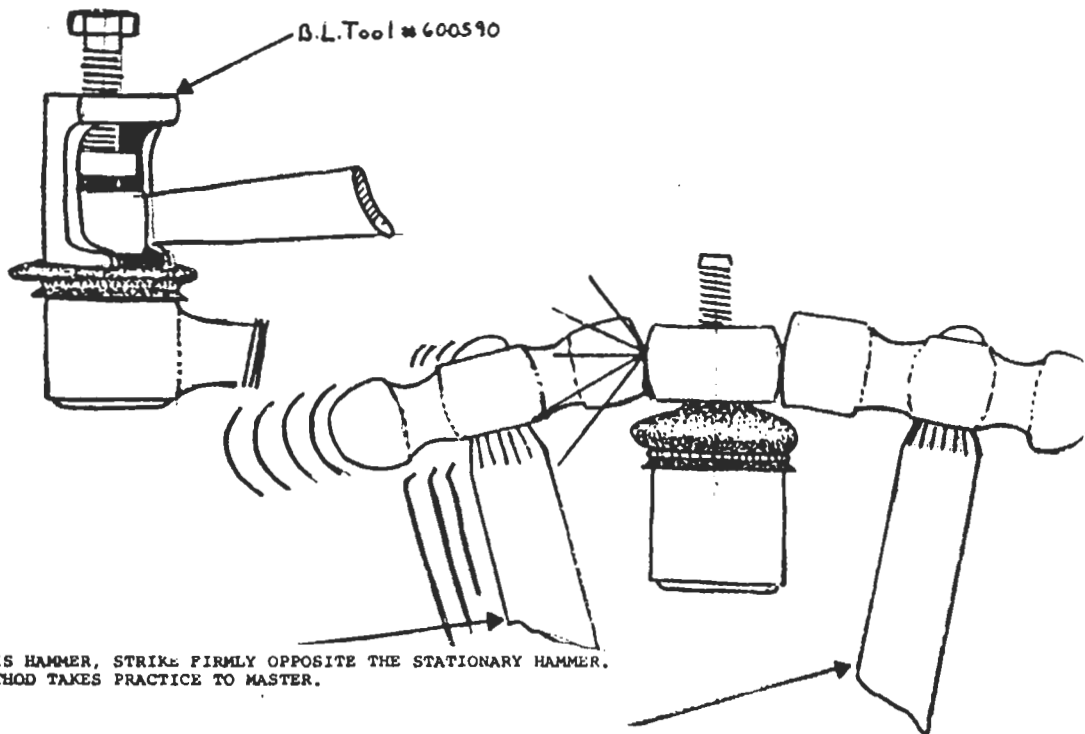
The final check is of the tie rod ends themselves. Your assistant will be needed again at the steering wheel. As he moves it, watch the tie rods. If there is any side to side movement, the tie rod must be replaced (see figure 2). If the protective boots are torn, they can be replaced. If the boots have been torn for a long time, dirt will have worked its way into the tie rod and you are better off replacing it. Figure 3 shows three ways to remove tie rod ends. When you screw them out of the tie rods, make sure you count the number of threads so you can put it back in the same relative position. This will make the alignment portion easier.

Now that you have ensured that your steering system is in acceptable condition, you come to the alignment portion of the job. The only adjustment that you can make at home is toe in. Caster and camber (see figure 4) are not adjustable and will not change unless your front axle housing is bent. If you have any doubts, an alignment shop can check caster and camber for you.



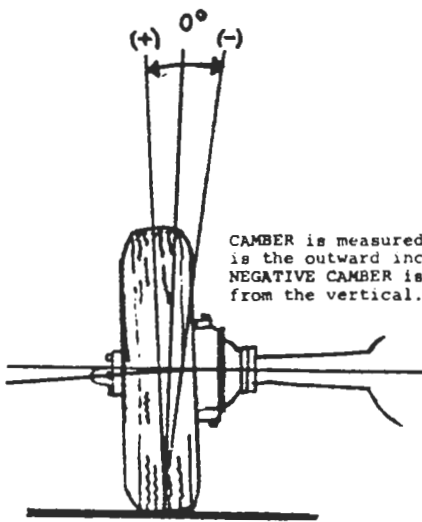
THIS IS A TIE ROD SEPARATOR OR "PICKLE FORK". THIS TOOL WILL SOMETIMES TEAR THE PROTECTIVE BOOT IF IT IS DETERIORATED.

FIGURE 3

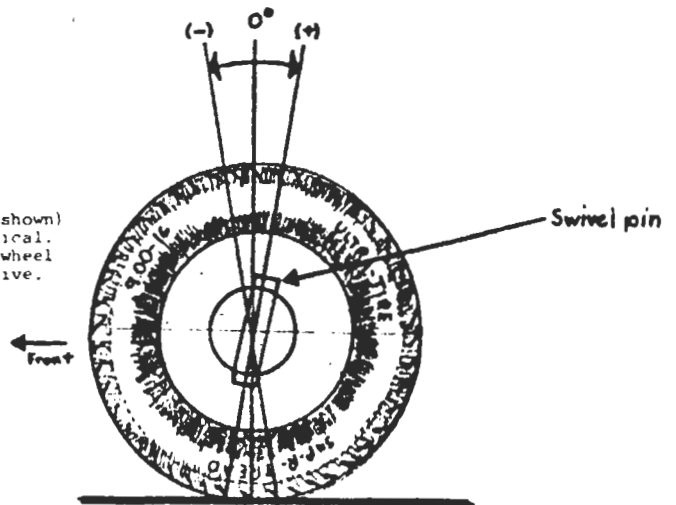


WITH THIS HAMMER, STRIKE FIRMLY OPPOSITE THE STATIONARY HAMMER. THIS METHOD TAKES PRACTICE TO MASTER.

HOLD THIS HAMMER TIGHTLY AGAINST ARM



CAMBER is measured in degrees. POSITIVE CAMBER (shown) is the outward inclination of the wheel from vertical. NEGATIVE CAMBER is the inward inclination of the wheel from the vertical. LR camber is $1\frac{1}{2}$ degrees positive.



CASTER is the forwards or backwards tilt of the king pin from the vertical. POSITIVE CASTER is the rearwards tilt of the king pin, and negative caster is the forward tilt of it. LR's have 3° of POSITIVE CASTER.

FIGURE 4

You will need to make yourself a couple of tools. Figure 5 shows some examples of these and how they are used. Once made, they can be used again and again, not only on the Land Rover, but on any other vehicle.

One at a time, jack the front wheels up, and spray a line of white or silver paint around the tire near the middle of the tread. While spraying the paint, spin the tire until you have a strip of paint around the circumference of the tire (see figure 5). Don't worry, the paint will wear off as soon as you drive the Land Rover. With your marking tool held stationary, and the nail point held lightly against the tire, spin the tire until you have a line scraped in the paint all around the tire (see figure 5).

Next, lower the LR and point the wheels as close to straight as you can. An easy way to do this is to line them up using the rear tire as a reference point (see 6). Do not use the steering wheel as a guide. It is often not centered correctly. When the wheels are pointed ahead, measure from line to line at the front of the tires using your alignment gauge (a tape measure will suffice). Do this as far above the ground as space allows. Then, measure at the rear of the tires, line to line, at the same distance from the ground as you did at the front. Compare the readings. If the front measurement was larger than the rear, then the wheels are toed out. If the front reading was smaller than the rear, then they are toed in. You want the front wheels to be toed in from $\frac{3}{64}$ to $\frac{3}{32}$ of an inch.

To adjust the toe-in, loosen the clamps at either end of the tie rod (the one farthest back), and using pliers, twist the rod clockwise to increase the toe-in, or counter-clockwise decreases the toe in. Once you have made the adjustments, tighten the clamps and double check the readings. If they are OK, double check that you have tightened the clamps.

The last step is to center the steering wheel. Do not remove the steering wheel to do this, except as a last resort. The proper method is to loosen the clamps on the tie rod farthest forward and twist it whichever way required to center the steering wheel. If you cannot center it in this manner, then you can remove the steering wheel to center it.

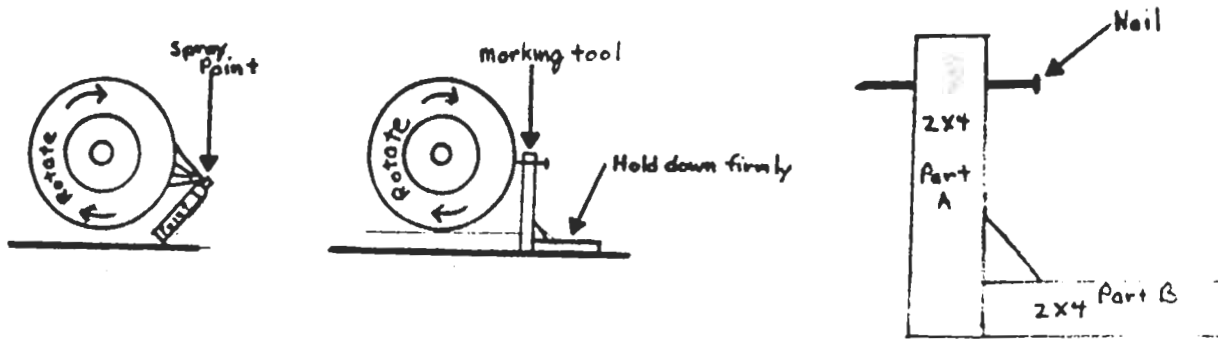


FIGURE 5

DETAIL OF MARKING TOOL. PART A SHOULD BE LONG ENOUGH TO REACH MIDDLE OF TIRE. PART B SHOULD BE LONG ENOUGH TO GET GOOD LEVERAGE FOR HOLDING.

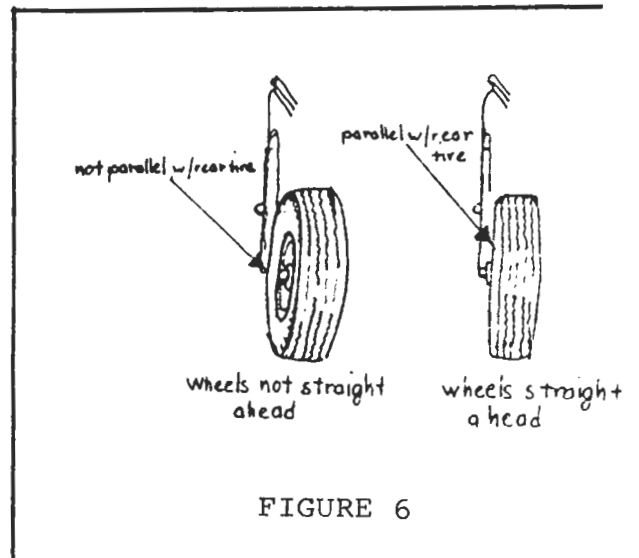
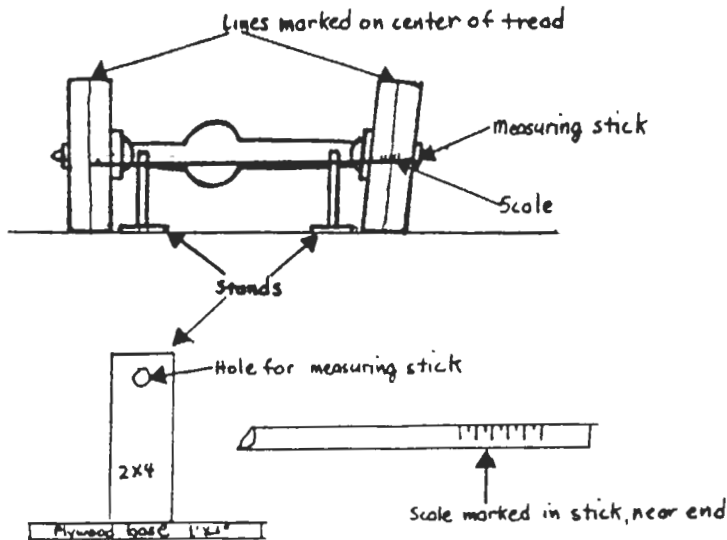


FIGURE 6

Remember that you are dealing with a potentially life threatening situation when dealing with the front end of your Land Rover, so take care with what you do, and double-check everything. Here are some extra tips to aid in getting the wander out of your Land Rover steering:

- *ROTATE YOUR TIRES REGULARLY TO AVOID CUPPING THEM
- *WHEN ALIGNING, PUT YOUR BEST TIRES UP FRONT
- *BAD SPRING-EYE BUSHINGS CAN CAUSE WANDERING AND CLUNKING
- *A STEERING DAMPENER WILL HELP TO SMOOTH STEERING VIBRATIONS
- *GOOD SHOCK ABSORBERS HELP WITH STEERING CONTROL
- *FOR SIDE TO SIDE PULLS, CROSS ROTATE FRONT TIRES TO SEE IF PULL CHANGES SIDES

CHANGE OF ADDRESS

For ease of mail handling, we now have a post office box. Our new address is:

Jim Allen, Editor, or-
 Steve Hill, Activities Coordinator, or-
 Steve Zedekar, Secretary/Treasurer
 P.O. Box 162201
 Sacramento, CA 95816

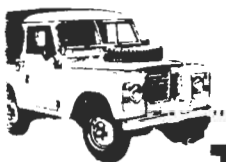


Land Rover Spares

Here is a list of parts and service establishments to aid your quest for parts. This list is published on a non-partisan basis. If you know of any others, let us know!

- ATLANTIC BRITISH PARTS
P.O. BOX 109, S. MAIN STREET
MECHANICSVILLE, NY 12118
(518) 664-6169 P,UP,R
- ATLANTIC BRITISH PARTS
P.O. BOX 322, HENRIETTA ROAD
LEWISTON, CA 96052
(916) 778-3922 P,UP,R
- ATLANTIC BRITISH PARTS
P.O. BOX 1068, MAIN STREET
WATERLOO, QUEBEC
CANADA, JOE-2NO
(514) 539-2669 P,UP,R
- BRITISH PACIFIC
101 WEST GREEN STREET
PASADENA, CA 91101
(213) 681-9783 P,S
- D.A.P. ENTEPRISES
36 BEACH STREET
WEST WAREHAM, MA 02576
(617) 866-2342 P,UP,R,SV,S
- THE GREAT AMERICAN LR CO.
7240 COOPER POINT ROAD N.W.
OLYMPIA, WA 98502
(206) 866-1232 P,UP,R,SV,S
- ✓ ISLAND ROVERS
351 MOONEY POND ROAD
SELDON, NY 11784
(516) 698-7667 (EVES & WKND) P,UP,S
- ✓ MCKANE'S ROVER IMPORTS
3211 INDIA STREET
SAN DIEGO, CA 92103
(714) 298-7371 P,UP,R,SV,S
- NORTH JERSEY LAND ROVER SUPPLIES
12 WILLS AVENUE R.D. #1
STANHOPE, NJ 07874
(201) 398-5715 P
- PAUL SAFARI COMPONENTS
OLDE COACH HOUSE
P.O. BOX 39, QUEENSTON STREET
HISTORIC QUEENSTON VILLAGE
ONTARIO, CANADA LOS-1L0
(416) 262-4446 P,UP,F,SV
- ROVERS NORTH
BOX 71
WESTFORD, VT 05494
(802) 879-0032 P,UP,F,SV
- ROVERS WEST *731 So. Vine Ave*
~~2832 NORTH FIRST AVENUE~~
TUCSON, AZ 85719
(602) 792-0295 P,UP,SV
- SCOTTY'S LAND ROVER SERVICE
45 RIDGE PARK DRIVE
CONCORD, CA 94518
(415) 686-2255 P,UP,R,SV,S
- WEST COAST BRITISH
6398 DOUGHERTY ROAD #34
DUBLIN, CA 94568
(415) 829-6091 P,UP,SV,S

KEY: P= NEW PARTS SUPPLY
UP= USED PARTS SUPPLY
SV= SERVICE AND REPAIR
S= LR SALES
F= FABRICATOR OF CUSTOM PARTS
R= COMPONENT REBUILDER



THE GREAT NORTH AMERICAN LAND ROVER CO.



PARTS SPECIALISTS

• 7240 Cooper Point Road N.W.
Olympia, Washington 98502
(206) 866-1232

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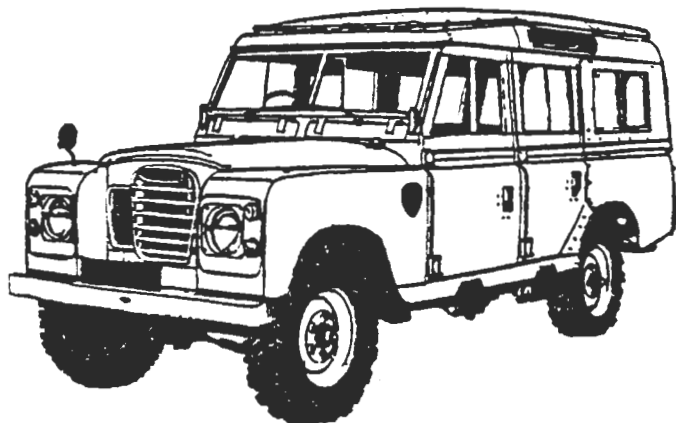
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PARTING OUT: '61 Land Rover 88", RHD

- *Gearbox/transfer case (less trans. case levers)- \$250
- *Front and rear driveshafts- \$35 ea. ~~x~~
- *Rear axle housing (inc. hubs, flanges, backing plates)- \$50
- *Rear axle shafts- \$15 ea.-
- *Brake drums- \$20 ea.-
- *Front axle assy., complete, w/diff. (less hubs)- \$225
 w/o diff.- \$100- *which hubs?*
- *Differential- \$125
- *Front springs- \$75 set
- *Rear springs (left spring, main leaf bent)- \$45-
- *Engine (less ancillaries--engine is seized due to not
operating for an extended period: rebuildable)- \$175
- *Engine parts- (Call, we may break the engine down)
- *Starter- \$15
- *Generator- \$15
- *Exhaust manifold (old type: pipe goes thru fenderwell)- \$35
- *Locking hubs (unusual English M.A.P. brand)- \$35-
- *16" wheels (one is damaged)- \$75 set
- *Unusual English trailer hitch- \$10
- *Misc. body parts (see picture!)- OFFER
- *Misc. parts- OFFER
- *SHIPPING EXTRA

Proceeds from the sale of these parts will go **into the club** account. CALL: Jim (916)722-0401, Steve Z. (916)391-1643, or Steve H. (916)393-3767

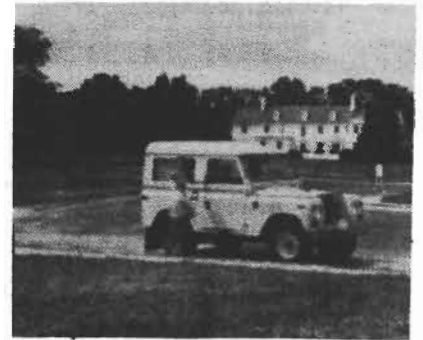
*bumper
distributor
gas tank and filler tube assembly*

ROVER REVUE

(right) Your Editor's '69 88 at the 10,500 foot level of Mt. Grant, in Nevada.

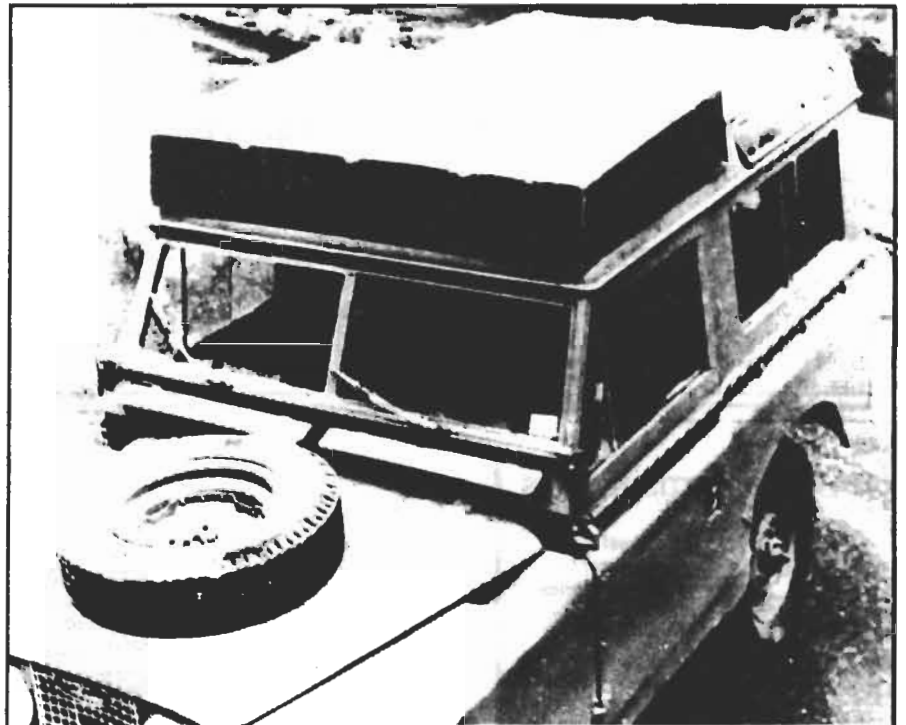
(lower left) Wes Newcomer's '73 88" and his '66 109. Wes hails from Beaumont, Texas.

(lower right) Steve and Jean Ganly's nice '71 IIA. Steve and Jean live in Alexandria, Virginia.



SOLAR POWERED LR?

When I saw this ad, I just couldn't resist writing to Free Energy Systems to find out more about this novel set-up. Gerry Keenan wrote me back and told me that they designed the solar array for several foreign military organizations. The idea was to reduce fuel consumption and to enable electrically powered devices to be operated for long periods of time without running the vehicle engine as a power source. They also have designed a variety of other solar cells for many different purposes.



END-OF-THE-WORLD POWER. Vehicle-mounted solar-power arrays have been developed to furnish electricity for radios or other field needs without resorting to noisy and inefficient use of the vehicle powerplant for generating current. Ready for distribution, the fiberglass-encased solar cells

simply switch from 12 to 24 volt operation for either powering equipment or charging vehicle batteries. Information and prices are available from *Free Energy Systems, Inc.*, Dept. SV, Rockdale Industrial Park, P.O. Box 3030, Lenni, PA 19052. (215) 583-4780. Telex: 510-669-0025.

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POSTSCRIPTS AND MISCELLANY



Lebanese soldiers with the Land Rover in which two men were killed in rush-hour traffic. UPI

THREE casualties of the fighting in Lebanon.