

Volume V, Number 3

August, 1976

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ROVER OWNERS' ASSOCIATION



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We are sorry for being so late with this issue of the Newsletter. However, many personal commitments and a general lack of participation from most of the membership have been responsible. In any case, the next issue should be forthcoming very shortly after this one and will include a full pictorial review of the new Rover sedan. Details of the car appear in this issue.

We have been getting many inquiries regarding back issues of the Newsletter, particularly from new members. As a result, we are making available photocopies of past issues to the membership. The cost of these will be \$.10 per page. We will list below the various issues that have been available to the membership and include their contents. Reprints will only be available of entire issues; after each volume and number we specify the number of pages that were contained within that particular issue. When ordering please specify which issue/s are wanted and enclose \$.10 for each page of that issue plus \$.13 postage for each issue ordered.

Volume I, Number 1 - 5 pages

Association Goals
Oil filter cross-reference chart
for Rover and Land-Rover
New Transmission for Rover 2000
and 3500
Range Rover introduction
Manual Transmission adjustment
on Rover 2000
Half-shaft U-joint problems on
Rover 2000

Volume I, Number 2 - 5 pages

A Short Rover Bibliography
Rover and Land-Rover Production
figures
Rust problems on Rover 2000
Rover durability - an overview
Rover parts and service sources

Volume I, Number 3 - 5

Bolt-on breakerless Ignition
Rover stainless mufflers
Squealing brakes
Rover/Smiths instrument difficulties
Servicing the Rover braking system
Rover turbine development cut-backs

Volume II, Number 1 - 6 pages

Header pipe cracks on Rover 2000TC's
Clutch problems and service on Rover
1971 Rover exports to the U.S.
Rover starter service
Oil filter cross-reference up-date

Volume II, Number 4 - 5 pages

Leyland Modernisation Plans
Land-Rover Parts Sources
Rover 3500S Parts Interchange
Rover 2000 Starter service
A Betroubled Land-Rover Owner

Volume III, Number 1 - 5 pages

Land-Rover Owner Problems
Introduction of Rover 2200 and 3500
Handling ropes and tackle
Used market for Rover and Land-Rover

Volume III, Number 2 - 5 pages

Land-Rover Parts Information
Rover 3500 Estate Wagon - pictorial
Rover P-7 Development

Volume III, Number 3 - 8 pages

21st Anniversary of Land-Rover
The First Land-Rover - pictorial
More Owners comment on their Land-
Rovers
Land-Rover Parts Information

Volume III, Number 4 - 7 pages

Land-Rover/Shorts armoured personnel
carrier - pictorial
Some Specialised Land-Rovers - pictorial
Fairley Overdrive for Land-Rover reviewed
Land-Rover Specialty Sources
Past Rovers: Rover 110

Volume III, Number 6 - 16 pages

Land-Rover to be withdrawn from the
U.S. market; No plans to market
Range Rover in U.S.

Service and Parts Sources
Land-Rover/Chevrolet engine swap
Land-Rover Owner Comments
Technical Section:

Rear Caliper (Girling) Rebuild
details for Rover 2000/3500
Brake disc wear specs for 2000/2500
Brake pad damping shims
Land-Rover Carb float valve service
Land-Rover oil pressure relief valve
spring
Land-Rover steering rod clips and ball
joints

Volume III, Number 6 (cont'd)

Technical:

Oil leakage from L-R Steering relay
Land-Rover road springs

Volume IV, Number 1 - 22 pages

Range Rover -pictorial
Rover and Land-Rover Owner Survey
Land-Rover Parts Interchange
Bostrom Land-Rover Seat - review
Land-Rover Accessory Info
New and used Land-Rover Spares

Technical:

Brake pad applicability Chart
Rover and Land-Rover Ignition
setting Charts
Rover 2000 Camshaft bolts
Rover 2000 low gear synchromesh
Rover 2000 engine over-revving
Rover 2000 Automatic gear selector
adjustment
Rover 2000 Cylinder head corrosion
Rover 2000/3500 speedo spindle seizure
Rover 3500 rear main seals
Rover 2000 Automatic - starting
difficulties when hot
Choke control operation procedure
Rover 3500 oil leakage from fuel
pump gasket
Dynamo noise - Rover and Land-Rover
Land-Rover Carb adjustment
Land-Rover radiator caps
Engine oil pressure - L-R diesels
Land-Rover 109 rear brake shoes
Land-Rover cylinder head gasket
modifications

Volume IV, Number 2 - 16 pages

Land-Rover pictorial
Land-Rover Owners Comment
Land-Rover Exhaust Manifolds
Compression Ratio Increase for
Land-Rover 2½ litre
More Land-Rover Parts Interchange
Land-Rover/Fairey Overdrive - test
Technical:

Rover carb fast idle adjustment
3500 exhaust manifolds
2000 Automatic trans. shift adjustment
Dynamo lubrication - Rover and Land-Rover
2000TC Sparking Plugs
3500 engine oil sump
200 and 3500 engine flame traps
2000 Clutch repairs
2000 primary pinion lubrication
2000/3500 bonnet latch info
3500 distributor contact points
Land-Rover steering relay unit

Volume IV, Number 3 - 16 pages

Rover/BRM Turbine - pictorial
Land-Rover Spin-on oil filter conversion
A History of the Headquarter Club
Complete Listing of member clubs
How Tire Size Affects Speedo readings
on the Land-Rover
Some practical tips for river crossing
Rover/Land-Rover parts and service sources
Landy Owners Comment

Technical:

Land-Rover gearbox
L-R front crankshaft pulley
Towing recommendations for Rover and
Land-Rover vehicles
Automatic trans dipstick info

Volume IV, Number 4 - 21 pages

Land-Rover pictorial
Artist's line drawing of new Rover
Dick O'Kane on Land-Rovers - reprint
Engine block heaters for Land-Rovers
Negative ground conversions
Land-Rover Overdrive
British-Leyland Problems - a review
Land-Rover parts interchange
L-R 109 rear brakes
L-R front hub advice
Technical tips for Land-Rover Owners
Land-Rover suspension modifications
Land-Rover/Olds V-8 engine swap -
a review and pictorial
Additional parts sources
Land-Rover Expeditions - a new book
Technical:

2000TC distributor rotor arm
2000 Automatic gear selector housing
2000/3500 automatic trans adjustment
Cylinder head thread insert salvage
instructions

Volume IV, Number 5 - 15 pages

Land-Rover pictorial
Rover Owners' Association patch
Alternator Conversion for early Landys
Land-Rover Owners Comment
Land-Rover axle failures
More parts sources
Technical:

Rover door lock adjustment
2000 ignition timing
Land-Rover hand brake maintenance
Rover 2000 advertisement - retrospect

Volume IV, Number 6 - 17 pages

Land-Rover pictorial
Land-Rover/Shorlands Security
Vehicle - catalog reproduction
Land-Rover manufacture and assembly
plants
Land-Rover parts and service sources
Land-Rover technical tips

Technical:

2000/3500 road spring requirements
L-R 2 $\frac{1}{4}$ connecting rod bearing nip
L-R exhaust manifold cracking
Frost precautions for Rover and
Land-Rover
L-R sparking plugs
L-R ignition settings
L-R clutches
Brake disc wear recommendations
3500 exhaust manifolds
3500 engine overheating
brake maintenance
2000 Automatic transmission oil
leaks
Rear brake hose - 2000SCand TC

Volume V, Number 1 - 18 pages

Rover 3500 Estate Wagon pictorial
Rumor on the new Rover sedan - text
and pictorial
Styling development of the Rover 2000
series - reprint of text and pictorial
from Style Auto magazine
Rover P-7 six cylinder car- an overview
Replacement window channels for land
Rover
Rover B.S. mid-engine prototype
Land-Rover 88/Chevrolet six engine
conversion - a text with pictures
Land-Rover Owners Comment
More parts sources
Rover and Land-Rover parts sources in
England

A Modified Landy from New Zealand: Chris Branch of the New Zealand Land-Rover Owners' Club recently wrote to us about his rather unusual Landy. His Land-Rover is a 1964 ex-British Army radio vehicle which is factory fitted with two fuel tanks (22 gallons each), oil cooler, full set of gauges, heater, and windscreen washers. Chris has rallied this vehicle for the past 6 years: the first three with the standard 2 $\frac{1}{4}$ litre petrol engine and 7.00 x 16 mudgrip tires by Firestone, then 18 months in the modified under 2500cc class because he widened the wheels 3" and fitted 7.50 x 16 tires. For the last 18 months Chris has been in the modified under 3000cc class since he re-powered with an English Ford 3-litre V-6 engine. This motor was blueprinted and develops slightly less power than the F-155 Toyota Landcruiser engine, but the Landy has no trouble outdoing the Landcruisers on the rough or on the road. The V-6 power figures are as follows: 150 bhp at 4750 rpm; 205 ft.lbs at 3000 rpm. The engine is capable of 6000 plus rpm. The gearbox and transfer case are standard heavy-duty S 11 A suffix B units with which I have had no trouble. Chris changed the standard Land-Rover differentials from the 4.7 to 1 ratio to Rover 90 4.3 to 1 differentials and then found these a bit too low for road use. As a result, he switched to Rover 95 3.9 to 1 differentials, but found these good on the road and too high for off-road use. Chris then returned to the original 4.3 to 1 Land-Rover differentials and installed a Fairey overdrive unit. This unit reduced the engine and transmission revs 25%. The above-mentioned differentials do not have to be modified in any way to fit the Land-Rover. Chris left the suspension standard except for the shocks: He installed gas-filled, coil spring-assisted ones and Chris said that this greatly improved the Land-Rover ride on and off the road. On the road Chris now gets 25 mpg at 60 mph and 18 to 20 mpg in the rough, which is a big improvement over the standard Land-Rover 2 $\frac{1}{4}$ litre unit.

FAIREY OVERDRIVE, A CANOE RACK, AND CANVAS DOORS:

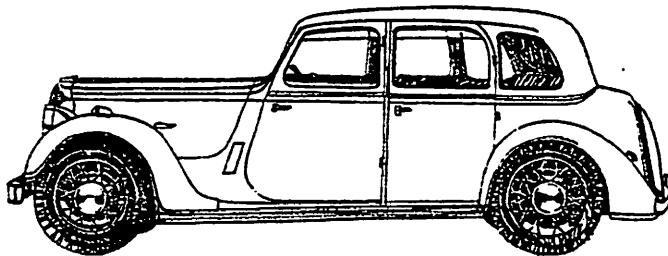
Member Thomas Gallucci of Naugatuck, Connecticut highly recommends the Fairey Overdrive unit available from Atlantic-British Parts. He installed it himself in about four hours and found the job very straight foward except for two points. Firstly, to remove the locknit on the shaft he used a chisel and hammer, gently tapping it until it loosened. Secondly, to remove the main gear, shift the transfer case into neutral and slide it out. Be sure to use the new tab washer for the locknut and do not forget to replace the shims (if used on your Rover). A hole cutter makes a neatly cut hole for the shifter. He has put about 1000 miles on his overdrive unit and wonders how he got along without it up until now.

With 6.78 x 15 tires and a \$50 brand-name tachometer the following figures were obtained. As one can see, one can travel at 60 mph and turn only slightly more engone rpm's than one previously did at 45 mph.

MPH	RPM (without overdrive)	RPM (with Fairey overdrive unit)
40	2650	2100
45	3000	2350
50	3350	2600
55	3700	2850
60	4000	3150

Tom also made a rack to carry his 15' canoe. He used two 8' 2x4's and claims that the work very well, and are cheap and easy to use. To anchor the rack one simply loops cord over the four crossmembers and uses the tie downs that are standard. He has also made a set of canvas doors to survice the heat problem inside the Land-Rover whenever the outside temperature rises to about 70°. Anyone interested for more details on the canoe rack or canvas doors can write to Tom at: 113 Fern Street, Naugatuck, Connoecticut, 06770, phone: 203-729-6811.

Tom would like any info from fellow members regarding a problem that he has been unable to remedy. On Series III Land-Rovers the exhaust pipe runs under the driver's seat causing tremendous heat. Tom finds that when the air temperature is 70° his inside temperature while running goes to 100° or better! Has anyone used insulation to cut down on this problem? Tom would also like to correspond with an ROANA member from British Columbia or the Northwest Territories.



1938 12 h.p. ROVER

BETTER FUEL ECONOMY FOR-OFF ROAD LANDYS:

For members that use their vehicles for strictly off-road or farm use we understand that the following modifications to an emission-controlled engine can increase fuel consumption approximately 40 to 50%. Install a non-emission distributor and hook up the vacuum advance line to the pipe on the opposite side of the carb (Zenith carb). This nipple was used for a pollution device. The stock distributor uses a vacuum retarder. One must also remove the carb's throttle plate and solder the hole. Failure to do this causes errattic idle, back firing, and a lot of grief. Note: It is illegal to remove any emission equipment for vehicles that are used on streets or highways.

Well, the new Rover 3500 was introduced to the motoring press on June 30, 1976. We originally found the rumored car leaving a lot to be desired in the way of body style. Of course, we were only making this judgement based on the line drawing that Road and Track magazine had printed. After viewing the first pictures of the car (Autoweek, July 3, 1976, Volume 26, Number 27, page 20 and Road and Track, August, 1976, pages 64 - 66) we are enthusiastic. The car strongly resembles the Ferrari Daytona in the front end area and bears some conceptual relationship to the BMC 1800 4 door Berlina Aerodinamica done by Pininfarina for the 1967 Turin Show. The Rover 3500 certainly has as much, if not more, styling flair than anything that Italy has to offer today. The car is a five-door sedan with a wind-cheating shape affording stability at speed, low wind noise, and outstanding fuel economy.

The car utilizes a conventional unit body construction with crushable structures front and rear, a very rigid roof structure with unusually robust pillars for roll-over resistance, and a bonded-in windshield. Door locks are burst proof, and horizontal compression struts just beneath the glassline in each door distribute longitudinal impact loads through the body via proximity pads at the end of each strut. This arrangement provides "bounce-back" clearance in a frontal impact, ensuring that all doors can still be opened after a crash. All five doors have electrical central locking, operated by a switch on the driver's door or by the key in either of the front doors. Rover says that it is a safety feature that in getting in, the driver unlocks all doors automatically, thus avoiding the potential danger of occupants being trapped in the car following an accident. Side intrusion resistance is provided by heavy doors with a deep stiffening indentation.

David Bache, who also did the design work on the P.6 2000 series Rovers (see Association Newsletter Volume V, Number 1), styled the current Rover 3500. As the early prototype P.6 Rovers reveal Bache first styled the car with a faired nose and under bumper intake, but was told that "Rovers must have a grille . . . and they must not make heads turn." This new Rover does have a faired nose and under bumper intake. The nose intake also features reverse-airfoil bars which perform a low-drag, anti-lift function while directing cool air upward into a conventionally mounted radiator block.

The new Rover 3500 has 60 percent more glass area than its predecessor and the full five seat interior layout is enormous. It is marginally wider than the Jaguar XJ sedans and the rear seat legroom is identical to the long-wheelbase XJ's. Dimensions of the new Rover compare with the old 3500 as follows. The new car has a 110.5 inch wheelbase and 185.0 overall length as compared to the old 3500's 103.4 inch wheelbase and 181 inch overall length. The track of the new car is 59.0 inches both front and rear with an overall width of 69.0 inches whilst the old one had a front track of 53.4 inches, a rear track of 51.8 inches and an overall width of 66 inches. The height of the new car is 53.5 inches and the old one was 56.2 inches. Dry weight of the new car is 2986 lbs while the old one was 3184 lbs.

The new Rover 3500 comes with a full complement of instruments and also has a new type of warning light system. Neatly grouped in the shaped bloc of instruments the warning light lettering is not seen until the light comes on. They are so-positioned so that non-essential warnings, such as the headlight's main beam light, do not reflect in the windshield. However, danger warnings, such as the oil warning light, do reflect in the windshield to insure that the driver cannot miss them. The new car also has a very unusual safety-steering wheel that is adjustable axially and vertically, and there are twin control stalks to handle the "safety-critical" functions.

A center console dominates the forward bay, running back between the front seats to carry radio, heater controls, gearshift, choke lever, handbrake, and optional electric window switches. There's so much space between the front seats at the rear of this console that a passenger can rise to his feet and wander into the back without too much trouble. The front seats have head-restraints as standard and their seat backs recline near vertical. The rear bench seat is deeply dished with a shelf-type folding center armrest. Front seatbelts have their lower pick-up positioned on specially designed runners to maintain seat belt adjustment even though the seat position may be altered.

The rear seat back can be folded forward and a vast rear parcel shelf can be easily removed to create a huge baggage space. The hatchback lifts on gas spring struts, normally lifting the parcel shelf with it on webbing straps. This gives access to the standard trunk and insures privacy of contents when the hatch is closed. There is pile carpeting throughout and the trunk space floorboards are removeable to reveal a deep well for a single spare tire.

The ventilation system includes a central cool air outlet to send a refreshing breeze to the rear compartment, as well as one directly in front of the passenger. An outlet for the driver is positioned between the speedometer and the tachometer, and the passenger's outlet forms the steering column mounting for left-hand drive cars, and vice versa. At each end of the dashboard is a rubber grommet which engages a matching one in the door and air is thus ducted through for de-fogging the side windows. Provision is made for air conditioning. Vents also feed a flow of air down to the interior of the box section sills to prevent sweating and consequent corrosion.

The list of standard features normally supplied as options is enormous and includes tinted glass, push-button twin-speaker radio, and the side window demist.

In place of the ingenious but highly complex suspension layout of the previous 3500, the new car has a simpler but more effective layout. At the front, there are MacPherson struts with offset coil springs. The MacPherson strut and power steering are mounted as an assembly on the X-frame front crossmember, as on the Triumph TR-7. However, while the TR-7's crossmember is mounted in rubber for isolation Rover engineers found that they could eliminate the rubber. The rear suspension uses a form of torque tube live axle with long travel coil springs. Another crossmember beneath the rear seat floor plan provides a torque tube pick-up point, and this forms the rear axle's major longitudinal location. Slender trailing links provide steering control at the axle's ends and a Watt link provides lateral control.

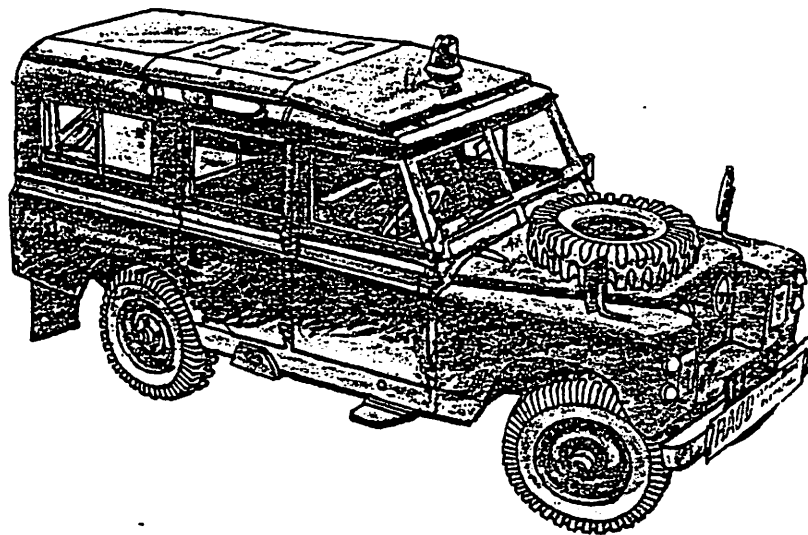
On the Range Rover an automatic self-leveling Boge Hydromat unit mounting on the differential case was used. Rover designers learned a lot about controlling axles with long spring travel from this design and the current 3500 benefits from this experience. The 3500 uses two Boge Nivolmat self-leveling dampers mounted as far outboard on the axle as possible to add roll control to their load compensating effect. The torque tube axle design also provides anti-dive and anti-squat characteristics under braking and acceleration. Coil springs are mounted independently on top of the axle tubes and the simple Boge units self level without the need for complex and wasteful engine-driven pumps - they simply employ borrowed energy from suspension movement.

Steering has never been a particularly good feature on any Rover, but the new model has a very accurate rack-and-pinion steering with Burman power assistance as standard. The steering is high geared to give good response to small movements of the wheel. The car achieves a 34.3 foot turning circle from 2.7 turns of the steering wheel as opposed to the old model's 31.5 foot turning circle from 3.25 turns of the wheel. Brakes are 10.2 inch diameter front discs with 9.0 diameter self-adjusting rear drums. Hydraulics are power assisted dual circuit with a pressure limiting valve in the rear circuit to prevent locking.

Under the front-hinged bonnet is Rover's General Motors-originated 3.5 litre aluminum V-8. The engine has an excellent service record in Europe (in the U.S. the only real problem was the automatic choke units fitted) and for the new 3500 it has a wider rev range, improved serviceability, and produces more power. GM's original unit revved to 4750 rpm and Rover's original changes raised the limit to 5200. In 3500 form the V-8 now runs cleanly to 6000 rpm. This has been achieved by altered hydraulic tappet valving and improved breathing. Larger inlet and exhaust valves operate within single springs, and head porting and exhaust manifolding have also been improved.

Drive is taken to the rear wheels with choice to the buyer of either the Borg-Warner three-speed Model 65 automatic transmission or an entirely new five-speed manual gearbox. The new transmission uses a single rail selector system, baulk-ring synchromesh on all five ratios and a remote shift, rubber mounted at four points to isolate it from drivetrain vibrations. The fifth gear provides a very high gearing, giving 28.3 mph per 1000 rpm. The automatic gives 25.3 mph per 1000 rpm; both employ a final drive ratio of 3.08:1. A very short driveshaft with two constant-velocity joints delivers power to the torque tube located rear axle. Leyland quotes 0-60mph in under 9.0 seconds. Testers recorded 8.8 with the automatic and heard of 8.5 with the manual. Leyland claims that the automatic nearly matches the manual's acceleration throughout the range. Rover claims a top speed of 125 mph for the manual transmission model and 14 mpg at touring speeds (85-90mph).. Testers were getting 26-28 mpg overall.

Production is now well under way at Leyland's new \$171 million factory at Solihull, and looks to meet tremendous demand at the \$9000 price being quoted for European versions. No plans for U.S. importation are official, but it does appear as though the car could meet our regulations without much effort. Engineer Spicer King and stylist David Bache, the Rover combination who gave us the original 2000, the Range Rover and now the new 3500, can now be regarded as industrial leaders in their field.



153
Truck, GS, Utility ½ ton, 4×4, Land Rover, U.K.

How to Check a Used Land-Rover: The following is a reprint from the December, 1974 issue of the Land-Rover Owners' Club Newsletter - Newcastle Branch in Sydney, Australia.

Listed below are methods of checking a used Land-Rover. There are several finer points; however, those listed should provide a guide that anyone can follow.

1. Check for rust, especially on the flat, angled section of the firewall where the pedals are. Also passenger side and lower parts of doors and side screens.
2. If possible, get the vehicle on a lift and look for oil leaks from the engine, transmission and both differentials. Check for wear in splined sections of front Propeller shaft and rear propeller shaft, on handvrake drum; check front and rear differential bearings.
3. Check lights, condition of lenses, electrical components, horn, etc.
4. Check brake and clutch pedals for wear on pedal facings.
5. Check slack in steering by moving steering wheel until wheels start to turn. Get someone to continue moving the steering wheel and check the tie rod ends for slackness. Also inspect the steering relay box and splines.
6. Check the battery by turning the engine over a few times with the ignition off. Check if there is water in the battery.
7. Start the engine. Check the ammeter and see if the oil light goes out. Check if smoke comes from the exhaust. Thick blue smoke means that the engine is worn. Check after driving at normal temperature with choke in for color of the exhaust pipe: black means burning oil; grey is all right.
8. Check tires, inside and out (cracks can be pu to the inside). Check the spare. Inspect the front tires for uneven wear; check rear tires also since they might have been rotated. All tires should have the same tread.
9. Take hold of top of front wheels and move in and out to check for wear in the swivel pin housings (large balls on front axle); if wear is evident this could prove costly. Check condition of balls on full right and full left lock for pitting and scoring. It is best if the wheels are jacked off the ground to check these points.
10. Look under bonnet for water leaks around the radiator, hoses, welsh plugs, and water pump. Check for oil leaks; check engine oil for cleanliness and water. If there is water in the oil it should be a grey color after the engine has been running. Check for bubbles in the radiator when hot. Bubbles mean that the engine or head may be cracked.
11. Listen for odd engine noises, knocks, rattles, etc. with bonnet up; also when first starting the engine.
12. Check clutch slip by applying handbrake, with engine engage top gear and let the clutch out. If the engine dies then the clutch is OK; if it doesn't then the clutch is slipping. Check for clutch shudder when driving; check engine mountings.
13. Check steering when moving to see if vehcile wanders.
14. Check brakes for stopping power and see if they pull to either side. Check handbrake: it should pull on and stay on. Check handbrake drum for oil leaks. Check brake hoses and lines.
15. When in top gear listen for a differential whine at about 30mph and transmission whine when you take your foot off of the accelerator at about 35mph. Check first and reverse gears for noise. Check that the transmission doesn't jump out of any gears, particularly third.
16. Watch if the ammeter shows a charge when the engine is first started and drops to zero after a run. Check to see if the speedometer is registering and note the miles covered.
17. Check on any modifications for neatness of installation, etc.
18. Check condition of tow bar: excessive wear indicates hard pulling.

The above covers the most important areas that a Land-Rover could be faulty or defective. Of course, check the body for dents, seats for tears, and chassis for signs of repair after an accident.

REPLACING FRONT CRANKSHAFT OIL SEAL ON THE LAND-ROVER 88 PETROL ENGINE: Member Harry W. Lineback offers the following advice regarding the replacement of the front crankshaft oil seal on the Land-Rover 88 2 $\frac{1}{4}$ litre petrol engine.

1971 Land-Rover Model 88 2 $\frac{1}{4}$ litre Petrol Engine

Material required: 2 gaskets
1 oil seal

Time required: 3 hours

1. Engage 4th gear.
2. Set parking brake tightly.
3. Disconnect battery; draining of engine oil is not required.
4. Remove fan belt.
5. Drain water from radiator and engine block (engine block drain turns counter-clockwise to open).
6. Using a heavy wrench remove cranking dog bolt in center of crankshaft (I used a 12" pipe wrench).
7. Using a 5 $\frac{1}{2}$ " spread gear puller remove the crankshaft fan pulley.
8. Remove the metal fan shroud.
9. Disconnect upper and lower radiator hoses (radiator side only).
10. Disconnect radiator over-flow hose at radiator cap and also from tank pipe.
11. Remove grill.
12. Remove fan from water pump shaft.
13. Remove the radiator.
14. Separate the water by-pass fitting from water pump by:
 - a) remove the two bolts on the thermostat housing that secures the heater temperature control.
 - b) remove the two bolts in the by-pass housing.
 - c) loosen the top clamp of the by-pass hose.
 - d) separate the by-pass unit together with heater control unit from water pump.
15. Remove front five bolts from engine oil pan.
16. Remove timing gear cover case (water pump will stay attached to timing gear case) eleven bolts.
17. Place timing gear cover case on work bench and remove oil seal dirt shield by the following method:
 - a) mark the shield so as to return it to its original position on the case.
 - b) pry off the shield at each rivet head using a thin-bladed screwdriver inserted between shield and timing gear cover case (shield will be bent at each pry point; however, once it is replaced these bent points will be hammered out).
Do not try to flatten the dirt shield during this particular step.
18. Using a flat end punch remove the oil seal, knocking out the seal toward the front end of the timing gear case cover. Tap lightly on all sides in a continuous pattern so as to cause the seal to extract evenly.
19. Insert new seal. Do not hammer directly. Use a piece of wood as a cushion ensuring that the seal is inserted in an even manner so as not to bind. Seal should be inserted to a point where outside of timing gear case is flush with outside of seal.
20. Place dirt shield on to the rivet shafts on the timing gear cover case. Be sure that it is aligned to the original position as marked in step 17a.
21. Using a medium size (approx. $\frac{1}{2}$ " dia.) metal dowel rod or similar device repress and flatten the dirt shield onto the timing gear cover case; the bulges caused by step 17 will now be flattened out. Dirt shield should now appear as it did prior to step 17.
22. Coat engine side and timing gear cover case with Permatex Hi-Tack or similar gasket reparation solution.
23. Place gaskets (2) on timing gear cover case.
24. Reassemble in reverse order making sure that the crankshaft pulley is aligned in the key slot.

A Two Battery System for the Land-Rover: The following article is a reprint of an article written by John Brown for the March, 1976 issue of Land-Rover News, a newsletter published by the Land-Rover Owners Club of Australia, Newcastle Branch. We thank them for their cooperation in allowing us to bring this to our membership.

Few Land-Rovers (and other makes of 4 wheel drive vehicles) in the Club could be classified as "standard" vehicles. We invariably add additional equipment to make our driving or camping more pleasureable and safer. The majority of this additional equipment is electrical and results in severe overloading of the battery fitted to the vehicle. Extra head, fog and driving lights, interior lights, electrical winches, reversing and spot lights, friges, and two-way radios are a few of the many items included in the "extras" list.

When one adds up the extra load on the system you will quickly see that extra battery capacity is required. The fitting of an additional battery is easy and this article will describe the best way of approaching the problem. It is most desirable to connect the second battery in such a manner that it can be run "dead flat" without affecting the charged condition of the standard battery fitted to the vehicle. This can be achieved by the use of semi-conducting devices known as "diodes." The diodes will allow current to flow in one direction only, that is, from the alternator or generator to the battery and not in the reverse or opposite direction. (Figure 1)

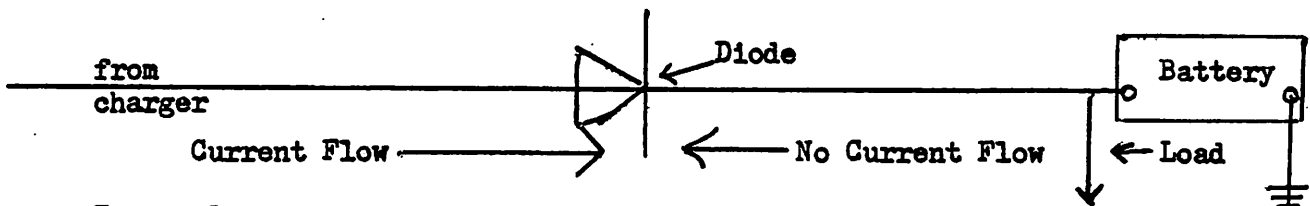


Figure 1.

It may be seen that by connecting the additional equipment to the second battery the main battery of the vehicle will be protected by the diodes and will not allow current to be drawn from it to supply the extra loads and so the vehicle can still be started even with the second battery "dead flat." (Figure 3.)

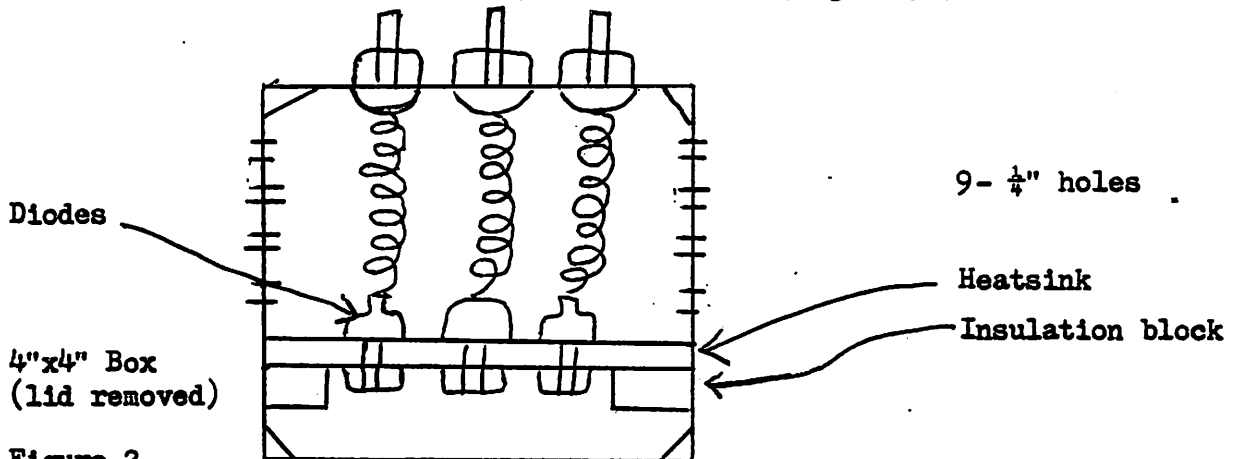


Figure 2.

To allow this system to be installed it will be necessary to obtain a "Double Diode Pack" (D.D.P.) These can be purchased commercially or can be made more cheaply by the following method:

Two Battery System (continued):

PARTS REQUIRED

Clipsal (256/3) 4"x4"x2 3/4" J. Box	4 - 1"x1/4" R.H. Brass Screws
Aluminum Heatsink - 4"x2"	4 - 1/2"x1/8" R.H. Brass Screws
2 Diodes BYX52-300R or Equivalent	8 - 1/4" Brass Nuts
2 Insulation Pieces 2"x1/2"x1/2"	16 - 1/4" Brass Washers
Short Pieces of Flexible Wire - 97/.012 or Equivalent	

Method:

Mount the two diodes to the heat sink and connect a short (5") piece of cable to the centre of the heatsink. Mount the heatsink in the 4" box by using the two insulation pieces and the 1/8" screws. Drill the side of the box to take the 3 - 1/4" terminal screws at 1" centres. Drill 9 - 1/4" holes in each side of the box to allow for ventiation and heat disipation of the diodes. Connect the tops of the diodes on the heatsink to the outer terminals on the box and the wire from the heatsink itself to the inner or center terminal on the box. Now you have your "double diode pack." (Figure 2.)

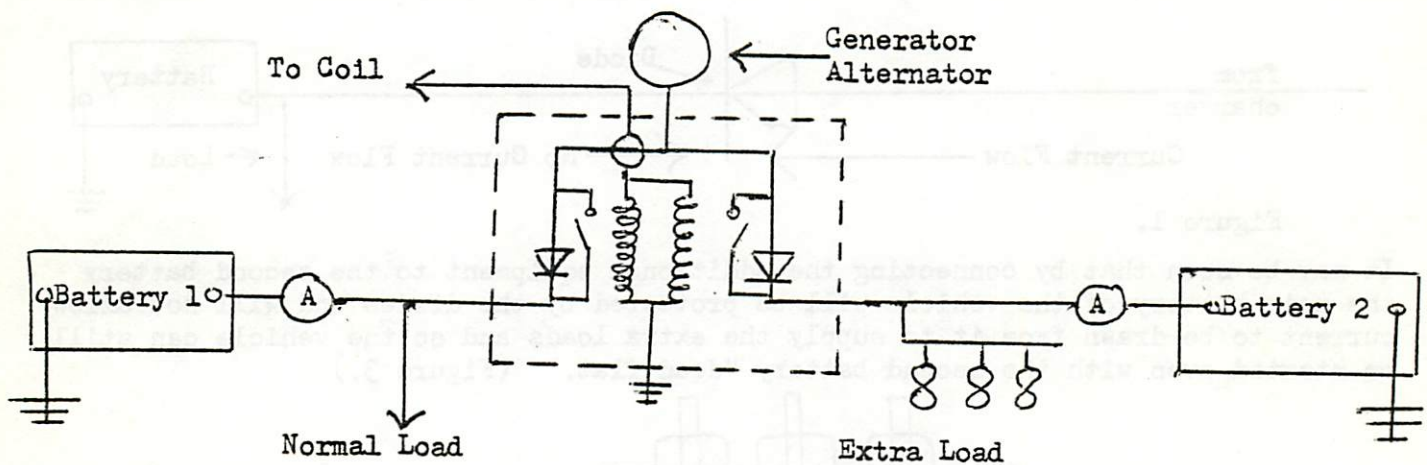


Figure 3.

If your vehicle is fitted with a generator no additional equipment is necessary except for your second battery, terminals, wire, etc. However, if an alternator is fitted an additional Double Pole Head Light Relay (NRL - 112 12v 35A) will be required. (See text on "Fitting to Alternator System".)

FITTING TO GENERATOR SYSTEM:

- 1) Install "double diode pack" (D.D.P.) in suitable location either on the inner fender guard or firewall - keep away from heat if possible.
- 2) Disconnect armature (big wire) from the generator and connect it to the one OUTER terminal on "D.D.P."
- 3) Connect new wire between generator armature (big terminal) and CENTER terminal of "D.D.P."
- 4) Connect additional battery via new ammeter (if required) from other OUTER terminal of "D.D.P"
- 5) Have auto-electrician increase output from generator by 0.8 volts to compensate for voltage drop across diode.

Two Battery System (continued):

Note: If the diodes fail bridge all three terminals on top of "D.D.P." but remember that you will lose your protection and both batteries will go flat together. If leaving bridge on for long periods reduce generator output voltage by 0.8 volts to prevent damage to batteries and generator.

FITTING TO ALTERNATOR SYSTEM:

When using diodes as a protective device there is a voltage drop or loss of voltage across the diode. This drop in voltage varies depending on the type of diodes used and the application in the circuit.

In our case the drop in voltage is 0.8 Volts. This means that the output voltage of the alternator must be increased to compensate for this voltage drop or the batteries will not come up to full charge. Most modern-day alternators are fitted with an electronic circuit (zener diodes which break down at a predetermined voltage) that automatically regulates the output voltage to 13.7 Volts and is not adjustable. As the alternator is only sensing the voltage at its output terminals it cannot compensate for the voltage drop across the diodes and so the battery voltage will remain "low".

After considerable research into this problem (and even the makers of the "Double Diode Pack" commercial unit were unable to answer our questions) the only solution appeared to be to bridge the diodes during running by the use of a double pole headlight relay. This allows the alternator to sense the actual battery voltage - the coils of the relay being connected across the ignition system so that the relay closes when the key is turned "ON". The diodes will protect each battery while the key is "OFF". You may ask, "Why not just use the relay and forget about diodes?" Alternators do not like open circuit conditions and can suffer total burn outs in a short time. Relays are more prone to problems - dirty contacts, coils not closing points, etc. than the possibility of a diode failure. The relay we used is rated at 35 amps and the diode at 75 amps and both of these share the load. If you had a 55 amp alternator fitted you would need a rather large relay if it was used without the "D.D.P."

To connect the relay to the "D.D.P." bridge both bottom terminals on the relay (some types have this already done and appear as terminal marked "B"). Connect wire from bridge, or "B" terminal on relay to center terminal on "D.D.P." and two tops of relay (L1 and L2) to outer terminals on "D.D.P." Connect both coils of relay together and run wire to key side of ignition coil. (Relay may be mounted on lid of box)

To install "D.D.P." and relay in vehicle carry out steps 1 to 4 as for "Fitting to Generator System", only substitute the word alternator for generator.

Three units as described above have been made and to date two have been installed in Range Rovers. The first unit has been in service for about six months and no problems have occurred. On two occasions the refrigerator was left turned on in the vehicle for two days while the vehicle stood locked at Tasmanian airport and the estimated inside temperature was 43°C. On returning to the vehicle the refrigerator had stopped (contents still cold) and the second battery was "dead flat", however the vehicle could be started and driven away.

This worthwhile unit has been developed with the co-operation and assistance of Don McNair of Transport Electrical Service Company in whose debt I am in for the loan of their extensive testing facilities.

- FOR SALE:** We buy, sell, or swap new or used Land-Rovers and parts. We prefer to deal on an exchange basis with items such as engines, transmissions, differentials, starters, etc. so that we can have a supply of used parts to work with. Rebuilt 2½ engines available - completely rebuilt with turned down cranks, new pistons, valve job, etc. We have the following in stock from which we will sell all or any parts:
- | | |
|-------------------------------|--------------------------|
| 1952 Series I Convertible RHD | 1966 Series IIa Bonneted |
| 1959 Series II Truck | 1969 Series IIa Bonneted |
| 1960 Series II Tropical roof | 1970 Series IIa Bonneted |
| 1964 Series IIa Truck | |
- Contact: Robert Shevchik, Emboy Automotive, 744 So Atherton St, State College, Pennsylvania, 16801 or call 814-237-0030.
- FOR SALE:** Snowplows. Front 6½ foot Meyers power angle plow, Meyers 6 foot rear plow with down pressure. Complete with electric pump, controls, all hoses and brackets to fit Land-Rover. Plows in excellent condition. \$900.00 complete. Contact: Dennis Jereb, 5575 Clarendon Hills Road, Clarendon Hills, Illinois, 60514 or call 312-887-1896 after 6:00 P.M.
- WANTED:** Land-Rover 109 Station Wagon. Contact: Richard W. Officer, Box 6275, APO, New York, 09633.
- FOR SALE:** A complete snow-plow set-up from a Land-Rover 88, Series IIa. It is in excellent shape with nothing bent or rusted. \$700 or will consider a deal for wheels and tires plus cash. Bruce Penn, 502 Chalfonte Dr, Catonsville, MD.
- FOR SALE:** 1967 Land-Rover 109 2½ litre petrol Pickup. Body and interior in good condition. Mechanical components are excellent: Complete engine rebuild by Authorised Land-Rover dealer 13,000 miles ago, new clutch, new exhaust system. Hydraulic snowplow. Price: \$1200.00. Contact: Alexander Farkas, 205 King George Road, Warren Township, New Jersey, 07060. Phone: 201-647-1081.
- WANTED:** Five 16" wheels for Series III model 88 Land-Rover. Also, overdrive unit for same as well as auxiliary fuel tank. Contact: Phillip B. Shepard, M.D. P.O. Box 188, Pembroke, Virginia, 24136, Phone: 703-382-4191.
- FOR SALE:** 1967 Rover 2000TC in good mechanical condition, but needs some cosmetic work. Included is a 1968 TC completely disassembled, with excellent to fair parts including glass, body panels, engine, mag wheels, and much more. For \$500.00. Contact: C. Frankovich, 12 Henry Court, Mount Arlington, New Jersey, 07856. Phone: 201-398-1620.
- FOR SALE:** 1974 Land-Rover 88 Series III. 12,000 miles, excellent condition. Light green. Has extras. Vehicle will be serviced to purchaser's total satisfaction. \$5000.00 firm. Call 609-478-4729 or write: Greg Gruse, Route #1, Box 357, Swedesboro, New Jersey, 08085.
- WANTED:** Land-Rover shop manuals, heated rear glass for Rover 2000, radiator muff and trailer hitch for Rover 2000.
- FOR SALE:** Parts from a 1969 2000TC wreck plus air conditioning and alternator equipment from a 1968 2000TC. Chrome style wheels and many other spares. Write: Roger Diggle, 206 N. Harvey, Urbana, Illinois, 61801 or phone: 217-384-8976. No collect calls, please.

FOR SALE: 1960 Land-Rover 109 Station Wagon. Faded red in color with some metal showing through. Small dent in side panel on right rear. Tropical roof. Drive train: Chevy 283 V-8, Jeep $\frac{1}{2}$ ton main transmission, Dodge Spicer transfer case, Warn overdrive and front hubs, Land-Rover differentials. AM/FM stereo cassette deck, motion-sensing burglar alarm, twin 5 gallon jerry can racks mounted to the rear door, lockable battery compartment under the passenger seat (left hand drive). Instrumentation: fuel level, ammeter, oil pressure, water temperature, high/low beam indicator, speedo, a lamp for silently testing the burglar alarm without setting off the horn, main transmission oil temperature, and transfer case/overdrive oil temp. All systems work perfectly. This Land-Rover will cruise all day at 70 mph. I have climbed long hills in the desert during the summer at 60 mph in overdrive with no overheating problems. Price: \$3500. Contact: Sherman Keene, c/o Eloise Peacock, Box 65186, Los Angeles, California, 90065. Phone: 213-222-3336 or 213-221-0091.

RENEWAL MEMBERS:

Edward Aho	815 Mt. Kisco Road Armonk, New York, 10504	1974 Land-Rover 88, Series III
Arnold Betbeze	1305 Scout Road Hixson, Tennessee, 37343	1965 2000SC, 1967 2000TC
Paul Bozman	26 Gander Crescent Kitimat, B.C., Canada	1972 Land-Rover 88, Series III 1966 2000TC
Chris Donald	P.O. Box 86356 N. Vancouver, B.C., Canada	1971 Land-Rover 88, Series IIa
Stephen Gaseau	222 Martling Avenue Tarrytown, New York, 10591	1967 Land-Rover 109, Series IIa
Jerome E. Gilles	2555-D W. 235th Street Torrence, California, 90505	1973 Land-Rover 88, Series III
Andrew Goldfine	120 Aspen Lane Duluth, Minnesota, 55803	1973 Land-Rover 88, Series III
David Goodson	Route 1, Box 83D Roy, Washington, 98580	1967 Land-Rover 109, Series IIa
Norman F. Lewis	6486 S. Kipling Court Littleton, Colorado, 80123	1965 Land-Rover 88, Series IIa 1957 Land-Rover 88, Series I
John R. Ludwig	326th ASA Co. APO, New York, 09178	1972 Land-Rover 88, Series III
George Matos	139 Moorehead Road Sarver, Pennsylvania, 16055	1963 Land-Rover 109 Pick-up
Hal Meredith	Tourist Village Motel, Rte. 6 & 209 Milford, Pennsylvania, 18337	1967, 1968, & 1969 2000TC's
Jacques Morecy	G.P. 237 St. Nicolas Co. Levis, Quebec, Canada, G0S-2Z0	1973 Land-Rover 88, Series III
Robert Osterman	65-28 Jay Avenue Maspeth, New York, 11378	1969 Land-Rover 88, Series IIa 1967 Land-Rover 109, Series IIa
Charles Rowell	P.O. Box 3 Monett, Missouri, 65708	1970 Land-Rover 88, Series IIa
David D. Traynham	26 TRW, Box 2011 APO, New York, 09860	1972 Land-Rover 88, Series III
Richard Turner	1104 W. Glendale Phoenix, Arizona, 85021	1972 Land-Rover 88, Series IIa
King Waters	2132 Lexington, Apt. D Houston, Texas, 77098	1973 Land-Rover 88, Series III

NEW MEMBERS:

Chris Boulsbee	322 18th Avenue Two Mountains, Port Quebec, Canada	1970 Land-Rover 88, Series IIa
Stephen R. Boyle	1817 West 4th Street Duluth, Minnesota, 55806	1965 Land-Rover 109, Series IIa
David Cosby	139 Beacon Street Hyde Park, Massachusetts, 02136	1974 Land-Rover 88, Series III
Thomas Dorian	P.O. Box 3541 Eugene, Oregon, 97403	1973 Land-Rover 88, Series III
Ron Eikenberry	1923 Red Dale Drive Rapid City, South Dakota, 57701	1972 Land-Rover 88, Series III
Sylvester L. Felty	P.O. Box 493 Fort Montgomery, New York, 10922	1967 2000TC
Emil C. Grohman	21430 Ontago Farmington, Michigan, 48024	1969 Land-Rover 88, Series IIa
Winston S. Harvey	4 Franklin Road Bedford, Massachusetts, 01730	1966 Land-Rover 109, Series IIa
Mark V. Hillman	12718 4th NW Seattle, Washington, 98177	1966 Land-Rover 88, Series IIa
Rick Jensen	7509 W 89th Street Los Angeles, California, 90045	1966 Land-Rover 88, Series IIa
Gordon Kirkpatrick	15631 SE Fairwood Blvd. Renton, Washington, 98055	1970 Land-Rover 88, Series IIa
Sharpe McCullough	113 Tuttle San Antonio, Texas, 78209	1959 Land-Rover 109, Series II
Rob Millberry	780 4th Street Lakeport, California, 95453	
Richard W. Officer	Box 6275 APO, New York, 09633	1972 Land-Rover 88, Series III
Mr. & Mrs. L. Palangi	401 Black Horse Pike Haddon Heights, New Jersey, 08035	1974 Land-Rover 88, Series III
Bruce R. Penn	502 Chalfonte Drive Catonsville, Maryland, 21228	1964 Land-Rover 88, Series IIa
Joseph Peterson, Jr.	721 Roselle Street Linden, New Jersey, 07036	1970 3500S
James G. Richmond	P.O. Box 1271 Roseburg, Oregon, 97470	1959 Land-Rover 88, Series II 1960 Land-Rover 88, Series II
Allan D. Rodgers	R.D. 2 New Wilmington, Pennsylvania, 16142	1966 Land-Rover 109, Series IIa
Bonny & Erwin Ruhland	2400 Bayou Drive League City, Texas, 77573	1974 Land-Rover 88, Series III
Stephan E. Seflik II	105 West Michigan Urbana, Illinois, 61801	1972 Land-Rover 88 Hardtop
Phillip B. Shepard	Box 188 Pembroke, Virginia, 24136	1972 Land-Rover 88, Series III
Edwin L. Sherrill	PO. 827, U.S. Merchant Marine Academy Kings Point, New York, 11024	1973 Land-Rover 88
James S. Smith	1224 Martine Avenue Plainfield, New Jersey, 07060	1970 Land-Rover 88, Series IIa
Peter Tester	129 Pointe Claire Avenue Pointe Claire, Quebec, Canada, H9S-4M7	1974 Land-Rover 88, Series III
Ronald Watt	127 Pointe Claire Avenue Pointe Claire, Quebec, Canada, H9S-4M7	1971 3500S (2), 1970 2000TC
Waldon R. Weber	Box 1748 Litchfield Park, Arizona, 85340	1969 Land-Rover 88, Series IIa