

## WHERE THERE IS NO MECHANIC



**A Guide for Driving and Vehicle Use in the  
Southern Africa Region**



## CONTENTS

<b>Section 1</b> .....	4
Basic servicing of your vehicle	
<b>Section 2</b> .....	6
More advanced servicing tips	
<b>Section 3</b> .....	9
Important basic equipment which you should have in your vehicle	
<b>Section 4</b> .....	11
Frequently encountered problems	
<b>Section 5</b> .....	15
Petrol vs Diesel	
<b>Section 6</b> .....	15
Some tips for off-road driving	
<b>Section 7</b> .....	19
Pulling a trailer	
Loading a truck	
<b>Section 8</b> .....	20
Types of tires	
<b>Section 9</b> .....	21
Economical driving	
<b>Section 10</b> .....	22
Log book	
Vehicle cleanliness and appearance	
Turning in a vehicle	
<b>Section 11</b> .....	23
Carjacking	
<b>Section 12</b> .....	26
Vehicle Policies	
<b>Appendix A</b> .....	28









tie rod ends. Follow recommended service intervals for frequency of servicing.

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**2:7 Items applying exclusively to petrol vehicles or diesel vehicles.**

- a) Petrol vehicles  
Remove, clean, check and re-set spark gap on all spark plugs. If you're unfamiliar with the method for doing this it is best to fit new ones about every 20,000 – 30,000 km.
- b) Diesel vehicles  
Most diesels have a drain facility on the bottom of the fuel filter (normally in the engine compartment). Every three months or whenever the indicator light glows, drain out any water and allow about a cup of diesel fuel to drain out. Retighten.

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**2:8 Items which should be checked about every 10,000 – 15,000 km or every 6-12 months (In severe conditions bi - monthly)**

- a) Check condition of all hoses to and from radiator. Seek help and change the hose if it appears to be bad or shows signs of deterioration. Be sure that no hose is being touched and damaged by a belt etc. Carry replacement hoses and clamps with you in case of emergency.
- b) Check/clean battery terminals if acid is forming (white substance). Remove NEGATIVE terminal first; then the POSITIVE one. Caution, this acid is very powerful. It will ruin clothing and burn skin!
  - 1. Stir 2 tablespoons of bicarbonate of soda into a half liter (500ml) of boiling water.
  - 2. Pour carefully over all affected parts - especially the 2 terminals and the 2 clamps.
  - 3. Allow to dry.
  - 4. Smear grease over those areas – especially the 2 clamps (in order to retard the future formation of acid)
  - 5. Tighten the POSITIVE clamp first;
  - 6. THEN position the NEGATIVE clamp in place and carefully tighten it too. (Do not over-tighten)
- c) If you know how to, prime or “bleed” the diesel fuel filter to remove air from the system,

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**SECTION 4 – FREQUENTLY ENCOUNTERED PROBLEMS**

**4:1 General awareness - Pay attention to the dials!**

It is very important to be aware of the gauges, warning lights, sounds and feel of your vehicle when everything is working properly. Scan gauges and lights every five minutes and especially keep an eye on temperature and oil pressure gauges/lights. Do not run an engine hot. Motor damage can happen costing the IMB (or you) many dollars. Know what sounds are normal and which are not. Awareness of your vehicle’s state can save time, money and maybe even lives.

- The TEMPERATURE GAUGE. Rising up into the HOT sector. [See Sect 4:5 for more info] Stop engine; open hood; look for the possible cause, (e.g. a water leak? Is the fan belt correct?) NEVER attempt to remove radiator cap when engine is hot! Allow to cool (with hood open). Only open the cap when radiator is cool enough to rest hand on it. Have water available; start engine; allow to idle while pouring water in very slowly. Drive on with care.
- The OIL GAUGE or LIGHT. Registering too low or lighting up. Stop engine; look for possible cause – e.g. oil leak which must be rectified before it is safe to proceed. Check oil level [Sect 1:1] Do not drive with the oil light on or the oil pressure gauge reading low.
- The FUEL GAUGE On many diesel vehicles there is a ‘low fuel’ warning light which warns you to add more fuel – especially important when negotiating steep areas. [Sect 4:4]

**4:2 Flat Tire**

- Try to stop the vehicle in a relatively safe yet flat place. Set the emergency brake and put suitable blocks/stones on either side of at least one opposite wheel. Loosen the wheel nuts of the flat wheel half a turn. Jack up the wheel until it is just clear of the ground. Have the spare wheel ready and remove the wheel nuts.
- Gently remove flat wheel. Immediately fit the spare wheel. Tighten all the wheel nuts a little. Alternate tightening wheel nuts, working in a cross manner. Lower the jack and recheck the wheel nuts.
- NOTE: In some areas, you will receive “unwanted” offers of help to change your tire. This can especially be true in a city venue where













- Avoid driving through deep diagonal ditches etc., where diagonally opposite wheels fall into the gully and can easily both lose grip simultaneously, allowing most 4WD vehicles to be truly stuck. It is better to alter the angle of approach where possible, so as to avoid this situation. Again, a little more momentum can be an advantage, rather than crawling through very slowly in the slowest gear.

### 6:7 Using a winch

Some 4WD vehicles are fitted with an Electric Winch (powered by the vehicle's battery). These can be very helpful when stuck.

- Pull out the cable and attach the hook to a length of chain or rope which is fixed to a strong object like a large tree or to another vehicle. (Never fix the winch cable directly to an 'anchor point' in such a way as to kink or otherwise damage the cable). It is often advisable to have 1 or 2 lengths of heavy rope available for winching purposes [Sect 3:5].
- A friend should hold the steering wheel so that the front wheels face in the appropriate direction (or tie the steering wheel to the brake pedal). Ensure the gear lever is in 'neutral' and allow winch to pull vehicle out. NOTE: The anchor point must not be too steeply off to one side thus pulling the vehicle off course.
- Where no suitable anchor point is available (e.g. In deep sand) it is often helpful to bury the spare wheel laying it flat in a trench about 30cm deep, having attached a strong rope to it for the winch cable to hook onto.

### Diesel Engines

Category	Status	Service
CH-4	Current	Introduced December 1, 1998. For high-speed, four-stroke engines designed to meet 1998 exhaust emission standards. CH-4 oils are specifically compounded for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, and CG-4 oils.
CG-4	Current	Introduced in 1995. For severe duty, high-speed, four-stroke engines using fuel with less than 0.5% weight sulfur. CG-4 oils are required for engines meeting 1994 emission standards. Can be used in place of CD, CE, and CF-4 oils.
CF-4	Current	Introduced in 1990. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CD and CE oils.
CF-2	Current	Introduced in 1994. For severe duty, two-stroke-cycle engines. Can be used in place of CD-II oils.
CF	Current	Introduced in 1994. For off-road, indirect-injected and other diesel engines including those using fuel with over 0.5% weight sulfur. Can be used in place of CD oils.
CE	Obsolete	Introduced in 1987. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CC and CD oils.
CD-II	Obsolete	Introduced in 1987. For two-stroke cycle engines.
CD	Obsolete	Introduced in 1955. For certain naturally aspirated and turbocharged engines.
CC	Obsolete	For engines introduced in 1961.
CB	Obsolete	For moderate duty engines from 1949 to 1960.
CA	Obsolete	For light duty engines (1940's and 1950's).

For more information about the API Engine Oil Program, call the American Petroleum Institute at 202-682-8516 or visit our website at [www.api.org/eolcs](http://www.api.org/eolcs). This guide is provided as a service to the motoring public courtesy of the American Petroleum Institute.  
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# Which oil is right for you?

The current and previous API Service Categories are listed below. Vehicle owners should refer to their owner's manuals before consulting these charts. Engine oils are categorized based on their performance characteristics and the type of service for which they are intended: **S** category oils are suitable for gasoline engines and **C** category oils for diesel engines. Oils may have more than one performance level. For automotive gasoline engines, the latest engine oil service category includes the performance properties of each earlier category. If an automotive owner's manual calls for an API SG or SH oil, an API SJ oil will provide full protection. For diesel engines, the latest category usually - but not always - includes the performance properties of an earlier category.

## Gasoline Engines

Category	Status	Service
SJ	Current	For all automotive engines presently in use. Introduced in the API Service Symbol in 1996.
SH	Obsolete	For model year 1996 and older engines. Valid when preceded by certain C categories.
SG	Obsolete	For model year 1993 and older engines.
SF	Obsolete	For 1988 and older engines.
SE	Obsolete	For 1979 and older engines.
SD	Obsolete	For 1971 and older engines.
SC	Obsolete	For 1967 and older engines.
SB	Obsolete	For older engines. Use only when specifically recommended by the manufacturer.
SA	Obsolete	For older engines; no performance requirement. Use only when specifically recommended by the manufacturer.

Note: API intentionally omitted "SI" from the sequence of categories because the letters are commonly used to refer to international units of measurement.

## SECTION 7 – PULLING A TRAILER and LOADING A TRUCK

### 7:1 Pulling a trailer

When pulling a trailer there are a few items to be aware of that can make the trip more pleasant.

- a) Make sure the tow bar or trailer hitch is securely attached to the chassis of the vehicle. Carry wrenches that fit the bolts if you need to tighten them along the way. Stop and check this often.
- b) Assure that the electrical wiring is working properly on the trailer
- c) Check the safety chain operation on the trailer. Make sure it has enough length and that it is strong enough to handle the loaded trailer.
- d) Do not exceed the carrying capacity of the trailer or the pulling capacity of the towing vehicle. Trailers without brakes normally are limited to a 500kg load capacity.
- e) Be aware of added stopping distances when pulling a loaded trailer, especially in damp or wet conditions.
- f) Properly load the trailer so that the tongue weight is limited to less than 100 pounds – place more load weight toward the back of the trailer to balance the tongue weight.
- g) Maintain proper air pressure in all tires, including the spare.
- h) Secure load properly. Shifting loads can overturn the trailer and the towing vehicle.
- i) If using an open trailer with a tarp assure that the tarp is adequately secured before departure. Re-tying a tarp alongside the road is dangerous.

### 7:2 Loading the roof rack or bed of a truck

- a) Loading a roof rack  
It is important to remember that the weight and size of luggage on the roof rack on the cab of a truck must be limited to perhaps 100kg on bad roads (150kg for larger 4WD vehicles). Luggage on a roof rack on a truck canopy should be no more than 75 kg maximum due to the fact that the canopy is not as strong as the actual vehicle body. Luggage must be secured very well and where possible, centrally positioned, not off to one side. Stop and check the luggage from time to time.

- b) Loading the bed of a pickup  
 Make sure that the heaviest containers are loaded low in the bed of a truck. We have had accidents where vehicles have flipped because of heavy items being loaded high in a canopy or roof rack. The center of gravity for a 4x4 pick up is already high. Help keep it as low as possible by loading items properly. Be sure all items, even inside a canopy, are secured properly.



### 3. Fuel Economy Rating

The “Energy Conserving” rating applies only to oils intended for gasoline-engine cars, vans, and light trucks. Widespread use of “Energy Conserving” oils may result in an overall savings of fuel in the nation as a whole. (Applies primarily to SAE 5W-30 and 10W-30 grades.)

Guide to SAE Grades of Motor Oil for Passenger Cars	
Multigrade oils such as SAE 5W-30 and 10W-30 are widely used because, under all but extremely hot or cold conditions, they are thin enough for easy cranking at low temperatures and thick enough to perform satisfactorily at high temperatures. <b>Note that your vehicle’s requirements may vary. Follow your vehicle manufacturer’s recommendations on SAE oil viscosity.</b>	
If the lowest outdoor temperature is	Typical SAE Viscosity Grades for Passenger Cars
0°C (32°F)	5W-30, 10W-30, 10W-40, 20W-50
-18°C (0°F)	5W-30, 10W-30, 10W-40
Below -18°C (0°F)	5W-30

### SECTION 8 - TYPES OF TIRES

There are many different kinds of tires, designed for various types of terrain. When buying a new set, it is useful to know which type would suit your average conditions best.

The following are the basic steps:

- The STREET or TOWN tire has many small grooves and the ‘ribs’ go right round the circumference of the tire. These generally give much better mileage and control on good/ fast roads also good for rocky conditions, very poor in mud.
- The MUD or OFF ROAD tire has much larger blocks with large, deep grooves, often going across the tire from left to right. Far better for off road and muddy conditions, not too good for fast roads – especially when wet.
- The SAND tire has large, shallow tread blocks, gives excellent ‘floatation’ in deep soft sand. Poor performance in mud or on fast, wet roads.

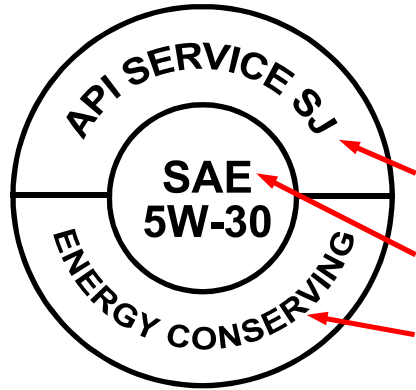
### Guidelines to help you get more from your motor oil.

- Refer to your owner’s manual for type of oil to use.
- Follow manufacturer’s oil change recommendations.
- Use only the recommended API category. “S” for gasoline engines; “C” for diesel engines.
- Select the proper SAE oil viscosity.
- If you find it necessary to mix brands of oil, use the same viscosity grade and API service category to maintain performance.
- Properly dispose of used oil. Contact your local service station or recycling center for assistance.

## APPENDIX A

# Motor Oil Guide

API's Service Symbol and Certification Mark identify quality engine oils for gasoline and diesel powered vehicles. Oils displaying the API Marks meet performance requirements set by U.S. and international vehicle and engine manufacturers and the lubricant industry. More than 500 companies participate in this voluntary program, which is backed by a market place sampling and testing program.



Describes Oil's Performance Level

Describes Oil's Viscosity

Fuel Economy Rating

## 1. Performance Level

**Gasoline engine oil categories** (for cars, vans, and light trucks with gasoline engines): Oils designed for gasoline-engine service fall under API's "S" (Service) categories. Look for current service category SJ. API SH may appear in the Service Symbol when preceded by a "C" category. See reverse for descriptions of current and obsolete API service categories.

**Diesel engine oil categories** (for heavy-duty trucks and vehicles with diesel engines): Oils designed for diesel-engine service fall under API's "C" (Commercial) categories. Look for current categories CH-4, CG-4, CF-4, CF-2, and CF.

## 2. Viscosity

The measure of an oil's thickness and ability to flow at certain temperatures.

d) The ALL TERRAIN tire is a compromise of a) and b) above and is often the best general purpose tire for African conditions.

NOTE: Generally speaking most modern vehicles use 'radial' tires as opposed to 'bias or cross ply' tires. Vehicles with coil spring suspension must not use 'cross ply' tires.

## SECTION 9 – ECONOMICAL DRIVING

In many countries, fuel and spare parts are either expensive or hard to find – sometimes BOTH. With this in mind, the following are a few suggestions to help you get the most work out of both the fuel and the vehicle.

- It is helpful to know that with a petrol vehicle, it is very possible to increase the distance you can travel on a certain quantity of fuel, by the way you drive.
- By driving carefully, accelerating slowly and using the right gear in every situation, a driver can go as much as twice as far as the harsh driver who accelerates and brakes hard and uses too slow a gear (e.g., too high an engine speed). It is worth knowing too that the 'gentle' driver will normally get far greater mileage from the vehicle (and the individual parts, e.g. brakes and tires) than the harsh driver. Also the careful driver is less likely to have an accident than the impatient driver.
- In most of the African countries it is far more risky traveling in the dark than in the daytime. It's also wiser starting a long journey well before dawn, rather than drive into the night. Avoid night driving if at all possible.
- Often considerable money can be saved by the owner who checks his vehicle frequently to rectify any fault which is developing. For example: the shock absorber rubbers are worn allowing many components to shake - especially on bad roads. If these little rubbers are not replaced promptly, this shaking will result in overloading of the associated parts causing them to wear



prematurely – and will finally lead to the vehicle being unsafe to drive.

**SECTION 10 – LOG BOOK**  
**VEHICLE CLEANLINESS AND APPEARANCE**  
**TURNING IN A VEHICLE**

**10:1 Log Book**

- You are required to have a log book for your IMB vehicle. This can be a separate book or at the end of this booklet are several pages of blank lined pages that you can use. You are required to record maintenance and repairs in this log book. Please be diligent to do this and be detailed in the entries. It can save the IMB considerable amounts of funds in not repeating required maintenance.

**10:2 Vehicle Cleanliness and appearance**

- It is the responsibility of the unit the vehicle is assigned to, to keep the vehicle clean and the appearance maintained in an adequate manner. If radios or speakers are added at personal expense the cutouts must be repaired or replaced when the vehicle is sold or replaced. The radio and speakers may be left with the vehicle as an option; however, the IMB is under no obligation to reimburse the costs.
- Waxing the vehicle at a minimum of every six months is recommended. Carpets and seat covers are to be kept clean.

**10:3 Turning in a vehicle**

- You will at some point in time be required to turn in a vehicle. This may be due to vehicle exchange, transfer of location, or Stateside Assignment. While you are on the field all necessary maintenance and repairs should be included in your budget. For this reason all vehicles should be returned to the fleet in the same shape as received, less the expected wear for the kilometers driven.
- Every CR will attempt to issue a vehicle that is roadworthy and contains the necessary equipment required by the country in which you are located. All the equipment issued with the vehicle should be returned with the vehicle.



**Country Representative's spare vehicle lot**

4. TAKE VARIOUS ROUTES HOME. But in the end, one just has to be alert, and at times the risk is unavoidable. After all, there are usually only two directions to go on the road leading to one's gate!

5. REST IN GOD'S SOVEREIGNTY. Thieves can do only what God allows in His permissive will. When it is a gang such as I experienced, I really do not know what could have been done differently. Even had I approached the gate at an angle where I could have sped away, there would have been an AK47 in front of me and an Uzi behind me. Trying to drive away would have likely ended in gunfire, and possible injury to Tom or me. So, be smart, but don't try to do it like in the movies. After all, those are staged.

## **SECTION 12 - VEHICLE POLICIES**

Contact your Country Representative for up to date vehicle policies in use in the Southern Africa Region. Please review and be aware of these policies.

### **END NOTES:**

Over 90% of the accidents that we have in the Southern Africa Region occur in the first term a missionary is on the field. A majority of these happen in the first year on the field. Making adjustments to field driving conditions, which sometimes include driving on the left hand side of the road in a right hand drive vehicle with a manual transmission, can save a lot of problems and maybe lives. It is very important to understand this and compensate for it by reducing your speed, not driving after dark, and being extra cautious in your driving habits. Understanding the vehicle you are driving, knowing its limitations, keeping it properly maintained and being aware of all that is going on around you can help reduce this rate. I hope the things in this little book will assist you as you carry out the ministry God has called you to Southern Africa to do.

Mark Hatfield.

- Needed repairs should be made by you before the vehicle is returned. These repairs include up to date oil and filter changes, replacement of worn or damaged tires, needed panel beating, engine/drive train and brake repairs, door/lock repairs, excessive windscreen damage repairs, inside and outside cleaning, and other odds and ends that are needed to keep the vehicle in good condition. You should turn in a vehicle as you would like to receive it!
- If these items are not completed, the costs for them will be charged to your 10145 account by the CR.

## **SECTION 11 - CARJACKING**

### **11:1 Prevention**

- Try to avoid putting yourself in the position of making a car theft/ carjacking easy for anyone.
- Use the mechanical anti theft devices in your vehicle (gear and steering wheel locks) at all times the car is not running.
- Try to avoid being blocked in without any escape route. This is especially true when entering gates. Stop on the road if necessary so that you can escape forward if blocked in at the rear. Keep bushes and shrubs clean around gates so that people cannot hide behind them.
- Differ your routes for trips you do on a regular basis. Be aware of a vehicle following you, especially if you are near a location where you normally stop.

### **11:2 What to do if carjacked**

If you are faced with a situation it is very important to remain calm and do exactly what those who are trying to take the vehicle ask you to do. Do all you can to avoid this type of situation, but when presented with the threat do not try to be a hero and do not try to save the vehicle. If you are taken with the hijacked vehicle, do exactly what they ask you to do. If they are speaking a language that you understand, but they do not know you are understanding do not let them know. Valuable information could be learned if they think they can speak without you understanding. Try to be aware of general directions as you are traveling. It could help you get

back home. If you are forced into the floor, trunk or back load box of a vehicle, remain calm and try to reason through your options. If released in a remote area seek assistance from the first person you can find that appears safe. Your mission family will be trying to locate you as soon as they get word of the hijacking. If no one can help you try to walk to the nearest road.

### 11:3 ANTI-HIJACKING Tips From The Zimbabwe Anti Hijack Trust

Be prepared - it could happen at any time - to you!

Remember that 98% of carjackings happen at gates, you must be aware, and get into the habit of waiting before you turn into your driveways to check what is going on around you. Can you phone home and advise relatives/friends that you are on the way? Can they have the gates open for you?

**DO NOT FIGHT BACK** if you are hijacked, you WILL be injured if you do. **THINK** before setting out on a journey. Plan ahead and be safe.

While driving, always leave your window approx. 5 cm open. If the window is totally closed, it is easier to break! Always put your bag under the passenger seat or in the trunk. Never grab for it when you are getting out of the car when being hijacked - the hijacker will think you are reaching for a gun and shoot you!

Always keep your cell phone clipped to your belt - thus when you are out of the car you can call for help.

Be more aware - count the number of cars around you, the number of people in groups etc. Then you will know exactly when one is missing!

Don't race to the light if it is red - you get hijacked only when the car is stationary - so glide to the red light, so there is only a short time until it turns green.

When a gun is put to your window, put both hands up facing the hijacker. Always allow him to see your hands otherwise he thinks you are looking around for a gun and will shoot you.

Be aware of where the police station is in your work and home areas.

The human body takes 21 days to kick into a habit; therefore, don't give up on being aware. Persist for at least 21 days.

Current vehicles considered "hot cakes" include Double Cabs, Toyotas, Sunnys and BMW's - be very aware if you have one.

Of course - keep your doors locked.

We all have to remain suspicious and very aware every time we drive our cars. We do not EXPECT to be held up, threatened, and conned into stopping. It therefore takes us several seconds to understand what is happening - vital seconds for the hijackers.

Anticipate trouble ahead, be prepared to turn around quickly if you sense something wrong, and, sad to say, don't trust anyone you don't know.

Apart from our homes, our cars are probably the next most important asset we own. Have you taken every precaution to keep it? Do you think ahead and plan your route?

The most innocent looking person walking past your car in town could be a carjacker – it has happened.

**11:4 Notes from a Carjacked Missionary.** (See Cover for a picture of the Author, Sam Upton ☺).

1. DO NOT RESIST! People are precious in God's sight. Vehicles are not. Vehicles can be replaced. Give up the vehicle as non-confrontationally as possible. Of course thieves can order us to do things that put us at greater risk. As best you can make decisions based upon reducing the risk to your own life.

(The night before I was hijacked, thieves, maybe the same ones, tried to steal a government vehicle. The adult son of the driver of the vehicle tried to stop the thieves and was shot in the stomach. Last I heard, he was fighting for his life in intensive care).

2. PRAY! PRAY! PRAY! I doubt if anyone needs to be reminded of this. Friends should call the Regional Office as soon as possible for the worldwide network of prayer warriors to be alerted. It is humbling to know that thousands can be praying within minutes.

3. DRIVE AS LITTLE AS POSSIBLE AT NIGHT. It is true that one carjacking and one failed attempt in our cluster happened at mid-day in broad daylight. However, more of these things happen at night than in day.