

**CHILTON** *BOOK*  
**COMPANY**

REPAIR MANUAL

**TOYOTA  
TRUCKS  
1970-88**

All U.S. Canadian models of Pick-ups, Land Cruisers  
and 4Runner, including 4-wheel drive and diesel engines

TRUCK

W. R. RIVELE  
MORGANTINI  
AND ATH 2A  
2.2  
4.6 B HP  
300  
ET1531-02

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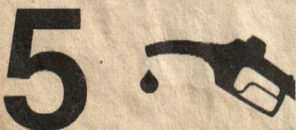
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## **SAFETY NOTICE**

Proper service and repair procedures are vital to the safe, reliable operation of all motor vehicles, as well as the personal safety of those performing repairs. This book outlines procedures for servicing and repairing vehicles using safe, effective methods. The procedures contain many NOTES, CAUTIONS and WARNINGS which should be followed along with standard safety procedures to eliminate the possibility of personal injury or improper service which could damage the vehicle or compromise its safety.

It is important to note that repair procedures and techniques, tools and parts for servicing motor vehicles, as well as the skill and experience of the individual performing the work vary widely. It is not possible to anticipate all of the conceivable ways or conditions under which vehicles may be serviced, or to provide cautions as to all of the possible hazards that may result. Standard and accepted safety precautions and equipment should be used when handling toxic or flammable fluids, and safety goggles or other protection should be used during cutting, grinding, chiseling, prying, or any other process that can cause material removal or projectiles.

Some procedures require the use of tools specially designed for a specific purpose. Before substituting another tool or procedure, you must be completely satisfied that neither your personal safety, nor the performance of the vehicle will be endangered.

Although the information in this guide is based on industry sources and is as complete as possible at the time of publication, the possibility exists that the manufacturer made later changes which could not be included here. While striving for total accuracy, Chilton Book Company cannot assume responsibility for any errors, changes, or omissions that may occur in the compilation of this data.

## **PART NUMBERS**

Part numbers listed in this reference are not recommendations by Chilton for any product by brand name. They are references that can be used with interchange manuals and aftermarket supplier catalogs to locate each brand supplier's discrete part number.

## **SPECIAL TOOLS**

Special tools are recommended by the vehicle manufacturer to perform their specific job. Use has been kept to a minimum, but where absolutely necessary, they are referred to in the text by the part number of the tool manufacturer. These tools can be purchased, under the appropriate part number, from Kent-Moore Corporation, 29784 Little Mack, Roseville, Michigan 48066. For Canada, contact Kent-Moore of Canada, Ltd., 2395 Cawthra Mississauga, Ontario, Canada L5A 3P2 or an equivalent tool can be purchased locally from a tool supplier or parts outlet. Before substituting any tool for the one recommended, read the SAFETY NOTICE at the top of this page.

## **ACKNOWLEDGMENTS**

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# General Information and Maintenance

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## HOW TO USE THIS BOOK

Chilton's Repair Manual for Toyota Trucks is intended to teach you about the inner workings of your truck and save you money on its upkeep.

The first two chapters will be the most used, since they contain maintenance and tune-up information and procedures. Studies have shown that a properly tuned and maintained truck can get at least 10% better gas mileage (which translates into lower operating costs) and periodic maintenance will catch minor problems before they turn into major repair bills. The other chapters deal with the more complex systems of your truck. Operating systems from engine through brakes are covered to the extent that the average do-it-yourselfer becomes mechanically involved. This book will not explain such things as rebuilding the differential for the simple reason that the expertise required and the investment in special tools make this task impractical and uneconomical. It will give you the detailed instructions to help you change your own brake pads and shoes, tune-up the engine, replace spark plugs and filters, and do many more jobs that will save you money, give you personal satisfaction and help you avoid expensive problems.

A secondary purpose of this book is a reference guide for owners who want to understand their truck and/or their mechanics better. In this case, no tools at all are required. Knowing just what a particular repair job requires in parts and labor time will allow you to evaluate whether or not you're getting a fair price quote and help decipher itemized bills from a repair shop.

Before attempting any repairs or service on your truck, read through the entire procedure outlined in the appropriate chapter. This will give you the overall view of what tools and supplies will be required. There is nothing more

frustrating than having to walk to the bus stop on Monday morning because you were short one gasket on Sunday afternoon. So read ahead and plan ahead. Each operation should be approached logically and all procedures thoroughly understood before attempting any work. Some special tools that may be required can often be rented from local automotive jobbers or places specializing in renting tools and equipment. Check the yellow pages of your phone book.

All chapters contain adjustments, maintenance, removal and installation procedures, and overhaul procedures. When overhaul is not considered practical, we tell you how to remove the failed part and then how to install the new or rebuilt replacement. In this way, you at least save the labor costs. Backyard overhaul of some components (such as the alternator or water pump) is just not practical, but the removal and installation procedure is often simple and well within the capabilities of the average truck owner.

Two basic mechanic's rules should be mentioned here. First, whenever the LEFT side of the truck or engine is referred to, it is meant to specify the DRIVER'S side of the truck. Conversely, the RIGHT side of the truck means the PASSENGER'S side. Second, all screws and bolts are removed by turning counterclockwise, and tightened by turning clockwise.

Safety is always the most important rule. Constantly be aware of the dangers involved in working on or around an automobile and take proper precautions to avoid the risk of personal injury or damage to the vehicle. See the section in this chapter, Servicing Your Vehicle Safely, and the SAFETY NOTICE on the acknowledgment page before attempting any service procedures and pay attention to the instructions provided. There are 3 common mistakes in mechanical work:

1. Incorrect order of assembly, disassembly



## 2 GENERAL INFORMATION AND MAINTENANCE

or adjustment. When taking something apart or putting it together, doing things in the wrong order usually just costs you extra time; however it CAN break something. Read the entire procedure before beginning disassembly. Do everything in the order in which the instructions say you should do it, even if you can't immediately see a reason for it. When you're taking apart something that is very intricate (for example a carburetor), you might want to draw a picture of how it looks when assembled at one point in order to make sure you get everything back in its proper position. We will supply exploded views whenever possible, but sometimes the job requires more attention to detail than an illustration provides. When making adjustments (especially tune-up adjustments), do them in order. One adjustment often affects another and you cannot expect satisfactory results unless each adjustment is made only when it cannot be changed by any other.

2. Overtorquing (or undertorquing) nuts and bolts. While it is more common for overtorquing to cause damage, undertorquing can cause a fastener to vibrate loose and cause serious damage, especially when dealing with aluminum parts. Pay attention to torque specifications and utilize a torque wrench in assembly. If a torque figure is not available remember that, if you are using the right tool to do the job, you will probably not have to strain yourself to get a fastener tight enough. The pitch of most threads is so slight that the tension you put on the wrench will be multiplied many times in actual force on what you are tightening. A good example of how critical torque is can be seen in the case of spark plug installation, especially where you are putting the plug into an aluminum cylinder head. Too little torque can fail to crush the gasket, causing leakage of combustion gases and consequent overheating of the plug and engine parts. Too much torque can damage the threads or distort the plug, which changes the spark gap at the electrode. Since more and more manufacturers are using aluminum in their engine and chassis parts to save weight, a torque wrench should be in any serious do-it-yourselfer's tool box.

There are many commercial chemical products available for ensuring that fasteners won't come loose, even if they are not torqued just right (a very common brand is Loctite®). If you're worried about getting something together tight enough to hold, but loose enough to avoid mechanical damage during assembly, one of these products might offer substantial insurance. Read the label on the package and make sure the product is compatible with the materials, fluids, etc. involved before choosing one.

3. Crossthreading. This occurs when a part

such as a bolt is screwed into a nut or casting at the wrong angle and forced, causing the threads to become damaged. Crossthreading is more likely to occur if access is difficult. It helps to clean and lubricate fasteners, and to start threading with the part to be installed going straight in, using your fingers. If you encounter resistance, unscrew the part and start over again at a different angle until it can be inserted and turned several times without much effort. Keep in mind that many parts, especially spark plugs, use tapered threads so that gentle turning will automatically bring the part you're threading to the proper angle if you don't force it or resist a change in angle. Don't put a wrench on the part until it's been turned in a couple of times by hand. If you suddenly encounter resistance and the part has not seated fully, don't force it. Pull it back out and make sure it's clean and threading properly.

Always take your time and be patient; once you have some experience, working on your truck will become an enjoyable hobby.

## TOOLS AND EQUIPMENT

Naturally, without the proper tools and equipment it is impossible to properly service your vehicle. It would be impossible to catalog each tool that you would need to perform each or every operation in this book. It would also be unwise for the amateur to rush out and buy an expensive set of tools and the theory that he may need one or more of them at sometime.

The best approach is to proceed slowly, gathering together a good quality set of those tools that are used most frequently. Don't be misled by the low cost of bargain tools. It is far better to spend a little more for better quality. Forged wrenches, 10 or 12 point sockets and fine tooth ratchets are by far preferable to their less expensive counterparts. As any good mechanic can tell you, there are few worse experiences than trying to work on a truck with bad tools. Your monetary savings will be far outweighed by frustration and mangled knuckles.

Certain tools, plus a basic ability to handle tools, are required to get started. A basic mechanics tool set, a torque wrench, and, for 1976 and later models, a Torx® bits set. Torx® bits are hexlobular drivers which fit both inside and outside on special Torx® head fasteners used in various places on some trucks.

Begin accumulating those tools that are used most frequently; those associated with routine maintenance and tune-up.

In addition to the normal assortment of screwdrivers and pliers you should have the following tools for routine maintenance jobs (your



truck, depending on the model year, uses both SAE and metric fasteners):

1. SAE/Metric wrenches, sockets and combination open end/box end wrenches in sizes from 1/8 in. (3mm) to 3/4 in. (19mm), and a spark plug socket (13/16 in. or 5/8 in.). If possible, buy various length socket drive extensions. One break in this department is that the metric sockets available in the U.S. will all fit the ratchet handles and extensions you may already have (1/4 in., 3/8 in., and 1/2 in. drive).

2. Jackstands for support.
3. Oil filter wrench.
4. Oil filler spout or funnel.
5. Grease gun for chassis lubrication.
6. Hydrometer for checking the battery.
7. A low flat pan for draining oil.
8. Lots of rags for wiping up the inevitable mess.

In addition to the above items there are several others that are not absolutely necessary, but handy to have around. These include oil-dry, a transmission fluid funnel and the usual supply of lubricants, antifreeze and fluids, although these can be purchased as needed. This is a basic list for routine maintenance, but only your personal needs and desires can accurately determine your list of necessary tools.

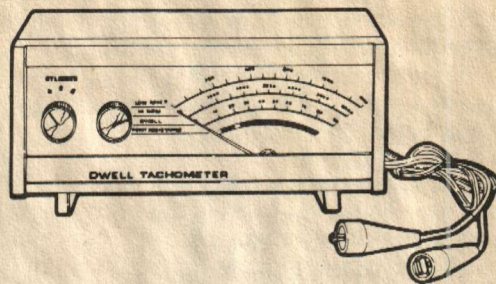
The second list of tools is for tune-ups. While the tools involved here are slightly more sophisticated, they need not be outrageously expensive. There are several inexpensive tach/dwell meters on the market that are every bit as good for the average mechanic as a \$100.00 professional model. Just be sure that it goes to at least 1200-1500 rpm on the tach scale and that it works on 4, 6 and 8 cylinder engines. A basic list of tune-up equipment could include:

1. Tach-dwell meter
2. Spark plug wrench
3. Timing light (a DC light that works from the truck's battery is best, although an AC light that plugs into 110V house current will suffice at some sacrifice in brightness)
4. Wire spark plug gauge/adjusting tools
5. Set of feeler blades.

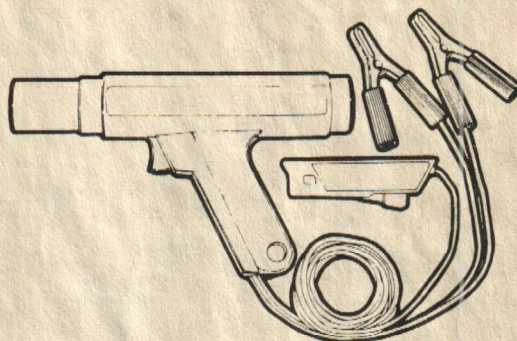
Here again, be guided by your own needs. A feeler blade will set the point gap as easily as dwell meter will read dwell, but slightly less accurately. And since you will need a tachometer anyway ... well, make your own decision.

In addition to these basic tools, there are several other tools and gauges you may find useful. These include:

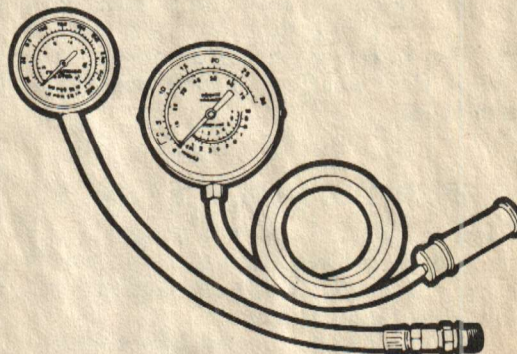
1. A compression gauge. The screw-in type is slower to use, but eliminates the possibility of a faulty reading due to escaping pressure
2. A manifold vacuum gauge
3. A test light
4. An induction meter. This is used for deter-



A dwell/tachometer is useful for tune-up work; you won't need a dwell meter if your car has electronic ignition



An inductive pickup simplifies timing light connection to the spark plug wire



A compression gauge and a combination vacuum/fuel pressure gauge are handy for troubleshooting and tune-up work

mining whether or not there is current in a wire. These are handy for use if a wire is broken somewhere in a wiring harness.

As a final note, you will probably find a torque wrench necessary for all but the most basic work. The beam type models are perfectly adequate, although the newer click (break-away) type are more precise, and you don't have to crane your neck to see a torque reading in awkward situations. The breakaway torque wrenches are more expensive and should be recalibrated periodically.



## 4 GENERAL INFORMATION AND MAINTENANCE

Torque specification for each fastener will be given in the procedure in any case that a specific torque value is required. If no torque specifications are given, use the following values as a guide, based upon fastener size:

### Bolts marked 6T

- 6mm bolt/nut - 5-7 ft. lbs.
- 8mm bolt/nut - 12-17 ft. lbs.
- 10mm bolt/nut - 23-34 ft. lbs.
- 12mm bolt/nut - 41-59 ft. lbs.
- 14mm bolt/nut - 56-76 ft. lbs.

### Bolts marked 8T

- 6mm bolt/nut - 6-9 ft. lbs.
- 8mm bolt/nut - 13-20 ft. lbs.
- 10mm bolt/nut - 27-40 ft. lbs.
- 12mm bolt/nut - 46-69 ft. lbs.
- 14mm bolt/nut - 75-101 ft. lbs.

## Special Tools

Normally, the use of special factory tools is avoided for repair procedures, since these are not readily available for the do-it-yourself mechanic. When it is possible to perform the job with more commonly available tools, it will be pointed out, but occasionally, a special tool was designed to perform a specific function and should be used. Before substituting another tool, you should be convinced that neither your safety nor the performance of the vehicle will be compromised.

Some special tools are available commercially from major tool manufacturers. Others for your Toyota can be purchased from your dealer or from Owatonna Tool Co., Owatonna, Minnesota 55060.

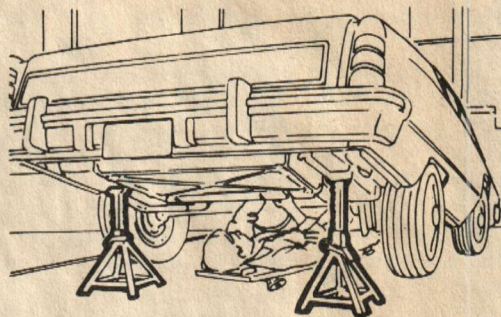
## SERVICING YOUR VEHICLE SAFELY

It is virtually impossible to anticipate all of the hazards involved with automotive maintenance and service but care and common sense will prevent most accidents.

The rules of safety for mechanics range from "don't smoke around gasoline," to "use the proper tool for the job." The trick to avoiding injuries is to develop safe work habits and take every possible precaution.

### Do's

- Do keep a fire extinguisher and first aid kit within easy reach.
- Do wear safety glasses or goggles when cutting, drilling, grinding or prying. If you wear glasses for the sake of vision, then they should be made of hardened glass that can serve also as safety glasses, or wear safety goggles over your regular glasses.
- Do shield your eyes whenever you work around the battery. Batteries contain sulfuric



Always support the car on jackstands when working under it

acid. In case of contact with the eyes or skin, flush the area with water or a mixture of water and baking soda and get medical attention immediately.

- Do use safety stands for any under-truck service. Jacks are for raising vehicles; safety stands are for making sure the vehicle stays raised until you want it to come down. Whenever the vehicle is raised, block the wheels remaining on the ground and set the parking brake.

- Do use adequate ventilation when working with any chemicals. Asbestos dust resulting from brake lining wear cause cancer.

- Do disconnect the negative battery cable when working on the electrical system.

- Do follow manufacturer's directions whenever working with potentially hazardous materials. Both brake fluid and antifreeze are poisonous if taken internally.

- Do properly maintain your tools. Loose hammerheads, mushroomed punches and chisels, frayed or poorly grounded electrical cords, excessively worn screwdrivers, spread wrenches (open end), cracked sockets, slipping ratchets, or faulty droplight sockets can cause accidents.

- Do use the proper size and type of tool for the job being done.

- Do when possible, pull on a wrench handle rather than push on it, and adjust your stance to prevent a fall.

- Do be sure that adjustable wrenches are tightly adjusted on the nut or bolt and pulled so that the face is on the side of the fixed jaw.

- Do select a wrench or socket that fits the nut or bolt. The wrench or socket should sit straight, not cocked.

- Do strike squarely with a hammer. Avoid glancing blows.

- Do set the parking brake and block the wheels if the work requires that the engine be running.



**Don'ts**

- Don't run an engine in a garage or anywhere else without proper ventilation—EVER! Carbon monoxide is poisonous. It is absorbed by the body 400 times faster than oxygen. It takes a long time to leave the human body and you can build up a deadly supply of it in your system by simply breathing in a little every day. You may not realize you are slowly poisoning yourself. Always use power vents, windows, fans or open the garage doors.

- Don't work around moving parts while wearing a necktie or other loose clothing. Short sleeves are much safer than long, loose sleeves. Hard-toed shoes with neoprene soles protect your toes and give a better grip on slippery surfaces. Jewelry such as watches, fancy belt buckles, beads, or body adornment of any kind is not safe while working around a truck. Long hair should be hidden under a hat or cap.

- Don't use pockets for toolboxes. A fall or bump can drive a screwdriver deep into you body. Even a wiping cloth hanging from the back pocket can wrap around a spinning shaft or fan.

- Don't smoke when working around gasoline, cleaning solvent or other flammable material.

- Don't smoke when working around the battery. When the battery is being charged, it gives off explosive hydrogen gas.

- Don't use gasoline to wash your hands. There are excellent soaps available. Gasoline may contain lead, and lead can enter the body through a cut, accumulating in the body until you are very ill. Gasoline also removes all the natural oils from the skin so that bone dry hands will suck up oil and grease.

- Don't service the air conditioning system unless you are equipped with the necessary tools and training. The refrigerant, R-12, is extremely cold and when exposed to the air, will

instantly freeze any surface it comes in contact with, including your eyes. Although the refrigerant is normally non-toxic, R-12 becomes a deadly poisonous gas in the presence of an open flame. One good whiff of the vapors from burning refrigerant can be fatal.

**SERIAL NUMBER IDENTIFICATION**

**Vehicle Identification Number**

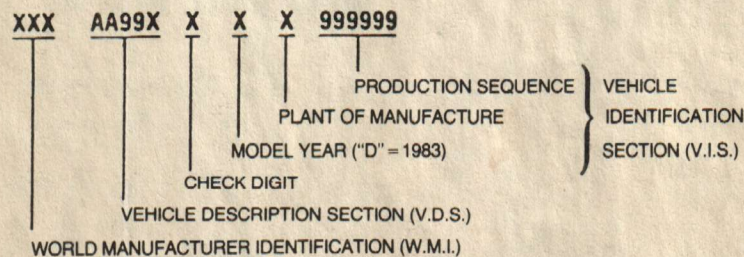
The vehicle serial number is stamped on the left side of the frame behind the front wheel (Pick-Ups) or on the right side of the firewall (Land Cruiser) on 1970-79 models. It can also be found stamped on a metal tag, fastened to the driver's side door pillar (all models).

On 1980-83 models, the number is located both on the right front fender apron in the engine compartment (Pick-Ups) or on the right side of the firewall (Land Cruiser), and on the driver's side door pillar.

All 1984-88 models have the vehicle identification number stamped on a plate attached to the left side of the instrument panel. The plate is visible through the windshield. The VIN is also stamped on a plate attached to the right front fender apron with the exception of the Land Cruiser where it still found on the right



VIN plate on the left side of the instrument panel

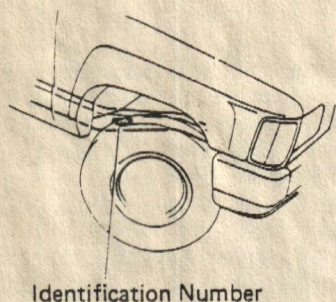
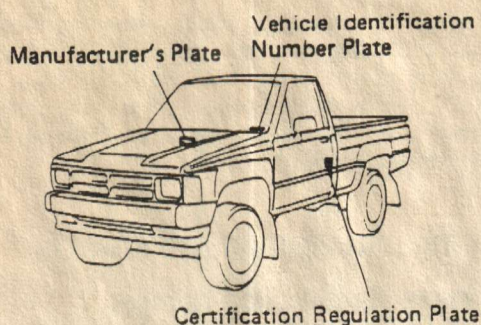


- FORMAT:** X = ALPHABETIC OR NUMERIC CHARACTERS  
 A = ALPHABETIC CHARACTERS ONLY  
 9 = NUMERIC CHARACTERS ONLY

The new 17 digit VIN is used on all 1981 and later models



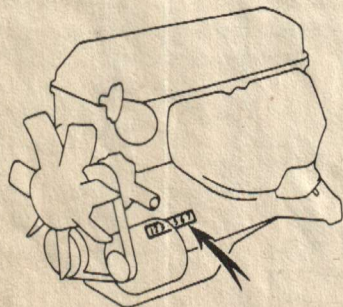
## 6 GENERAL INFORMATION AND MAINTENANCE



Vehicle identification numbers can usually be found in one of the above locations

side of the firewall and additionally on the driver's side door pillar.

The serial number on all 1970-80 models consists of a series identification (see chart) followed by a six digit production number. The serial number on all 1981-88 models has been changed to the 17-digit format. The first three digits are the World Manufacturer Identification number. The next five digits are the Vehicle Description Section (same as the series identification number above). The remaining nine digits are the production numbers.



Engine identification number location—8R-C, 18R-C, 20R, 22R, 22R-E and 22R-TE engines

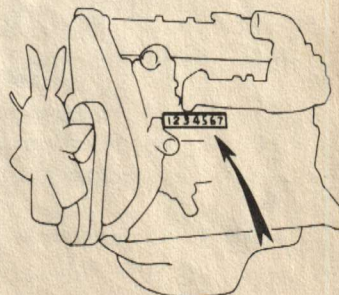
### Vehicle Identification

Model/Type	Year	Series Identification Number*
Pick-Up/ 8R-C 18R-C	1970-74	RN20L RN21L
Pick-Up/20R	1975-80	RN32L (2 wd) RN42L (2 wd) RN37L (4 wd) RN47L (4 wd)
Pick-Up/22R	1981-83	RN34L (2 wd) RN44L (2 wd) RN38L (4 wd) RN48L (4 wd)
Pick-Up/2L	1981-83	LN34 (2 wd) LN44 (2 wd) LN38 (4 wd) LN48 (4 wd)
Pick-Up/22R, 22R-E	1984-85	RN50 RN55 RN60 RN65
Pick-Up/2L, 2L-T	1984-85	LN51 LN56 LN65
Pick-Up/22R, 22R-E, 22R-TE	1986-88	RN50 RN55 RN61 RN66 RN70 RN75
Pick-Up/3VZ-E	1988	VZN61 VZN66
Land Cruiser/F, 2F	1970-87	FJ40 FJ60
Land Cruiser/3F-E	1988	FJ62

\*The suffix L may not appear in the serial number.

### ENGINE

The engine serial number consists of an engine series identification number followed by a six digit production number.



Engine identification number location—1L, 2L and 2L-T engines



Engine Identification

Year	Model	Engine Displacement cu. in. (cc)	Engine Series Identification	No. of Cylinders	Engine Type
1970-71	Pick-Up	113.8 (1858)	8R-C	4	SOHC
1972-74	Pick-Up	120.7 (1980)	18R-C	4	SOHC
1975-80	Pick-Up	133.3 (2189)	20R	4	SOHC
1981-83	Pick-Up	144.4 (2367)	22R	4	SOHC
		133.5 (2188)	1L	4	Diesel/SOHC
1984-88	Pick-Up/4 Runner	144.4 (2367)	22R, 22R-E	4	SOHC
		144.4 (2367)	22R-TE	4	Turbo/SOHC
		149.3 (2447)	2L	4	Diesel/SOHC
		149.3 (2447)	2L-T	4	Turbo Diesel/SOHC
		180.0 (2950)	3VZ-E	6	SOHC
1970-74	Land Cruiser	236.7 (3878)	F	6	OHV
1975-87	Land Cruiser	257.9 (4200)	2F	6	OHV
1988	Land Cruiser	241.3 (3955)	3F-E	6	OHV

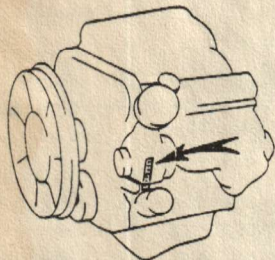
SOHC: Single Overhead Camshaft  
OHV: Overhead Valve

8R-C, F, 2F and 3F-E Engines

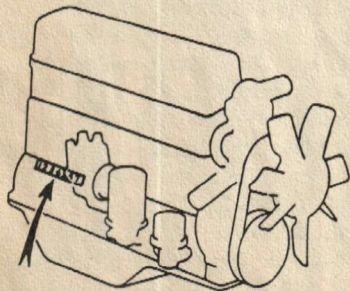
The serial number is stamped on the right side of the engine block beside the fuel pump (except on fuel injected engines).

18R-C Engines

The 2000cc model 18R-C engine has its serial



Engine identification number location—3VZ-E engines



Engine identification number location—F, 2F and 3F-E engines

number stamped on the left side of the engine below the number one spark plug.

20R, 22R, 22R-E, 22R-TE and 3VZ-E Engines

On these engines the serial number is stamped on the left side of the cylinder block, behind the alternator.

1L, 2L and 2L-T Engines

On these engines the serial number is stamped on the left side of the cylinder block, under the manifold.

ROUTINE MAINTENANCE

Air Cleaner

REMOVAL AND INSTALLATION

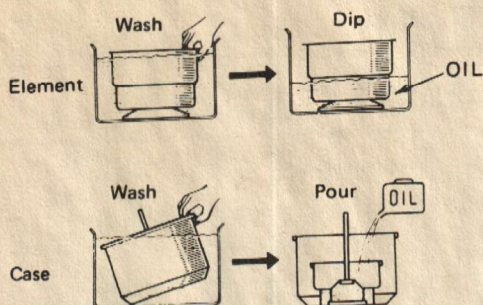
Oil Bath Type

Clean the element and replace the oil in the oil bath type air cleaner every 3,000 miles (4,800 km) or sooner in dusty areas.

Remove the air cleaner assembly from the vehicle and disassemble the various parts. Remove any rubber or plastic hoses that are connected to the air cleaner. Remove the oil from the oil cup and scrape out all the dirt inside and the bottom. Wash the cup with a safe solvent, such as kerosene. Refill the oil cup to the level mark with the same weight (SAE) oil as is being used in the engine at that particular time. If it is cold and you are using a light viscosity oil in



## 8 GENERAL INFORMATION AND MAINTENANCE



### Oil bath air cleaner

the engine, use a light viscosity oil in the air filter. If you are using a heavier oil in the crankcase for warm weather, use the same, heavier oil in the oil bath air cleaner. Soak the filter element in the same safe solvent as the oil cup. Agitate the element thoroughly in the cleaning solution to remove all dirt particles. Dry the element thoroughly with compressed air. Reassemble the air cleaner assembly and reinstall it on the engine to the reverse order of disassembly and removal.

### Dry Type

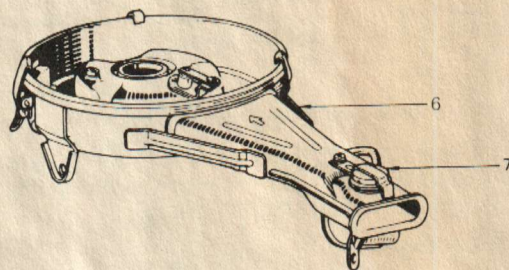
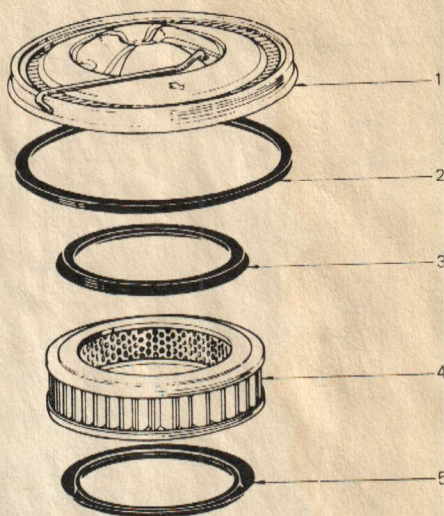
The element should be replaced at the recommended intervals shown in the Maintenance Intervals chart later in this chapter. If your truck is operated under severely dusty conditions or severe operating conditions, more frequent changes will certainly be necessary. Inspect the element at least twice a year. Early spring and early fall are always good times for inspection. Remove the element and check for any perforations or tears in the filter. Check the cleaner housing for signs of dirt or dust that may have leaked through the filter element or in through the snorkel tube. Position a drop-light on one side of the element and look through the filter at the light. If no glow of light can be seen through the element material, replace the filter. If holes in the filter element are apparent or signs of dirt seepage through the filter are evident, replace the filter.

### AIR CLEANER ASSEMBLY

1. Disconnect all hoses, ducts and vacuum tubes from the air cleaner assembly.



Sometimes the air filter can be cleaned with low pressure compressed air



- |                    |                             |
|--------------------|-----------------------------|
| 1. Cover           | 5. Gasket                   |
| 2. Gasket          | 6. Case                     |
| 3. Gasket          | 7. Hot air intake diaphragm |
| 4. Cleaner element |                             |

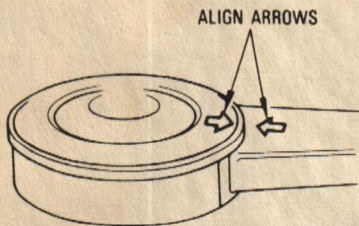
**20R air cleaner element and case. Other models are similar. Check the gasket for a tight seal before replacing the cover**

2. Remove the top cover wing nut (two on the Land Cruiser) and grommet (if equipped). Most models will also utilize three or four side clips to further secure the top of the assembly, simply pull the wire tab and release the clip; in fact air cleaners on fuel injected engines are secured solely by means of clips (air box-to-cleaner housing). Remove the cover and lift out the filter element. On fuel injected engines, simply lift up on the air box and slide out the filter.

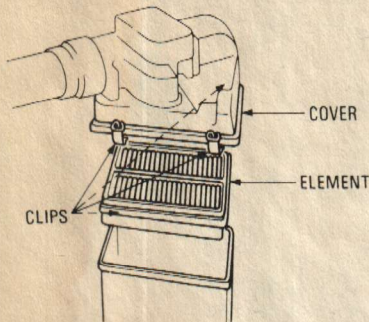
3. Remove any side mount brackets and/or retaining bolts and lift off the air cleaner assembly. Remove only the lower filter housing box on fuel injected engines.

4. Clean or replace the filter element as detailed previously. Wipe clean all surfaces of the air cleaner housing and cover. Check the condition of the mounting gasket and replace it if it appears worn or broken.

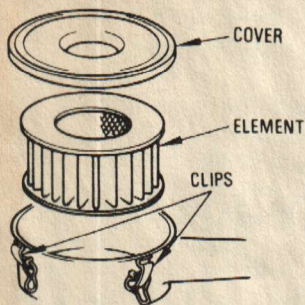




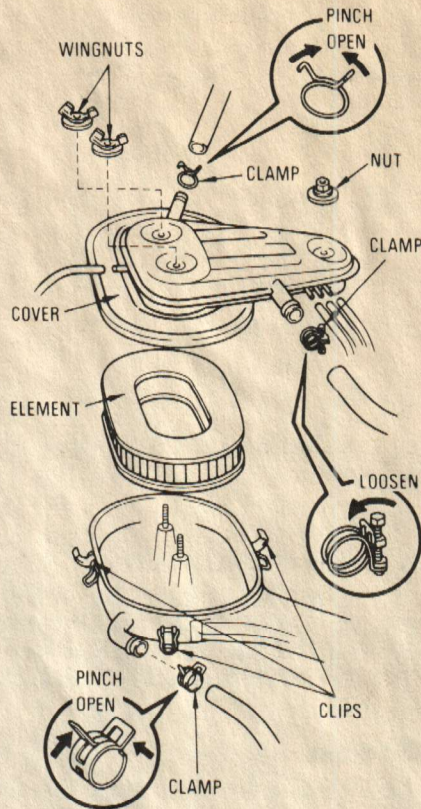
Make sure the arrows align when installing the air cleaner housing lid—18R-C, 20R and 22R engines



Air cleaner assembly—22R-E and 22R-TE engines



Air cleaner assembly—1L, 2L and 2L-T engines



Air cleaner assembly—F-series engines

**AIR CLEANER ELEMENT**

The element can, in most cases be replaced by removing the wingnut(s) and side clips as already detailed. Remember that on fuel injected engines the air box should not be removed, just lifted upward carefully until the element is accessible.

On certain Land Cruisers with diesel engines that utilize a cyclone-type air cleaner, there is also a dust cup that should be cleaned. It's underneath the regular air cleaner assembly and can be opened just like the regular cleaner (sideclips!). Once the top is off, carefully clean out any dust or accumulated crud with a rag.

**Crankcase Ventilation Filter**

Certain models may also utilize a cleaner-mounted crankcase ventilation filter, if so, it should also be cleaned or replaced at the same time as the regular filter element. To replace the filter, remove the air cleaner top cover and pull the filter from its housing on the side of the cleaner assembly. Push a new filter into the housing and reinstall the cover. If the filter and plastic holder need replacement, remove the clip mounting the feeder tube to the cleaner

5. Reposition the air cleaner assembly and install the mounting bracket and/or bolts.
6. Reposition the filter element in the case and install the cover being careful not to overtighten the wingnut(s). On round-style cleaners (carburetted engines), be certain that the arrows on the cover lid and the snorkel match up properly.

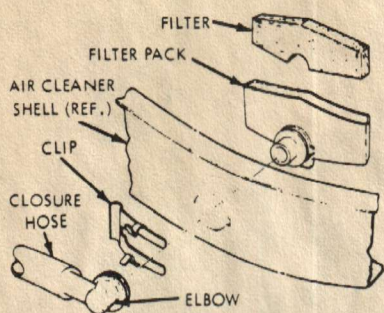
*NOTE: Filter elements on fuel injected engines have a TOP and BOTTOM side, be sure they are inserted correctly.*

7. Reconnect all hoses, ductwork and vacuum lines.

*NOTE: Never operate the engine without the air filter element in place.*



## 10 GENERAL INFORMATION AND MAINTENANCE



Crankcase ventilation filter

housing and then remove the assembly from the air cleaner.

### Fuel Filter

#### REMOVAL AND INSTALLATION

**CAUTION: NEVER SMOKE WHEN WORKING AROUND OR NEAR GASOLINE! MAKE SURE THAT THERE IS NO ACTIVE IGNITION SOURCE NEAR YOUR WORK AREA!**

#### F and 2F Engines

The Land Cruiser uses a cartridge type fuel filter with a disposable element. The filter is located in the fuel line. It should not be necessary to remove it in order to change the disposable element. To replace the element, proceed as follows:

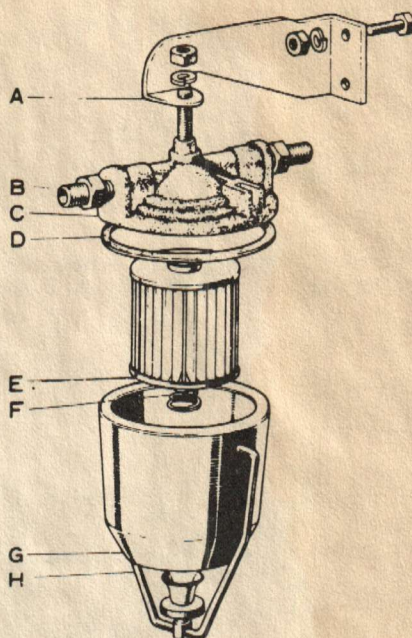
1. Loosen and remove the nut on the filter bowl bail.
2. Withdraw the bowl, element spring, element and the bowl gasket.
3. Wash all of the parts in solvent and examine them for damage.
4. Install a new filter element and bowl gasket.
5. Install the components in the reverse order of removal. Do not fully tighten the bail nut.
6. Seat the bowl by turning it slightly. Tighten the bail nut fully and check for leaks.

The above procedure should be performed if the clear glass bowl fills up with water or every 12,000 miles (20,000 km).

**CAUTION: Do not have any open flame nearby while servicing the fuel filter because of the presence of flammable gasoline vapors.**

#### 3F-E Engines

1. Unbolt the retaining screws and remove the protective shield from the fuel filter.
2. Place a pan under the delivery pipe (large connection) to catch the dripping fuel and SLOWLY loosen the union bolt to bleed off the fuel pressure.



- A. Fuel filter bracket
- B. Fuel line fitting
- C. Mounting boss
- D. Filter bowl gasket
- E. Filter element
- F. Filter element positioning spring
- G. Fuel filter bowl
- H. Bowl retaining bail

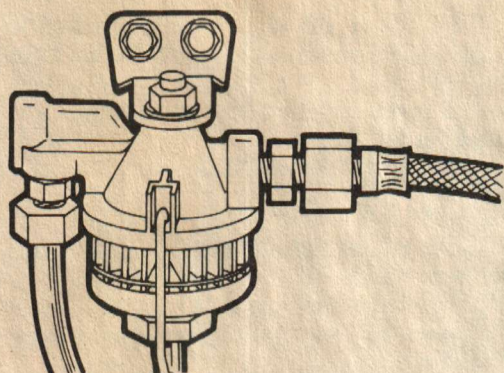
#### Early Land Cruiser fuel filter

3. Remove the union bolt and drain the remaining fuel.
  4. Disconnect and plug the inlet line.
  5. Unbolt and remove the fuel filter.
- NOTE: When tightening the fuel line bolts to the fuel filter, you must use a torque wrench. The tightening torque is very important, as under or over tightening may cause fuel leakage. Insure that there is not fuel line interference and that there is sufficient clearance between it and any other components.**
6. Coat the flare unit, union nut and all bolt threads with engine oil.
  7. Handtighten the inlet line to the fuel filter.
  8. Install the fuel filter and then tighten the inlet line nut to 22 ft. lbs. (29 Nm).
  9. Reconnect the delivery pipe using new gaskets and then tighten the union bolt to 22 ft. lbs. (29 Nm).
  10. Run the engine for a few minutes and check for any fuel leaks.
  11. Install the protective shield.

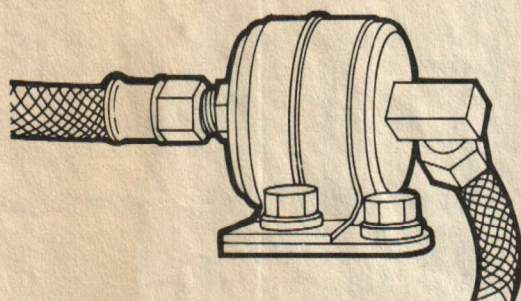
#### 8R-C Engines

It is not necessary to remove the filter unit to replace the element.





Only the bottom nut need be unbolted on the 8R-C fuel filter



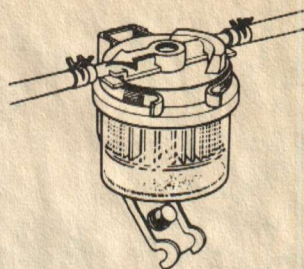
The fuel filter on 18R-C engines will either have two nuts, as illustrated here, or a nut on one side and a clamp on the other. Be sure you get the correct replacement filter for your truck

1. Loosen and remove the nut on the filter bowl bail.
2. Take out the bowl, element spring, element, and bowl gasket.
3. Wash the parts (except for the element—discard that) in solvent and inspect for damage. Install a new filter element, and if its condition warrants, a new gasket.
4. After reinstalling the parts, do not fully tighten the bail nut.
5. Seat the bowl by turning it slightly, pressing gently against the gasket. Tighten the bail nut fully and check for leaks.

**18R-C Engines**

The entire fuel filter is replaced on these engines.

1. Unfasten the fuel intake hose. Use a wrench to loosen the attachment nut, and another wrench on the opposite side to keep the filter from turning.
2. Remove the flexible fuel line from the other side of the filter. Unfasten the attaching screws from the filter bracket.
3. Install the new filter and reconnect the fuel lines. Start the engine and check for leaks.



The arrow on the 20R fuel filter must point toward the carburetor line

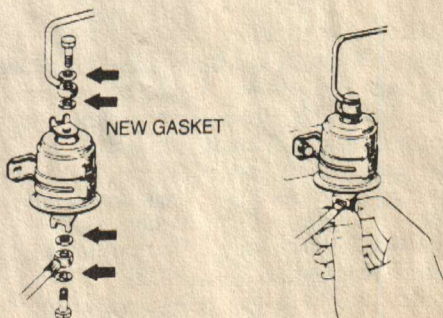
**20R and 22R Engines**

The entire fuel filter is replaced on these engines.

1. Using a pair of pliers, expand the hose clamp on one side of the filter, and slide the clamp further down the hose, past the point to which the filter pipe extends. Remove the other clamp in the same manner.
2. Grasp the hoses near the ends and twist them gently to pull them free from the filter pipes.
3. Pull the filter from the clip and discard.
4. Install the new filter into the clip. The arrow must point towards the hose that runs to the carburetor. Push the hoses onto the filter pipes, and slide the clamps back into position. Start the engine and check for leaks.

**22R-E, 22R-TE and 3VZ-E Engines**

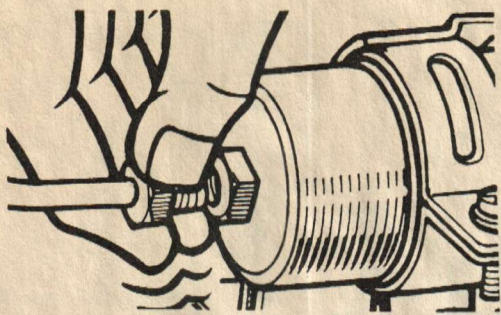
1. Unbolt the retaining screws and remove the protective shield from the fuel filter.
2. Place a pan under the delivery pipe (large connection) to catch the dripping fuel and SLOWLY loosen the union bolt to bleed off the fuel pressure.
3. Remove the union bolt and drain the remaining fuel.
4. Disconnect and plug the inlet line.
5. Unbolt and remove the fuel filter.



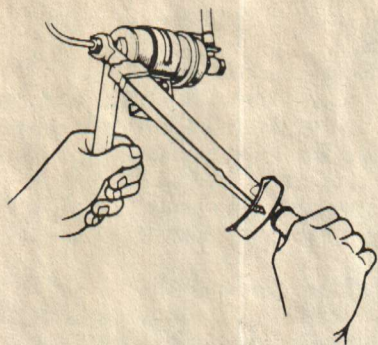
Always use new gaskets when installing the fuel filter on fuel injected engines



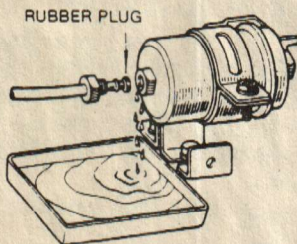
## 12 GENERAL INFORMATION AND MAINTENANCE



Hand-tighten the fuel inlet line—fuel injected engines



A torque wrench is essential when tightening the fuel line to the fuel filter—fuel injected engines



When removing the fuel lines, it is always a good idea to place a pan underneath to catch any dripping fuel

**NOTE:** When tightening the fuel line bolts to the fuel filter, you must use a torque wrench. The tightening torque is very important, as under or over tightening may cause fuel leakage. Insure that there is not fuel line interference and that there is sufficient clearance between it and any other components.

6. Coat the flare unit, union nut and all bolt threads with engine oil.

7. Handtighten the inlet line to the fuel filter.

8. Install the fuel filter and then tighten the inlet line nut to 22 ft. lbs. (29 Nm).

9. Reconnect the delivery pipe using new gaskets and then tighten the union bolt to 22 ft. lbs. (29 Nm).

10. Run the engine for a few minutes and check for any fuel leaks.

11. Install the protective shield.

### 1L, 2L and 2L-T Engines

1. Disconnect the fuel level warning switch connector at the lower end of the filter.

2. Drain the fuel from the filter (see Chapter 5), loosen the two mounting bolts and remove the filter.

3. Remove the water level warning switch from the filter housing and then unscrew the filter from the housing. An oil filter strap wrench may come in handy when removing the filter.

4. Install the water level warning switch using a new O-ring.

5. Coat the filter gasket lightly with diesel fuel and then screw it in hand tight. Next, use the strap wrench and turn the filter  $\frac{3}{4}$  turn more.

6. Mount the filter assembly, tighten the bolts and connect the warning switch.

7. Using the priming pump on top of the filter, fill the filter with fuel and check for leaks.

### DRAINING THE DIESEL FUEL FILTER

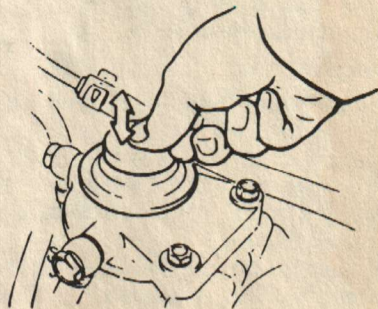
**CAUTION:** When the fuel filter warning light or buzzer comes on, the water in the fuel filter must be drained immediately.

1. Raise the hood and position a small pan or jar underneath the drain plug to catch the water about to be released.

2. Reach under the fuel filter and turn the drain plug counterclockwise about 2-2½ turns.

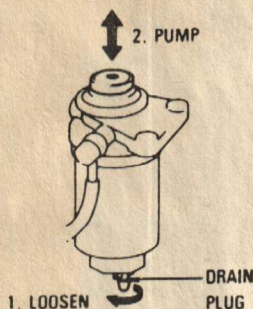
**NOTE:** Loosening the drain plug more than the suggested amount will cause water to ooze from around the threads of the plug.

3. Depress the priming pump on top of the filter housing until fuel is the only substance being forced out.



When replacing the diesel fuel filter, always use the priming pump to fill the filter with fuel before starting the engine





When draining water from the diesel fuel filter, turn the drain plug counterclockwise

4. Retighten the drain plug by hand only, do not use a wrench.

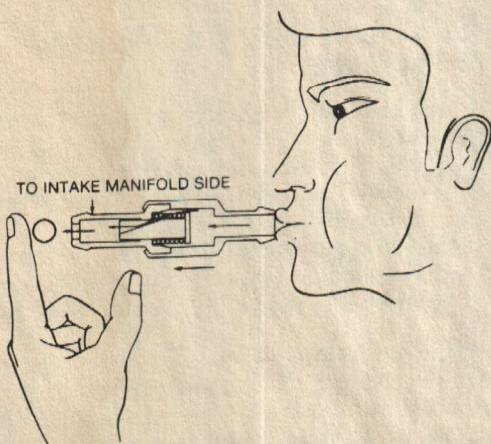
### PCV Valve

The PCV valve regulates crankcase ventilation during various engine operating conditions. At high vacuum (idle speed and partial load range) it will open slightly and at low vacuum (full throttle) it will open fully. This causes vapor to be removed from the crankcase by the engine vacuum and then sucked into the combustion chamber where it is dissipated.

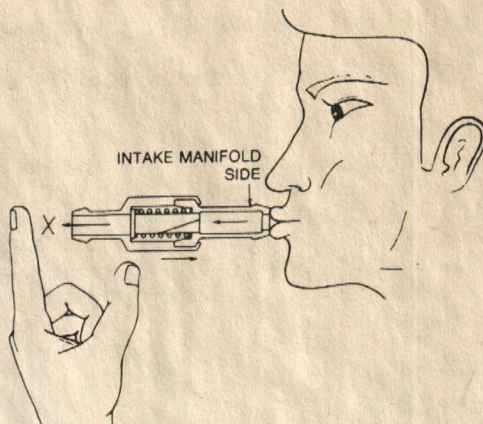
*NOTE: The PCV system will not function properly unless the oil filler cap is tightly sealed. Check the gasket on the cap and be certain it is not leaking. Replace the cap or gasket or both if necessary to ensure proper sealing.*

### REMOVAL AND INSTALLATION

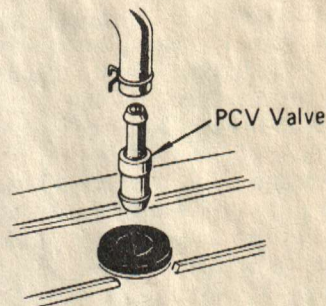
1. Check the ventilation hoses and lines for leaks or clogging. Clean or replace as necessary.
2. Locate the PCV valve in the cylinder head cover and remove it by pulling it upward.



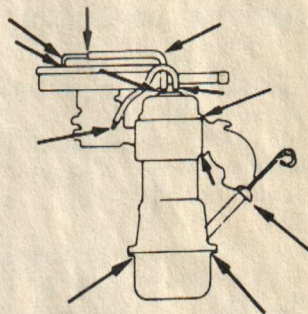
Air should pass through the PCV valve when blowing into the crankcase side



Air should not pass through the PCV valve when blowing through the intake manifold side



PCV valves are located in the cylinder head cover



Check all PCV hoses, connections and gaskets for cracks and brittleness

3. Blow into the crankcase end of the valve. There should be free passage of air through the valve.
4. Blow into the intake manifold end of the valve. There should be little or no passage of air through the valve.
5. If the PCV valve failed either of the preceding two checks, it will require replacement.
6. To install, simply slip the hose back onto the proper end of the PCV valve and then press



## 14 GENERAL INFORMATION AND MAINTENANCE

it into the retaining grommet in the cylinder head cover.

7. For further information on the PCV system, please refer to Chapter 4.

**NOTE:** *On models with fuel injection, there is no PCV valve. Vapor passage in the ventilation lines is controlled by two orifices. To check the PCV system on these models, inspect the hoses for cracks, leaks or other visible damage. Blow through the orifices to make sure they are not blocked. Replace any components as necessary.*

### Heat Riser

#### SERVICING

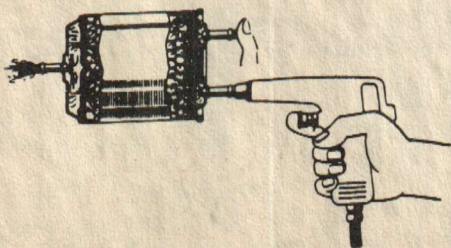
Certain early models may have been equipped with exhaust control valves (heat risers) which would be located near the head pipe connection in the exhaust manifold. The valves aid initial warm-up during particularly cold weather by slightly restricting the gas flow. The resultant heat generated by this restriction is transferred to the intake manifold where it results in improved fuel vaporization.

The operation of this valve should be checked every 6 months or 6,000 miles (9,600 km). If the valve appears to be sticking, lubricate the shaft bushings lightly with penetrating oil and then operate the valve manually a few times to work in the lubricant. If this is no help, replace the entire valve.

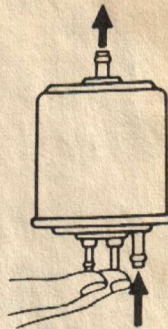
### Evaporative Emission Control Canister

There is no charcoal canister for 1970-71 engines. It can be found on the front of the left fender on late 1971-74 trucks and at the rear of the engine compartment, on or near the firewall on 1975 and later trucks (if so equipped).

The canister functions to cycle the fuel vapor from the fuel tank and carburetor float chambers into the intake manifold and eventually into the cylinders for combustion. The activated charcoal element within the canister acts as a storage device for the fuel vapors at times



Using compressed air to clean the charcoal canister



When cleaning the canister on later models, blow air into the outer vent pipe while plugging the other two

when the engine operating conditions are not conducive to the efficient burning of the vapors.

The only required service for the canister inspection at the intervals specified in the Maintenance Chart at the end of this chapter. If the charcoal element is gummed up, the entire canister will require replacement. Disconnect the canister purge hoses, loosen the retaining bracket bolt(s) and lift out the canister. Installation is simply the reverse of the removal process.

### Case Storage System

1970-71 trucks use a case storage system in lieu of the charcoal canister. This system's basic function is to prevent the escape of fuel vapors by routing them into a storage case for later combustion. The only scheduled maintenance for this system is the replacement of the system's air filter every 12,000 miles (20,000 km). The filter is located above the fuel vapor storage case, next to the fuel filler cap. Unplug the old filter from the hose, discard it, and insert the new filter.

### Battery

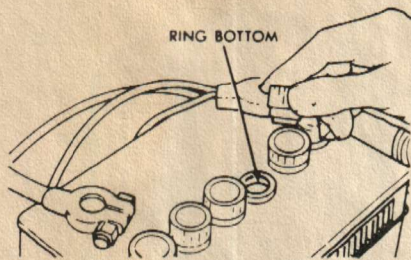
#### FLUID LEVEL (EXCEPT MAINTENANCE FREE BATTERIES)

Check the battery electrolyte level at least once a month, or more often in hot weather or during periods of extended operation. The level can be checked through the case on translucent polypropylene batteries; the cell caps must be removed on other models. The electrolyte level in each cell should be kept filled to the split ring inside, or the line marked on the outside of the case.

If the level is low, add only distilled water, or colorless, odorless drinking water, through the opening until the level is correct. Each cell is completely separate from the others, so each must be checked and filled individually.

If water is added in freezing weather, the





Fill each battery cell to the bottom of the split ring with distilled water

truck should be driven several miles to allow the water to mix with the electrolyte. Otherwise, the battery could freeze.

**SPECIFIC GRAVITY (EXCEPT MAINTENANCE FREE BATTERIES)**

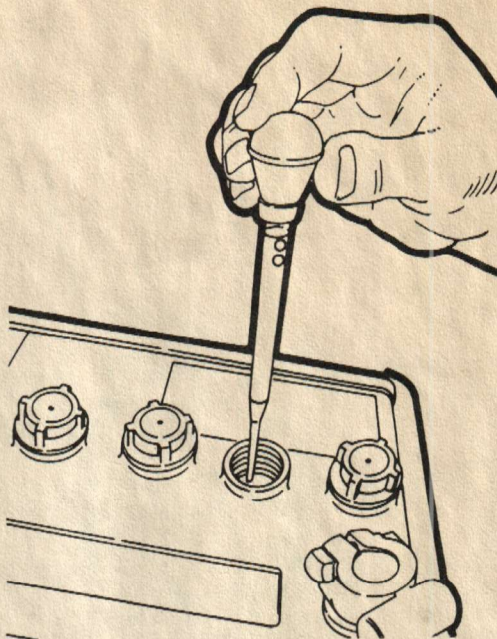
At least once a year, check the specific gravity of the battery. It should be between 1.20 in.Hg and 1.26 in.Hg at room temperature.

The specific gravity can be checked with the use of an hydrometer, an inexpensive instrument available from many sources, including auto parts stores. The hydrometer has a squeeze bulb at one end and a nozzle at the other. Battery electrolyte is sucked into the hydrometer until the float is lifted from its seat. The specific gravity is then read by noting the position of the float. Generally, if after charging, the specific gravity between any two cells varies more than 50 points (0.50), the battery is bad and should be replaced.

It is not possible to check the specific gravity in this manner on sealed (maintenance free) batteries. Instead, the indicator built into the top of the case must be relied on to display any signs of battery deterioration. If the indicator is dark, the battery can be assumed to be OK. If the indicator is light, the specific gravity is low, and the battery should be charged or replaced.

**CABLES AND CLAMPS**

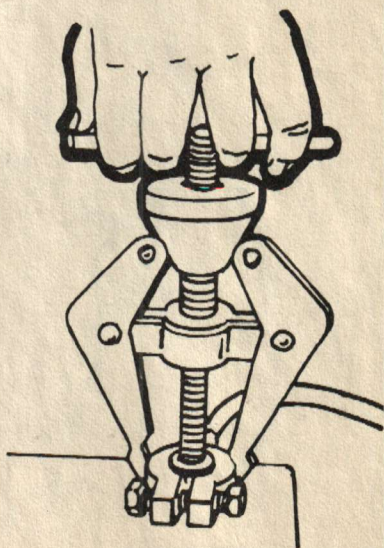
Once a year, the battery terminals and the cable clamps should be cleaned. Loosen the



The specific gravity of the battery can be checked with a simple float-type hydrometer

clamps and remove the cables, negative cable first. On batteries with posts on top, the use of a puller specially made for the purpose is recommended. These are inexpensive, and available in auto parts stores. Side terminal battery cables are secured with a bolt.

Clean the cable lumps and the battery terminal with a wire brush, until all corrosion, grease, etc., is removed and the metal is shiny.



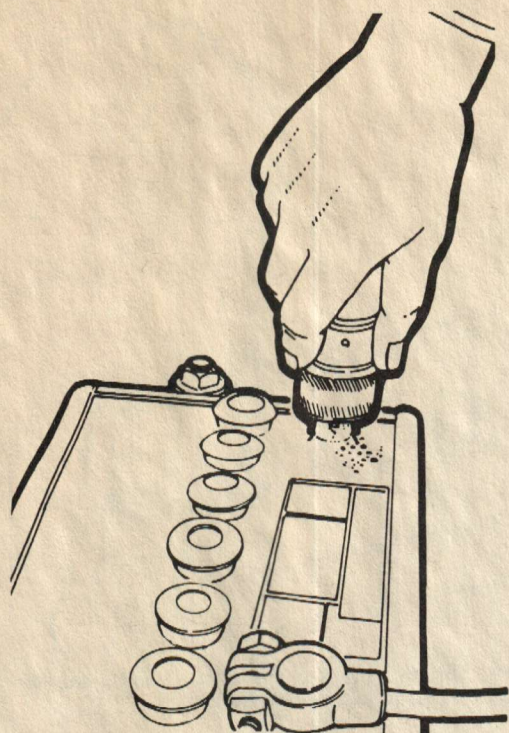
Special pullers are available to remove cable clamps

**Battery State of Charge at Room Temperature**

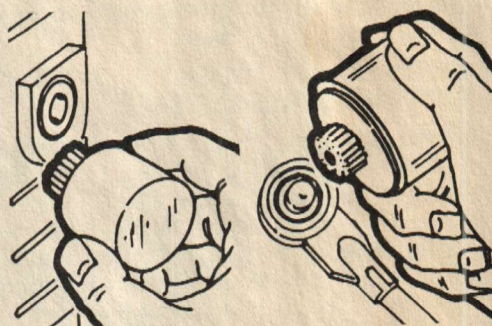
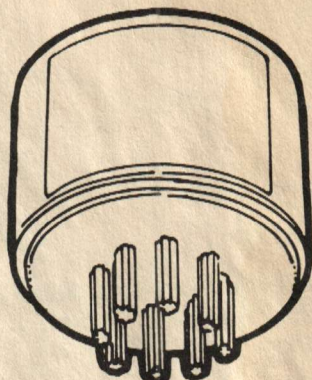
Specific Gravity Reading	Charged Condition
1.260-1.280	Fully Charged
1.230-1.250	¾ Charged
1.200-1.220	½ Charged
1.170-1.190	¼ Charged
1.140-1.160	Almost no Charge
1.110-1.130	No Charge



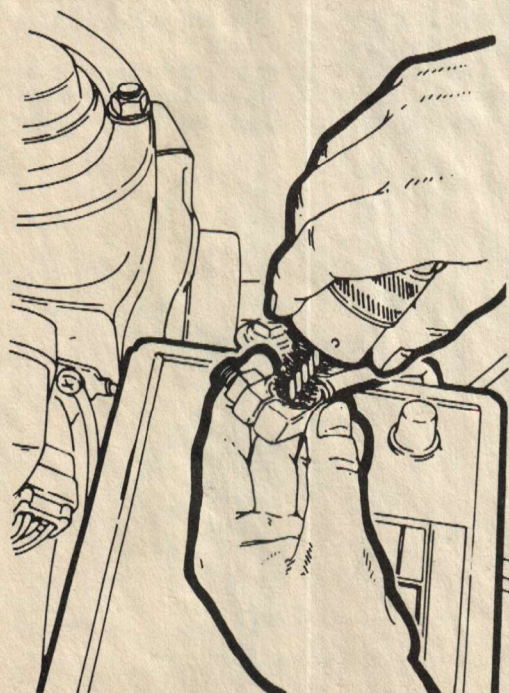
16 GENERAL INFORMATION AND MAINTENANCE



Clean the battery posts with a wire brush, or the special tool shown



Special tools are also available for cleaning the posts and clamps on side terminal batteries



Clean the inside of the clamps with a wire brush, or the special tool

It is especially important to clean the inside of the clamp thoroughly, since a small deposit of foreign material or oxidation there will prevent a sound electrical connection and inhibit either starting or charging. Special tools are available for cleaning these parts, one type for conventional batteries and another type for side terminal batteries.

Before installing the cables, loosen the battery holddown clamp or strap, remove the battery and check the battery tray. Clear it of any debris, and check it for soundness. Rust should be wire brushed away, and the metal given a coat of anti-rust paint. Replace the battery and tighten the holddown clamp or strap securely, but be careful not to overtighten, which will crack the battery case.

After the clamps and terminals are clean, re-install the cables, negative cable last; do not hammer on the clamps to install. Tighten the clamps securely, but do not distort them. Give the clamps and terminals a thin external coat of grease after installation, to retard corrosion.

Check the cables at the same time that the terminals are cleaned. If the cable insulation is cracked or broken, or if the ends are frayed, the cable should be replaced with a new cable of the same length and gauge.