



# SERVICE NEWS

**Keeping the  
'87 Corolla  
A/C System  
in Good  
Condition**

**Getting  
Started on the  
'87 Tercel**

**Where's Your  
Vehicle ID**

**A Hot Tip for  
Oxygen  
Sensors**

**Taking  
Repairs Down  
to the Wire**

**PART OF TOYOTA'S  
CONTINUING SUPPORT TO  
AFTERMARKET REPAIR.**



# Reman vs. Rebuilt: Toyota Gets to the Core of the Matter



Remanufactured and rebuilt parts are not created equal.

Genuine Toyota Remanufactured Parts are built to fit and perform exactly like the original part — right down to the core.

Take Genuine Toyota remanufactured air conditioning compressors, for example. After the cores are completely disassembled, they are thoroughly cleaned and inspected. All damaged or worn components are replaced with new Genuine Toyota parts, as are all gaskets, shaft seals and o-rings. Each compressor is then tested for discharge volume, gas leaks, abnormal noise and rotating torque.

Genuine Toyota remanufactured alternator and starter cores undergo a similar procedure. And when you install a Genuine Toyota remanufactured computer, you get all of the quality and reliability of the original part, plus innovations that have been added since the original computer was installed.

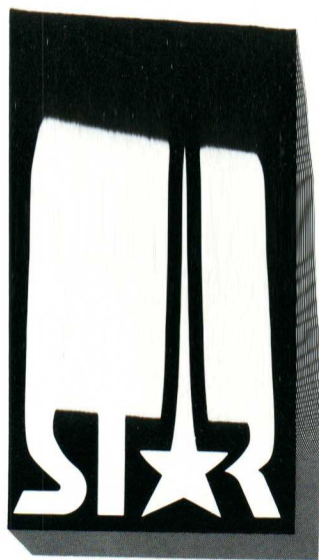
This attention to detail sets Toyota apart from parts rebuilders. They often repair or replace only broken or worn-out components. The units are then reassembled including worn bearings and diodes.

Your local Toyota STAR dealer offers a wide selection of Genuine Toyota Remanufactured Parts at substantial savings. Isn't it about time you made Genuine Toyota Remanufactured Parts a core part of your business?



*"I love what you do for me."*

© 1991 Toyota Motor Sales, U.S.A., Inc.



# SERVICE NEWS

## Features

- |  |   |
|--|---|
| Troubleshooting and Repairing the 1987 Corolla Air Conditioning System | 2 |
| The 1987 Tercel Conventional Starting System and Troubleshooting       | 7 |

## Tech Tips

- |                                    |    |
|------------------------------------|----|
| Vehicle Identification Information | 12 |
| A New Tip for Oxygen Sensors       | 13 |
| Wiring Diagrams Get a New Look     | 14 |

## Environmental News

- |  |    |
|--|----|
| The Latest News About CFC Recovery and Recycling | 16 |
|--|----|

## Parts News

- |                          |    |
|--------------------------|----|
| Collision Repair Manuals | 17 |
|--------------------------|----|

## Specifications

- |            |    |
|------------|----|
| 1989 Camry | 18 |
|------------|----|

### WHAT IS A STAR DEALER?

STAR (Support To Aftermarket Repairs) is a special Toyota support program offered by a select group of Toyota dealers, recognized by Toyota as having made an extraordinary commitment to serving the special needs of independent repair and body shops. From extra parts inventory and special local or WATS telephone lines, to specially trained counterpeople backed by outstanding delivery services, Toyota STAR dealers are a unique group of parts wholesale specialists who offer support, services and benefits not usually offered by the typical dealership.

Toyota STAR Service News are only available through Toyota's Wholesale parts specialists, Toyota STAR dealers. Articles and technical data in this periodical are based in whole or in part on prior communications to Toyota dealers.

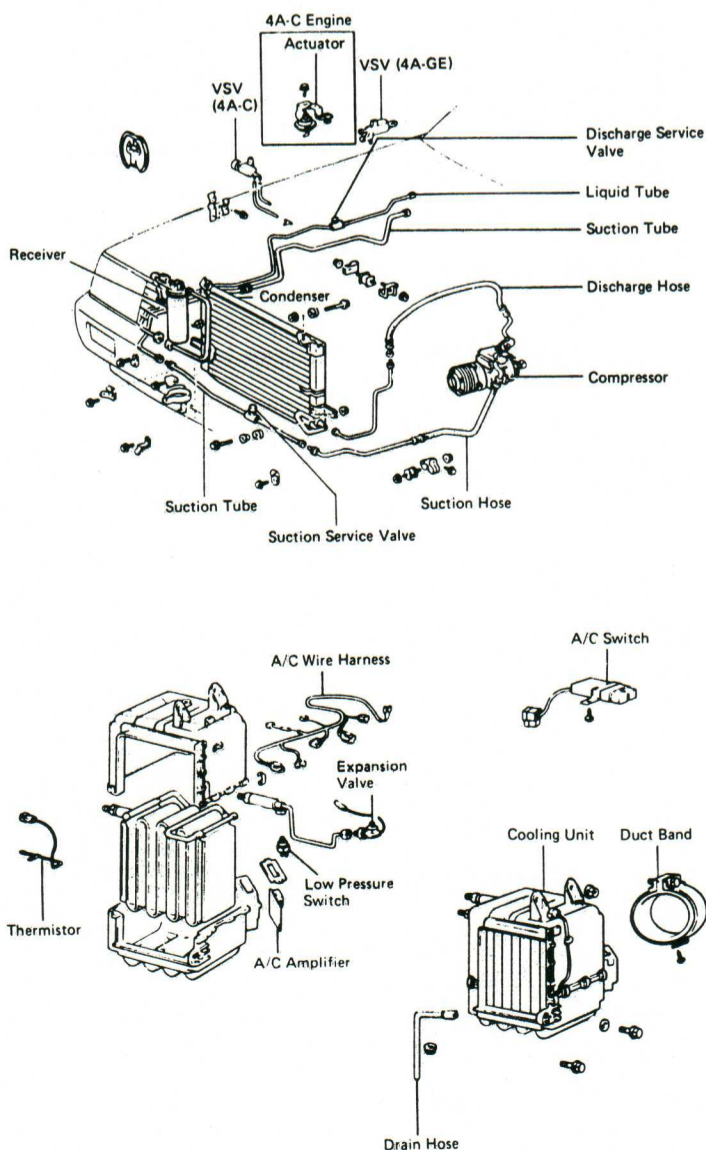
All procedures, specifications and part numbers were in effect at the time this publication went to press. No express or implied warranty implications are intended, nor should any be construed. Toyota Motor Sales, U.S.A., Inc. reserves the right to change procedures, specifications and/or part numbers without incurring obligation. For complete specifications and/or procedures please refer to the appropriate repair manuals. For part number changes, please consult with your local Toyota STAR dealer. Contents of this publication may be reprinted with permission. Please address all correspondence and inquiries to Editor, Toyota STAR Service News, P.O.

## Features

# TROUBLESHOOTING AND REPAIRING THE 1987 COROLLA AIR CONDITIONING SYSTEM

## Corolla A/C System Components Application: 1987 Corolla

**Please Note:** Due to space limitations in this issue of Toyota STAR Service News, the following air conditioning troubleshooting and repairing does not include extensive review of associated electrical procedures. If you require additional information, please contact your local STAR dealer representative.



Problem	Possible cause	Remedy	
No cooling or warm air	Magnetic clutch does not engage	Replace fuse and check for short Check magnetic clutch Check switch Check thermistor Check amplifier Repair as necessary Check refrigerant pressure Check heater relay Check circuit breaker Check pressure switch	
	(a) A/C fuse blown		
	(b) Magnetic clutch faulty		
	(c) A/C switch faulty		
	(d) Thermistor faulty		
	(e) A/C amplifier faulty		
	(f) Wiring or ground faulty		
	(g) Refrigerant empty		
	(h) Heater relay faulty		
	(i) Circuit breaker faulty		
	(j) Pressure switch faulty		
	Compressor does not rotate properly		Adjust or replace drive belt Check compressor
	(a) Drive belt loose or broken		
(b) Compressor faulty	Check expansion valve Test system for leaks Check receiver		
Expansion valve faulty			
Leak in system			
Fusible plug on receiver blown or clogged screen			

Problem	Possible cause	Remedy
No cooling or warm air (Cont'd)	Blower does not operate	Replace fuse and check for short Check A/C switch Check circuit breaker Check heater relay Check blower motor Repair as necessary
	(a) A/C fuse blown	
	(b) A/C switch faulty	
	(c) Circuit breaker faulty	
	(d) Heater relay faulty	
	(e) Blower motor faulty	
(f) Wiring faulty		
Cool air comes out intermittently	Magnetic clutch slipping	Check magnetic clutch Check expansion valve Repair as necessary Evacuate and charge system Check amplifier
	Expansion valve faulty	
	Wiring connection faulty	
	Excessive moisture in system	
A/C Amplifier faulty		
Limited amount of cool air at high speed	Thermistor faulty	Check thermistor
Cool air comes out only at high speed	Condenser clogged	Check condenser Adjust or replace drive belt Check compressor Check refrigerant charge Evacuate and charge system
	Drive belt slipping	
	Compressor faulty	
	Insufficient or too much refrigerant	
	Air in system	
Insufficient cooling	Condenser clogged	Check condenser Check or replace drive belt Check magnetic clutch Check compressor Check expansion valve Check thermistor Check amplifier Check refrigerant charge Evacuate and charge system Check receiver Check resistor Reset water valve cable
	Drive belt slipping	
	Magnetic clutch faulty	
	Compressor faulty	
	Expansion valve faulty	
	Thermistor faulty	
	A/C amplifier faulty	
	Insufficient or too much refrigerant	
	Air or excessive compressor oil in system	
	Receiver clogged	
Temperature control resistor faulty		
Water valve cable set faulty		
Insufficient velocity of cool air	Evaporator clogged or frosted	Clean evaporator fins or filters Repair as necessary Repair as necessary Replace blower motor Check amplifier
	Air leakage from cooling unit or air duct	
	Air inlet blocked	
	Blower motor faulty	
	A/C Amplifier faulty	

## Checking the Refrigeration System with Manifold Gauge

Before you read the manifold gauge pressure, make sure that:

1. The temperature at the air inlet is 30-35°C (86-95°F)
2. The engine is running at 2,000 rpm
3. The blower speed is set on high
4. The A/C switch is ON
5. The temperature control lever is set at COOL

Remember that gauge indications may vary slightly due to ambient temperature conditions.

## Normally Functioning Refrigeration System

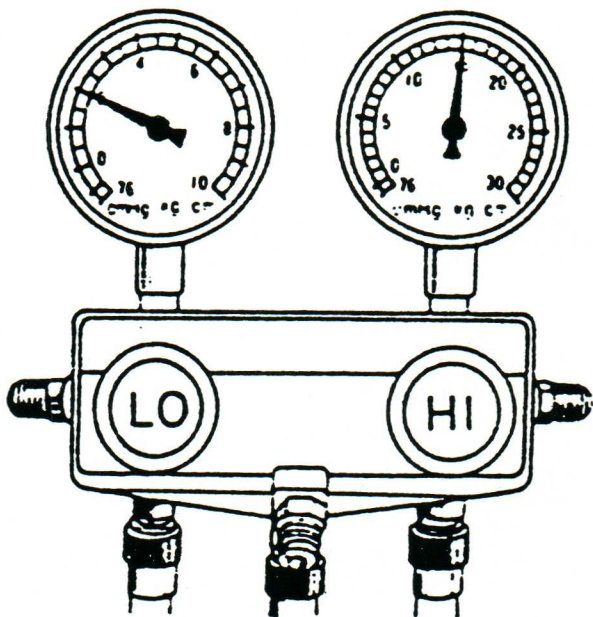
If the refrigeration system is functioning normally, the gauge reading will be:

Low pressure side

1.5 - 2.0 kg/cm<sup>2</sup>  
(21-28 psi, 147-196 kPa)

High pressure side

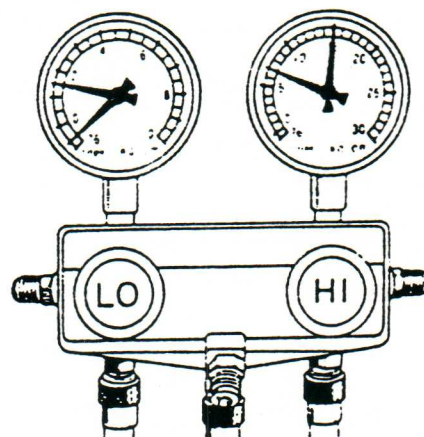
14.5-15.0 kg/cm<sup>2</sup>  
(206-213 psi, 1,422-1,471 kPa)



## Moisture Present in the Refrigeration System

If the system periodically cools and then fails to cool, moisture in the refrigeration system is a likely cause.

The most common symptom of moisture is that, during operation, pressure at the low pressure side sometimes becomes a vacuum and sometimes is normal.



This condition is most likely caused by moisture that has entered the refrigeration system and freezes at the expansion valve orifice, temporarily stopping the cycle. The normal cycle is restored when the ice melts.

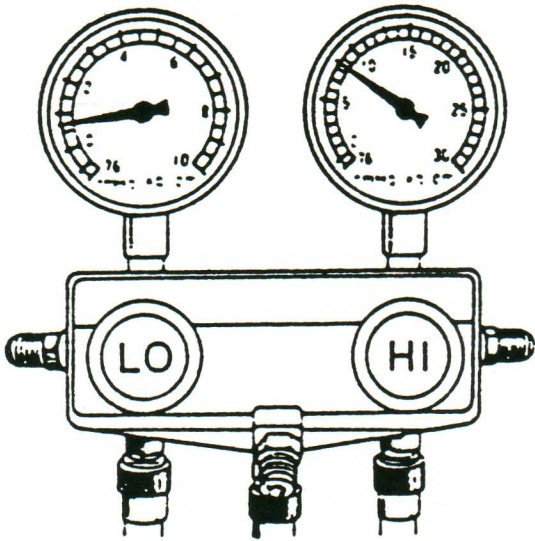
You can tell if this is the problem if the drier is oversaturated. The drier would be oversaturated because the ice blocks the circulation of refrigerant.

To repair this problem, replace the receiver and drier. Also, remove moisture in the cycle through repeated vacuum purging. Then, charge the refrigerant to the proper amount.

## Insufficient Refrigerant

If you are getting a low pressure reading at both low and high pressure sides and bubbles are seen in sight glass and there is insufficient cooling performance, the cause may be an insufficient amount of refrigerant in the system.

## Features

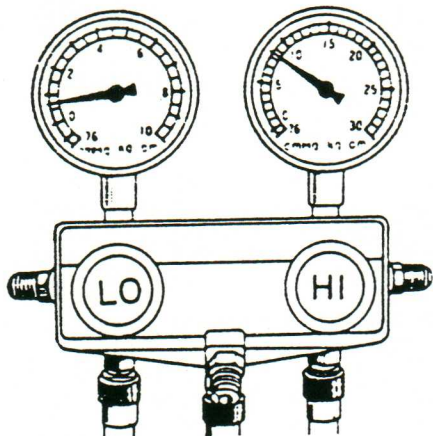


Lack of refrigerant is most commonly the result of a gas leak somewhere in the refrigeration system.

To repair the problem, check the system with a leak detector, then repair the leak. Finish by charging the refrigerant to the proper amount.

### Poor Refrigerant Circulation

If you are getting a low pressure reading at both low and high pressure sides and there is frost on the tubes leading from the receiver to the unit, the problem may be poor refrigerant circulation.

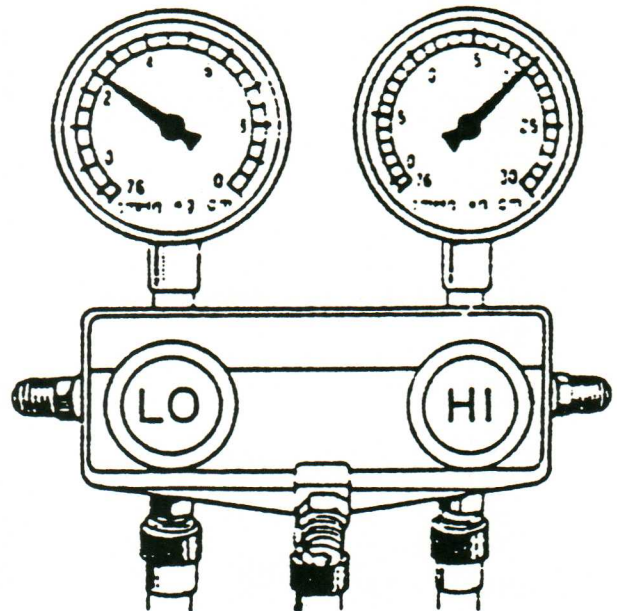


Circulation can be impaired by dirt in the receiver. To repair this condition, check to see if the receiver is clogged. If so, replace the receiver.

### Refrigerant Overcharge or Insufficient Condenser Cooling

If you are getting a high pressure reading at both the low and high pressure sides, there are two possible causes:

- Excessive refrigerant in the system, or
- Insufficient condenser cooling



If you determine that there is excessive refrigerant in the cycle, the refrigerant is overcharged. If the condenser fins are clogged or the fan motor is faulty, the condenser cooling is insufficient.

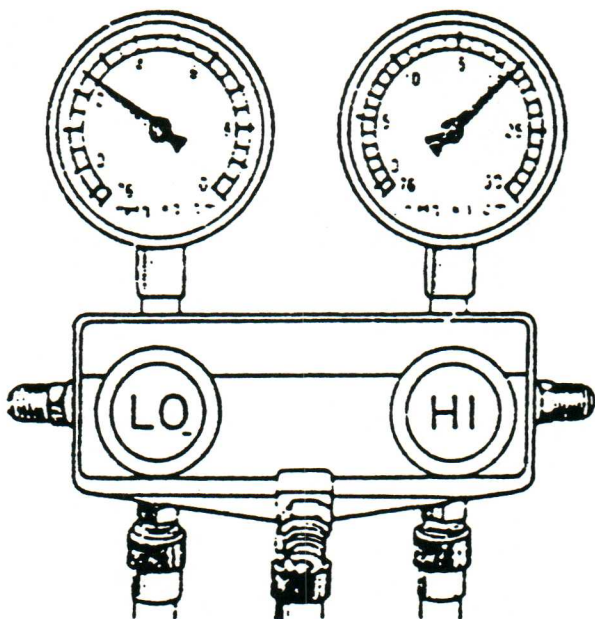
To repair the problem, clean the condenser and check the fan motor operation.

If you find that the condenser is clean and the fan motor is operating properly, check the amount of refrigerant in the system. Remember to vent the refrigerant through the gauge manifold low pressure side by gradually opening the valve.

## Improperly Mounted Expansion Valve/Defective Heat Sensing Tube

If you are getting a high pressure reading at both the low and high pressure sides and there is frost or a large amount of dew on the piping at the low pressure side, there are two possible causes:

- The expansion valve is malfunctioning or the heat sensing tube is installed improperly
- The refrigerant flow is out of adjustment

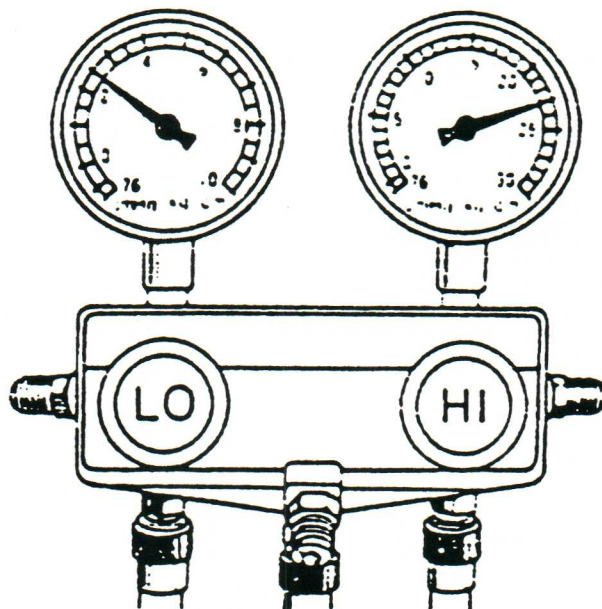


The result is excessive refrigerant in the low pressure piping, and the expansion valve may be opened too wide.

To repair the problem, check the heat sensing tube installation. If it is properly installed, test the expansion valve and replace if found to be faulty.

## Air Present in the Refrigeration System

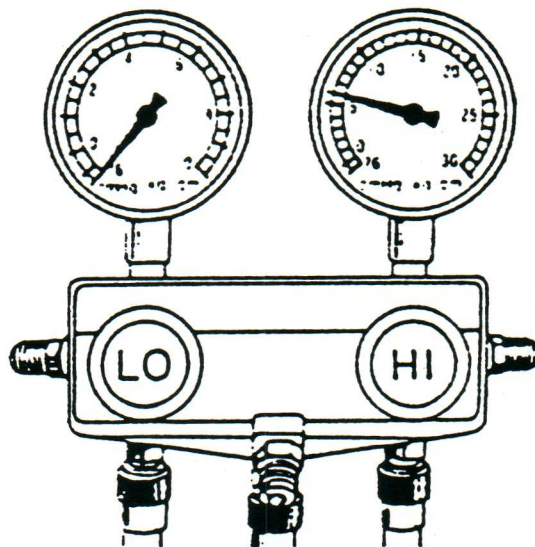
If you are getting a high pressure reading at both the low and high pressure sides (after the refrigeration system has been opened and the refrigerant charged without vacuum purging), air may have entered the refrigeration system.



If you find that air is present (there will be insufficient vacuum purging) you will need to replace the receiver and the drier. Check for dirty or insufficient compressor oil. Then, vacuum purge and charge the system with new refrigerant.

## Refrigerant Does Not Circulate

If the customer complaint is that the system does not cool, or it cools from time to time, lack of refrigerant circulation could be the cause.



Symptoms of this problem include a vacuum on the low pressure side and that very low pressure on the high pressure side. Other symptoms include frost or dew on the receiver and drier or the expansion valve.

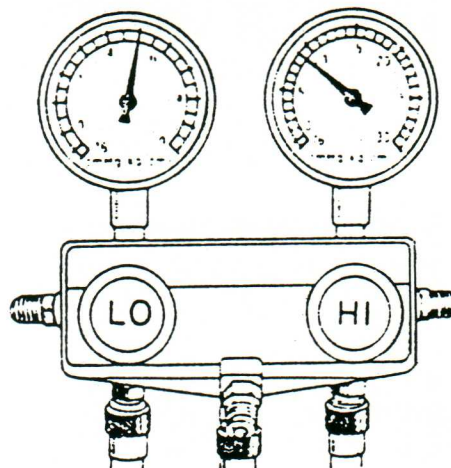
To repair the problem, you must allow the vehicle to stand for a period of time. Restarting the system will help you determine whether the problem is caused by moisture, dirt or a gas leak from the expansion valve heat sensing tube.

If the problem is moisture, you will need to replace the receiver and the drier. You will then need to move the moisture in the cycle through repeated vacuum purging. Then, charge the refrigerant to the proper amount.

If the problem is dirt, remove the expansion valve and clean it off by blowing on it. If you can't remove the dirt, replace the valve. Vacuum purge the system and charge the new refrigerant to the proper amount.

If the problem is a gas leakage, replace the expansion valve.

## Defective Compression Compressor



If the system does not cool and your gauge readings show that the pressure is too high on the low pressure side and too low on the high pressure side, the problem may be an internal leak in the compressor.

To repair the problem, replace or repair the compressor.

## Special Tools and Equipment

Tool	SST. No.	Use
Manifold gauge set	07117-78010	To evacuate and charge system
Ohmmeter		Electrical diagnosis
Magnetic clutch tool set (which includes the following eight tools):	07110-77011	
Pressure plate remover	07112-71010	To remove the pressure plate
Snap ring pliers	07114-84020	To remove the pressure plate
Key remover	07112-45021	To remove the key
Shaft plate remover	07112-15010	To remove the shaft plate
Shaft seal remover	07114-15010	To remove the shaft seal
Hexagon wrench set	07110-61050	To remove service valves and front housing
Shaft plate installing	07112-25010	To install the shaft plate tool
Key press tool	07114-45010	To install the key

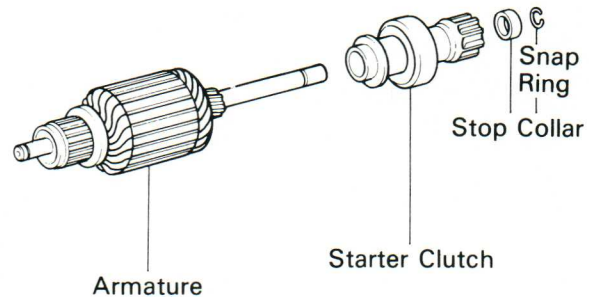
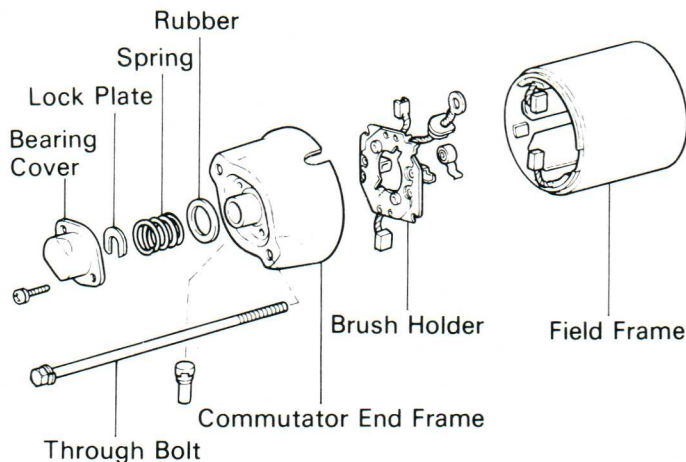
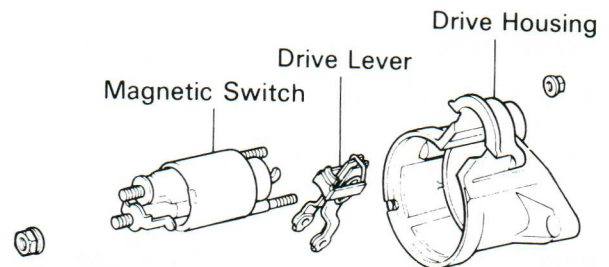


## THE 1987 TERCEL CONVENTIONAL STARTING SYSTEM & TROUBLESHOOTING

### Components

#### Application: 1987 Tercel

Please Note: This article is meant to provide practical information regarding the Tercel starting system and troubleshooting. For complete inspection procedures, please contact your local STAR dealer representative.

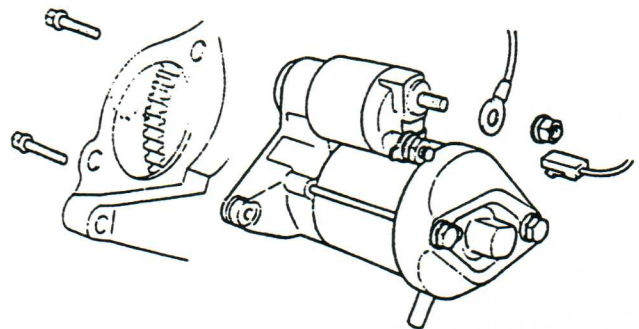


### Conventional Starter Disassembly

1. Begin by removing the starter from the clutch housing. This is done by disconnecting the cable from the negative terminal of the battery. On some vehicles you also will need to remove the Air Suction hose.

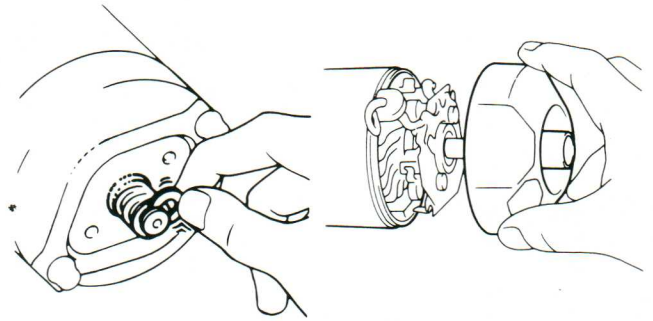
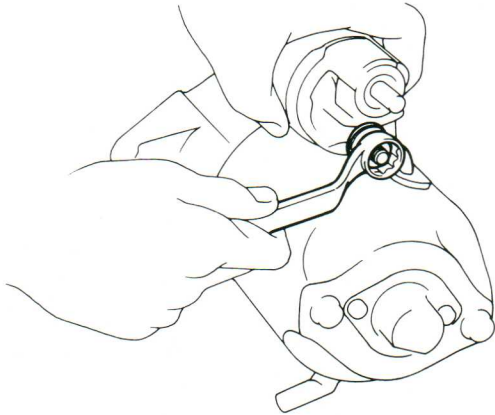
Remove the nut and disconnect the battery cable from the magnetic switch on the starter. Disconnect the other wire from the terminal.

Remove the two bolts and remove the starter from the clutch housing.



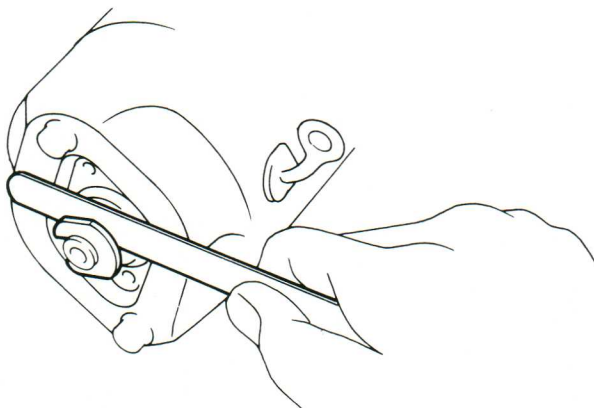
## 2. Remove the magnetic switch.

- a. Remove the nut and disconnect the lead wire from the magnetic switch terminal.
- b. Loosen the two nuts holding the magnetic switch to the drive housing. Lift the magnetic switch up and out to unhook the plunger from the drive lever.



## 3. Remove the end frame.

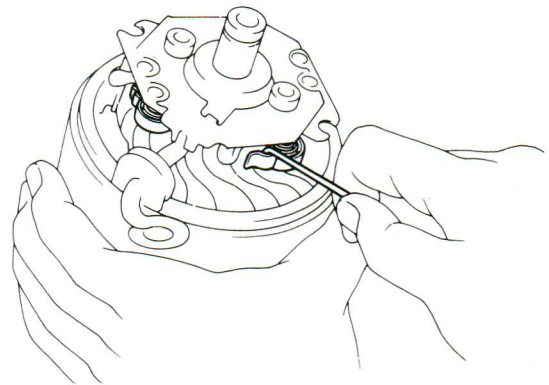
- a. To do this, first remove the bearing cover.
- b. Then, using a feeler gauge, check the armature shaft thrust clearance between the lock plate and the end frame. The thrust clearance should be 0.05 - 0.60 mm (0.0020 - 0.0236 in.)



- c. Now, remove the lock plate, spring and rubber.
- d. Remove the two through bolts and pull out the commutator end frame.

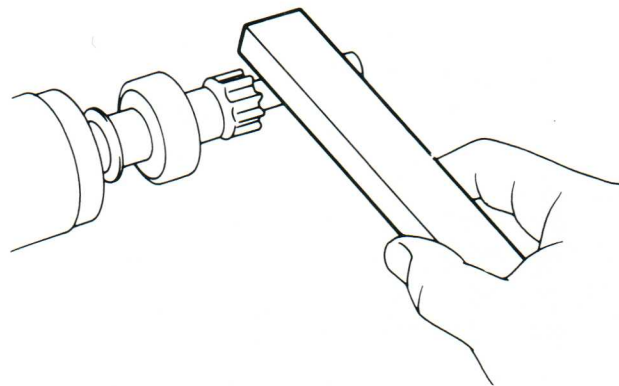
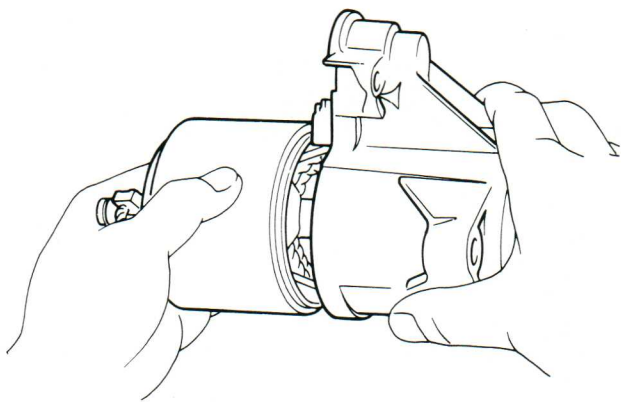
## 4. Remove the brushes and brush holder.

- a. Using a piece of steel wire, separate the brush springs and remove the brushes from the brush holder.
- b. Pull the brush holder off the armature.

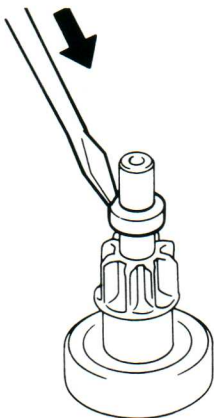
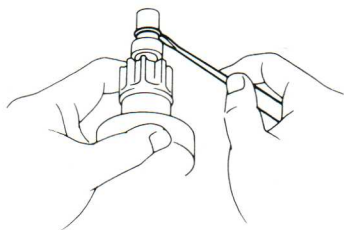


## 5. Pull the field frame apart from the drive housing.

6. Remove the armature by removing the drive lever from the drive housing. Then, pull the armature from the drive housing.



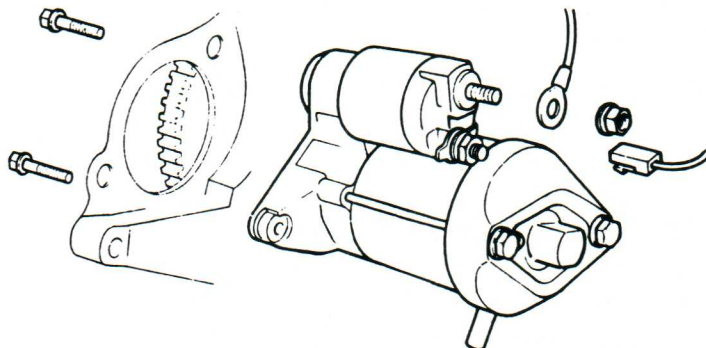
7. Remove the starter clutch.
  - a. Using a screwdriver, tap in the stop collar. Then pry off the snap ring.
  - b. Remove the rear collar from the shaft.



- c. If the pinion was difficult to pull out, smooth the shaft with an oil stone.
  - d. Remove the starter clutch.

## Conventional Starter Installation

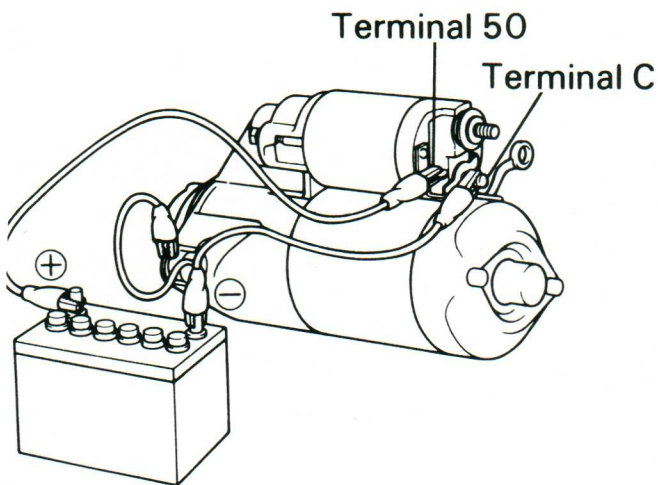
1. Install the starter in the clutch housing.
2. Connect the connector to the terminal on the magnetic switch. Connect the battery cable to the terminal on the switch, then install the nut.
3. Install the Air Suction hose (federal).
4. Connect the cable to the negative terminal of the battery. Make sure that the engine starts.



## Conventional Starter Performance Test

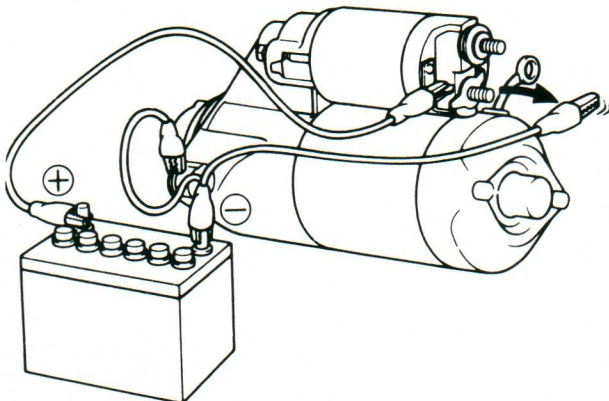
**CAUTION:** These tests must be performed within three to five seconds to avoid burning out the coil.

1. Perform the pull-in test.
  - a. Disconnect the field coil lead from terminal C.
  - b. Connect the battery to the magnetic switch as shown. Check that the pinion moves outward. If the pinion does not move, replace the magnetic switch.



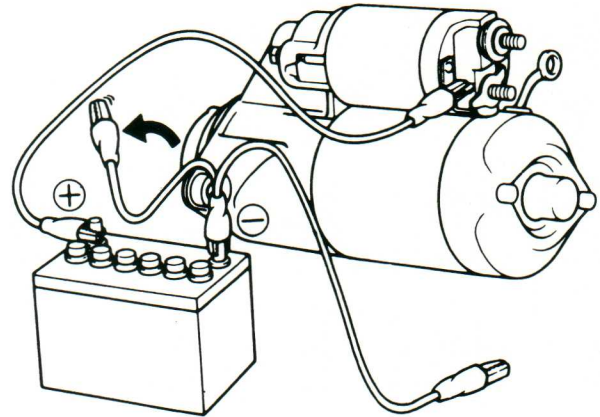
2. Perform the hold-in test.

With the battery connected as indicated in step 1 and the pinion out, disconnect the negative lead from terminal C. Check that the pinion remains out. If the pinion returns inward, replace the magnetic switch.

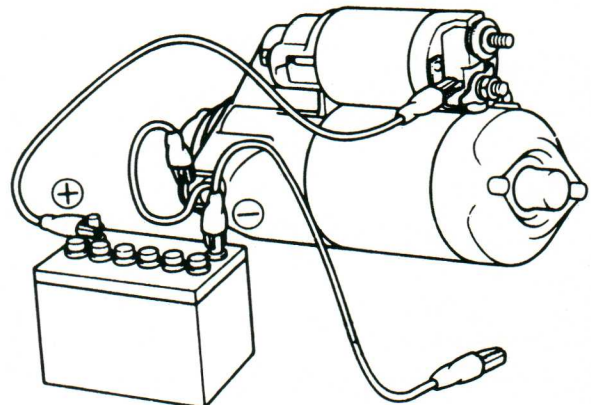


3. Check the pinion return.

Disconnect the negative lead from the switch body. Check that the pinion returns inward. If the pinion does not return, replace the magnetic switch.



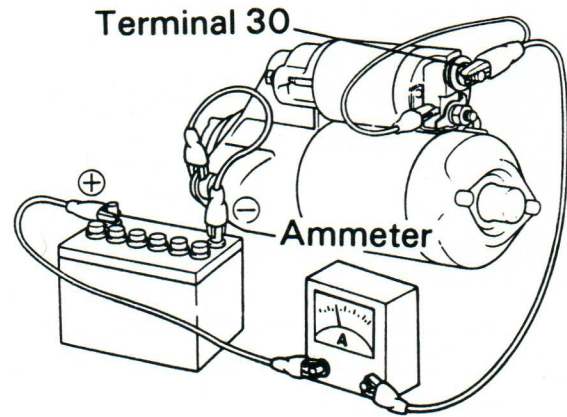
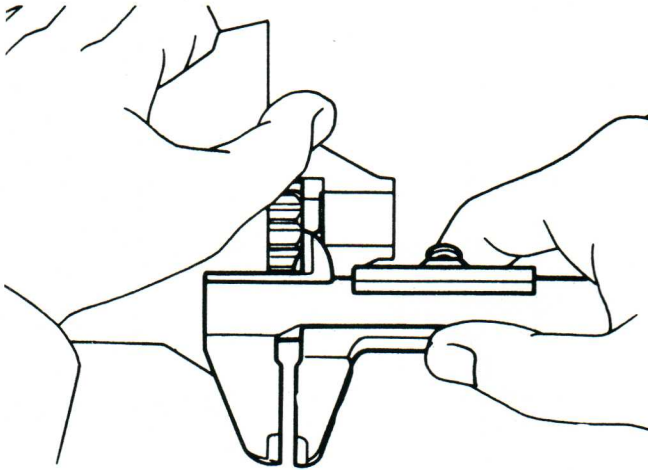
4. Check the pinion clearance.
  - a. Connect the battery to the magnetic switch as shown.



# Features

b. Move the pinion gear toward the armature to remove slack and measure the clearance between the pinion end and the stop collar.

Standard clearance: 0.1-0.4mm (0.004-0.016 in.)



5. Perform the no-load performance test.
  - a. Connect the field coil lead to terminal C. Make sure that the lead is not grounded.
  - b. Connect the battery and the ammeter to the starter as shown.

- c. Check that the starter rotates smoothly and steadily with the pinion moving out.
    - d. Check that the ammeter reads the specified current.
- Specified current: Less than 50A at 11V

## Troubleshooting the Conventional Starter

Problem	Possible	Cause	Remedy
Engine will not crank	Battery charge low		Check battery specific gravity Charge or replace battery
	Battery cables loose, corroded or worn		Repair or replace cables
	Starter relay faulty (M/T)		Replace starter relay
	Clutch start switch faulty (M/T)		Adjust switch position or replace switch
	Neutral start switch faulty (A/T)		Adjust or replace switch
	Fusible link blown		Replace fusible link
	Starter faulty		Repair starter
Engine cranks slowly	Ignition switch faulty		Replace ignition switch
	Battery charge low		Check battery specific gravity Charge or replace battery
Starter keeps running	Battery cables loose, corroded or worn		Repair or replace cables
	Starter faulty		Repair starter
Starter spins—engine will not crank	Starter faulty		Repair starter
	Ignition switch faulty		Replace ignition switch
	Short in wiring		Repair wiring
Starter spins—engine will not crank	Pinion gear teeth broken or faulty starter		Repair starter
	Flywheel teeth broken		Replace flywheel

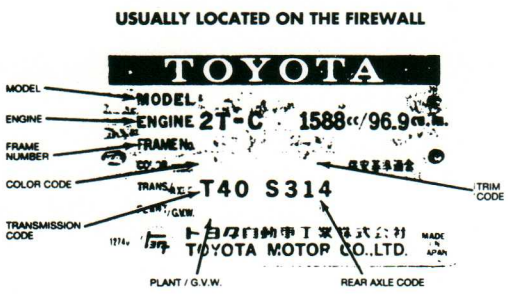
## VEHICLE IDENTIFICATION INFORMATION

### Model Application: All

Knowing where to look for vehicle identification information can save you valuable time and help your Toyota dealer provide you with the right parts the first time. Here's the inside scoop on Toyota vehicle information:

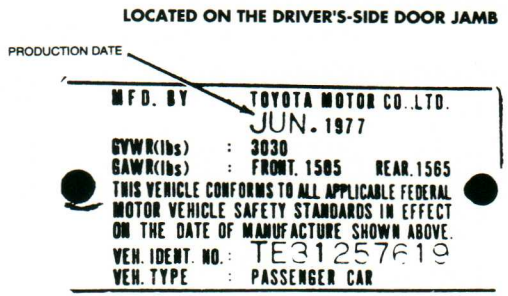
Model Number and Color/Trim Codes are printed on the metal plate located on the vehicle's firewall.

### Up to August 1980

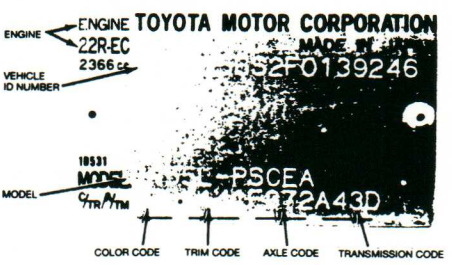


The production date is printed on the metal plate that is attached to the doorjamb.

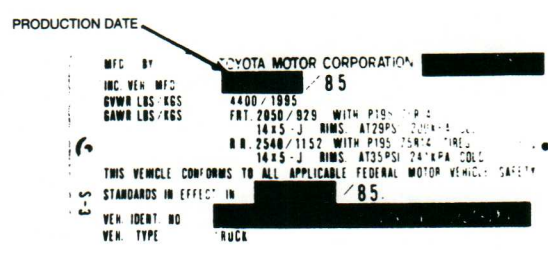
### Up to August 1980



### After August 1980



### After August 1980



## A NEW TIP FOR OXYGEN SENSORS

### Model Application: 1989+ Corolla GTS (except Calif.); V6 2WD Truck (Calif. only)

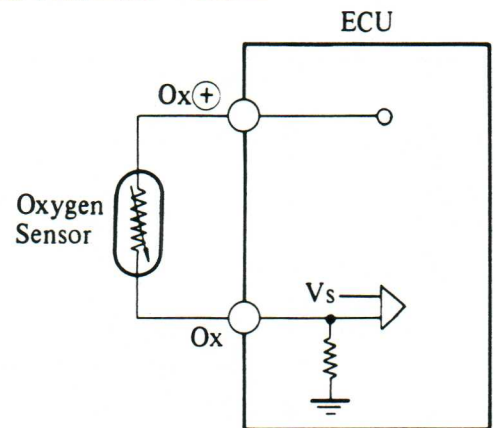
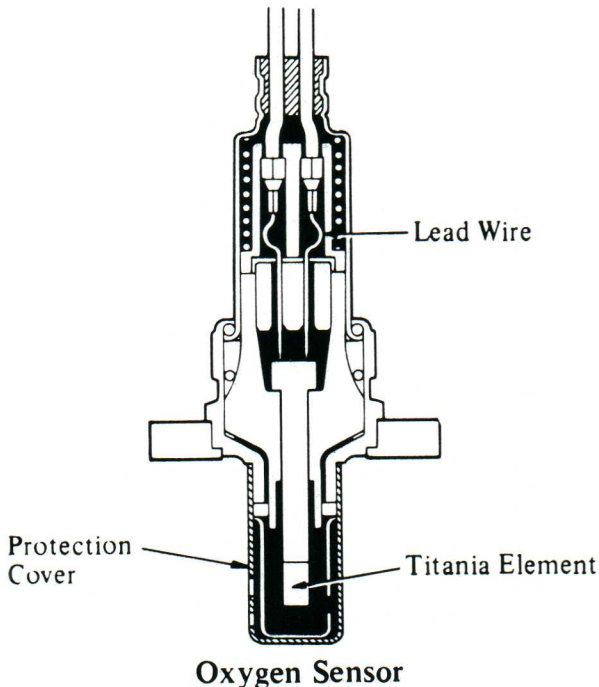
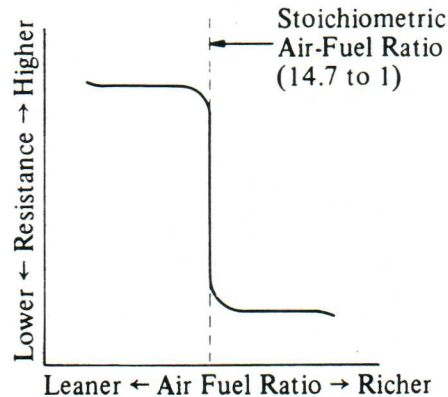
A titania-tipped oxygen sensor is now standard equipment on 1989+ Corolla GTS models and the V6 2WD Truck. The new sensor is smaller and lighter than the zirconia sensor used on all other models. It is also manufactured as a sealed unit, which makes it less susceptible to contamination.

A thick film of titania at the tip of the element enables the sensor to detect oxygen concentrations in the exhaust gas. Unlike the zirconia element, which generates voltages according to the oxygen concentration in the exhaust gas, the titania element varies the resistance of the sensor based on the oxygen concentration in the exhaust gas. If the air/fuel ratio is lean, resistance is high; if it is rich, resistance is low.

Because the titania-tipped sensor's resistance also changes with temperature changes, a heater has been built into the sensor to maintain a constant temperature.

Both the zirconia and the titania sensor vary output voltage to the ECU from .1 to .9 volts. However, the zirconia sensor generates its own voltage.

The ECU provides the titania sensor with a constant 1-volt potential to the element's Ox positive terminal. The ECU compares voltage drops at the Ox terminal to a predetermined reference voltage. As exhaust gas concentrations change, so does the resistance within the sensor.



If the Ox voltage is greater than the reference voltage, the ECU determines that the air-fuel ratio is "rich." If the Ox voltage is lower than the reference voltage, the ECU judges the air-fuel ratio to be "lean."

## WIRING DIAGRAMS GET A NEW LOOK

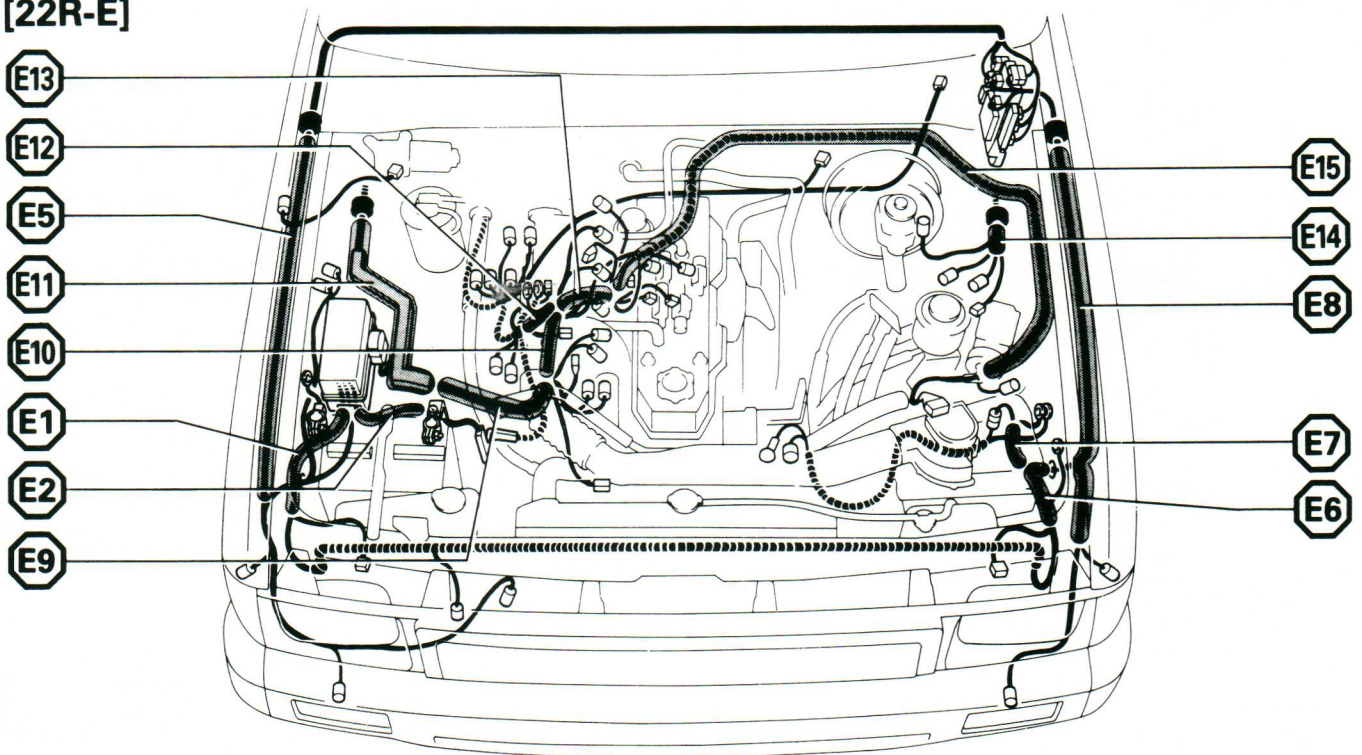
### Model Application: All

Finding in-loom splice points, ground points and power sources can be even easier if you're looking at 1989 (or more recent) Electrical Wiring Diagrams.

The new, improved electrical wiring diagrams are designed to be more practical and useful than ever before. The manuals feature larger diagrams with enhanced detail, as well as close-up looks at particular components.

○ : Location of Splice Points

[22R-E]



The books also include a comprehensive "How To Use This Manual" section and a new section for wire splice locations in the Cressida and Truck. More service hints are also included in the "System Circuits" section.

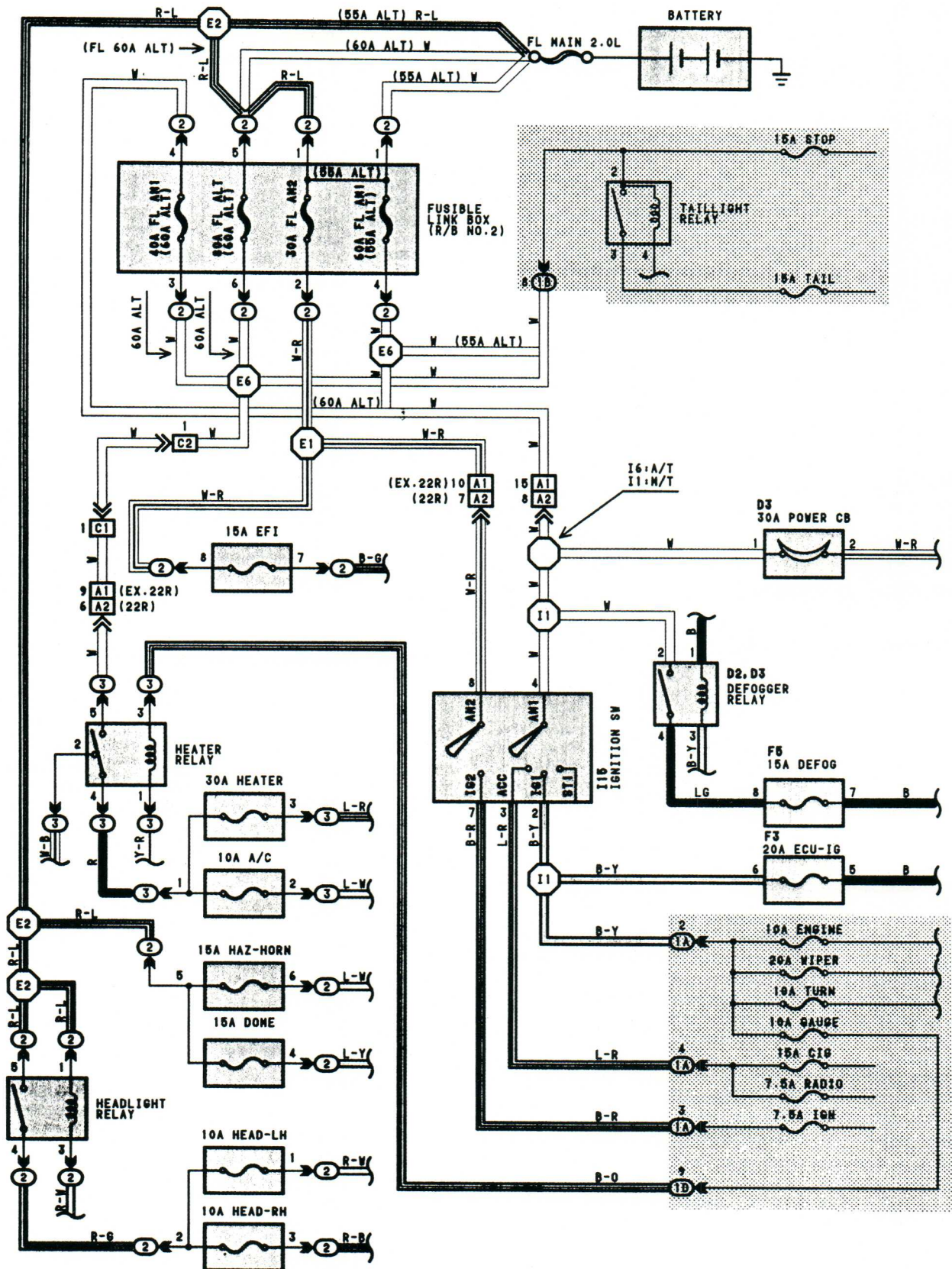
The manuals move from the introductory and preparatory sections into Relay Locations, Electrical Wiring Routing, Power Source, SystemCircuits and Ground Points. The Power

Source section also includes an easy-to-use reference chart, which provides you with at-a-glance ability to find the power sources for over 100 key components and systems.

Wires are also color-coded and labeled with source and destination. All components within the system are shown in pale blue and junction blocks are shaded gray.



# Tech Tips



# THE LATEST NEWS ABOUT CFC RECOVERY AND RECYCLING

## Model Application: All

How you service air conditioning systems has changed recently, thanks to increased awareness of the damaging effects that chlorofluorocarbons (CFCs) have on the atmosphere.

Venting R-12 into the atmosphere, as was often done when servicing A/C systems, releases thousands of pounds of CFCs into the atmosphere annually. These CFCs have been proven to contribute significantly to the depletion of the ozone layer. Using CFC recovery equipment can prevent the CFCs from being released into the atmosphere, thus reducing the potential for further damage to the ozone layer.

According to section 609 of the Clean Air Act, if your repair shop serviced 100 or more vehicles in 1990, you must now (as of Jan. 1, 1992) use recovery and recycling equipment each time a repair requires the air conditioning system to be opened. If your shop serviced fewer than 100 vehicles, you have until Jan. 1, 1993 to comply.

In addition, A/C technicians who work in facilities that service 100 or more air conditioning-related problems per year must be EPA-certified through ASE, the Mobile Air Conditioning Society (MACS) or the International Mobile Air Conditioning Association (IMACA).

Again, if your shop serviced fewer than 100 A/C problems in 1990, you have until Jan. 1, 1993 to become EPA-certified.

In some areas, such as Southern California, all technicians servicing A/C systems must be certified (as of Jan. 1, 1992), regardless of the size of the facility. And, as of Nov. 15, 1992, you must be

EPA-certified to purchase R-12 in containers less than 20 pounds at the retail level.

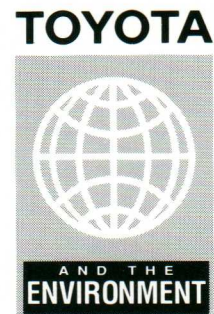
For certification information, call or write the following organizations:

ASE  
13505 Dulles Technology Dr.  
Herndon, VA 22071-3415  
(703) 713-3800

IMACA  
2100 North Highway 360  
Suite 1300  
Grand Prairie, TX 75050-1034  
(214) 988-6081

MACS  
P.O. Box 97  
East Greenville, PA 18041  
(215) 541-4500

Some state and local requirements differ from the national EPA requirements, so be sure to verify that the certification test you take meets your state and local requirements!



## FACTORY COLLISION REPAIR MANUALS FROM TOYOTA

Today's modern unibody vehicles are very complex. Factory-approved cutting and sections procedures save time and money by providing an alternative to the task of removing numerous welds, rewelding and trying to effectively reapply a rustproofing material to the various seams and weld joints. These methods are described in a series of relatively inexpensive collision repair manuals from your Toyota STAR dealer.

Toyota's individual Collision Repair Manuals contain repair instructions for cutting and replacing many body and support member components, identification and location of plastic parts and high-strength steel components, as well as body seam sealing locations and handy factory body dimension drawings with easy-to-locate reference points and reference lengths.

### Repair Manuals for Collision Damage

<u>Car</u>	<u>Year(s)</u>	<u>Material Number</u>
Starlet	81-84	00400-36158
Tercel	80-82	00400-98367
Tercel 2WD	83-86	00400-36431-E
Tercel 4WD	83-86	00400-36432E
Tercel	87	00400-BRM001-E
Tercel Coupe	87	00400-BRM01-1U
Tercel	92	00400-BR029
Corolla	80-83	00400-36001
Corolla FF/FR	83-87	00400-36434E
Corolla FFX16	87	00400-BRM00-6E
Corolla	88	00400-BR013
Corolla Wagon	88	00400-BR013
Corolla All-Trac Wagon	88 1/2	00400BR014
Celica/Supra	82-85	00400-36182
Celica	86-87	00400-BRM00-1E
Camry	83-86	00400-36433-E
Camry	87	00400-BRM01-0E
Camry	92	00400-BR032
Cressida	81-84	00400-36118
Cressida	85-87	00400-36441E
Cressida Wgn	85-87	00400-36442E
Cressida	90	00400-BR016
MR2	85-87	00400-36440A
MR2	87	00400-BRM008-E
MR2	91	00400-BR025
Van	84-87	00400-BRM00-3E
Previa	91	00400-BR027
Paseo	92	00400-BR030
Supra	86 1/2-87	00400-BRM00-5E

### Miscellaneous Manuals

#### Toyota Fundamental Body Repair Procedure

Material #00400-BRM00-2E

This manual covers structure, body materials, body repairs, welding techniques and tools and equipment.

#### Toyota Fundamental Painting Procedures

Material #00400-BR024

This manual covers fundamentals, facilities, tools and equipment, repainting processes, problem areas, safety and cleanliness, and an explanation of refinishing terminology.

Ask your local Toyota STAR dealer for more details.

## 1989 CAMRY SPECIFICATIONS

### Model Application: 1989 Camry

The following specifications should help you with your 1989 Camry repairs. If you have any questions, please refer to your 1989 Camry Repair Manual or contact your Toyota STAR dealer representative.

### Vehicle Models and Codes:

Body Type	Transmission	VDS of VIN	Model No.
4-Door Sedan	5-Speed Manual	SV24E	2511*
4-Door Sedan	4-Speed Auto.	SV24E	2512*
4-Door Sedan DLX	5-Speed Manual	SV21E	2521*
4-Door Sedan DLX	4-Speed Auto.	SV21E	2522*
4-Door Sedan LE	4-Speed Auto	SV22E	2532*
4-Door Sedan DLX (V6)	5-Speed Manual	VV21E	2523
4-Door Sedan DLX (V6)	4-Speed Auto.	VV21E	2524
4-Door Sedan LE (V6)	4-Speed Auto.	VV22E	2534
4-Door ALLTRAC Sedan DLX	5-Speed Manual	SV21J	2553
4-Door ALLTRAC Sedan DLX	4-Speed Auto.	SV21J	2556
4-Door ALLTRAC Sedan LE	4-Speed Auto.	SV22J	2554
5-Door Wagon	4-Speed Auto.	SV22W	2564
5-Door Wagon DLX	5-Speed Manual	SV21W	2565
5-Door Wagon DLX	4-Speed Auto.	SV21W	2562
5-Door Wagon DLX (V6)	4-Speed Auto.	VV21W	2566
5-Door Wagon LE	4-Speed Auto.	VV22W	2568

\* Indicates both TMM and TMC produced Camrys

### Weight (Pounds):

Model No.	Curb
2511	2690
2512	2745
2521	2733
2522	2789
2523	2965
2524	3020
2532	2811
2534	3086
2553	3086
2554	3175
2556	3152
2564	2921
2565	2855
2566	3130
2568	3197

### Dimensions:

	Sedan in. (mm)	Sedan DLX, LE in. (mm)	Wagon in. (mm)
Overall Length	182.1 (4625)	182.1 (4625)	183.1 (4650)
Overall Width	66.5 (1690)	67.4 (1712)	67.4 (1712)
Overall Height	54.1 (1375)	54.1 (1375)	54.5 (1385)
Wheelbase	102.4 (2600)	102.4 (2600)	102.4 (2600)
Front Tread	58.3 (1480)	58.3 (1480)	58.3 (1480)
Rear Tread	57.1 (1450)	57.1 (1450)	57.1 (1450)
Ground Clearance	5.3 (135)	5.3 (135)	5.3 (135)

	Sedan DLX, LE V6 in. (mm)	Wagon DLX, LE V6 in. (mm)	Sedan ALLTRAC in. (mm)
Overall Length	182.1 (4625)	183.1 (4650)	182.1 (4625)
Overall Width	67.3 (1710)	67.3 (1710)	67.3 (1710)
Overall Height	54.1 (1375)	54.5 (1385)	54.1 (1375)
Wheelbase	102.4 (2600)	102.4 (2600)	102.4 (2600)
Front Tread	58.1 (1475)	58.1 (1475)	58.3 (1480)
Rear Tread	56.9 (1445)	56.9 (1445)	57.1 (1450)
Ground Clearance	5.2 (135)	5.3 (135)	5.4 (136)

### Engine:

Model	3S-FE
Type	4 cylinder in-line transverse, DOHC
Displacement	121.9 cu. in. (1998 cc)
Bore and Stroke	3.39 X 3.39 in. (86.0 X 86.0 mm)
Compression Ratio	9.3:1
Compression Pressure	STD 178 psi
HP (SAE Net)	115 hp @ 5200 rpm
Torque (SAE Net)	124 ft. lb. @ 4400 rpm

# Specifications

<b>Model</b>	<b>2VZ-FE</b>
Type	6 cylinder V-type transverse, DOHC
Displacement	153.0 cu. in. (2507 cc)
Bore and Stroke	3.44 X 2.74 in. (87.5 mm X 69.5 mm)
Compression Ratio	9.0:1
Compression Pressure	STD 178 psi
HP (SAE Net)	153 hp @ 5600 rpm
Torque (SAE Net)	155 ft. lb. @ 4400 rpm

## Ignition System:

	<b>3S-FE</b>	<b>2VZ-FE</b>
Spark Plug Type	Conventional tip	Conventional tip
Nippondenso	Q16R-U11	PQ20RU
Spark Plug Gap	0.043 in. (1.1 mm)	0.043 in. (1.1 mm)
Firing Order	1-3-4-2	1-2-3-4-5-6

## Ignition Timing:

<b>3S-FE</b>	<b>2VZ-FE</b>
10° BTDC at idle	10° BTDC at idle
(TE1 and E1 short circuit)	(TE1 and E1 short circuit)

## Valve Clearance (Cold):

	<b>3S-FE</b>	<b>2VZ-FE</b>
Intake	0.007-0.011 in. (0.19-0.29 mm)	0.005-0.009 in. (0.13-0.23 mm)
Exhaust	0.011-0.015 in. (0.28-0.38 mm)	0.011-0.015 in. (0.27-0.37 mm)

## Cooling System:

Type	Water cooled
Radiator	Vertical flow tube/corrugated fin
Radiator Cap	
Opening	12.8 psi (88 kPa)
Centrifugal	Water Pump
Thermostat	180°F (82°C) Cooling System
<b>3S-FE</b>	
Capacity w/heater	M/T - 6.8 qt. (6.4 l) A/T (2WD) - 6.7 qt. (6.3 l) A/T (4WD) - 7.2 qt. (6.8 l)
<b>2VZ-FE</b>	
	M/T - 10.0 qt. (9.5 l) A/T - 9.9 qt. (9.4 l)

## Fuel System:

Type of Fuel Distribution	Electronic Fuel Injection
Fuel Pump Type	Electric
Fuel Pump Pressure	41 psi (284 kPa)
Fuel Tank Capacity	15.9 gal (60 l)
Fuel Grade	USE ONLY UNLEADED FUEL (R+M/2 = 87)

## Electrical System:

Battery (volts/amp hrs)	12V/60A-hr
Alternator (volts/amperes)	12V/70A

## Lubrication System:

	<b>3S-FE</b>	<b>2VZ-FE</b>
Type	Mechanical	Mechanical
Oil Pump	Gear Type	Rotor Type
Oil Filter	Full Flow	Full Flow
Oil Filter Capacity	0.4 qt. (.4 l)	0.2 qt. (.2 l)
Recommended Oil	API grade SF or better	API grade SF or SF/CC
Oil Capacity w/ Filter	4.1 qt.	4.1 qt.

## Tires:

	<b>3S-FE</b>	<b>2VZ-FE</b>
Radial	Size, Type 195/60R15, Radial	185/70SR14,

## Brakes:

Type	Power assisted, Wagon: LSP Valve*
Front	Disc 10.0 in. (255 mm)
Rear	Drum; ALLTRAC Disc, V6 Disc
Parking Brake	Rear, Drum; ALLTRAC & V6 Drum in Disc
Rear Drum	9.00 in (228.6 mm)
Rear Disc	ALLTRAC & V6 10.6 in. (269 mm)

\*Optional anti-lock brake system for ALLTRAC and V6 models.

## Clutch:

	<b>3S-FE</b>	<b>2VZ-FE</b>
Type	Single dry plate	Single dry plate
Operation	Hydraulic release	Hydraulic release
Disc Diameter	8.8 in. (224 mm)	9.3 in. (236 mm)
Press. Plate Type	Diaphragm	Diaphragm
Clutch Pedal		
Free Play	0.2 - 0.6 in. (5-15 mm)	0.2 - 0.6 in. (5-15 mm)

## Transaxle:

### Manual, 5-speed synchromesh, floor shift

Gear Ratio	S51	E52	E56F (ALLTRAC)
First	-3.538	-3.230	-3.538
Second	-1.960	-2.045	-2.045
Third	-1.250	-1.333	-1.333
Fourth	-0.945	-0.972	-1.028
Fifth	-0.731	-0.820	-0.820
Reverse	-3.153	-3.583	-3.583
Lubricant			
Capacity	2.7 qt. (2.6 1)	4.4 qt. (4.2 1)	5.3 qt. (5.0 1)
Fluid Type	DEXRON® II ATF	API GL-5 SAE 75W-90 Multipurpose	API GL-5 SAE 75W-90 Multipurpose

### Automatic

### (A140E, A140L & 540E) 4-speed

Gear Ratio	A140E & A140L	A540H	A540E
First	-2.810	-2.810	-2.810
Second	-1.549	-1.549	-1.549
Third	-1.000	-1.000	-1.000
Fourth	-0.706	-0.734	-0.734
Reverse	-2.296	-2.296	-2.296
Fluid			
Capacity	5.9 qt. (5.6 1)	7.4 qt. (7.0 1)	6.2 qt. (5.9 1)
Fluid Type	DEXRON® II ATF	Type "T"	DEXRON® II ATF

## Steering:

Type	Rack and Pinion, Power-assisted	
Gear Ratio	17.4:1	
Turning Circle	34.8 ft. (10.6 m)	35.43 ft. (10.8 m) V6 models

## Alignment – Front Wheel (Unloaded):

	4-Door Sedan	5-Door Wagon	ALLTRAC
Service Checking:			
Caster	1° 40'±45'	1° 00'±45'	1° 40'±45'
Camber	35'±45'	30'±45'	35'±45'
Toe-In	1 ±2mm	1 ±2mm	1 ±2mm
Service Reset:			
Caster	1° 40'±30'	1° 00'±30'	1° 40'±30'
Camber	35'±30'	30'±30'	35'±30'
Toe-In	1 ±1mm	1 ±1mm	1 ±1mm

## Alignment– Rear (Unloaded):

	4-Door Sedan	5-Door Wagon	ALLTRAC
Service Checking:			
Camber	-35'±45'	-5'±45'	-45'±45'
Toe-In	4 ±2mm	4 ±2mm	3 ±2mm
Service Reset:			
Camber	-35'±30'	-5'±30'	-45'±30'
Toe-In	4 ±1mm	4 ±1mm	3 ±1mm

## Suspension

Front	MacPherson struts
Rear	MacPherson struts

## Differential– (except ALLTRAC & V6 Models):

Type	Helical Gear
Differential Ratio	3.736:1
Lubricant Capacity	2.7 qt. (2.6 1) w/manual trans. 1.7 qt. (1.6 1) w/auto. trans.
Lubricant Type	DEXRON® II ATF

## Differential– V6 Models:

Type	Helical Gear
Differential Ratio	3.933:1 w/manual trans. 3.625:1 w/auto. trans.
Lubricant Capacity	4.4 qt. (4.2 1) w/manual trans. 1.06 qt. (1.02 1) w/auto. trans.
Lubricant Type	DEXRON® II ATF w/auto. trans. API GL-5 75W-90 w/manual trans.

## Differential– ALLTRAC:

	Front	Rear
Type	Helical Gear	Hypoid Gear
Differential Ratio	M/T 4.235:1 A/T 4.286:1	2.928:1
Lubricant Capacity	5.3 qt. (5.0 1)	1.2 qt. (1.1 1)
Lubricant Type	Multipurpose API GL-5 SAE 75W-90	Hypoid Gear Oil API GL-5 SAE 90

Please Note: DEXRON® is a registered trademark of General Motors.

# Are insurance companies asking you to paint over inferior replacement parts?

When working on Toyotas, it's wise to use only Genuine Toyota Body Parts, even though insurance companies often suggest that you use imitation replacements. Imitation replacement parts simply may not meet Toyota's high quality standards for fit and corrosion resistance.

You'll appreciate what the real thing does for you. Genuine Toyota Body Parts have proven quality and durability. They look right, fit right and maintain maximum corrosion protection—which can save you work now and complaints later. What's more, Toyota dealers offer you competi-



tive prices, prompt delivery and the technical advice you may need.

See your local STAR Dealer for more information, and *Accept No Substitutes*. Use only Genuine Toyota Body Parts. They'll make both you and your repairs look good.

*"I love what you do for me."*



TOYOTA GENUINE PARTS

# STAR dealers win best supporting role.

Toyota's STAR Dealers have been recognized for their outstanding performance in serving the wholesale market. To them, you're not the competition. You're the customer. A valued customer. And they'll support you in any way they can.

STAR Dealers provide convenient daily delivery service, dedicated outside salespeople, and direct wholesale parts hotlines. They also maintain a large inventory of competitively priced Toyota Genuine Parts, which means you can get most parts immediately. If not, their direct access to the Toyota Parts Distribution Network can get you almost any part you need within 24 hours. And finally, if you have a question about a specific part or repair job, just ask. No one knows Toyotas, or the parts needed to repair them, like a Toyota STAR Dealer.

So give Toyota's STAR Dealers a chance to perform for you.



*"I love what you do for me."*



© 1991 Toyota Motor Sales, U.S.A., Inc.