Service Manual

MONTERO

1984

FOREWORD

This Service Manual has been prepared with the latest service information available at the time of publication. It is subdivided into various group categories and each section contains diagnosis, disassembly, repair, and installation procedures along with complete specifications and tightening references. Use of this manual will aid in properly performing any servicing necessary to maintain or restore the high levels of performance and reliability designed into these outstanding vehicles.

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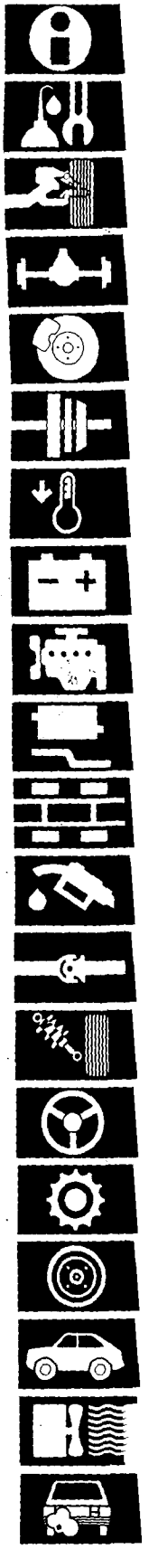
GROUP INDEX



INTRODUCTION

This publication contains the essential removal, installation, adjustment and maintenance procedures for servicing all Body Styles. This information is current as of time of publication.

INDEX

The preceding page contains a table of contents which lists the group number, group title and symbol of each group. The symbol is also located at the left or right top of each page.

GROUP INDEX

The first page in each group has an index to the subjects included in that group.

PAGE NUMBERS

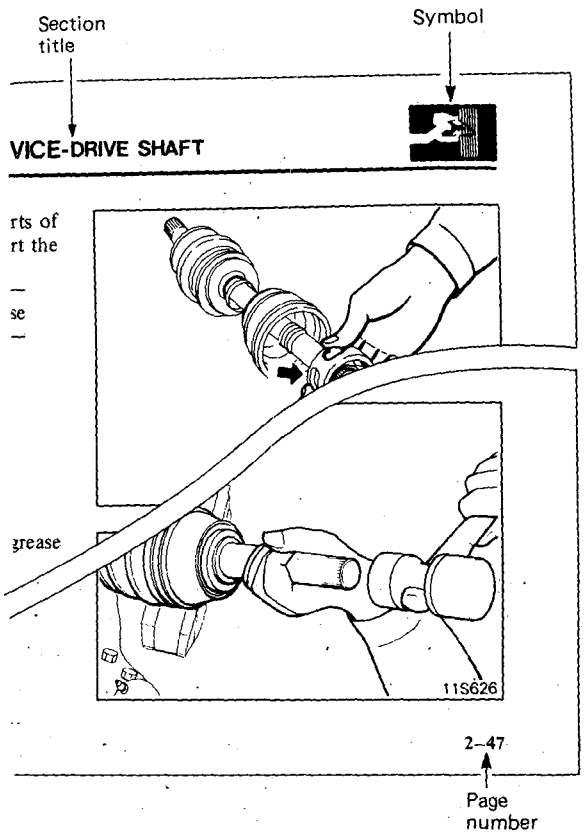
All page numbers consist of two sets of digits separated by a dash. The digits preceding the dash identify the number of the group. The digits following the dash represent the consecutive page number within the group. The page numbers can be found on the lower left or right of each page.

TEXT

1. This manual contains essential procedures for removal, disassembly, inspection, reassembly and installation. For reassembly and installation, reverse the order of disassembly and removal procedures respectively, paying attention to the key points.
2. Unless otherwise specified, each service procedure covers all models. Procedures covering specific models are identified by the model codes, destination or similar designation. A description of these designations is covered in this unit under "VEHICLE IDENTIFICATION".

ILLUSTRATIONS

Illustrations are placed abreast the text. If two or more texts are paired with one illustration, the illustration number at lower right corner of the illustration is given in ( ) at the end of the more pertinent text for reference.



DEFINITION OF TERMS

Standard Dimensions or Values

Design dimensions or values or finished dimensions after adjustment of part.

Service Limit

The allowable limitation of wear, bends, deformation or other damage which restricts the use of parts due to poor performance or insufficient strength.

Repair Limit

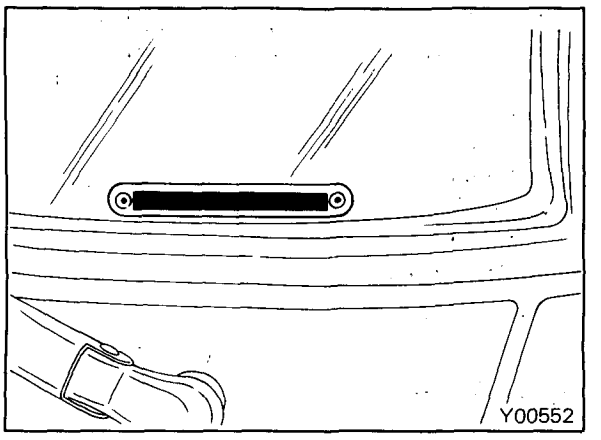
The limitation of wear, deterioration or functional decline of parts at which correction or adjustment is required to maintain their performance in use.

SPECIAL TOOLS

Some of the special tools which appear in this Manual are either not available in the United States, or have been modified or replaced. If the tool pictured on the "Special Tools" page at the beginning of each section has an "*", it has been modified or replaced. Refer to the Mitsubishi Motors special tool catalog, MSSP-3G-TC, check the numerical index and refer to the indicated page number for illustration, description and application. If it is not listed in the numerical index, refer to the replacement/interchange list for an illustration and description of the new tool.
If the pictured tool has a "D", it has been deleted, and is not available in the U.S.

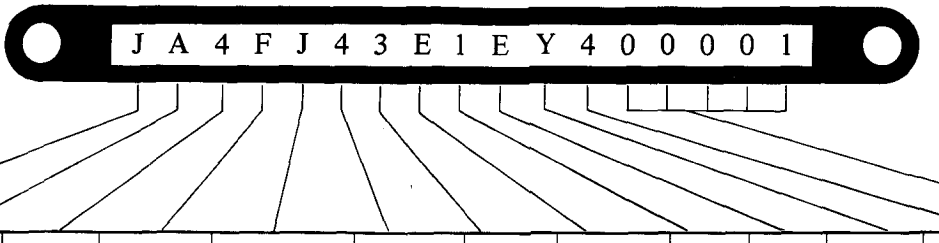
VEHICLE IDENTIFICATION NUMBER PLATE LOCATION

The vehicle identification number (V.I.N.) plate is located on the left top side of the instrument panel and it is visible through the windshield.



VEHICLE IDENTIFICATION NUMBER CODE CHART

All vehicle identification numbers contain 17 digits. The vehicle number is a code which tells country, make, vehicle type, line, etc.



1st digit	2nd digit	3rd digit	4th digit	5th digit	6th digit	7th digit	8th digit	9th digit	10th digit	11th digit	12th digit	13th thru 17th digit
Country	Make	Vehicle type		Line	Series	Body	Engine	Check digit	Model year	Plant	Trans-mission	Serial number
J- Japan	A- Mitsubishi	4- Multi-purpose vehicle (MPV)	F- 4001 lbs. or more with hydraulic brakes	J- MONTERO	4- High 5- Premium	2- 2-door canvas-top 3- 2-door metal-top	E- 2.6 liters (155.9 C.I.D.)	0 1 2 3 . . . . 9 X	E- 1984 year	Y- Nagoya	4- 5-speed 49 states 5- 5-speed California* 7-A/T 49 states 8-A/T California*	00001 to 99999

NOTE Digit in position 9 is used for V.I.N. verification.
*Can also be sold in Federal States.

VEHICLE IDENTIFICATION NUMBER LIST

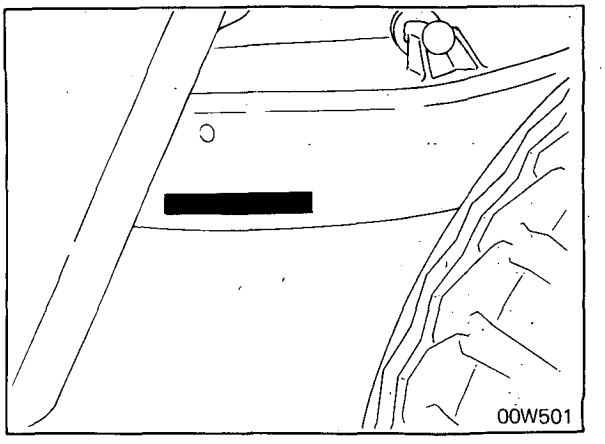
V. I. N. (except serial number)	Brand (Package)	Destination	Engine displacement	Model code
JA4FJ42E□EY4	MONTERO	Federal	2.555 liters (155.9 C. I. D.)	L042GNJLF
JA4FJ42E□EY5		California*		L042GNJLH
JA4FJ52E□EY4		Federal		L042GNULF
JA4FJ52E□EY5		California*		L042GNULH
JA4FJ43E□EY4		Federal		L042GVNJLF
JA4FJ43E□EY5		California*		L042GVNJLH
JA4FJ43E□EY7		Federal		L042GVKJLF
JA4FJ43E□EY8		California*		L042GVKJLH
JA4FJ53E□EY4		Federal		L042GVNULF
JA4FJ53E□EY5		California*		L042GVNULH
JA4FJ53E□EY7		Federal		L042GVKULF
JA4FJ53E□EY8		California*		L042GVKULH

*Can also be sold in Federal States.

CHASSIS NUMBER

Stamping Location

The chassis number is stamped on the side of the frame near the right rear shock absorber.



Chassis Number Code Chart

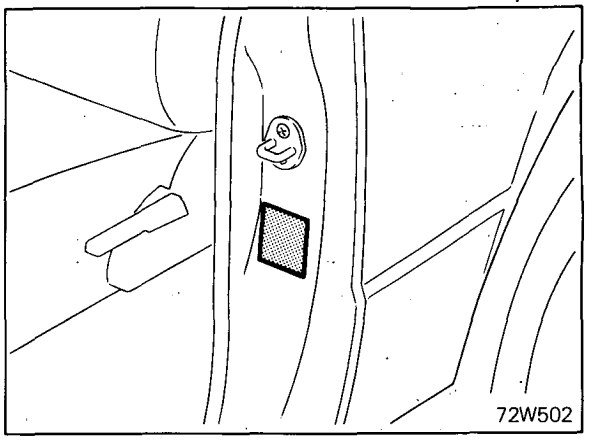
L04 2 GV DY400001

Vehicle line	Engine displacement	Body type	
L04- MONTERO	2- 2.555 liters (155.9 C.I.D.)	G- 2-door canvas-top GV- 2-door metal-top	Refer to 10th thru 17th digits of V.I.N. plate

VEHICLE SAFETY CERTIFICATION LABEL

The vehicle safety certification label is attached to face of left door pillar. (72W502)

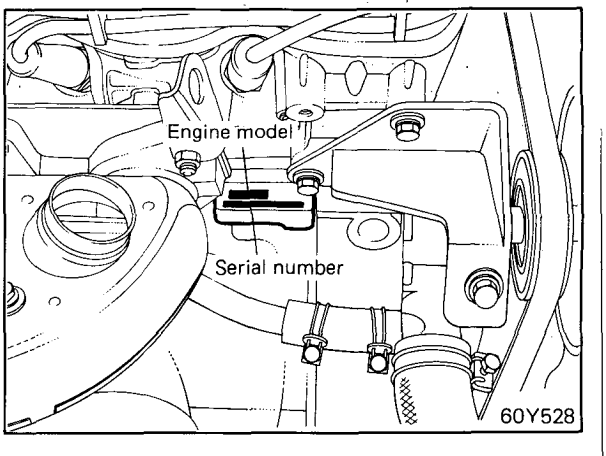
This label indicates the month and year of manufacture, Gross Vehicle Weight Rating (G.V.W.R.), front and rear Gross Axle Weight Rating (G.A.W.R.), and Vehicle Identification Number (V.I.N.).



ENGINE MODEL STAMPING

The engine model number is stamped at the right front side on the top edge of the cylinder block as shown in the following:

Engine model	Engine displacement
G54B	2.555 liters (155.9 C.I.D.)



The engine serial number is stamped near the engine model number, and the serial number cycles, as shown below.

Engine serial number	Number cycling
AA0201 to YY9999	AA0201 – – – → AA9999 AB0001 – – – → AY9999 BA0001 – – – → YY9999

ENGINE AND TRANSMISSION MODEL

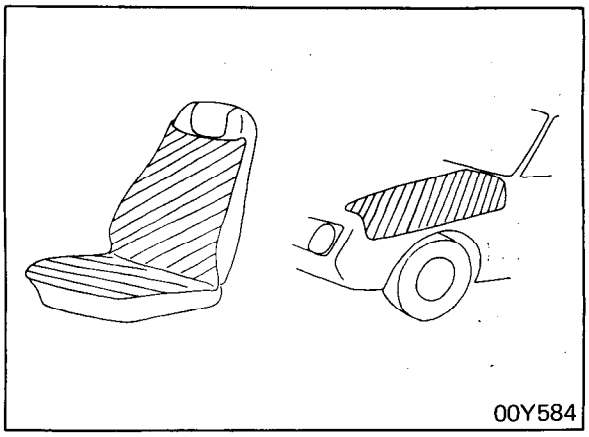
Vehicle model	Engine model	Transmission model
L042GNJLF L042GNJLH L042GNULF L042GNULH L042GVNJLF L042GVNJLH L042GVNULF L042GVNULH	G54B	KM145-O-THQ
L042GVKJLF L042GVKJLH L042GVKULF L042GVKULH	G54B	KM146

BODY COLOR CODE

Exterior code	Body color
Two-tone	
B93B91X13	Black/Light blue (Metallic)
C38C19X13	Black/Brown (Metallic)
H74H80X13	Black/Silver (Metallic)
R79R78X13	Black/Red
W44W42X13	Black/White
X04X21H80	Velvet black/Silver (Metallic)

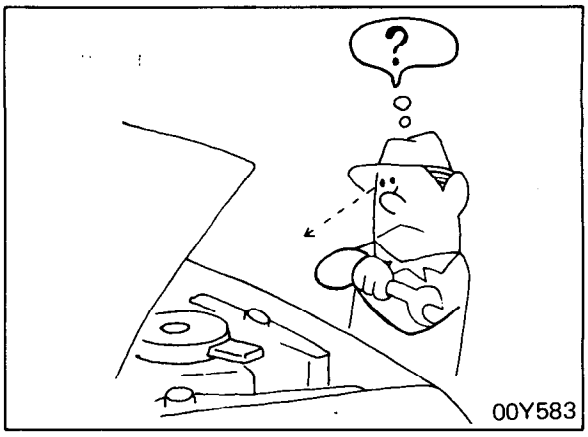
PROTECTING THE VEHICLE

If there is a likelihood of damaging painted or interior parts during service operations, protect them with suitable covers (such as seat covers, etc.).



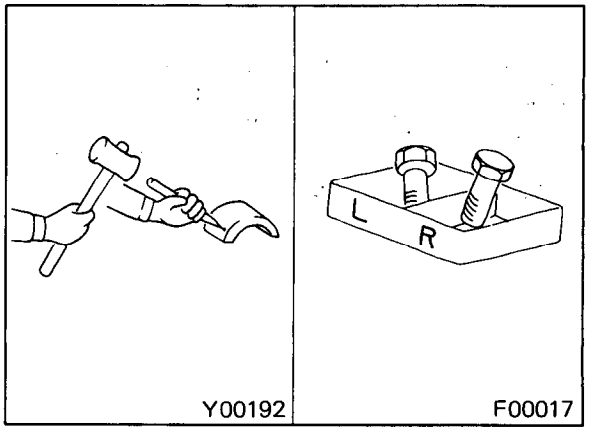
REMOVAL AND DISASSEMBLY

When checking a malfunction, find the cause of the problem. If it is determined that removal and/or disassembly is necessary, perform the work by following the procedures contained in this Service Manual.



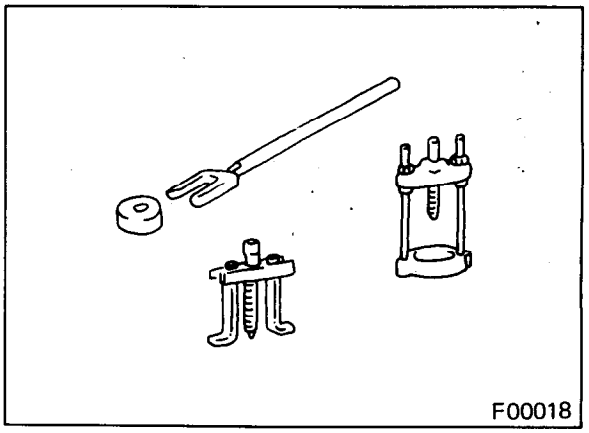
If punch marks or mating marks are made to avoid error in assembly and facilitate the assembly work, be sure to make them in locations which will have no detrimental effect on performance and/or appearances.
If an area having many parts, similar parts, and/or parts which are symmetrical right and left is disassembled, be sure to arrange the parts so that they do not become mixed during the assembly process.

1. Arrange the parts removed in the proper order.
2. Determine which parts are to be reused and which are to be replaced.
3. If bolts, nuts, etc., are to be replaced, be sure to use only the exact size specified.



SPECIAL TOOLS

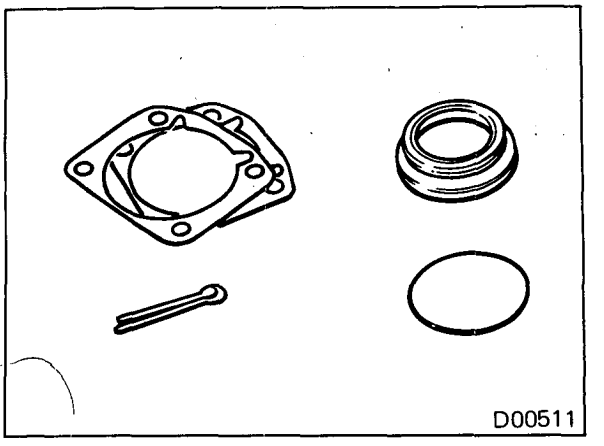
If other tools are substituted for the special tools to do service or repair work, there is the danger that vehicle parts might be damaged, or the mechanic might be injured; therefore, be sure to use the special tool whenever doing any work for which the use of one is specified.



PARTS TO BE REPLACED

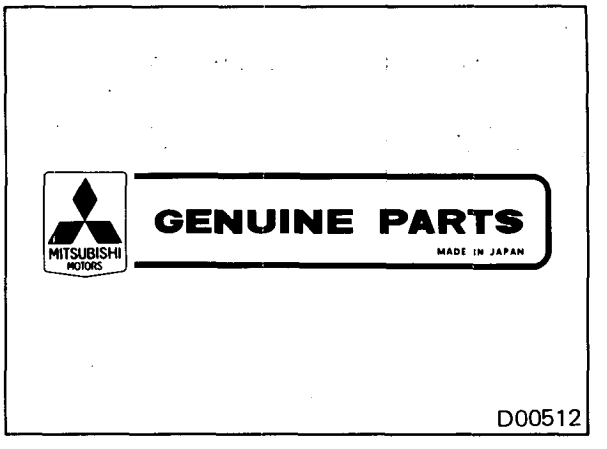
If any of the following parts are removed, they must be replaced with new parts.

1. Oil seals
2. Gaskets
3. Packings
4. O-rings
5. Lock washers
6. Cotter pins
7. Self-locking nuts



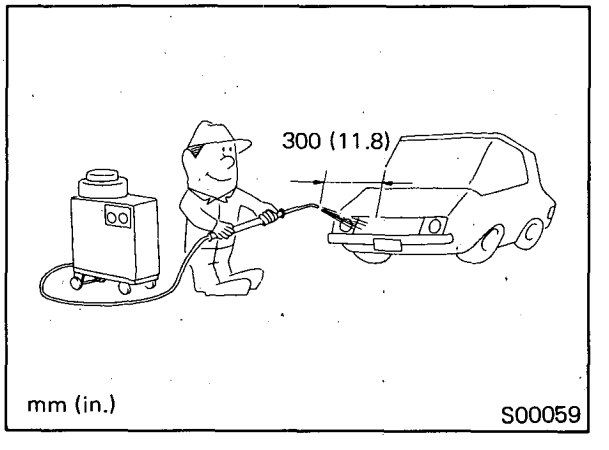
PARTS

When replacing parts, use Mitsubishi genuine parts.



VEHICLE WASHING

If high-pressure car-washing equipment or steam car-washing equipment is used to wash the vehicle, be sure to maintain the spray nozzle at a distance of at least 300 mm (11.8 in.) from any plastic parts and all opening parts (doors, luggage compartment, sunroof, etc.).

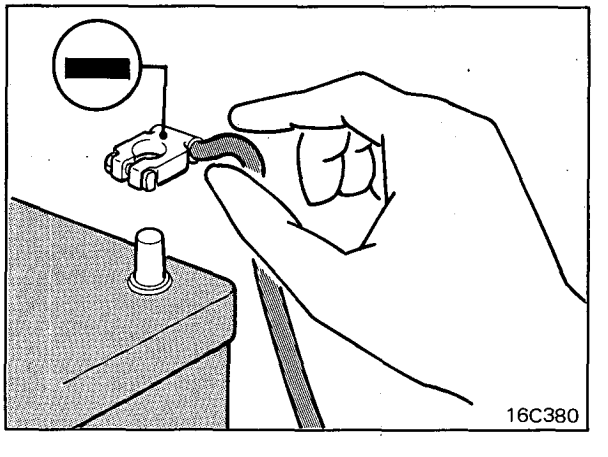


SERVICING THE ELECTRICAL SYSTEM

When servicing the electrical system, disconnect the negative cable terminal from the battery.

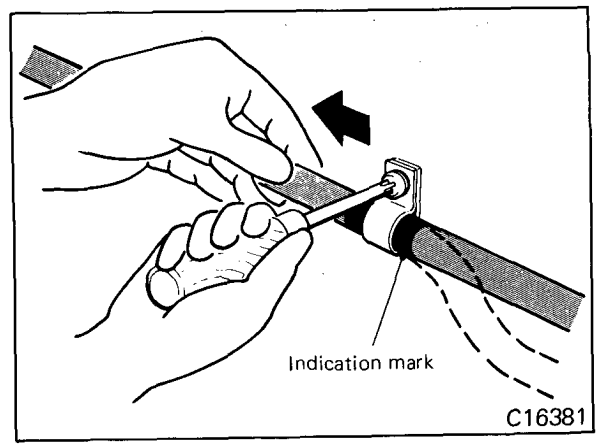
Caution

Before connecting or disconnecting the negative cable, be sure to turn off the ignition switch and the lighting switch. (If this is not done, there is the possibility of semi-conductor parts being damaged.)

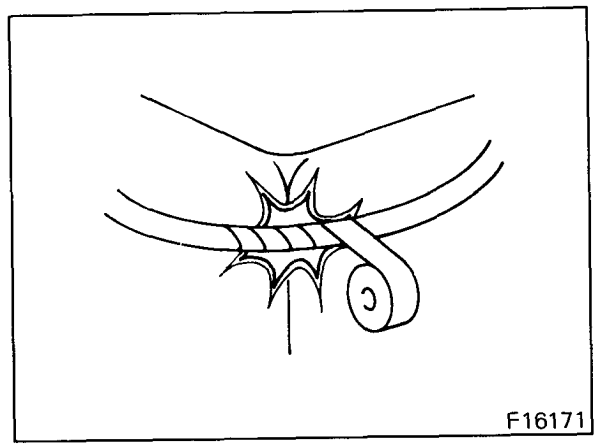


WIRING HARNESSES

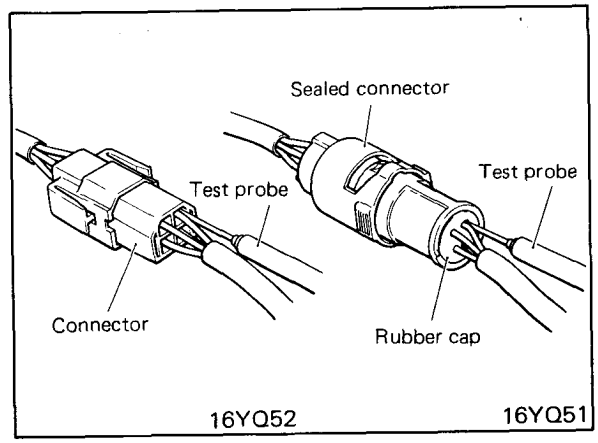
1. Secure the wiring harnesses by using clamps so that there is no slack. However, for any harness which passes to the engine or other vibrating parts of the vehicle, allow some slack within a range that does not allow the engine vibrations to cause the harness to come into contact with any of the surrounding parts. Then secure the harness by using a clamp.
   In addition, if a mounting indication mark (yellow tape) is on a harness, secure the indication mark in the specified location. (C16381)



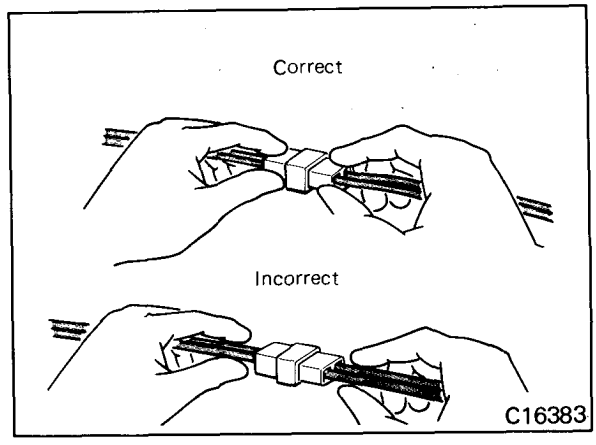
2. If any section of a wiring harness contacts the edge of a part, or a corner, wrap the section of the harness with tape or something similar in order to protect it from damage.



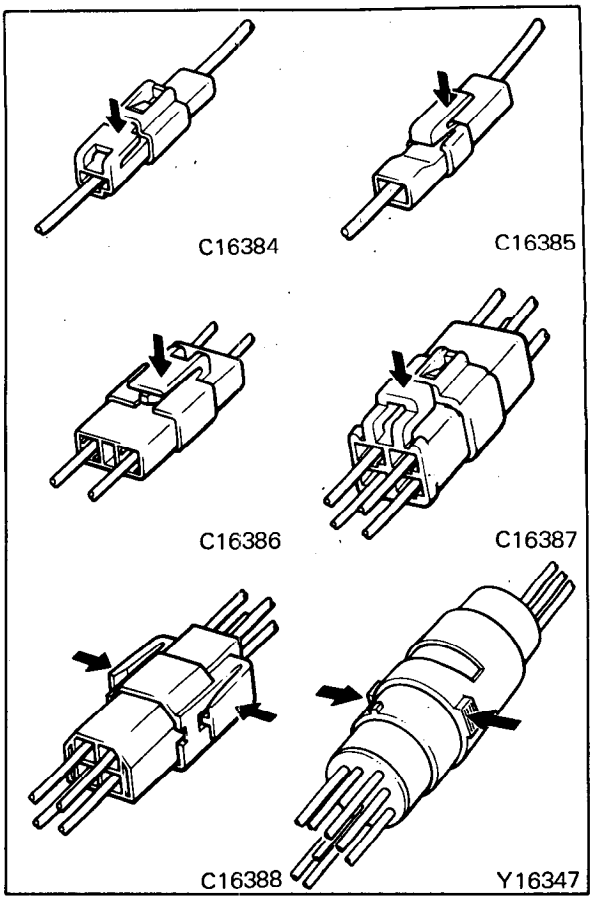
3. When using a circuit tester to perform continuity or voltage checks on connector terminals, insert the test probe from the harness side.
   If the connector is a sealed connector, insert the test probe into the hole in the rubber cap for the electrical wires, being careful not to damage the wire insulation. Continue to insert the test probe until it makes contact with the terminal.



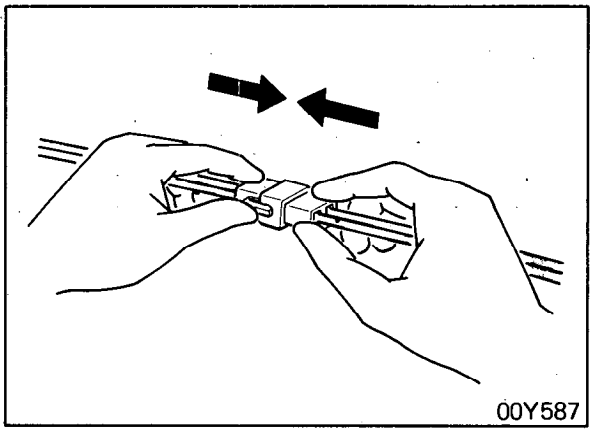
4. When disconnecting a connector, be sure to pull only the connector, not the harness.



5. Disconnect connectors which have catches by pressing in the direction indicated by the arrows in the illustration.

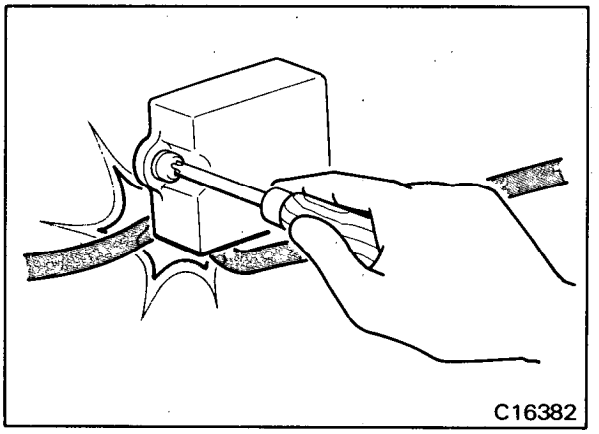


6. Connect connectors which have catches by inserting the connectors until they snap.

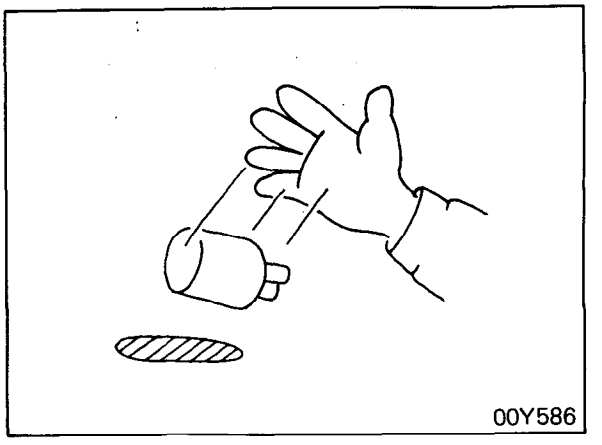


ELECTRICAL COMPONENTS

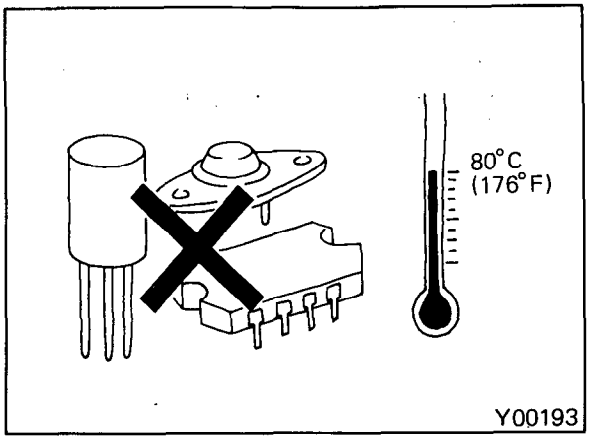
1. When installing any of the vehicle parts, be careful not to pinch or damage any of the wiring harnesses.



2. Sensors, relays, etc., are sensitive to strong impacts. Handle them with care so that they are not dropped or mishandled.

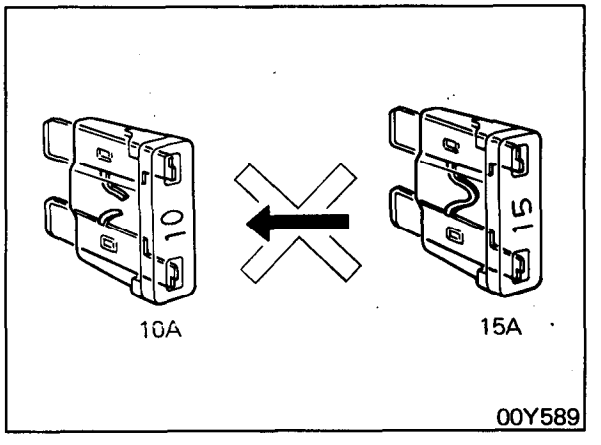


3. The electronic parts used for relays, etc., are sensitive to heat. If any service which causes a temperature of 80°C (176°F) or more is performed, remove the part or parts in question before carrying out the service.



FUSES AND FUSIBLE LINKS

1. If a blown-out fuse is to be replaced, be sure to use only a fuse of the specified capacity. If a fuse of a capacity larger than that specified is used, parts may be damaged and the circuit may not be protected adequately.

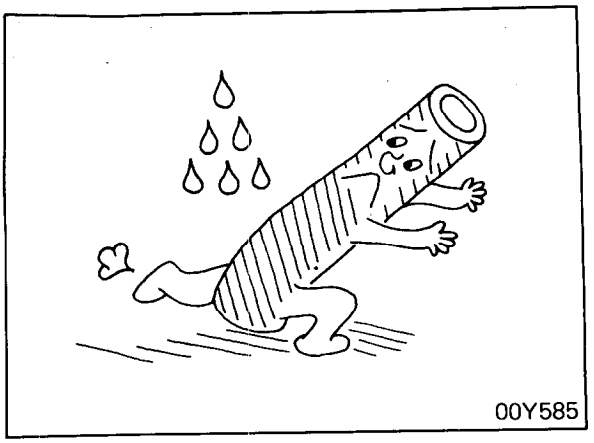


2. If additional optional equipment is to be installed in the vehicle, follow the procedure listed in the appropriate instruction manual; however, be sure to pay careful attention to the following points:
   (1) In order to avoid overloading the wiring, take the electrical current load of the optional equipment into consideration, and determine the appropriate wire size.
   (2) Where possible, route the wiring through the existing harnesses.
   (3) If an ammeter or similar instrument is to be connected to a live-wire circuit, use tape to protect the wire, use a clamp to secure the wire, and make sure that there is no contact with any other parts.
   (4) Be sure to provide a fuse for the load circuit of the optional equipment.

Nominal size	SAE gauge No.	Permissible current	
		In engine compartment	Other areas
0.3 mm²	AWG 22	–	5A
0.5 mm²	AWG 20	7A	13A
0.85 mm²	AWG 18	9A	17A
1.25 mm²	AWG 16	12A	22A
2.0 mm²	AWG 14	16A	30A
3.0 mm²	AWG 12	21A	40A
5.0 mm²	AWG 10	31A	54A

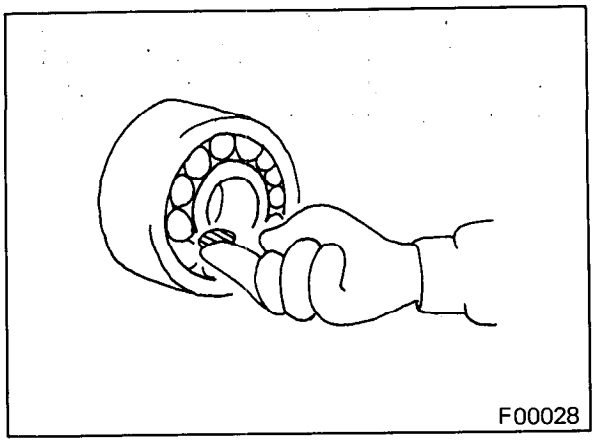
TUBES AND OTHER RUBBER PARTS

Be careful to avoid spilling any gasoline, oil, etc., because if it adheres to any tubes or other rubber parts, they might be adversely affected.



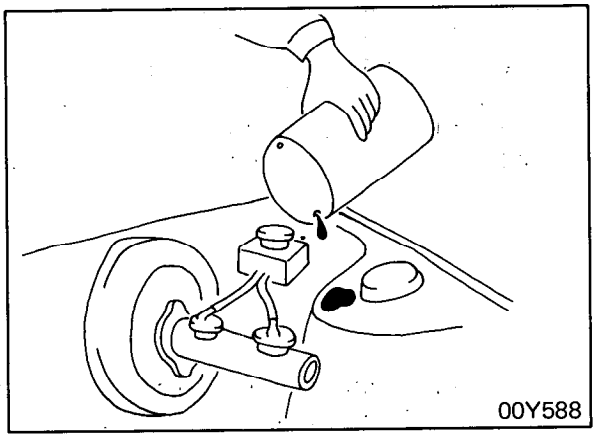
LUBRICANTS

In accordance with the instructions in this Service Manual, apply the specified lubricants in the specified locations during assembly and installation.



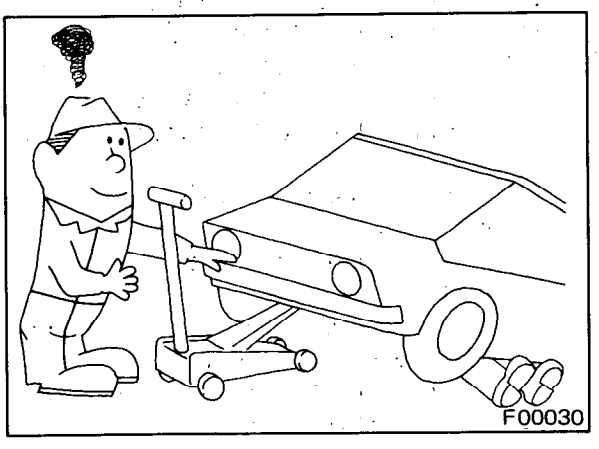
BRAKE FLUID

Be careful to avoid spilling any brake fluid, because if it adheres to the vehicle body, the paint coat might be discolored.



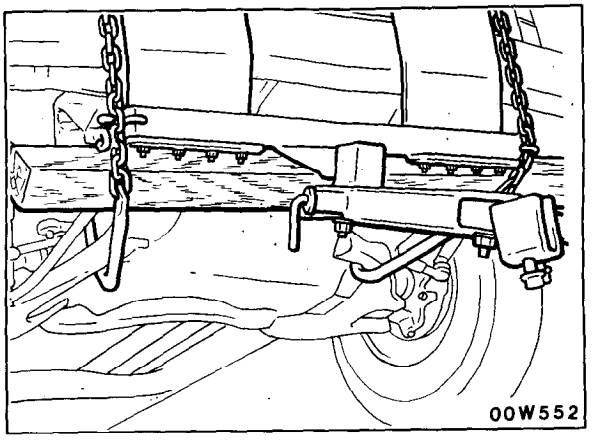
DOING SERVICE WORK IN GROUPS OF TWO OR MORE MECHANICS

If the service work is to be done by two or more mechanics working together, all the mechanics involved should take safety into consideration while they work.



TOWING AND HOISTING

The MONTERO can only be towed from the front with conventional sling-type equipment and tow chain with grab hooks.
If a vehicle is towed from the rear, use a tow dolly.
A lumber spacer (4" x 4" x 55" wood beam) should be placed forward of under guard and under towing hook/ shipping tie down hook.
Then, attach J-hook to the lower arm.
A safety chain system must be used. This system must be completely independent of the primary lifting and towing attachment. Care must be taken in the installation of safety chains to insure they do not cause damage to bumper, painted surfaces or lights.



Lifting–Ground Clearance

Towed vehicle should be raised until wheels are a minimum of 10 cm (4 in.) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or when crossing sharp rises such as curbs. If necessary, ground clearance can be increased by removing the wheels from the lifted end of the disabled vehicle and carrying the lifted end closer to the ground. A 20 cm (8 in.) ground clearance must be maintained between brake drums and ground.

Front Towing Pickup

The vehicle may be towed on its rear wheels for extended distances, provided the parking brake is released.
Make certain the transmission remains in "NEUTRAL".

Safety Precautions

The following precautions should be taken when towing the vehicle.

1. Remove exhaust tips and any other optional equipment, that interface with the towing sling. Padding (heavy shop towel or carpeting) should be placed between the towing sling cross bar and any painted surfaces, and bumper surfaces.
2. A safety chain system completely independent of the primary lifting and towing attachment must be used.
3. Any loose or protruding parts of damaged vehicle such as hoods, doors, fenders, trim, etc., should be secured prior to moving the vehicle.
4. Operator should refrain from going under a vehicle unless the vehicle is adequately supported by safety stands.
5. Never allow passengers to ride in a towed vehicle.
6. State and local rules and regulations must be followed when towing a vehicle.

HOISTING

Post Type

Special care should be taken when raising the vehicle on a frame contact type hoist. The hoist must be equipped with the proper adapters in order to support the vehicle at the proper locations. (See next page)
Conventional hydraulic hoists may be used after determining that the adapter plates will make firm contact with the side frame.

Floor Jack

A regular floor jack may be used under the front crossmember or rear axle housing.

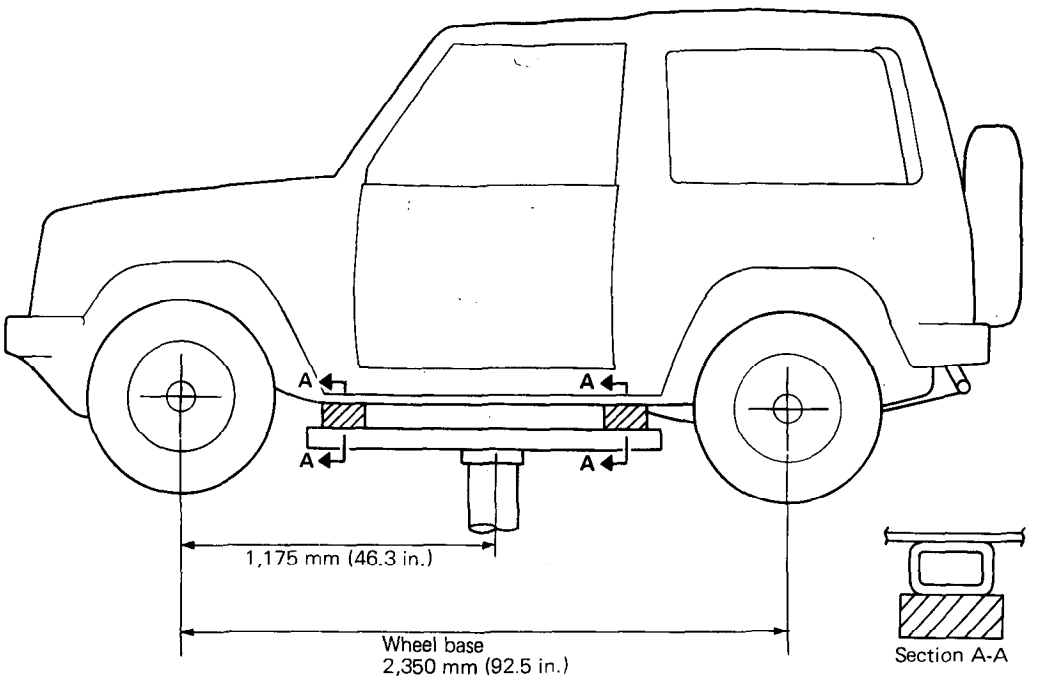
Caution

1. **A floor jack must never be used on any part of the underbody.**
2. **Do not attempt to raise one entire side of the vehicle by placing a jack midway between front and rear wheels. This practice may result in permanent damage to the body.**

Emergency Jacking

Jack receptacles are located at the front crossmember and rear axle housing to accept the jack supplied with the vehicle for emergency road service. Always block the opposite wheels and jack only on a level surface.

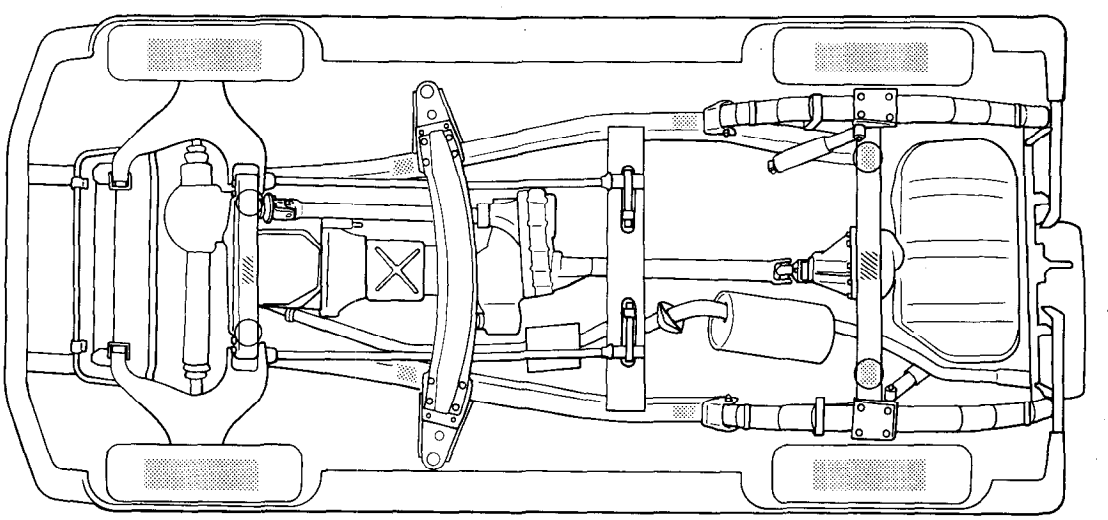
Frame Contact Support Locations



NOTE
The locations of the support point shown as Section A-A are the same as those of the twin post hoist or sissors jack (emergency) shown in the illustration (00W554) below.

00W553

Lifting and Jacking Support Locations

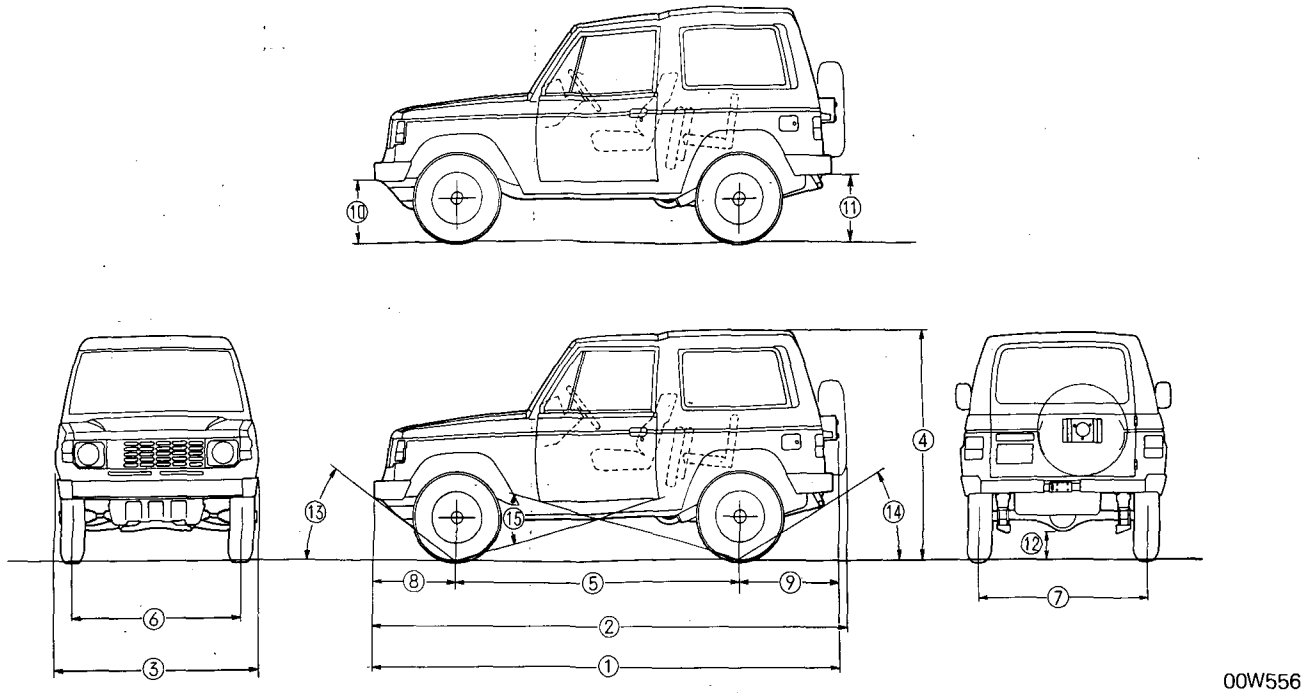


Twin post hoist

Floor jack

○ Frame contact or jack (jack supplied with the vehicle) on hoist

00W554



00W556

Description	L042G		NJLF/H	NULF/H	VNJLF/H	VKJLF/H	VNULF/H	VKULF/H
Vehicle dimensions	mm (in.)							
Overall length								
Without spare tire		①	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)	3,930 (154.7)
With spare tire		②	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)	3,995 (157.3)
Overall width		③	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)	1,680 (66.1)
Overall height		④	1,760 (69.3)	1,760 (69.3)	1,800 (70.9)	1,800 (70.9)	1,800 (70.9)	1,800 (70.9)
Wheelbase		⑤	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)	2,350 (92.5)
Tread	Front	⑥	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)	1,400 (55.1)
	Rear	⑦	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)	1,375 (54.1)
Overhang	Front	⑧	745 (29.3)	745 (29.3)	745 (29.3)	745 (29.3)	745 (29.3)	745 (29.3)
	Rear	⑨	900 (35.4)	900 (35.4)	900 (35.4)	900 (35.4)	900 (35.4)	900 (35.4)
Height at curb weight (wt.)								
Front bumper to ground		⑩	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)	480 (18.9)
Rear bumper to ground		⑪	440 (17.3)	440 (17.3)	440 (17.3)	440 (17.3)	440 (17.3)	440 (17.3)
Minimum running ground clearance		⑫	210 (8.3)	210 (8.3)	210 (8.3)	210 (8.3)	210 (8.3)	210 (8.3)
Angle of approach		⑬	38°	38°	38°	38°	38°	38°
Angle of departure		⑭	30°	30°	30°	30°	30°	30°
Ramp breakover angle		⑮	21°	21°	21°	21°	21°	21°
Vehicle weights	kg (lbs.)							
Curb weight			1,411 (3,111)/ 1,412 (3,113)	1,428 (3,148)/ 1,429 (3,150)	1,441 (3,177)/ 1,442 (3,179)	1,456 (3,210)/ 1,457 (3,212)	1,462 (3,223)/ 1,463 (3,225)	1,477 (3,256)/ 1,478 (3,258)
Gross vehicle weight rating			1,910 (4,210)	1,910 (4,210)	1,910 (4,210)	1,910 (4,210)	1,910 (4,210)	1,910 (4,210)
Gross axle weight rating	Front		1,000 (2,205)	1,000 (2,205)	1,000 (2,205)	1,000 (2,205)	1,000 (2,205)	1,000 (2,205)
	Rear		1,450 (3,197)	1,450 (3,197)	1,450 (3,197)	1,450 (3,197)	1,450 (3,197)	1,450 (3,197)
Seating capacity			4	4	4	4	4	4

Description		L042G	NJLF/H	NULF/H	VNJLF/H	VKJLF/H	VNULF/H	VKULF/H
Engine								
Model No.					G54B			
Type					In-line OHC			
Number of cylinders					4			
Bore					91.1 mm (3.59 in.)			
Stroke					98.0 mm (3.86 in.)			
Piston displacement					2,555 cm^3 (155.9 CID)			
Compression ratio					8.2			
Firing order					1-3-4-2			
Basic ignition timing					7°BTDC ± 2°			
Transmission & transfer case								
Model No.			KM145	KM145	KM145	KM146	KM145	KM146
Type			5-speed manual	5-speed manual	5-speed manual	3-speed automatic	5-speed manual	3-speed automatic
Gear ratio								
Transmission		1st	3.740	3.740	3.740	2.745	3.740	2.745
		2nd	2.136	2.136	2.136	1.543	2.136	1.543
		3rd	1.360	1.360	1.360	1.000	1.360	1.000
		4th	1.000	1.000	1.000	–	1.000	–
		5th	0.856	0.856	0.856	–	0.856	–
		Reverse	3.578	3.578	3.578	2.214	3.578	2.214
Transfer case		High	1.000	1.000	1.000	1.000	1.000	1.000
		Low	1.944	1.944	1.944	1.944	1.944	1.944
Final ring gear ratio			4.625 4.875*	4.625 4.875*	4.625 4.875*	4.222 4.625*	4.625 4.875*	4.222 4.625*
Clutch								
Type			Dry single disc & diaphragm spring	Dry single disc & diaphragm spring	Dry single disc & diaphragm spring	–	Dry single disc & diaphragm spring	–
Chassis								
Tire size					215SR15			
Front suspension								
Type					Wishbone compression type			
Spring constant (Wheel position)					22 N/mm (123 lbs./in.)			
Rear suspension								
Type					Asymmetrical semi-elliptic leaf spring			
Spring constant								
At load of 1,000-2,500 N (220-551 lbs.)					24 N/mm (134 lbs./in.)			
At load of 4,670-8,870 N (1,030-1,955 lbs.)					56 N/mm (314 lbs./in.)			
Brakes								
Type		Front			Disc			
		Rear			Drum (Leading and trailing)			
Power steering								
Gear type					Integral type (Recirculating ball nut)			
Gear ratio					16.4			
Fuel tank capacity					60 liters (15.9 U.S. gal./13.2 Imp. gal.)			

*Optional for Federal (not available in California).

CAPACITY CONVERSION TABLE

U.S. gal.	Imperial gal.	U.S. gal.	Imperial gal.	U.S. gal.	Imperial gal.
1/4	1/5	7	5-3/4	15	12-1/2
1/2	3/8	7-1/4	6	15-1/2	13
3/4	5/8	7-1/2	6-1/4	16	13-1/4
		7-3/4	6-1/2	16-1/2	13-3/4
1	3/4			16-3/4	14
1-1/4	1	8	6-3/4		
1-1/2	1-1/4	8-1/4	6-3/4	17	14-1/4
1-3/4	1-1/2	8-1/2	7	17-1/2	14-1/2
		8-3/4	7-1/4	18	15
2	1-3/4	9	7-1/2	18-1/2	15-1/2
2-1/4	1-3/4	9-1/4	7-3/4	19	15-3/4
2-1/2	2	9-1/2	8	19-1/2	16-1/4
2-3/4	2-1/4	9-3/4	8	20	16-3/4
				20-1/2	17
3	2-1/2	10	8-1/4		
3-1/4	2-3/4	10-1/4	8-1/2	21	17-1/2
3-1/2	3	10-1/2	8-3/4	21-1/2	18
3-3/4	3	10-3/4	9	22	18-1/4
				22-1/2	18-3/4
4	3-1/4	11	9-1/4	23	19-1/4
4-1/4	3-1/2	11-1/4	9-1/4	23-1/2	19-1/2
4-1/2	3-3/4	11-1/2	9-1/2	24	20
4-3/4	4	11-3/4	9-3/4	24-1/2	20-1/2
5	4-1/4	12	10	25	20-3/4
5-1/4	4-1/4	12-1/4	10-1/4	25-1/2	21-1/4
5-1/2	4-1/2	12-1/2	10-1/2	26	21-3/4
5-3/4	4-3/4	12-3/4	10-1/2	26-1/2	22
				27	22-1/2
6	5	13	10-3/4	27-1/2	23
6-1/4	5-1/4	13-1/2	11-1/4	28	23-1/4
6-1/2	5-1/2	14	11-3/4	29	24-1/4
6-3/4	5-1/2	14-1/2	12	30	25

CAPACITY CONVERSION U.S. GALLONS TO LITERS

Gallons	0	1	2	3	4	5	6	7	8	9
					Liters					
–	–	3.7854	7.5708	11.3560	15.1420	18.9270	22.7120	26.4980	30.2830	34.0690
10	37.854	41.640	45.425	49.210	52.996	56.781	60.567	64.352	68.137	71.923
20	75.708	79.494	83.279	87.064	90.850	94.635	98.421	102.210	105.990	109.781
30	113.56	117.35	121.13	124.92	128.70	132.49	136.27	140.06	143.85	147.63
40	151.42	155.20	158.99	162.77	166.56	170.34	174.13	177.91	181.70	185.49
50	189.27	193.06	196.84	200.63	204.41	208.20	211.98	215.77	219.55	223.34
60	227.12	230.91	234.70	238.48	242.27	246.05	249.84	253.62	257.41	261.19
70	264.98	268.76	272.55	276.33	280.12	283.91	287.69	291.48	295.26	299.05
80	302.83	306.62	310.40	314.19	317.97	321.76	325.55	329.33	333.12	336.90
90	340.69	344.47	348.26	352.04	355.83	359.61	363.40	367.18	370.97	374.76

DIMENSION AND TEMPERATURE CONVERSION CHART

Inches (fraction)	Inches (decimals)	Millimeters	Inches to millimeters: Inches	Inches to millimeters: mm	Millimeters to inches: mm	Millimeters to inches: Inches	Fahrenheit & Celsius: °F	Fahrenheit & Celsius: °C	Fahrenheit & Celsius: °C	Fahrenheit & Celsius: °F
1/64	.015625	.3969	.0001	.00254	0.001	.000039	-20	-28.9	-30	-22
1/32	.03125	.7937	.0002	.00508	0.002	.000079	-15	-26.1	-28	-18.4
3/64	.046875	1.1906	.0003	.00762	0.003	.000118	-10	-23.3	-26	-14.8
1/16	.0625	1.5875	.0004	.01016	0.004	.000157	-5	-20.6	-24	-11.2
5/64	.078125	1.9844	.0005	.01270	0.005	.000197	0	-17.8	-22	-7.6
3/32	.09375	2.3812	.0006	.01524	0.006	.000236	1	-17.2	-20	-4
7/64	.109375	2.7781	.0007	.01778	0.007	.000276	2	-16.7	-18	-0.4
1/8	.125	3.1750	.0008	.02032	0.008	.000315	3	-16.1	-16	3.2
9/64	.140625	3.5719	.0009	.02286	0.009	.000354	4	-15.6	-14	6.8
5/32	.15625	3.9687	.001	.0254	0.01	.00039	5	-15.0	-12	10.4
11/64	.171875	4.3656	.002	.0508	0.02	.00079	10	-12.2	-10	14
3/16	.1875	4.7625	.003	.0762	0.03	.00118	15	-9.4	-8	17.6
13/64	.203125	5.1594	.004	.1016	0.04	.00157	20	-6.7	-6	21.2
7/32	.21875	5.5562	.005	.1270	0.05	.00197	25	-3.9	-4	24.8
15/64	.234375	5.9531	.006	.1524	0.06	.00236	30	-1.1	-2	28.4
1/4	.25	6.3500	.007	.1778	0.07	.00276	35	1.7	0	32
17/64	.265625	6.7469	.008	.2032	0.08	.00315	40	4.4	2	35.6
9/32	.28125	7.1437	.009	.2286	0.09	.00354	45	7.2	4	39.2
19/64	.296875	7.5406	.01	.254	0.1	.00394	50	10.0	6	42.8
5/16	.3125	7.9375	.02	.508	0.2	.00787	55	12.8	8	46.4
21/64	.328125	8.3344	.03	.762	0.3	.01181	60	15.6	10	50
11/32	.34375	8.7312	.04	1.016	0.4	.01575	65	18.3	12	53.6
23/64	.359375	9.1281	.05	1.270	0.5	.01969	70	21.1	14	57.2
3/8	.375	9.5250	.06	1.524	0.6	.02362	75	23.9	16	60.8
25/64	.390625	9.9219	.07	1.778	0.7	.02756	80	26.7	18	64.4
13/32	.40625	10.3187	.08	2.032	0.8	.03150	85	29.4	20	68
27/64	.421875	10.7156	.09	2.286	0.9	.03543	90	32.2	22	71.6
7/16	.4375	11.1125	.1	2.54	1	.03937	95	35.0	24	75.2
29/64	.453125	11.5094	.2	5.08	2	.07874	100	37.8	26	78.8
15/32	.46875	11.9062	.3	7.62	3	.11811	105	40.6	28	82.4
31/64	.484375	12.3031	.4	10.16	4	.15748	110	43.3	30	86
1/2	.5	12.7000	.5	12.70	5	.19685	115	46.1	32	89.6
33/64	.515625	13.0969	.6	15.24	6	.23622	120	48.9	34	93.2
17/32	.53125	13.4937	.7	17.78	7	.27559	125	51.7	36	96.8
35/64	.546875	13.8906	.8	20.32	8	.31496	130	54.4	38	100.4
9/16	.5625	14.2875	.9	22.86	9	.35433	135	57.2	40	104
37/64	.578125	14.6844	1	25.4	10	.39370	140	60.0	42	107.6
19/32	.59375	15.0812	2	50.8	11	.43307	145	62.8	44	112.2
39/64	.609375	15.4781	3	76.2	12	.47244	150	65.6	46	114.8
5/8	.625	15.8750	4	101.6	13	.51181	155	68.3	48	118.4
41/64	.640625	16.2719	5	127.0	14	.55118	160	71.1	50	122
21/32	.65625	16.6687	6	152.4	15	.59055	165	73.9	52	125.6
43/64	.671875	17.0656	7	177.8	16	.62992	170	76.7	54	129.2
11/16	.6875	17.4625	8	203.2	17	.66929	175	79.4	56	132.8
45/64	.703125	17.8594	9	228.6	18	.70866	180	82.2	58	136.4
23/32	.71875	18.2562	10	254.0	19	.74803	185	85.0	60	140
47/64	.734375	18.6531	11	279.4	20	.78740	190	87.8	62	143.6
3/4	.75	19.0500	12	304.8	21	.82677	195	90.6	64	147.2
49/64	.765625	19.4469	13	330.2	22	.86614	200	93.3	66	150.8
25/32	.78125	19.8437	14	355.6	23	.90551	205	96.1	68	154.4
51/64	.796875	20.2406	15	381.0	24	.94488	210	98.9	70	158
13/16	.8125	20.6375	16	406.4	25	.98425	212	100.0	75	167
53/64	.828125	21.0344	17	431.8	26	1.02362	215	101.7	80	176
27/32	.84375	21.4312	18	457.2	27	1.06299	220	104.4	85	185
55/64	.859375	21.8281	19	482.6	28	1.10236	225	107.2	90	194
7/8	.875	22.2250	20	508.0	29	1.14173	230	110.0	95	203
57/64	.890625	22.6219	21	533.4	30	1.18110	235	112.8	100	212
29/32	.90625	23.0187	22	558.8	31	1.22047	240	115.6	105	221
59/64	.921875	23.4156	23	584.2	32	1.25984	245	118.3	110	230
15/16	.9375	23.8125	24	609.6	33	1.29921	250	121.1	115	239
61/64	.953125	24.2094	25	635.0	34	1.33858	255	123.9	120	248
31/32	.96875	24.6062	26	660.4	35	1.37795	260	126.6	125	257
63/64	.984375	25.0031	27	690.6	36	1.41732	265	129.4	130	266

ENGLISH AND SI METRIC MEASURE

Cubic Centimeters to Inches:

When changing cubic centimeters to cubic inches, multiply cubic centimeters times .061 to obtain cubic inches, (C.C. x .061 = Cubic Inches).

Cubic Inches to Centimeters:

When changing cubic inches to cubic centimeters, multiply cubic inches times 16.39 to obtain cubic centimeters, (Cubic Inches x 16.39 = C.C.).

Liters to Cubic Inches:

When changing liters to cubic inches, multiply liters times 61.02 to obtain cubic inches, (Liters x 61.02 = Cubic Inches).

Cubic Inches to Liters:

When changing cubic inches to liters, multiply cubic inches times .01639 to obtain liters, (Cubic Inches x .01639 = Liters).

Cubic Centimeters to Liters:

When changing cubic centimeters to liters, divide by 1,000 simply by moving the decimal point three figures to the left.

Liters to Cubic Centimeters:

When changing liters to cubic centimeters, move the decimal point three figures to the right.

Miles to Kilometers:

When changing miles to kilometers, multiply miles times 1.609 to obtain kilometers, (Miles x 1.609 = Kilometers).

Kilometers to Miles:

When changing kilometers to miles, multiply kilometers times .6214 to obtain miles, (Kilometers x .6214 = Miles).

Pounds to Kilograms:

When changing pounds to kilograms, multiply pounds times .4536 to obtain kilograms, (Pounds x .4536 = Kilograms).

Kilograms to Pounds:

When changing kilograms to pounds, multiply kilograms times 2.2046 to obtain pounds, (Kilograms x 2.2046 = Pounds).

Pounds to Newtons:

When changing pounds to newtons, multiply pounds times 4.4482 to obtain newtons, (Pounds x 4.4482 = Newtons)

Newtons to Pounds:

When changing newtons to pounds, multiply newtons times .2248 to obtain pounds, (Newtons x .2248 = Pounds).

Foot-pounds to Newton-meters:

When changing foot-pounds to newton-meters, multiply foot-pound times 1.3558 to newton-meters, (Foot-pound x 1.3558 = Newton-meters).

Newton-meters to Foot-pounds:

When changing newton-meters to foot-pounds, multiply newton-meters times .7376 to foot-pounds, (Newton-meters x .7376 = Foot-pounds).

Pounds Per Square Inch(psi) to Kilopascals:

When changing pounds per square inch(psi) to kilopascals, multiply pounds per square inch times 6.895 to kilopascals, (Pounds Per Square Inch(psi) x 6.895 = Kilopascals.).

Kolopascals to Pounds Per Square Inch(psi):

When changing kilopascals to pounds per square inch(psi), multiply kilopascals times .1450 to pounds per square inch(psi), (Kilopascals x .1450 = Pounds Per Square Inch(psi)).

TIGHTENING TORQUE

Description	Torque Nm (ft. lbs.)				Remarks
Thread for general purposes (size x pitch) (mm)	Head mark ④		Head mark ⑦		
6 x 1.0	3.0 to 3.9	(2.2 to 2.9)	4.9 to 7.8	(3.6 to 5.8)	
8 x 1.25	7.9 to 12	(5.8 to 8.7)	13 to 19	(9.4 to 14)	
10 x 1.25	16 to 23	(12 to 17)	27 to 39	(20 to 29)	
12 x 1.25	29 to 43	(21 to 32)	47 to 72	(35 to 53)	
14 x 1.5	48 to 70	(35 to 52)	77 to 110	(57 to 85)	
16 x 1.5	67 to 100	(51 to 77)	130 to 160	(90 to 120)	
18 x 1.5	100 to 150	(74 to 110)	180 to 230	(130 to 170)	
20 x 1.5	150 to 190	(110 to 140)	160 to 320	(190 to 240)	
22 x 1.5	200 to 260	(150 to 190)	340 to 430	(250 to 320)	
24 x 1.5	260 to 320	(190 to 240)	420 to 550	(310 to 410)	
Taper thread for pipes (size)					
PT 1/8		7.9 to 12	(5.8 to 8.7)		Internal thread: Aluminum
		16 to 19	(12 to 14)		Internal thread: Cast iron
PT 1/4		19 to 30	(14 to 22)		Internal thread: Aluminum
		34 to 45	(25 to 33)		Internal thread: Cast iron
PT 3/8		39 to 54	(29 to 40)		Internal thread: Aluminum
		58 to 73	(43 to 54)		Internal thread: Cast iron
Taper thread for dry sealed pipes (size)					
NPTF 1/16		4.9 to 7.8	(3.6 to 5.8)		Internal thread: Aluminum
		7.9 to 12	(5.8 to 8.7)		Internal thread: Cast iron
NPTF 1/8		7.9 to 12	(5.8 to 8.7)		Internal thread: Aluminum
		16 to 19	(12 to 14)		Internal thread: Cast iron
NPTF 1/4		19 to 30	(14 to 22)		Internal thread: Aluminum
		34 to 45	(25 to 33)		Internal thread: Cast iron