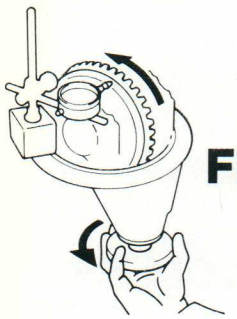
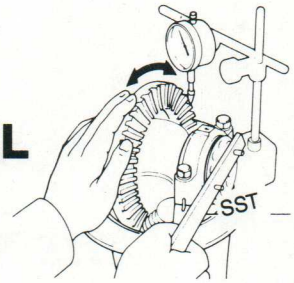
TOYOTA
SERVICE NEWS

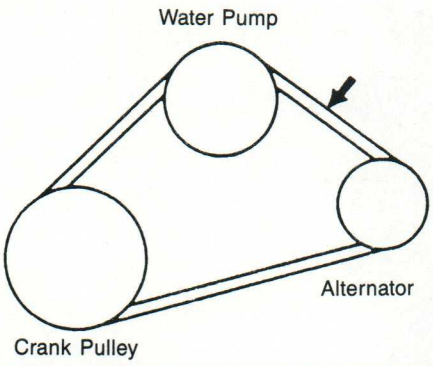
BULLETIN 18 WINTER 1985

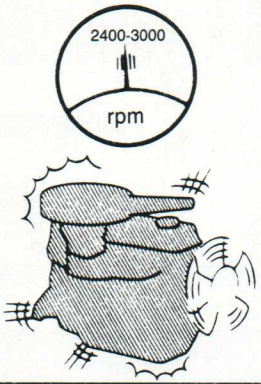
DIAGNOSING

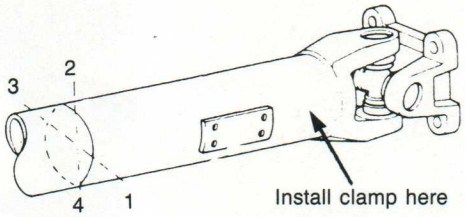


ENGINE VIBRATION
FRONT END OR REAR TIRE/WHEEL VIBRATION
DRIVELINE VIBRATION



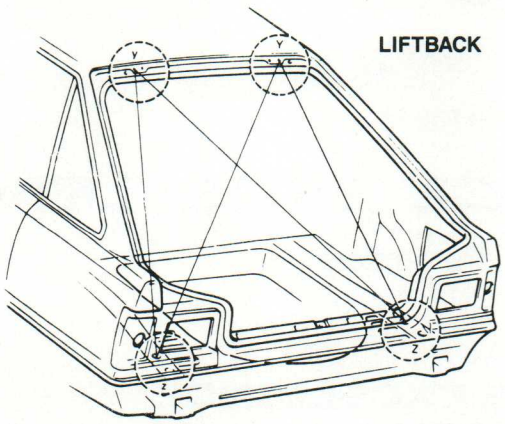




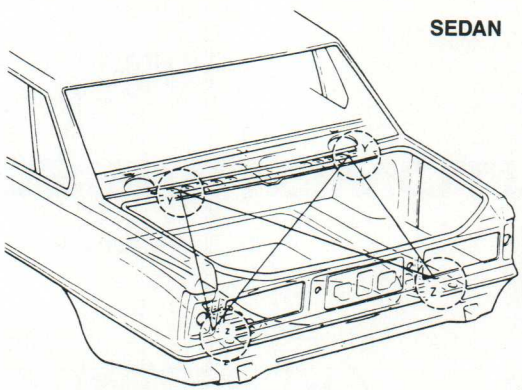


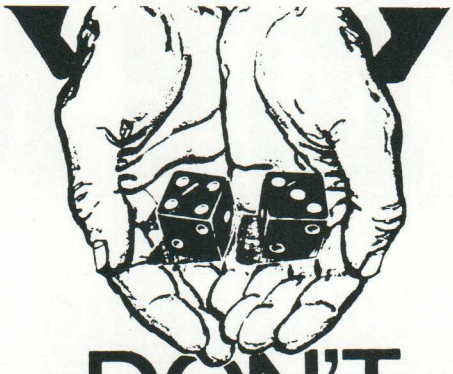
BODY DIMENSION DRAWINGS 1985 TOYOTA CAMRY

LIFTBACK



SEDAN





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TOYOTA SERVICE NEWS

Bulletin No. 18 Winter 1985

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ARTICLE NO.	DESCRIPTION	PAGE
167	Diagnosing Vehicle Vibration	
	— Engine Vibration	18-2
	— Front End Or Rear Tire/Wheel	18-4
	— Drive Line (Drive shaft)	18-6
	— Differential	18-9
168	Toyota Service Publications Applicability List	18-10
169	Body Dimension Drawings	18-15
170	Repair Manuals For Collision Damage	18-19

REMEMBER ALL-AMERICAN

BUCKLE UP WEEK NOVEMBER 24-30

GET MORE FROM LIFE – BUCKLE UP!

TOYOTA
GENUINE PARTS

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Article No. 167

DIAGNOSING VEHICLE

ENGINE VIBRATION

NOTE: *We have published similar articles on vehicle vibration in a previous issue. Because we continue to receive request for such articles, we have decided to update and reprint the series.*

The accurate diagnosis and repair of vehicle vibration can best be accomplished by dividing the procedure into the most likely problem areas: engine, front end, rear, tire/wheel and driveline. This provides you with an organized approach to locating the ailing system or component. That should help increase your troubleshooting speed and efficiency.

This first article deals with the diagnosis of vehicle vibration that is engine-related.

ROAD TEST:

All vibration diagnosis must begin with a road test to determine the exact nature of the problem and verify the abnormal condition. It is important to inspect the general condition of the vehicle and install a tachometer in the car if it is not so equipped. During the test drive, write down the speed and RPM range where the symptoms occur, and try to determine the proximity of vibration. Then, in the service stall, increase the engine speed to the RPM noted on the road with the transmission in neutral or clutch depressed. Engine vibration at this point can usually be traced to three possible causes:

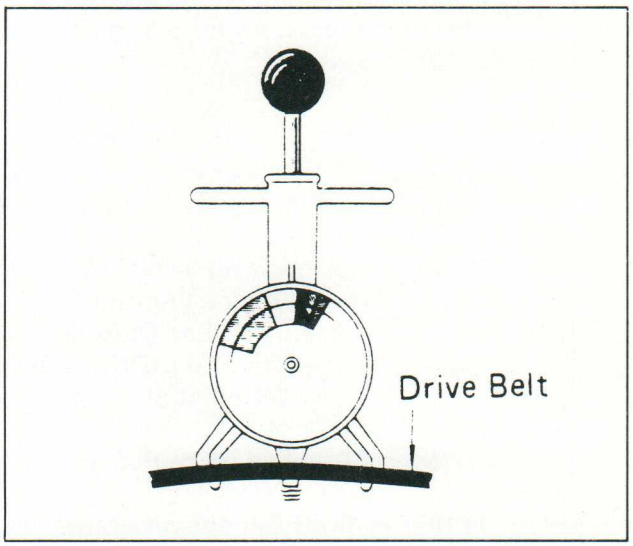
I. Condition and Operation:

Before beginning repairs of any kind, make sure of proper engine condition and operation by thorough analysis.

II. Accessories, Belts, Pulleys:

1. After confirming vibration RPM and proper engine tune, stop engine.

2. Carefully inspect engine accessory drive belts and pulleys for damage, misalignment, and wear. Correct as necessary.



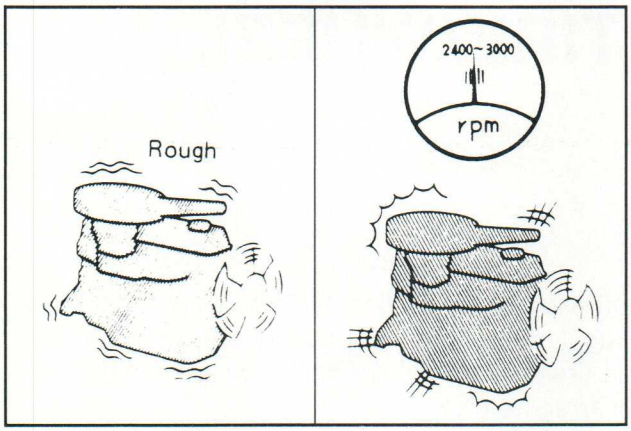
3. Check and adjust drive belt tension and accessory mounting tightness.

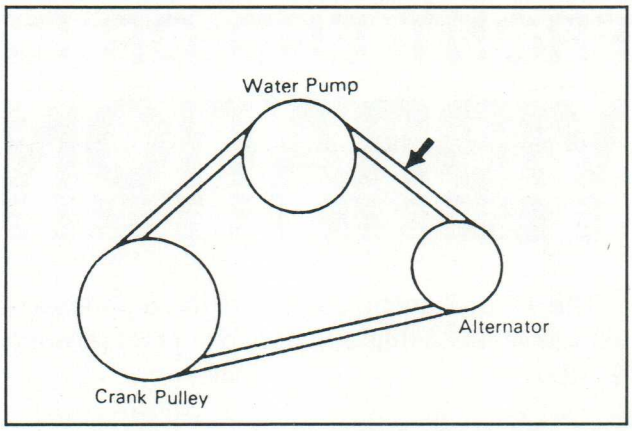
4. Start engine and allow it to idle. Observe operation of belts and pulleys and listen for abnormal noise. Watch carefully for irregular motion of belts. If belts are found to be shaking, wavering or jumping, replace belt and recheck. If irregular motion continues, check for pulley runout, flange width uniformity and for proper accessory operation. Correct as necessary and recheck vibration.

5. Increase engine speed to vibration RPM. Again, observe belts for proper operation. Listen carefully to each component to locate cause of vibration. Remove suspected accessory belt to verify.

6. If vibration persists, stop engine and remove drive belts one at a time. Recheck vibration after each

VIBRATION





belt is removed. When vibration is eliminated, repair accessory system last disconnected.

CAUTION: Be careful to avoid engine overheating when operating with water pump and/or fan disconnected.

7. To repair accessory system, install new belt and check mounting. If still bad, repair/replace accessory unit as necessary.

III. Component Imbalance

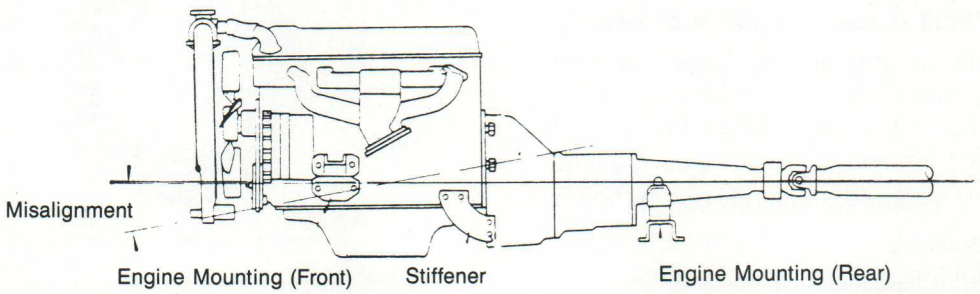
If previous inspections and repairs have not corrected vibration, it may be due to rotating or reciprocating imbalance. These conditions are extremely uncommon. Therefore, the technician should exercise extreme care when proceeding. Review all diagnosis notes and retest as appropriate.

1. Operate engine with all accessory drive belts removed.

CAUTION: Avoid engine overheat while operating with belts removed.

2. Inspect exhaust system at full operating temperature. Look for frame contact and stressed or stretched hangers. Loosen exhaust system flanges and hangers (not manifold to head), engage a forward and reverse gear to rock engine, and retighten all exhaust components. Retest.
3. Loosen engine mount to frame bolts slightly and rock engine in a forward and reverse gear. Stop engine and retighten engine mount. (See diagram below.)
4. If condition still exists, loosen engine to transmission bolts slightly and rock engine in a forward and reverse gear. Retighten all bolts.
5. If condition still exists, vibration is most likely due to imbalance of rotating components (i.e., clutch, fly wheel, torque converter, etc.).

After completing your repairs, another road test at the noted speed and RPM will quickly determine whether or not the entire problem has been solved. Non-engine related vibrations may be due to improper tire/wheel balance, run-out, alignment or uniformity. These possible front-end causes will be covered on the next page.



FRONT END OR REAR TIRE/WHEEL VIBRATION

The second article deals with the diagnosis of vehicle vibration that is front end or rear tire/wheel related.

I. Steering and Suspension

When diagnosing and correcting front end-related vibrations, it is always important to conduct a general front end steering and suspension inspection. The following components should be checked for adjustment, wear, damage and modifications. Refer to the appropriate Toyota Repair Manual for specific instructions.

- Proper manufacturer specified tire air pressure
- Front wheel bearing preload and condition
- Worn, damaged, loose or modified components such as:

  — Tire and wheel assemblies
  — Ball joints
  — Tie rods
  — Bushings
  — Idler arm, pitman arm (if applicable)
  — Steering rack bushings (if applicable)
  — Shock absorbers
  — Springs

- Steering preload
- Collision damage or improper collision damage repair

II. Tire and Wheel Imbalance (Front or Rear)

Tire and wheel imbalance is typified by a constant low-frequency vibration at 30 MPH and above.

Tire and wheel balance should be done by using either an off-the-car or on-the-car spin balancer. Static or bubble balancers are not recommended.

Before proceeding with the balance, check air pressure, lug nut torque, front wheel bearing preload and visually inspect the tires for any tread or sidewall irregularities. Also make sure that the tread area of the tires are free of debris and inspect the wheels for irregularities.

In order to achieve an accurate balance, it is important to make periodic equipment checks and recalibrations as necessary. Stud mounting adaptors are recommended on balance equipment to achieve the most accurate results.

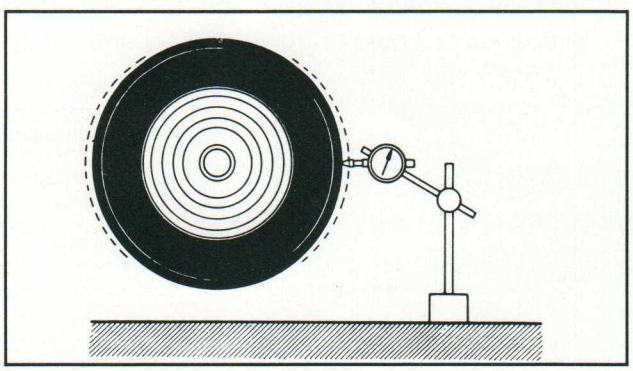
Non-factory equipment must also be taken into consideration. Aftermarket tire/wheel assemblies, or any suspension or steering modifications, can be a cause of or contributor to vibration problems

III. Tire and Wheel Runout

Although not as common as imbalance, tire and wheel runout can cause vibration problems. Tire and wheel assemblies must be checked for both radial and lateral runout.

Radial Runout

Radial runout or "out-of-round" can usually be identified as a low frequency thumping vibration felt at speeds of 30 MPH and above. Make sure that the tires are warm and recently driven to ensure that there are no flat spots.



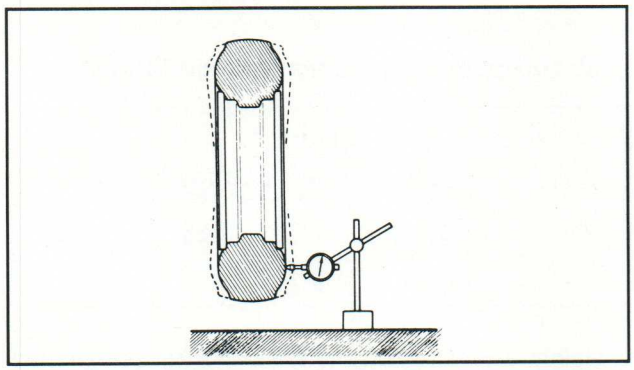
1. Wrap the center tread band with tape to provide a smooth running surface.
2. Position the dial indicator pickup against the tape to measure radial runout.
3. Rotate the tires slowly while reading the runout measurement. Note the amount and mark the maximum and minimum runout points. If the runout exceeds specification, phase match the tire and wheel assembly. (See Section IV Phase Matching)

* Specification: 1.4 mm (.055 in.)

Lateral Runout

Lateral or "side-to-side" runout can be identified as a low frequency, side-to-side shake or shimmy at speeds of 45 MPH and above.

1. The dial indicator pickup should be positioned on a smooth running surface as close to the center of the tire sidewall as possible.



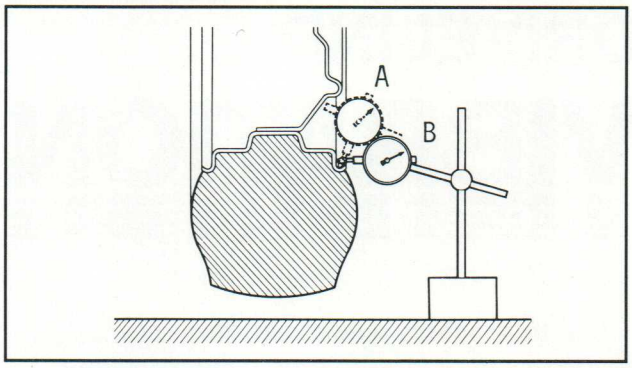
2. Rotate the tire slowly while reading the amount and mark the maximum and minimum runout points. If runout exceeds the specification, phase match the tire and wheel assembly. (See Section IV Phase Matching)

* Specification: 2.0 mm (.080 in.)

If the *wheel* is suspected to have excessive radial or lateral runout, it should be checked by the following procedure:

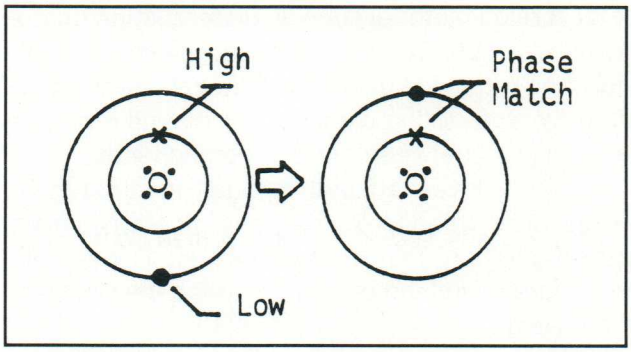
1. Locate the dial indicator at position "A" and measure radial runout.
2. Locate the dial indicator at position "B" and measure lateral runout.
3. If the wheel exceeds specification for either measurement, replace it.

* Specification: 1 mm (0.040 in.)



IV. Tire and Wheel Phase Matching

Excessive "tire and wheel assembly" radial or lateral runout may be corrected by tire-to-wheel phase matching.



0 - Minimum tire runout
X - Maximum wheel runout

NOTE: The procedures for correcting radial or lateral runout are the same.

1. Dismount the tire from its wheel and reassemble matching the *minimum tire* runout point to the *maximum wheel* runout point.
2. Recheck the assembly runout to confirm improvements.
3. Repair or replace components as necessary. If wheel runout is within specification, replace the tire.
4. Install the best tire/wheel assemblies to the front axle, if possible.

If a vibration still exists after an accurate balance has been achieved, and runout and tire-to-wheel phase match are correct, it may be necessary to phase match the driveshaft. This procedure will be covered next.

DRIVELINE VIBRATION

The third article deals with the diagnosis of driveline vibration that is driveshaft related.

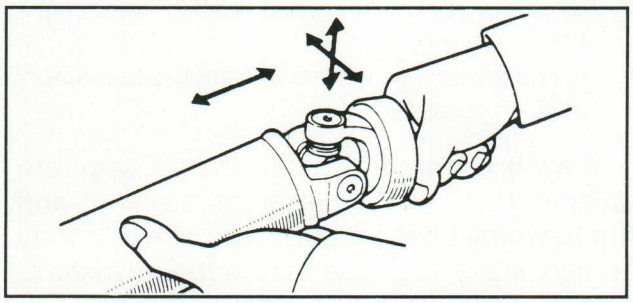
I. Driveshaft/Differential Phase Matching

Before beginning diagnosis of driveline vibration, inspect the general condition of driveline components. Look for any signs of damaged or loose parts, or for foreign material such as undercoating on the driveshaft tube. Correct any discrepancy immediately and retest to verify vibration. Vehicle must be lifted by axle during diagnosis to maintain proper relationships between moving components.

Remove driveshaft and reinstall to differential flange after rotating 90 degrees clockwise from original position. Test for improvement. Repeat this procedure to find the position at which the vibration is smallest.

II. Universal Joint Inspection

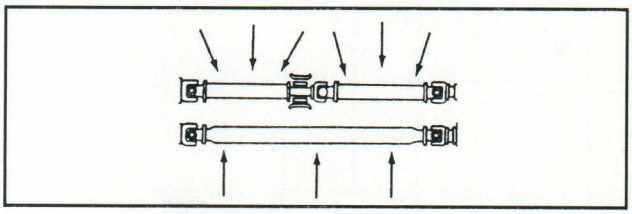
1. Mark driveshaft position at rear joint to pinion companion flange.
2. Remove driveshaft.
3. Inspect spider bearings for wear or damage.
4. Verify smooth joint movement in each direction. Joint should move easily by hand. Overly tight joints may be loosened by lightly striking yoke with a hammer. If this procedure does not correct tightness, replace joint if possible.



5. Check spider bearing free play by turning yoke while holding shaft tightly.

   Specification:
   Snap ring type joints (replaceable)
   0.05 mm (0.002 in.)
   Shell type joint (non-replaceable)
   0.0 mm (0.0 in.)
6. Repair/replace components as necessary.
7. Reinstall shaft. Verify effect of any change made.

III. Driveshaft/Companion Flange Runout



1. Using a dial indicator, measure runout at the front, center and rear of a one-piece shaft. Measure at six places for a two-piece shaft according to the illustration above.
2. If runout exceeds specification at any point except the rearmost position, replace the component and retest. If runout is only excessive at the rear joint, proceed to the next step.

   Specification: 0.8 mm (0.031 in.)
3. Mark the driveshaft tube at the point of excessive runout with a crayon or paint.
4. Disconnect and reindex the driveshaft 180 degrees. Reconnect and measure runout. Mark high spot. If runout is within specification at this time, retest for vibration. If runout is beyond specification, proceed to the next step.

CAMRY BODY DIMENSIONS DRAWINGS

Point Symbol	Nomenclature	Hole dia. (mm)
A, a	Fender front installation nut	6 ϕ
B, b	Front spring support inner hole	9.5 ϕ
C, c	Fender rear installation nut	6 ϕ
D	Cowl top panel center mark	—
E, e	Front side member bumper installation hole	15 ϕ
F, f	Front side member working hole	15 ϕ
G, g	Headlamp upper installation hole	7 x 11
H, h	Cooler condenser installation hole	6 ϕ
I, i	Cowl top side panel standard hole	9 ϕ
J, j	Engine mounting member front installation nut	12 ϕ
K, k	Strut bar bracket front side inner installation nut	10 ϕ
L, l	Strut bar bracket rear side rear installation hole	13 ϕ
M, m	Engine mounting bracket front hole	12.5 ϕ
N, n	Engine mounting bracket rear hole	12.5 ϕ
O, o	Lower arm front installation hole	12.5 ϕ
P, p	Engine mounting member rear installation nut	12 ϕ
Q, q	Front side member standard hole	15 ϕ
R, r	Front floor under reinforcement front standard hole	15 ϕ
S, s	Front floor under reinforcement rear standard hole	15 ϕ
T, t	Rear floor side member standard hole	15 ϕ
U, u	Strut bar inner installation hole	12 ϕ
V, v	Rear floor crossmember standard hole	11 ϕ
W, w	Rear floor side member standard hole	15 ϕ
X, x	Rear floor side member standard hole	15 ϕ
Y, y	Upper back reinforcement standard hole (Sedan)	9 ϕ
	Back door hinge outer installation hole (Liftback)	13 ϕ
Z, z	Rear floor pan bumper front installation hole	45 ϕ

BODY DIMENSION DRAWINGS (Cont.)

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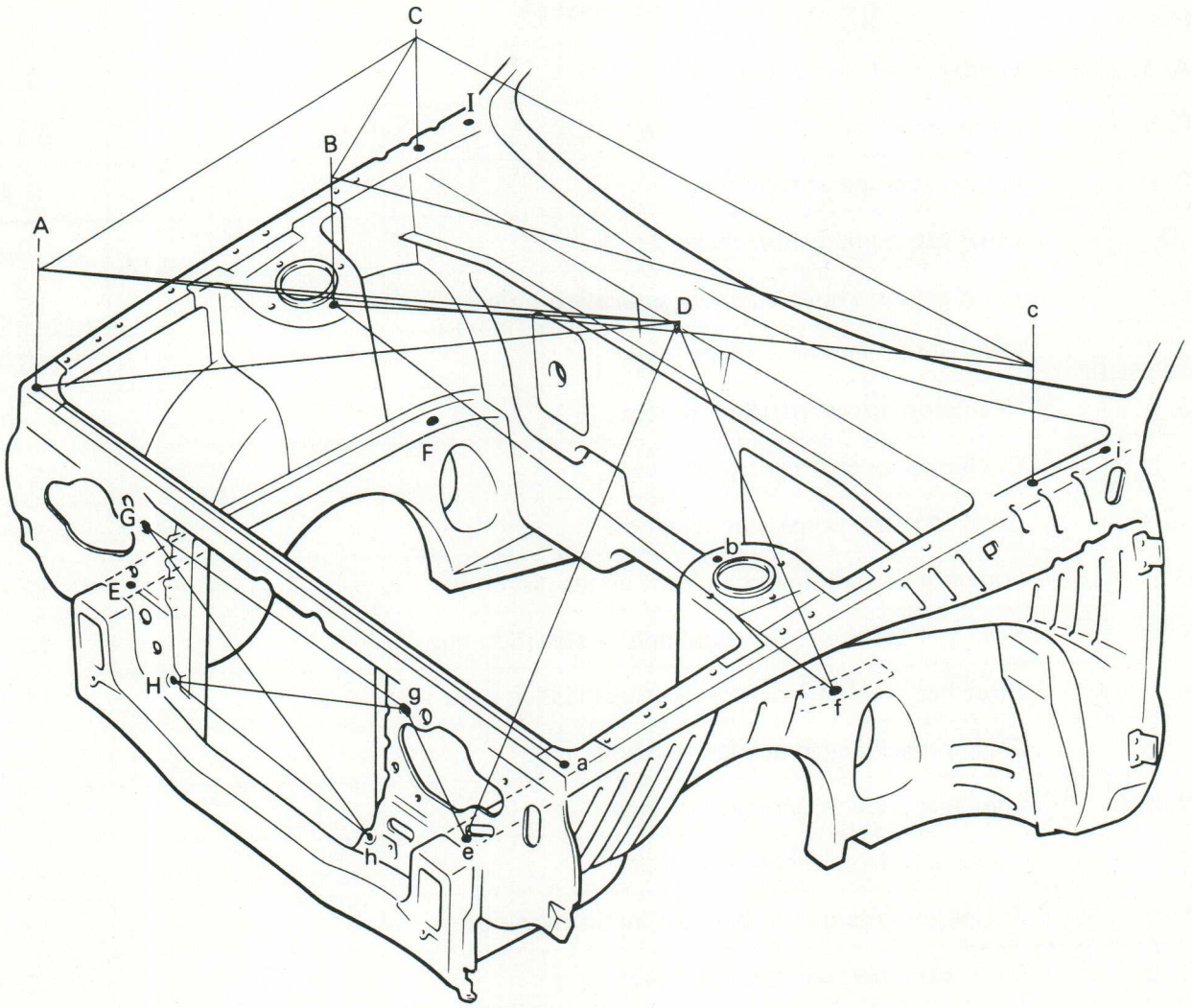


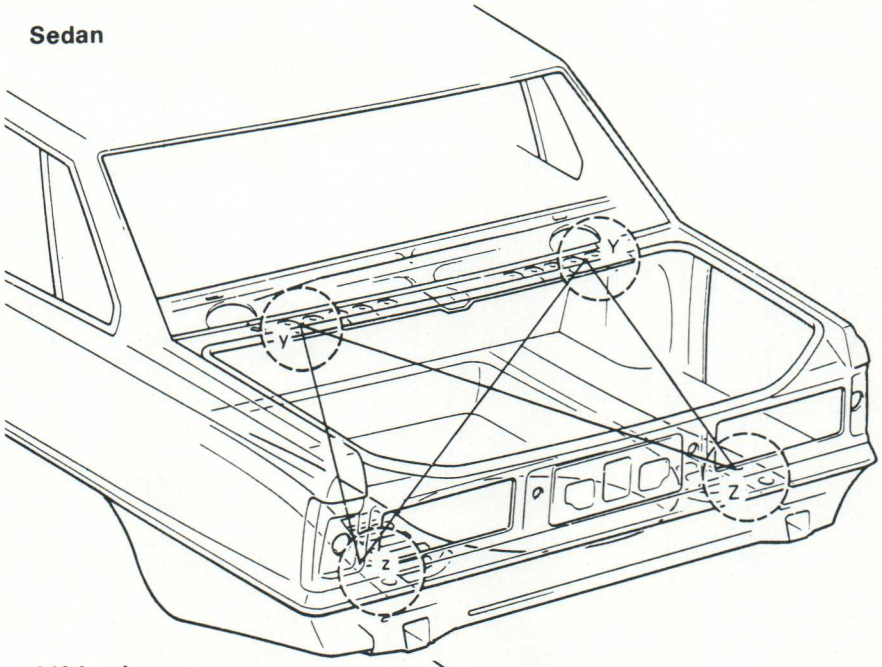
mm (in.)

A — a	A — C	A — c	B — b	B — c	B — D	B — f	B — C	C — c	C — i
1,381 (54.37)	889 (35.00)	1,649 (64.92)	965 (37.99)	1,219 (47.99)	561 (22.09)	988 (38.90)	370 (14.57)	1,397 (55.00)	133 (5.24)
D — A	D — e	D — f	G — g	G — h	g — e	H — h	H — g	—	—
1,114 (43.86)	1,039 (40.91)	595 (23.43)	784 (30.87)	795 (31.30)	185 (7.28)	730 (28.74)	795 (31.30)	—	—

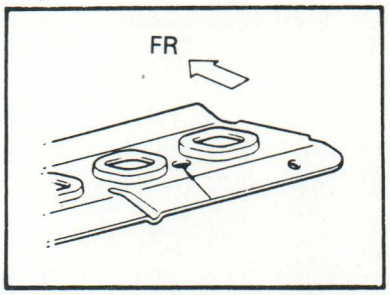
BODY DIMENSION DRAWINGS (Cont.)

1985 TOYOTA CAMRY

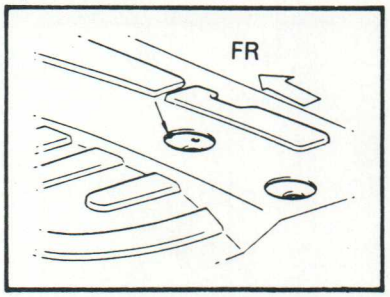
Sedan



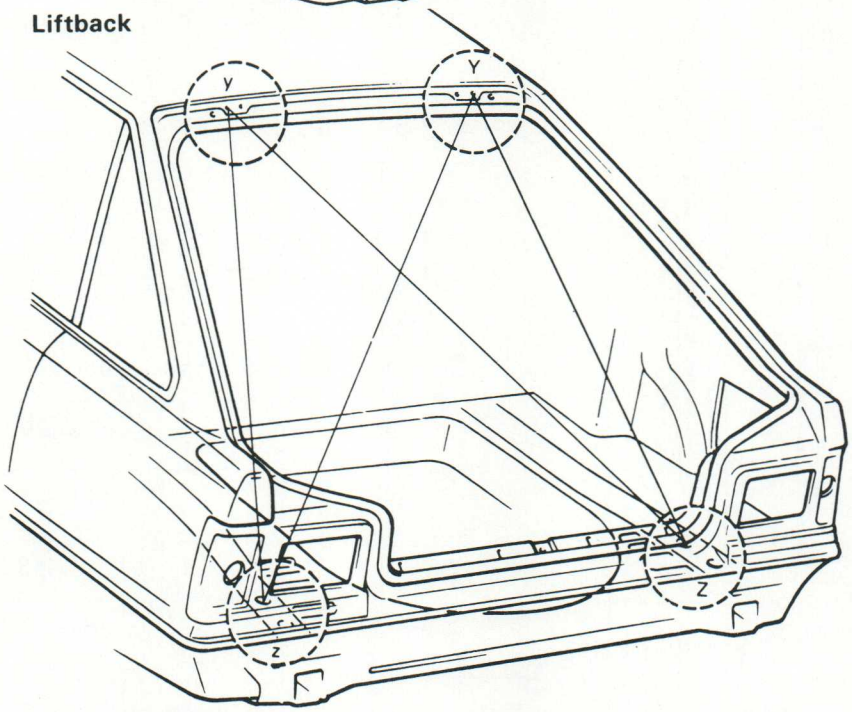
Y, y



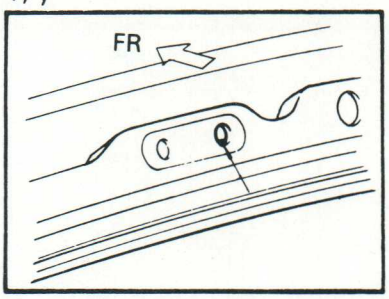
Z, z



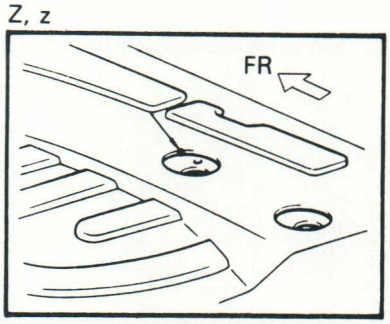
Liftback



Y, y



Z, z

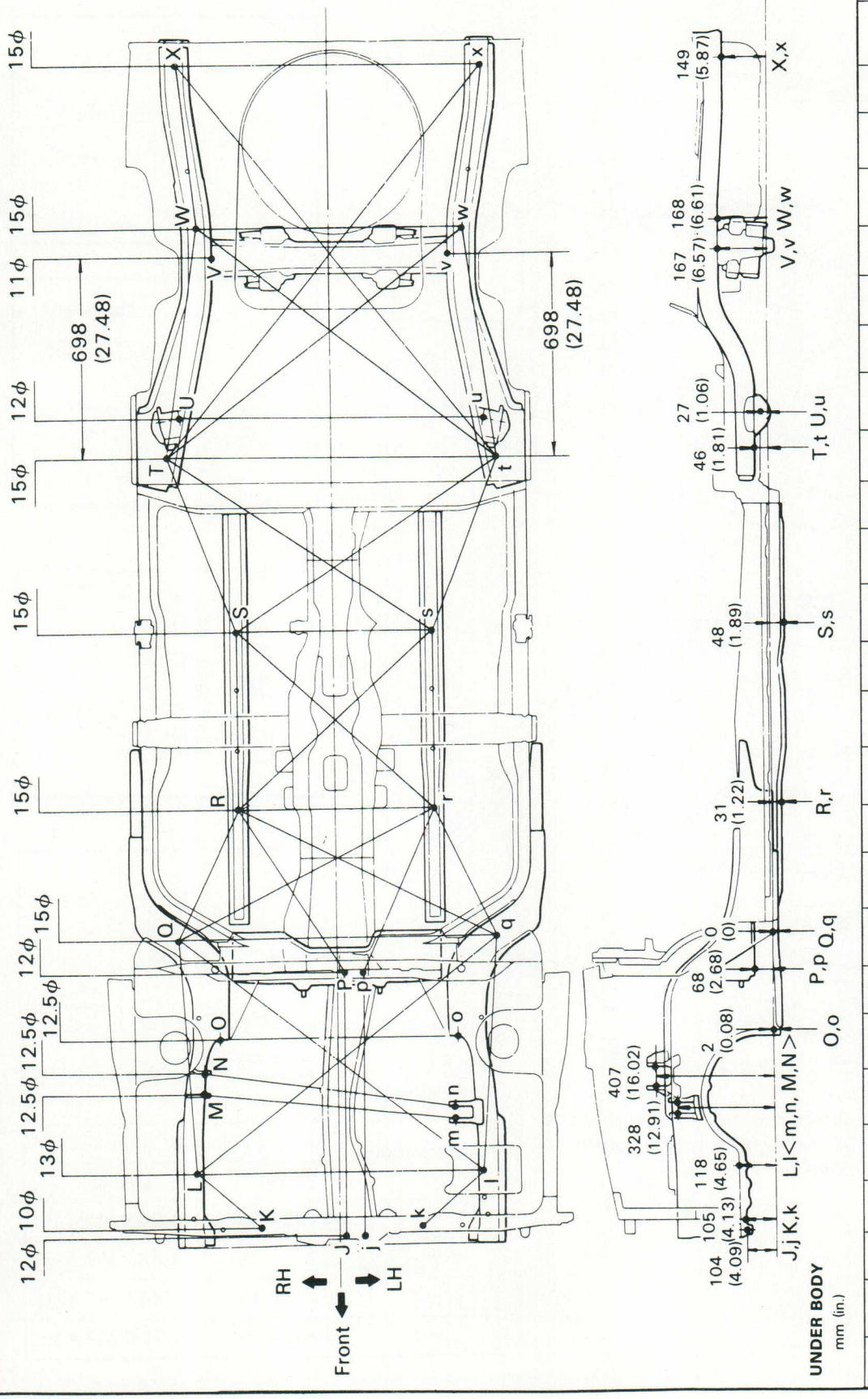


NOTE: The luggage compartment measurement is performed between the two dot-marked points as shown in the figure above.

Point symbol	Reference length mm (in.)	
	Sedan	Liftback
Y – Z	612 (24.09)	1,205 (47.44)
Y – z	969 (38.15)	1,461 (57.52)
y – Z	969 (38.15)	1,461 (57.52)
y – z	612 (24.09)	1,205 (47.44)

BODY DIMENSION DRAWINGS (Cont.)

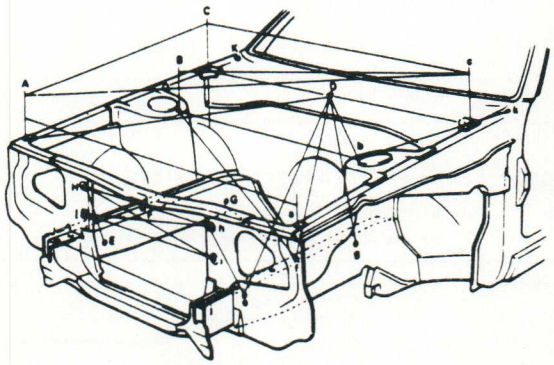
1985 TOYOTA CAMRY



Point Symbol	Reference length mm (in.)
K – L k – l	280 (11.02)
L – l	958 (37.72)
L – q l – Q	1,280 (50.39)
L – Q l – q	783 (30.83)
M – m	852 (33.54)
N – n	853 (33.58)
O – o	804 (31.65)
P – J p – j	861 (33.90)
P – R	666 (26.22)
p – r	615 (24.21)
Q – R q – r	476 (18.74)
Q – r R – q	966 (38.03)
R – r	660 (25.98)
R – s r – S	892 (35.12)
R – S r – s	600 (23.62)
S – s	660 (25.98)
S – T s – t	638 (25.12)
S – t s – T	1,068 (42.05)
T – t	1,110 (43.70)
T – W t – w	787 (30.98)
T – w t – W	1,270 (50.00)
T – x t – X	1,693 (66.65)
U – u	1,027 (40.43)
W – w	894 (35.20)
W – X w – x	544 (21.42)
X – x	1,024 (40.31)

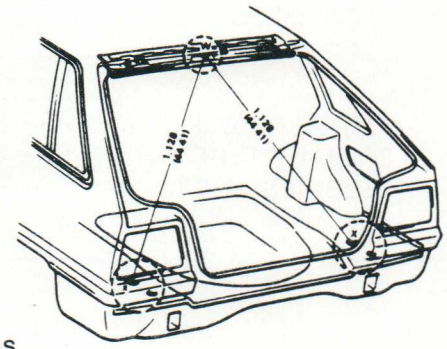
Article No. 170

REPAIR MANUALS FOR COLLISION DAMAGE



FEATURING:

- Factory recommended repair procedures
- Weld locations & types
- Body dimensions
- Body sealing points
- Plastics type & locations



MODEL	MODEL YEAR	PUBLICATION NO.
Starlet	1981, 82, 83, 84	36158
Tercel	1980, 81, 82	98367
Tercel	1983, 84, 85	36431E
Tercel 4 x 4	1984, 85	36432E
Corolla	1980, 81, 82, 83	36001
Corolla (RWD & FWD)	1984, 85	36434E
Celica & Supra	1982, 83, 84, 85	36182
Camry	1983, 84, 85	36433E
Cressida	1981, 82, 83, 84	36118
Cressida Sedan	85	36441E
Cressida Wagon	85	36442E
MR2	85	36440A
Fundamental Painting Procedure	All	36438E

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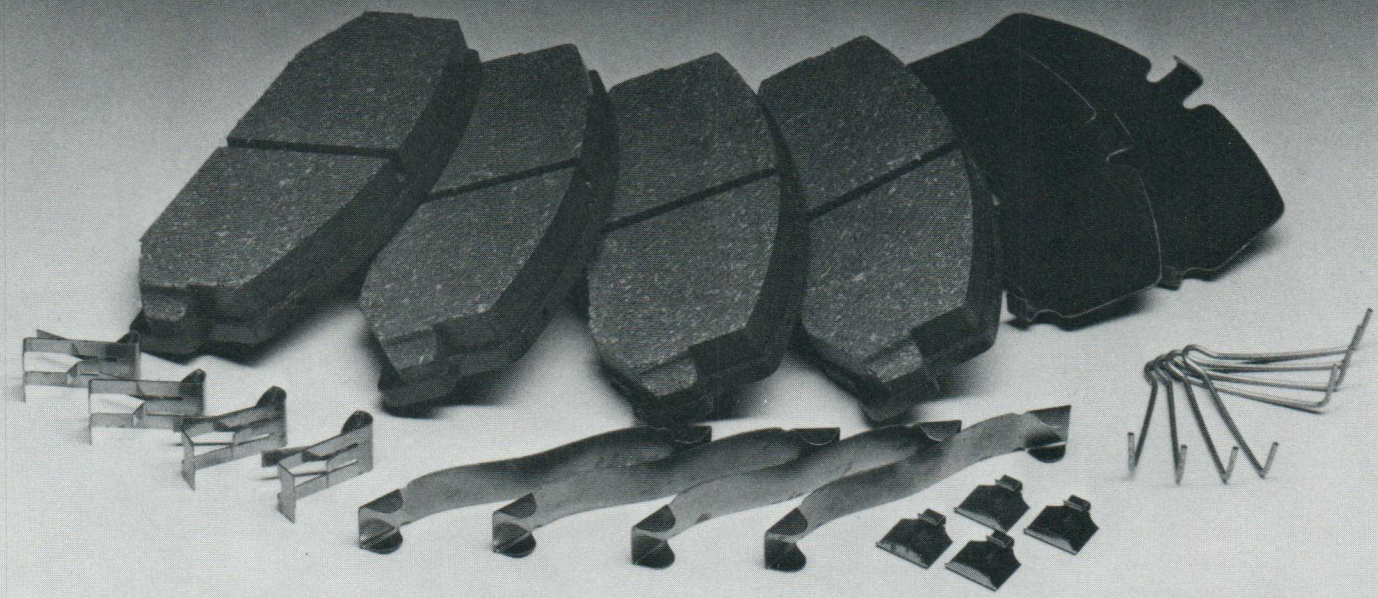

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