pininfarina

Spider Service Manual

GENERAL INFORMATION

This parts list covers serviceable items for Model CJ-5 Jeep on which production started at Chassis Serial No. 454-GB3-10,001, Engine Serial No. 71785, with "F" Head.

Alphabetical Index: At the back of the book, just ahead of the Numerical Index, the Alphabetical Index lists items by name. Item names are arranged alphabetically followed by group and sub-group numbers.

Numerical Index: Located at the back of the book, this index lists part numbers in sequence followed by description and group and sub-group numbers.

Abbreviations: · Follow the group index.

Illustrations: Illustrations bear a figure number and caption, and a legend indicating reference number, description and group and sub-groups.

Standard Parts: These are listed in the Alphabetical Index, in sequence according to size. Willys and General Motors part numbers are shown in the Numerical Index. The purpose for which the parts are required is shown in the group listing description, inset under the item with which they are used or attached.

Special Equipment and Accessories: Those available from the Parts Division are listed in Group 35.

Welding Assemblies: A "Welding Assembly" consists of two or more sheet metal parts welded together at the plant in fixtures for accuracy. Parts for assemblies which cannot be welded to advantage in the field are not listed except in occasional instances where the cost of a welding assembly would be excessive.

Engine Serial Number Location: Engine serial number is stamped on top water pump boss at upper front end of cylinder block.

Undersize Bearings and/or Oversize Pistons: Definite information is given by letters stamped after the engine number. Code is as follows:

Letter "A" —(10,001-A) indicates .010″ undersize main and connecting rod bearings.

Letter "B" —(10,001-B) indicates .010″ oversize pistons.

Letters "AB"—(10,001-AB) indicates .010″ undersize main and rod bearings and .010″ oversize pistons.

467 - [illegible]

79-83 - BY Pinin.

This manual has been written to provide basic information for the proper servicing of the Spider models.

The information is grouped in sections. Each section is identified by two-digit numbers. Each section covers the service procedures for the individual groups and sub-groups. They are identified by a number. The root of the number is taken from the general sub-group code now being used for the Parts Catalogue and the Service Time Schedule. This number identifies the service time schedule operation, parts catalogue sheet for the part covered by the service procedure, and the service procedure.

HOW TO USE THE MANUAL

The information identification number consists of five digits, as follows:

a) The first two digits identify the section.

b) The third designates the group within the section and is used in conjunction with the first two.

c) The last two digits indicate an assembly or task consisting of several parts. This number identifies the sub-group. It refers to the sub-group in both the Parts Catalog and the Service Time Schedule.

Find the information required as follows:

1) Find the tab index page for the information on the first page of the manual.

2) Find the group and sub-group for the information on the table of contents.

UPDATING THE MANUAL

– Revision sheets are supplied together with a revised "Composition of the Manual" sheet.

– Revision sheets can be of two types:

1) Replacement sheets: In this case the new sheet will carry the same page number as the old one. A notation in the bind margin will read Supersedes page . . . dated . . ."

2) Complementary sheets on topics already dealt with: In this case the additional sheet will carry the same sub-group number as the sheet on which the topic has been first dealt with. The page number will be followed by a letter suffix.

Example: If additional information is needed for information on page 2, the new sheet will be 2A.

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Spider Service Manual

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GENERAL INFORMATION - MAINTENANCE - 00

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SPIDER

	1975/1976	1977/1978
Type	Motornummern:	
(with catalytic converter)	132A1.040.5 132A1.031.5	132A1.040.6 132A1.031.6
Cycle	Four-stroke, gasoline	
No. of cylinders	Four	
Bore	3.31 in. (84 mm)	
Stroke	3.12 in. (79.2 mm)	
Displacement	107.13 cu. in. (1756 cc)	
Compression ratio	8 to 1	
Horsepower rating, S.A.E. net at	86 HP 6200 rpm	
Horsepower rating, S.A.E. net (catalytic converter version) at	83 HP 5800 rpm	
Torque rating, S.A.E. net at	90 ft. lbs. 2800 rpm	
Torque rating, S.A.E. net (catalytic converter version) at	86 ft. lbs. 2800 rpm	
Arrangement	Front in line	
Valve arrangement	Overhead valves. Twin overhead camshafts driven by toothed timing belt with tensioner.	
Valve Timing:		
Intake		
Opens	5° B.T.D.C.	
Closes	53° A.B.D.C.	
Exhaust		
Opens	53° B.B.D.C.	
Closes	5° A.T.D.C.	
Valve clearance:		
– for checking valve timing	0.031 in. (0.80 mm)	
– operation clearance, engine cold:		
Intake	0.018 in. (0.45 mm)	
Exhaust	0.020 in. (0.50 mm)	

Type	
49 State version	132C2.040
California version	132C2.031
Cycle	Four-stroke, gasoline
No. of cylinders	Four
Bore	3.31 in. (84 mm)
Stroke	3.54 in. (90 mm)
Displacement	121.74 cu. in. (1995 cc)
Compression ratio	8.1 to 1
Horsepower rating, S.A.E. net at rpm	
49 State version	86 HP at 5100 rpm
California version	80 HP at 5000 rpm
Torque rating, S.A.E. net at rpm	
49 State version	104.3 ft. lbs. at 3000 rpm
California version	100.0 ft. lbs. at 3000 rpm
Arrangement	Front in line
Valve arrangement	Overhead valves. Twin overhead camshafts driven by toothed timing belt with tensioner.
Valve timing:	
Intake	
Opens	5° B.T.D.C.
Closes	53° A.B.D.C.
Exhaust	
Opens	53° B.B.D.C.
Closes	5° A.T.D.C.
Valve clearance:	
For checking valve timing	0.031 in. (0.80 mm)
Operating clearance, engine cold	
Intake	0.018 in. (0.45 mm)
Exhaust	0.020 in. (0.50 mm)

Motornummern:

Type	
Carburetor version	132C3.040
Fuel injected version	132C3.031
Cycle	Four-stroke, gasoline
No. of cylinders	Four
Bore	3.31 in. (84 mm)
Stroke	3.54 in. (90 mm)
Displacement	121.74 cu. in. (1995 cc)
Compression ratio	8.1 to 1
Horsepower rating, S.A.E. net at rpm	
Carburetor version	80 HP at 5000 rpm
Fuel injected version	102 HP at 5500 rpm
Torque rating, S.A.E. net at rpm	
Carburetor version	100 ft. lbs. at 3000 rpm
Fuel injected verions	110 ft. lbs. at 3000 rpm
Arrangement	Front in line
Valve arrangement	Overhead valves. Twin overhead camshafts driven by toothed timing belt with tensioner.
Valve timing:	
Intake	
Opens	5° B.T.D.C.
Closes	53° A.B.D.C.
Exhaust	
Opens	53° B.B.D.C.
Closes	5° A.T.D.C.
Valve clearance:	
For checking valve timing	0.031 in. (0.80 mm)
Operating clearance, engine cold	
Intake	0.018 in. (0.45 mm)
Exhaust	0.020 in. (0.50 mm)

Motornummern: 132C3.040 / 132C3.031

Type	
Fuel injected version and turbocharged version	132C3.031
Cycle	Four-stroke, gasoline
No. of cylinders	Four
Bore	3.31 in. (84 mm)
Stroke	3.54 in. (90 mm)
Displacement	121.74 cu. in. (1995 cc)
Compression ratio	8.1 to 1
Horsepower rating, S.A.E. net at rpm	
Turbocharged version	120 HP at 6000 rpm
Fuel injected version	102 HP at 5500 rpm
Torque rating, S.A.E. net at rpm	
Turbocharged version	130 ft. lbs. at 3600 rpm
Fuel injected version	110 ft. lbs. at 3000 rpm
Arrangement	Front in line
Valve arrangement	Overhead valves. Twin overhead camshafts driven by toothed timing belt with tensioner.
Valve timing:	
Intake	
Opens	5° B.T.D.C.
Closes	53° A.B.D.C.
Exhaust	
Opens	53° B.B.D.C.
Closes	5° A.T.D.C.
Valve clearance:	
For checking valve timing	0.031 in. (0.80 mm)
Operating clearance, engine cold	
Intake	0.018 in. (0.45 mm)
Exhaust	0.020 in. (0.50 mm)

arburetor Version

'ertical, dual-barrel downdraft WEBER carburetor with differntial opening of the secondary throttle, automatic butterfly alve choke and idle stop solenoid.

nrichment system consists of mechanical and vacuum assisted ccelerator pumps and a power valve.

arburetor fed by mechanical pump. Fuel filter installed in uel line between fuel pump and carburetor.

arburetor equipped with thermostatic air cleaner containing aper cartridge element.

uel Injection Version

lectronically controlled fuel injection with engine and exhaust ensors supplying information to the electronic control unit to ptimize the fuel/air mixture in all engine operating conditions.

our injectors, one per cylinder and a cold start valve, all supied at constant fuel pressure.

uel flow controlled by variation in opening time of injectors.

n air flow sensor to measure air flow variation.

ir cleaner with paper cartridge installed before air flow sensor.

Forced circulation by gear pump.

Pressure limiter valve on delivery circuit. Normal lubrication pressure at rated engine rpm and oil temperature 50 to 71 psi (3.5 to 5 kg/cm^2).

Full-flow cartridge oil filter.

COOLING SYSTEM

Radiator and translucent expansion tank. Water circulated by centrifugal pump.

Thermostat with controlled by-pass on cylinder head water outlet duct.

Four-blade fan driven by electric motor controlled by thermostatic switch on radiator: cut-in temperature about 194°F (90°C).

EMISSION CONTROL SYSTEMS

Engine fuel system provided with fuel recirculation (closed circuit) and evaporative emission control system.

Crankcase emission control (CEC) system (closed circuit) by recirculation of blow-by gases and oil vapors.

Exhaust emission control system separate from CEC system. System reduces air pollution from exhaust by gas recirculation, post-combustion processes and catalytic converter.

CHASSIS

LUTCH

ingle-plate, dry, with disc spring mechanically controlled.

RANSMISSION

Manual transmission: five forward speeds (all synchronized) nd reverse.

Automatic transmission: three forward speeds and reverse, ully automatic.

	Manual			
Gear Ratios	1975–1978	1979–1980	1981–1982	Automatic
First	3.667	3.612	3.667	2.4 to 1
Second	2.1	2.045	2.1	1.48 to 1
Third	1.361	1.357	1.361	1 to 1
Fourth	1	1	1	—
Fifth	0.881	0.830	0.881	—
Reverse	3.526	3.244	3.244	1.92 to 1

PROPELLER SHAFT

REAR AXLE

Semi-floating.

Hypoid final drive.

Gear ratio: 4.30 to 1 (10/43) – 1975 to 1978
3.58 to 1 (12/43) – Automatic Trans. 1979 and up
3.90 to 1 (10/39) – Manual Trans.

STEERING

Worm screw and roller type.

Ratio: 1/16.4

Turning circle diameter: 34 ft. 2 in. (10.4 m)

Steering column of the break-away mount type with two universal joints. Independent and symmetric track rods to each wheel. Sealed-for-life joints. Hydraulic, double-acting damper on relay support.

BRAKES

Hydraulically operated by pedal through vacuum servo and tandem master cylinder.

Disk type, with floating caliper and one cylinder to each wheel.

Independent front and rear circuits.

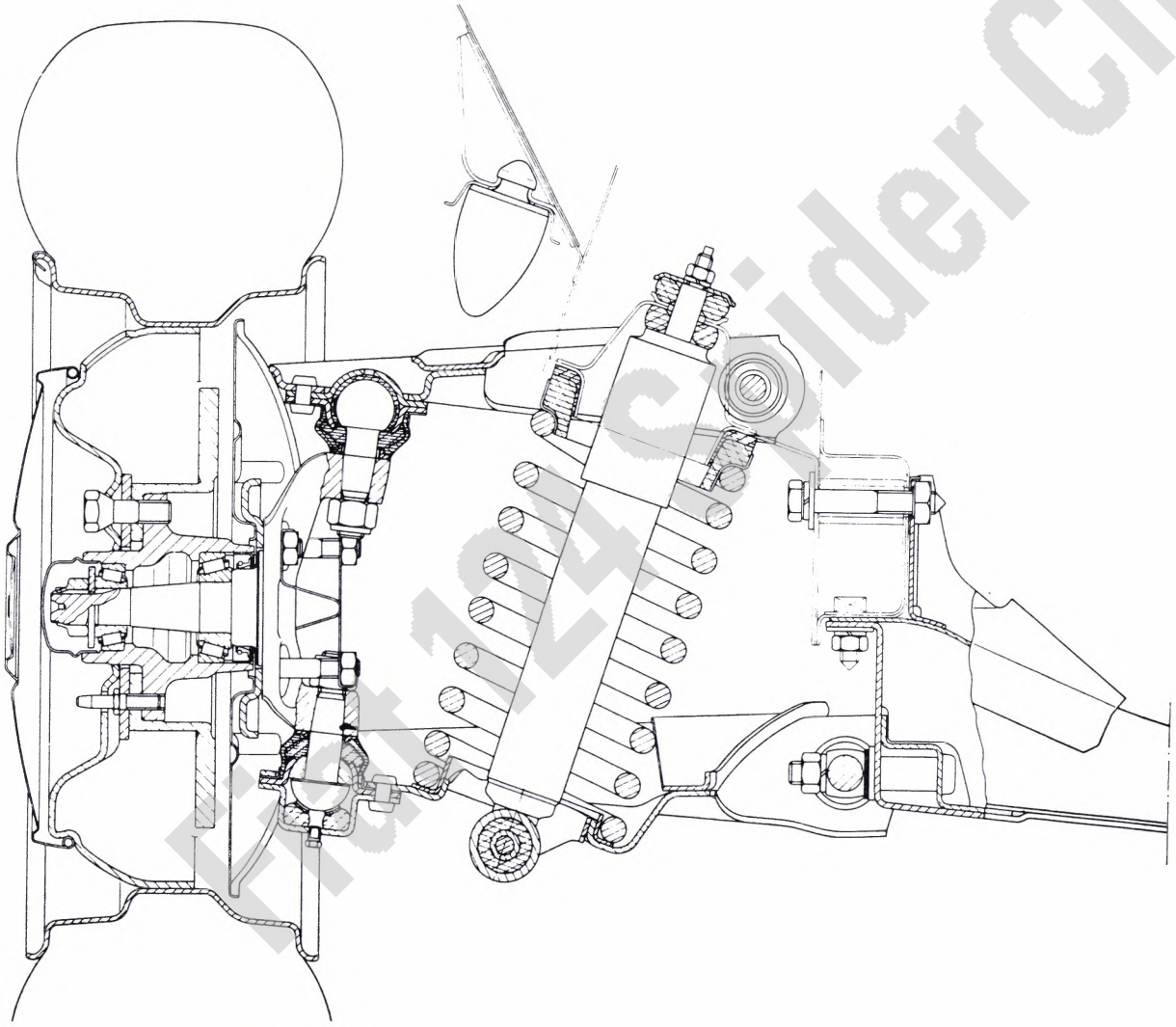
Proportioning valve in rear circuit for car load and deceleration rate variation compensations.

Device for automatic wear take-up.

Parking hand brake acting on rear brakes.

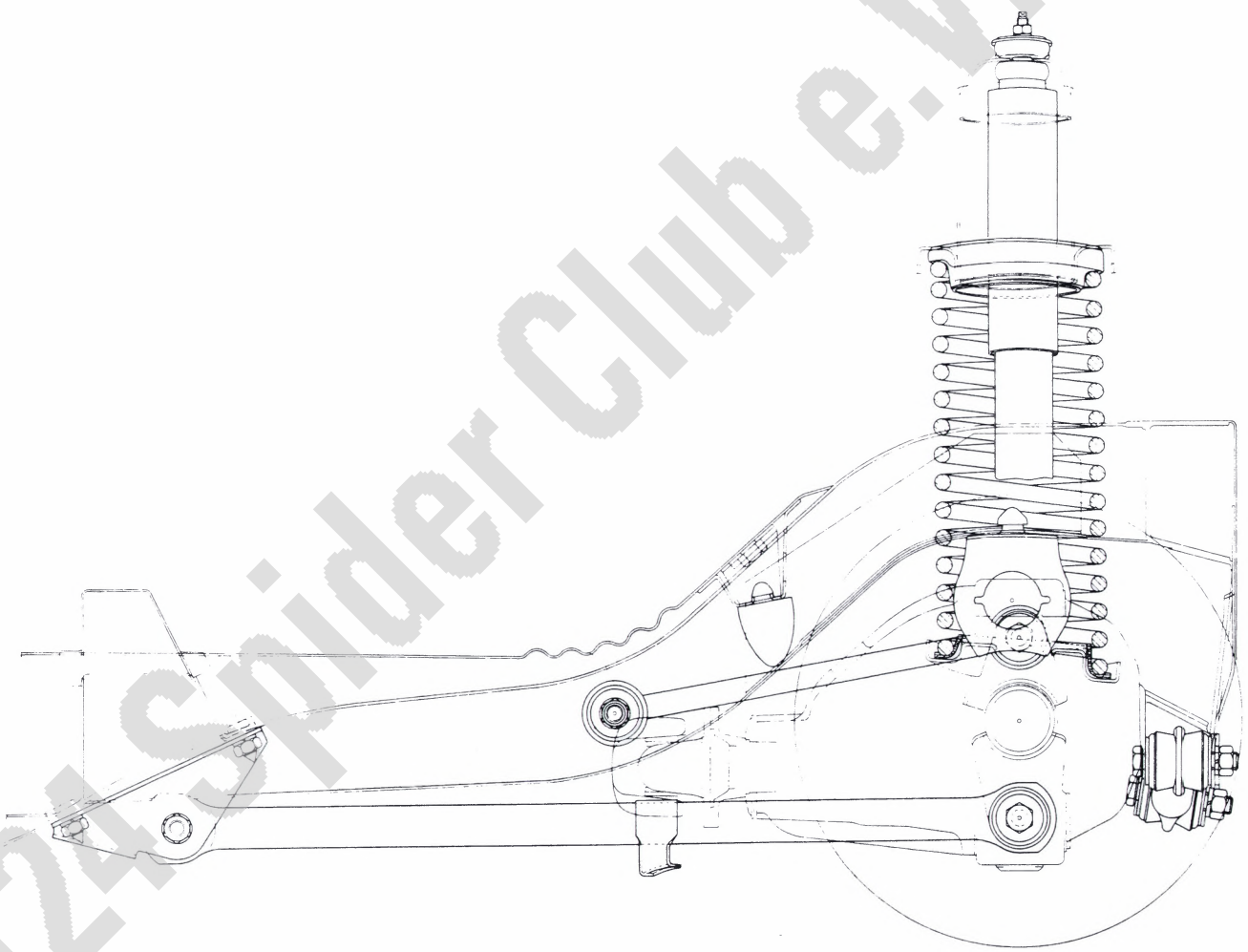
FRONT SUSPENSION

Independent wheels, by swinging arms, with coil springs and hydraulic, double-acting telescopic shock absorbers. Stabilizer bar. Sealed-for-life articulations.



REAR SUSPENSION

By rigid axle anchored to body through 5 reaction rods – 4 longitudinal and 1 transversal. Coil springs, hydraulic double-acting telescopic shock absorbers. Asymmetric wheel motions stabilized by elastic mounts of reaction rods.



WHEELS AND TIRES

Disk wheels, ventilated, with rim size . . . . . 5 J x 13"
Radial-ply tires, size. . . . . 165 SR-13"
or
Alloy wheels, ventilated, with rim size. . . . . 5.5 J x 14"
Radial-ply tires, size. . . . . R 185/60-14"

ELECTRICAL SYSTEM

1975 to 1977

Voltage . . . . . 12 Volts

Alternator

Continuous current rating . . . 44 Amps
Incorporated current rectifiers.
Automatic voltage regulator.
Cut-in speed at starting of engine (with users off).

Battery

With grounded negative; capacity at 20-hr discharge rate. . . . 60 Amp. hr.
Cold (−18°C) high-discharge test current . . . . . 255 Amp.

Starter

Power rating. . . . . 1.3 kW
Direct engagement by solenoid and free-wheeling pinion.

Heater Fan Motor

Power rating. . . . . 20 W

Engine Radiator Fan Motor

Power rating. . . . . 110 W

Windshield Wiper Motor

Power rating. . . . . 28 W

Ignition System (1975 & 1976)

Firing order 1-3-4-2
Basic ignition timing at 850 rpm . . . . . 0° (TDC)
Automatic advance . . . . . 36°
Dwell angle, for distributor contacts gap check (at 850 ± 50 rpm) . . . . . 55°
Breaker additional points gap .31 - .49 mm (.012 - .019 in.)
Spark Plugs: CHAMPION N 7 Y or AC DELCO 41-42 XLS or MARELLI CW 78 LP
Thread size . . . . . 14 x 1.25 mm
Gap . . . . . .5-.7 mm (.020-.027 in.)

1978 to 1980

Voltage . . . . . 12 Volts

Alternator

Continuous current rating . . . 55 Amps
Incorporated current rectifiers.
Automatic voltage regulator.
Cut-in speed at starting of engine (with users off).

Battery

With grounded negative; capacity at 20-hr discharge rate. . . . 60 Amp. hr.
Cold (−18°C) high-discharge test current . . . . . 255 Amp.

Starter

Power rating. . . . . 1.3 kW
Direct engagement by solenoid and free-wheeling pinion.

Heater Fan Motor

Power rating. . . . . 20 W

Engine Radiator Fan Motor

Power rating. . . . . 110 W

Windshield Wiper Motor

Power rating. . . . . 28 W

Ignition System (1977 & 1978)

Firing order 1-3-4-2
Basic igniiton timing at 850 rpm . . . . . 0° (TDC)
Automatic advance . . . . . 36°
Dwell angle, for distributor contacts gap check (at 850 ± 50 rpm) . . . . . 55°
Breaker additional points gap .31 - .49 mm (.012 - .019 in.)
Spark Plugs:
Standard Type: CHAMPION N9 Y
AC DELCO 42-XLS
MARELLI CW 7LP
BOSCH W175 T30
Resistor Type: CHAMPION RN9 Y
AC DELCO R42-XLS
MARELLI CW 7LPR
BOSCH W175 TR30

1981 and ON

Voltage . . . . . 12 Volts

Alternator

Continuous current rating . . . 65 Amps
Incorporated current rectifiers.
Automatic voltage regulator.
Cut-in speed at starting of engine (with users off).

Battery

With grounded negative; capacity at 20-hr discharge rate. . . . . 60 Amp.hr.
Cold (−18°C) high-discharge test current . . . . . 255 Amp.

Starter

Power rating. . . . . 1.3 kW
Direct engagement by solenoid and free-wheeling pinion.

Heater Fan Motor

Power rating. . . . . 20 W

Engine Radiator Fan Motor

Power rating. . . . . 110 W

Windshield Wiper Motor

Power rating. . . . . 28 W

Ignition System (1979 and on)

Firing order 1-3-4-2
Electronic, with inductive discharge ignition distributor.
Basic ignition timing at 800 to 850 rpm (manual transmission), at 700 to 750 rpm (automatic transmission) . . . . . 10° ± 1.5 BTDC
Automatic advance . . . . . 28°
Spark Plugs:
Standard Type: CHAMPION N9 Y
AC DELCO 42-XLS
MARELLI CW 7LP
FIAT 1L4J
BOSCH W 7D
Resistor Type: CHAMPION RN9 Y or RN1 OY
AC DELCO R42-XLS or R43 - XLS
MARELLI CW 7LPR or CW 67 LPR
FIAT 1L4JR

PERFORMANCE

(1975 to 1978)

Speeds

Maximum speeds after break-in, fully laden:

	m.p.h.
1st gear	28
2nd gear	50
3rd gear	75
4th gear	102
5th gear, over	105

Gradeability

Maximum grades climable, fully laden:

1st gear	50%
2nd gear	25%
3rd gear	15%
4th gear	10%
5th gear	8%

WEIGHTS

Curb weight	2,250 lbs.
Vehicle load capacity (total 430 lbs.):	2 adults (300 lbs) + 130 lbs. of luggage
Gross weight (fully laden)	2,680 lbs.
Designated seating capacity	2 persons
Occupant distribution	2 in front

(1979 and On)

Speeds

Maximum speeds after break-in, fully laden:

	Manual Trans.	Auto. Trans.
1st gear	28	47
2nd gear	50	76
3rd gear	76	103
4th gear	104	
5th gear, over	105	

Gradeability

Maximum grades climable, fully laden:

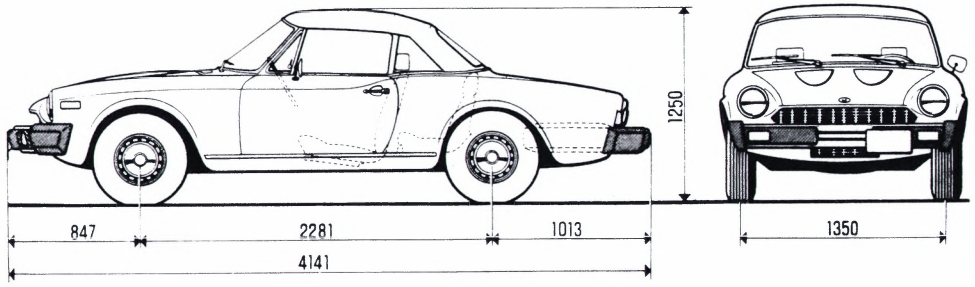
	%	%
1st gear	48	48
2nd gear	29	30
3rd gear	17	20
4th gear	12	
5th gear	9	

WEIGHTS

Curb weight:	Manual	2,360 lbs.
	Automatic	2,400 lbs.
Vehicle load capacity (total 430 lbs.):	2 adults (300 lbs.) + 130 lbs. of luggage	
Gross weight:	Manual	2,790 lbs.
(fully laden)	Automatic	2,830 lbs.
Designated seating capacity		2 persons
Occupant distribution		2 in front

MAIN DIMENSIONS (ALL)

mm	520	847	1,013	1,120	1,250	1,320	1,350	1,613	2,281	4,141
in.	20.5	33.4	39.9	44	49.2	52	53.2	63.5	89.7	163



CAPACITIES

UNIT	QUANTITY lt	kg	U.S. Units	REFILL
Fuel tank	43	–	11.4 gals.	Leaded (no catalytic converter) or unleaded gasoline with octane rating of at least 91 (Research Method)
Radiator, cylinder jackets and heating system	8		8.5 qts.	Use 50-50 antifreeze and water mixture
Engine sump and filter (*)	4.125	3.75	4.25 qts.	See table below
Transmission				
Manual	1.65	1.50	1.75 qts.	SAE 80W/90 oil (not EP) containing special anti-wear additives.
Automatic	2.8	2.5	3.0 qts.	DEXRON automatic transmission fluid (**)
Rear axle	1.30	1.20	1.40 qts.	SAE 80W/90 EP oil
Steering box	0.215	0.195	0.40 pts.	SAE 80W/90 EP oil ATF type A (suffix A)
Hydraulic brake circuits	0.38	0.38	0.40 pts.	DOT 3 motor vehicle brake fluid to F.M.V.S. No. 116

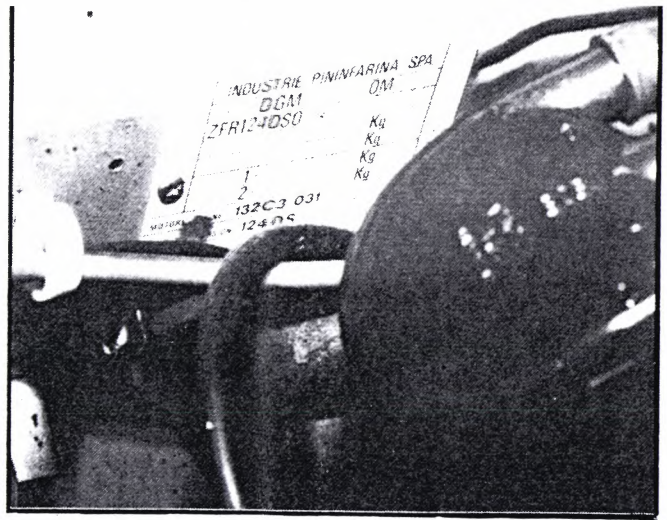
Windshield washer bottle	Temperature	Solvent in bottle	
	above 32°F (0°C)	3%	Pure water plus high quality windshield washer solvent
	down to 14°F (–10°C)	50%	
	below 14°F (–10°C)	100%	

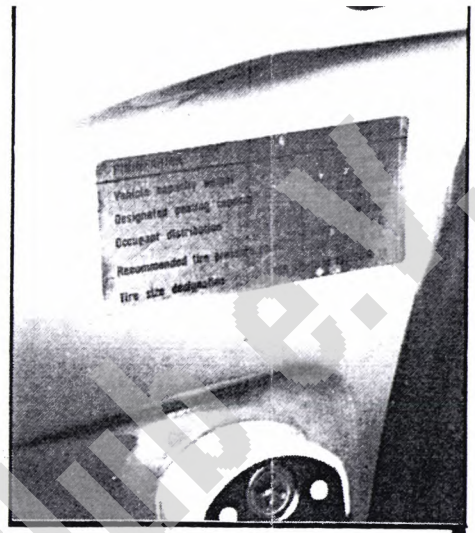
Engine oil usage, temperature	Unigrade oil	Multigrade oil
Below 5°F (–15°C)	VS10W (SAE 10W)	–
5°F (–15°C) to 32°F (0°C)	VS20W (SAE 20W)	VS15W-40 (SAE 15W-40)
32°F (0°C) to 95°F (35°C)	VS30 (SAE 30)	VS15W-40 (SAE 15W-40)
Above 95°F (35°C)	VS40 (SAE 40)	VS15W-40 (SAE 15W-40)

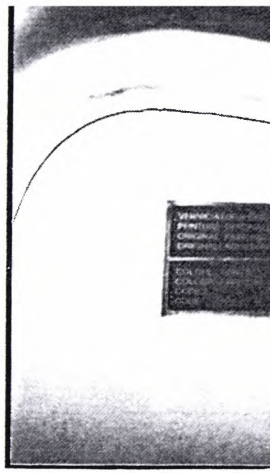
(*) Total capacity including sump, filter and lines is 5½ qts. Amount indicated in table is the requirement for periodic oil changes.
(**) Fluid refill quantity for new or overhauled transmission is 6 qts.

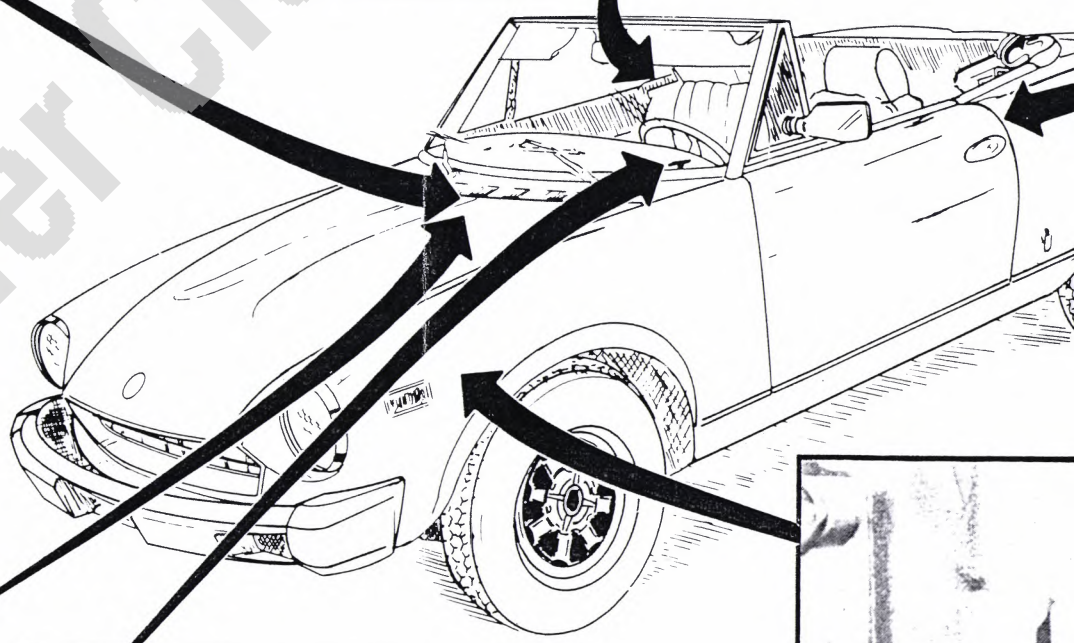
LUBRICATION SPECIFICATIONS

FIAT TYPE	INTERNATIONAL DESIGNATION	APPLICATION
VS	Low ash content detergent oil API service SE, CC to MIL-L-46152 and the European sequence.	Engine
ZC 90	SAE 80W/90 oil (not EP) with anti-wear additives.	Manual transmission
GI/A	ATF - DEXRON type	Automatic transmission
W 90/M	SAE 80W/90 EP oil to MIL-L-2105B	Rear axle Manual steering box
Jota 1	Lithium-base grease N.L.G.I. No. 1	Seat rails
MR 3	Lithium-base grease N.L.G.I. No. 3	Starter, ball joints, front wheel bearings

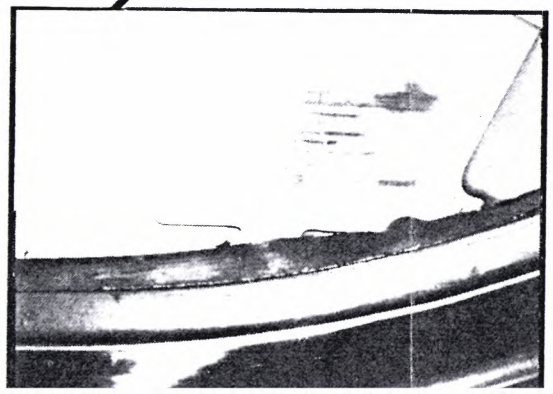








REGULATIONS CONFORMITY TAG – LOCATED ON ENGINE COMPARTMENT COWL



TUNE-UP

This section contains information needed to perform a tune-up of the engine. Perform the tasks in this section according to the MAINTENANCE chart.

Example: If doing tune-up at 7,500 miles, check spark plugs. If doing tune-up at 15,000 miles, change spark plugs.

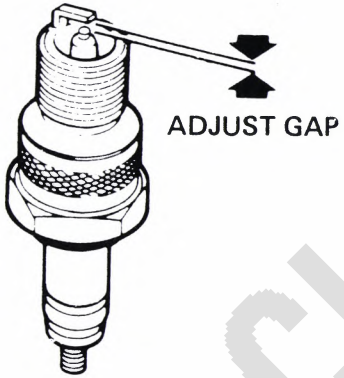
SPARK PLUGS

Remove plugs. Inspect plugs for condition. Clean or replace plugs.

Adjust plug gap.

Gap	Normal	Resistor
	0.023 to 0.027 in. (0.6 to 0.7 mm)	0.027 to 0.031 in. (0.7 to 0.8 mm)

NOTE: If checking tappet clearance, leave plugs out until clearance is adjusted.



TAPPET CLEARANCE (Engine Cold)

Fuel Injected and Turbocharged Engines

Loosen clamps (1) on molded air intake line (2) and remove line (on turbocharged engines, remove air plenum).

Disconnect line (3) to auxiliary air regulator (4). Remove two bolts holding auxiliary air regulator to cylinder head.

Disconnect coolant line (5) at throttle plate heater (6).

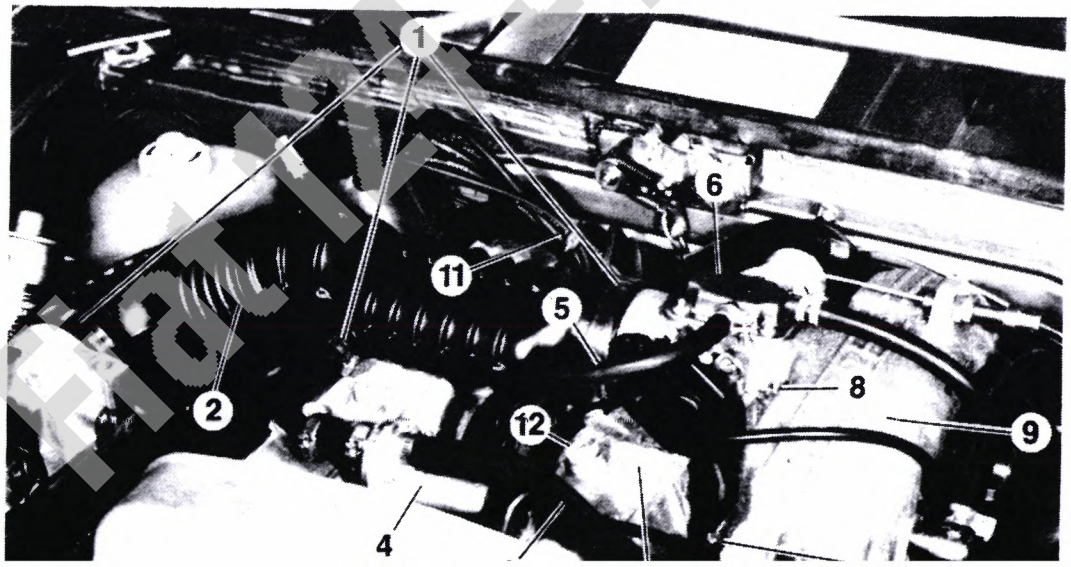
Remove six bolts (7) and two nuts (8) on intake manifold half (9). Carefully lift and move manifold back so that it is positioned clear of cam cover (10).

NOTE: If intake manifold gasket is damaged it must be replaced.

Remove spark plug wires (11) from support.

Remove four bolts (12) holding cam covers. Remove covers and gaskets.

1. Clamp
2. Air intake line
3. Auxiliary air regulator line
4. Auxiliary air regulator
5. Coolant line
6. Throttle plate heater
7. Bolt
8. Nut
9. Intake manifold
10. Cam cover
11. Spark plug wires
12. Bolt



Carburetored Engines

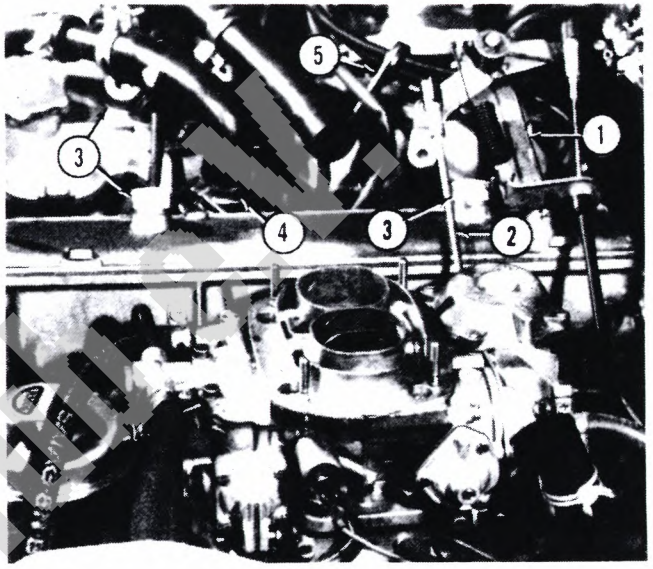
Remove air cleaner. Disconnect accelerator rod (2) from carburetor.

On engines with air pump, remove hose from air pump check valve (4).

Remove spark plug wires from support (5).

Remove four bolts (3) holding camshaft covers. Remove covers and gaskets.

1. Support 2. Accelerator rod 3. Bolts 4. Check valve 5. Support

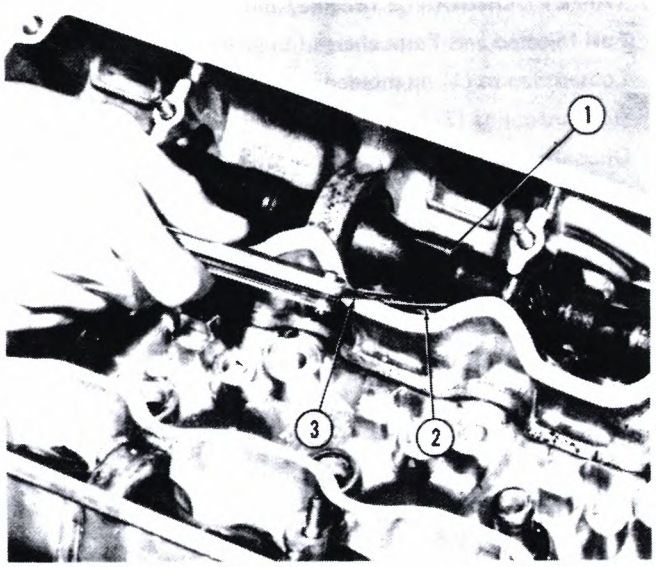


All Engines

Position camshaft so that lobe for valve being checked is pointing up and at right angle to valve.

Clearance: Intake – 0.017 to 0.019 in.
(0.43 to 0.48 mm)
Exhaust – 0.019 to 0.021 in.
(0.48 to 0.53 mm)

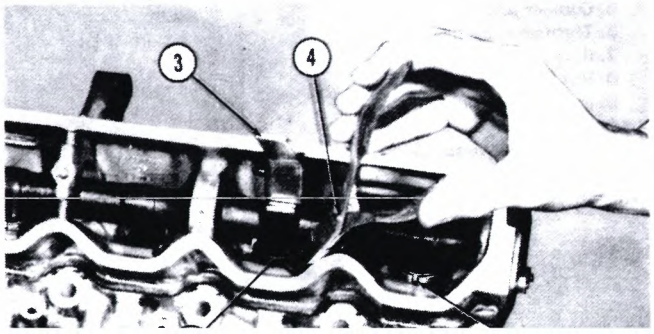
1. Camshaft lobe 2. Tappet 3. Feeler gauge



Adjust clearance as necessary by replacing tappet plates (2).

After adjusting, install cam covers, and all removed parts.

1. Notch on tappet 2. Tappet plate 3. Clamping tool 4. Tool

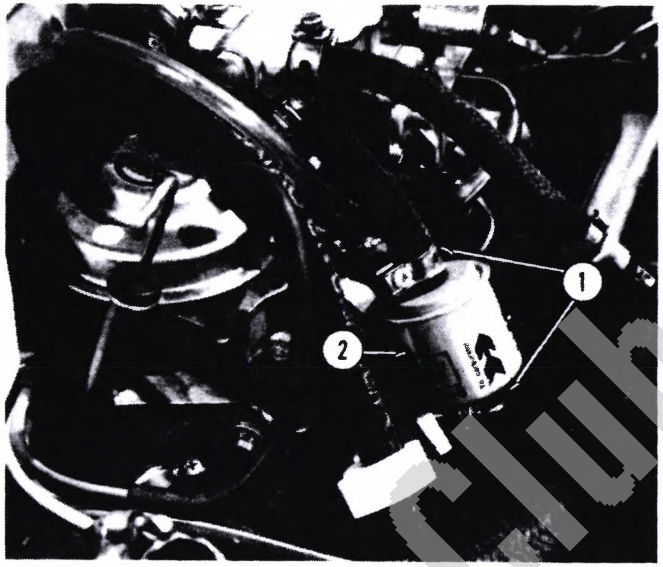


FUEL FILTER

Carburetor

Replace fuel filter (2) by loosening two fuel line clamps (1), then pulling fuel lines from filter. Install in reverse order. Do not use plastic type filters.

1. Clamps 2. Fuel filter



Fuel Injection

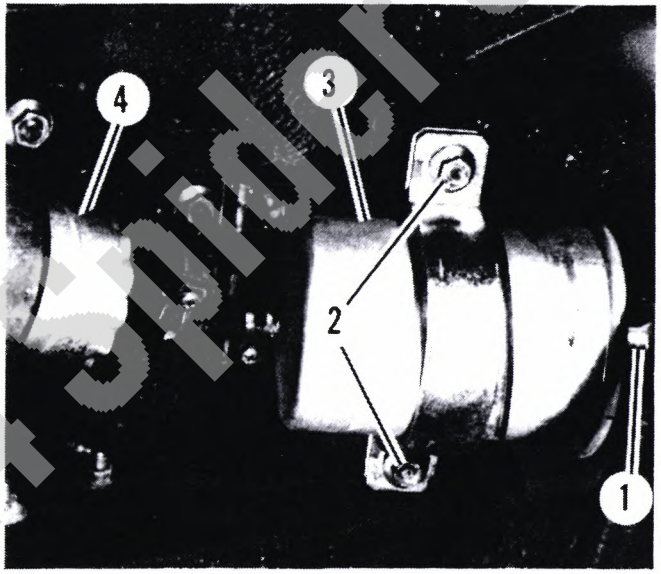
CAUTION: Before disconnecting fuel lines, system must first be depressurized (refer to Fuel Injection section).

Fuel filter (3) is located underneath vehicle on left side, just forward of rear axle.

Loosen line clamps (1) and disconnect lines. Remove two nuts (2) and clamp to remove filter.

CAUTION: Replace filter with same type as was removed. Fuel injection system pressure is higher than carburetor system and requires special filter.

1. Clamp 2. Nut 3. Fuel filter 4. Fuel pump



ENGINE OIL

With engine warm, drain oil. Remove oil filter.

Coat seal on new filter with oil.

Thread filter on by hand until seal touches plate. Turn filter down ¾ turn more. Fill oil sump to full mark. Run engine and check for oil pressure. Check around filter for leaks. Stop engine and add oil if necessary to bring level ot full mark.

IGNITION TIMING

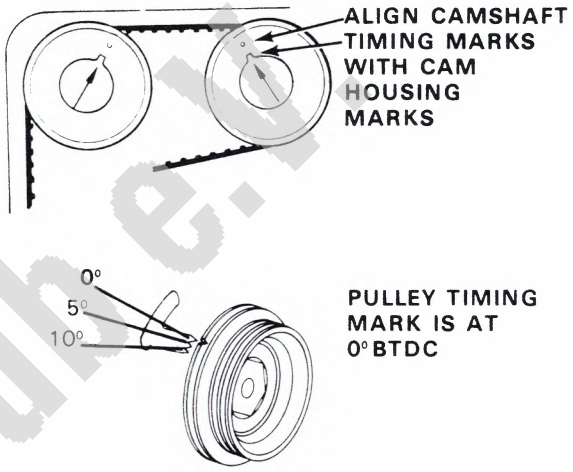
CAUTION: On Engines with electronic ignition, DO NOT disconnect high tension coil wire while engine is running or being cranked for starting or other testing.

Remove rubber plugs from timing belt rear cover.

Turn engine to align camshaft timing marks with pointers on cam housing.

Check that crank pulley notch aligns with zero degree timing pointer. If not, adjust cam timing. Engine is now set to fire on No. 4 cylinder.

CHECK CAM TIMING

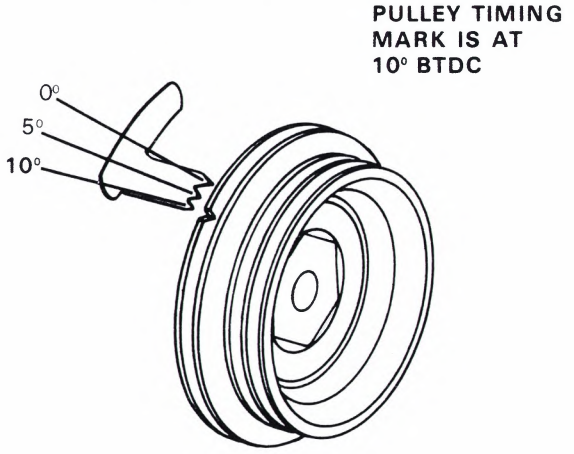


Connect timing light. Start engine and run at normal idle.

Check initial timing. (Refer to timing specifications in this section.)

To adjust, loosen distributor and hold down nut and rotate distributor. Fully tighten distributor hold down nut. Adjust carburetor settings.

CHECK IGNITION TIMING



IDLE AND CO ADJUSTMENT

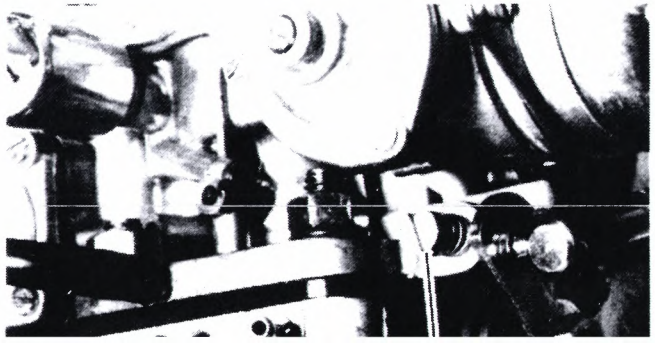
NOTE: Refer to fuel injection section for adjustments to this system.

Carburetor

On cars with air induction, remove air cleaner cover and block inlet to reed valves. Reinstall cover.

On cars with air pump, pinch off air injection hose between check valve and tee fitting.

On all cars, connect tachometer. Apply handbrake. Start engine and allow it to warm up. Insert CO tester probe in



AIR CLEANER
(Carburetor)

Installation

Install air cleaner (3) on carburetor with four nuts and plate. Connect hoses to bottom of air cleaner.

Place element (2) in air cleaner. Place cover (4) on air cleaner. Secure cover with three nuts (1) and washers.

Install heated air hose on snorkel.

On cars with air induction, install reed valve hoses on air cleaner.

On cars with air pump, install air injection hose on air cleaner.

1. Nut 2. Filter element 3. Air cleaner 4. Cover

REED VALVE FILTER
(Carburetored Engines With Air Induction)

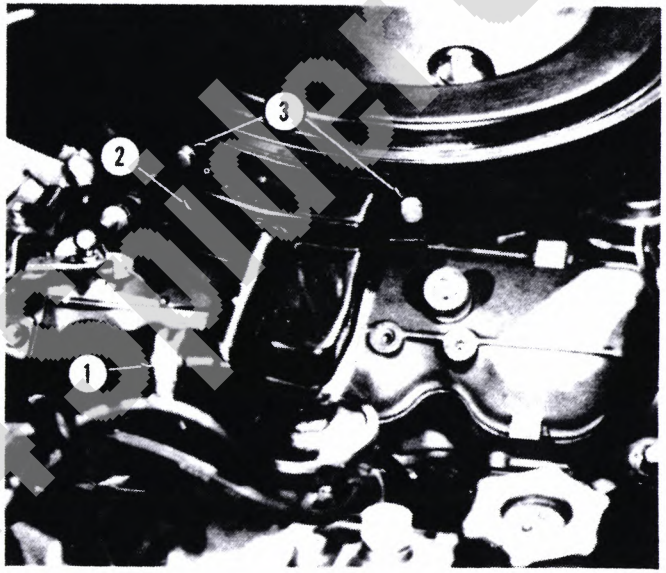
Removal and Installation

Loosen clamp (1) and remove hose from air induction filter housing (2).

Remove two bolts (3) and washers and remove air induction filter housing from air filter. Remove filter.

Install in reverse order.

1. Clamp 2. Air induction filter housing 3. Bolts



AIR CLEANER
(Fuel Injection)

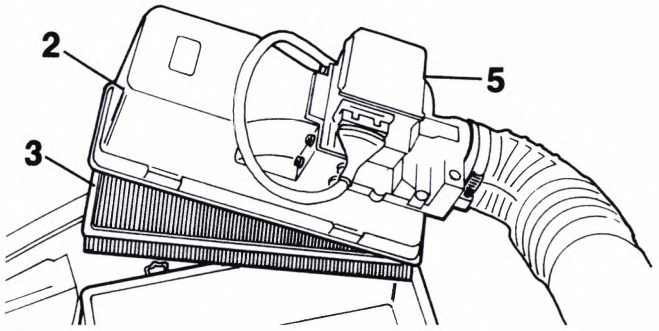
Removal and Installation

NOTE: The air filter element should be changed every 30,000 miles. If vehicle is frequently driven in heavy traffic or sandy or dusty areas, it is recommended to replace filter every 15,000 miles.

Using a screwdriver, release the four catches (1).

Lift the cover (2) off and remove the filter (3).

Install new filter and replace cover.



ENGINE - 10

ENGINE - 10

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CYLINDER BLOCK CON-RODS

DESCRIPTION		IN.	MM
Cylinder bore diameter		3.3070 to 3.3090	84.000 to 84.050
Cylinder bores are graded into classes with 0.0004 in (0.01 mm) progression.			
Auxiliary shaft bushing seats, diameters:			
– belt end		2.0126 to 2.0138	51.120 to 51.150
– flywheel end		1.6547 to 1.6559	42.030 to 42.060
Crankshaft bearing saddle bore diameter		2.2329 to 2.2334	56.717 to 56.730
Length of rear main bearing bore between thrust ring seats		0.9095 to 0.9134	23.100 to 23.200
Big-end bore diameter		2.1219 to 2.1225	53.897 to 53.913
Small-end bore diameter		0.9424 to 0.9438	23.939 to 23.972
Small-end bushing O.D.		0.9455 to 0.9465	24.016 to 24.041
Small-end bushing I.D., fitted and finish reamed	Class 1	0.8662 to 0.8664	22.004 to 22.007
	Class 2	0.8664 to 0.8665	22.007 to 22.010
Thickness of standard big-end bearings (2000 eng.)		0.0603 to 0.0605	1.5338 to 1.537
Thickness of standard big-end bearings (1800 eng.)	Class A (*)	.0599 to .0600	1.521 to 1.525
	Class B (**)	.0600 to .0602	1.525 to 1.529
Range of undersize big-end bearings for service		0.010-0.020-0.030-0.040	0.254-0.508-0.762-1.016
Small-end bushing fit: interference		0.0017 to 0.0040	0.044 to 0.102
Piston pin-small-end bushing fit: – clearance		0.0004 to 0.0006	0.010 to 0.016
Big-end bearings: – fit clearance (2000 eng.)		0.0008 to 0.0025	0.021 to 0.065
Big-end bearings: – fit clearance (1800 eng.)	Class A	.0018 to .0031	.045 to .079
	Class B	.0019 to .0032	.047 to .081
Maximum misalignment between C/Ls of connecting rod small-end and big-end: – measured at 4.92 in (125 mm) from the shank		0.0031	0.08

PISTON-PINS-RINGS

DESCRIPTION		IN.	MM
Diameter of standard pistons, measured at right angles to C/L of piston ring at 1.181 in (30 mm) from piston skirt edge	Class A	3.3051 to 3.3055	83.950 to 83.960
	Class C	3.3059 to 3.3063	83.970 to 83.980
	Class E	3.3066 to 3.3070	83.990 to 84.000
Oversize piston range		0.0079-0.0157-0.0236	0.2-0.4-0.6
Piston boss bore diam.	Class 1	0.8660 to 0.8661	21.996 to 21.999
	Class 2	0.8661 to 0.8662	21.999 to 22.002
Piston ring groove width	Top groove	0.0604 to 0.0612	1.535 to 1.555
	Center groove	0.0798 to 0.0806	2.030 to 2.050
	Bottom groove	0.1561 to 0.1569	3.967 to 3.987
Standard piston pin diam	Class 1	0.8658 to 0.8659	21.991 to 21.994
	Class 2	0.8659 to 0.8660	21.994 to 21.997
Oversize piston pin		0.0079	0.2
Piston ring thickness:			
– first compression ring		0.0582 to 0.0587	1.478 to 1.490
– second oil ring		0.0779 to 0.0787	1.980 to 2.000
– third oil ring with oilways and expander		0.1544 to 0.1549	3.925 to 3.937
(*) Piston fit in bore (measured at right angles to pin):			
– fit clearance		0.0016 to 0.0024	0.040 to 0.060
Piston pin in boss: fit clearance		0.0001 to 0.0003	0.002 to 0.008
Piston ring side clearance:			
– first compression ring: fit clearance		0.0018 to 0.0030	0.045 to 0.077
– second oil ring: fit clearance		0.0011 to 0.0027	0.030 to 0.070
– third oil ring: fit clearance		0.0011 to 0.0024	0.030 to 0.062
Piston ring end gap in bore:			
– first compression ring: fit clearance		0.0118 to 0.0177	0.30 to 0.45
– second oil ring: fit clearance		0.0118 to 0.0177	0.30 to 0.35
– third oil ring: fit clearance		0.0098 to 0.0157	0.25 to 0.40
Oversize piston ring range:			
– compression and oil rings		0.0079-0.0157-0.0236	0.2-0.4-0.6

(*) Measured at 1.876 in. (47.65 mm) from piston head.

CRANKSHAFT AND MAIN BEARINGS

DESCRIPTION		IN.	MM
Main bearing journal standard diam.		2.0860 to 2.0868	52.985 to 53.005
Main bearing saddle bore		2.2329 to 2.2334	56.717 to 56.730
Standard main bearing insert thickness (2000 eng.)	Class 1	0.722 to 0.724	1.834 to 1.840
	Class 2	0.724 to 0.726	1.839 to 1.845
Standard main bearing insert thickness (1800 eng.)		.0718 to .0721	1.825 to 1.831
Main bearing inserts for service		0.01-0.02-0.03-0.04	0.254-0.508-0.762-1.016
Crankpin standard diameter	Class A	1.9997 to 2.0001	50.792 to 50.802
	Class B	1.9993 to 1.9997	50.782 to 50.792
Main bearing-to-journal fit: — fit clearance (2000 eng.)		0.0012 to 0.0030	0.032 to 0.077
Main bearing-to-journal fit: — fit clearance (1800 eng.)		.0020 to .0037	.050 to .095
Length of rear main bearing journal, shoulder-to-shoulder		1.1014 to 1.1034	27.975 to 28.025
Width of rear main bearing seat, between thrust ring seats		0.9095 to 0.9134	23.100 to 23.200
Rear main bearing seat thrust ring thickness		0.0909 to 0.0929	2.310 to 2.360
Oversize thrust ring thickness		0.0959 to 0.0979	2.437 to 2.487
Crankshaft end clearance, thrust rings installed: — fit clearance		0.0021 to 0.0120	0.055 to 0.305
Maximum misalignment of main bearing journals (total indicator reading) (2000 eng.)		0.0011	0.03
Maximum misalignment of main bearing journals (total indicator reading) (1800 eng.)		.0008	0.02
Maximum misalignment of crankpins to main bearing journals		0.013	0.35
Maximum out-of-round of crankpins and main bearing journals, after grinding		0.0002	0.005

Flywheel:		
– parallel relationship of driven plate resting face to crankshaft flange mounting face: max. out-of-true	0.0039	0.10
– squareness of above faces to rotation axis: max. out-of-true	0.0039	0.10

CYLINDER HEAD

DESCRIPTION		IN.	MM
Valve guide seat bore (2000 eng.)		0.5492 to 0.5502	13.950 to 13.977
Valve guide seat bore (1800 eng.)		.5886 to .5896	14.950 to 14.977
Valve guide O.D., standard (2000 eng.)		0.5527 to 0.5534	14.040 to 14.058
Valve guide O.D., standard (1800 eng.)		.5905 to .5912	14.998 to 15.016
Valve guide oversize on O.D., for service (2000 eng.)		0.0019–0.0039– 0.0098–0.0177	0.05–0.10– 0.25–0.45
Valve guide oversize on O.D., for service (1800 eng.)		.0079	.2
Fit between valve guide and bore in head: interference (2000 eng.)		0.0024 to 0.0042	0.063 to 0.108
Fit between valve guide and bore in head: interference (1800 eng.)		.0008 to .0026	.021 to .066
Inside diameter of valve guides, fitted in cylinder head		0.3158 to 0.3165	8.022 to 8.040
Valve stem diameter		0.3139 to 0.3146	7.974 to 7.992
Fit between valve stem and guide: – fit clearance		0.0012 to 0.0026	0.030 to 0.066
Valve seat angle in cylinder head		45° ± 5′	
Valve face angle		45° 30′ ± 5′	
Valve head diameter (2000 eng.)	intake exhaust	1.6377 to 1.6535 1.4114 to 1.4350	41.60 to 42.00 35.85 to 36.45
Valve head diameter (1800 eng.)	intake exhaust	1.6614 to 1.6772 1.4115 to 1.4350	42.20 to 42.60 35.85 to 36.45
Max. eccentricity of valve head in one complete turn guided by stem, with indicator set on center of contact face		0.0012	0.03
Width of valve seat in cylinder head (contact face), abt		0.079	2
Inside diameter of valve seats in cylinder head (2000 eng.)	intake exhaust	1.4566 to 1.4645 1.2755 to 1.2834	37.00 to 37.20 32.40 to 32.60
Inside diameter of valve seats in cylinder head (1800 eng.)	intake exhaust	1.4134 to 1.4213 1.2756 to 1.2835	35.90 to 36.10 32.40 to 32.60
Lift on valve C/L (without play)		0.3765	9.564
Diameter of tappet bores in head		1.4567 to 1.4576	37.000 to 37.025
Outside diameter of tappets		1.4557 to 1.4565	36.975 to 36.995

VALVE SPRINGS

DESCRIPTION	INNER SPRING	OUTER SPRING
Spring height under a load of 85.5 lbs. (38.9 kg)	–	1.417 in (36 mm)
Spring height under a load of 32.7 lbs. (14.9 kg)	1.220 in (31 mm)	–
Minimum permissible load referred to the above heights	32 lbs. (14.5 kg)	79.4 lbs. (36 kg)

VALVE MECHANISM

DESCRIPTION		IN.	MM
Diameter of camshaft journal bores in head:			
– front		1.1814 to 1.1824	30.009 to 30.034
– middle		1.8031 to 1.8042	45.800 to 45.825
– rear		1.8189 to 1.8198	46.200 to 46.225
Diameter of camshaft journals:			
– front		1.1788 to 1.1795	29.944 to 29.960
– middle		1.8013 to 1.8020	45.755 to 45.771
– rear		1.8171 to 1.8178	46.155 to 46.171
Camshaft journal to bore fit:			
– fit clearance	front	0.0019 to 0.0035	0.049 to 0.090
	middle	0.0011 to 0.0027	0.029 to 0.070
	rear	0.0011 to 0.0027	0.019 to 0.070

AUXILIARY DRIVE SHAFT

Diameter of bushing bores in crankcase:		
– front	2.0126 to 2.0138	51.120 to 51.150
– rear	1.6547 to 1.6559	42.030 to 42.060
Inside diameter of bushings finished in bores:		
– front	1.8930 to 1.8938	48.084 to 48.104
– rear	1.5354 to 1.5362	39.000 to 39.020
Diameter of shaft journals:		
– front	1.8903 to 1.8913	48.013 to 48.038
– rear	1.5326 to 1.5336	38.929 to 38.954
Fit between bushings and bores in crankcase:		

CARBURETORS

Year	Type, Weber	Venturi Diameter MM	Main Jet MM	Idle Jet MM	Emulsion Tube MM	Air Corrector Jet MM	Pump Jet MM	Needle Valve MM	Float Level MM	Position Primary Throttle on Full Choke MM
75–76	32ADFA 2/100 (49 State)	*23 **25	1.25 1.40	0.50 0.60	F74 F74	1.85 1.70	0.50	1.75	*** 6.5	1.05/1.15
	32ADFA 5/100 (Calif.)					1.80 1.70				
77	32ADFA 12/100 (49 State)	*23 **25	1.25 1.40	0.50 0.60	F73 F7	1.85 1.70	0.50	1.75	*** 6.5	1.05/1.15
	32ADFA 15/101 (Calif.)					1.75 1.70				
78	32ADFA 11/100 (49 State)	*23 **25	1.25 1.40	0.50 0.60	F73 F7	1.85 1.70	0.50	1.75	*** 6.5	1.05/1.10
	32ADFA 14/101 (Calif.)					1.75 1.70				
79	28/32ADHA 3/179 (49 State – S/T)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.75 1.60	0.50	1.75	*** 6.5	1.00/1.10
	28/32ADHA 4/179 (49 State – A/T)									1.05/1.15
	28/32ADHA 7/179 (Calif – S/T)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.70 1.70	0.50	1.75	*** 6.5	1.00/1.10
	28/32ADHA 8/179 (Calif – A/T)					1.65 1.70				1.05/1.15
80	28/32ADHA 7/180 (Std. Trans.)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.70 1.70	0.50	1.75	*** 6.5	1.00/1.10
	28/32ADHA 8/180 (Auto. Trans.)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.65 1.70	0.50	1.75	*** 6.5	1.00/1.10

*Primary Throat
**Secondary Throat
***Tolerance ± 1 MM

80 and on	BOSCH L-JETRONIC FUEL INJECTION

LUBRICATION

Oil pump	gear type
Oil pump drive	by auxiliary shaft
Oil pressure relief valve	built in oil pump
Clearance between gears upper end and pump cover mating face	0.0010 to 0.0051 in. (0.026 to 0.131 mm)
Clearance between gears and pump housing inside wall	0.0043 to 0.0071 in. (0.110 to 0.180 mm)
Fit between drive spindle guide bushing and bore in crankcase	interference at all times (0.0010 to 0.0027 in. [0.025 to 0.070 mm])
Clearance between drive spindle and bushing press fitted in crankcase	0.0012 to 0.0026 in. (0.032 to 0.067 mm)
Clearance between drive gear spindle and bore in pump body	0.0006 to 0.0021 in. (0.016 to 0.055 mm)
Clearance between pin and driven gear	0.0007 to 0.0022 in. (0.017 to 0.057 mm)
Lash between matched gears	0.006 in. (0.15 mm)
Lash between drive spindle gear and auxiliary shaft gear	0.0023 in. (0.06 mm)
Full-flow oil filter with by-pass valve	cartridge type
Low oil pressure indicator sending unit	electric tell-tale
Lubrication pressure at 212° F (100° C)	50 to 71 psi (3.5 to 5.0 Kg/sq. cm)

OIL PRESSURE RELIEF VALVE SPRING

Length of seated spring under a load of 13.67 ± 0.55 lbs. (6.2 ± .25 kg)	0.886 in. (22.5 mm)
Minimum permissible load referred to length of seated spring	12.78 lbs. (5.8 kg)

COOLING SYSTEM

Water circulation cooling system:	
— Water pump	centrifugal vane type

Thermostat:	
– begins opening at	172° to 180° F (78° to 82° C)
– opening at 198° F (92° C), equal to or more than	0.29 in. (7.5 mm)
Fit clearance between impeller vanes and pump body	0.04 in. (1 mm)
Radiator cap valve opening pressure	11.4 p.s.i. (0.8 Kg/sq. cm)
Water temperature indicator	electrical gauge

TORQUE SPECIFICATIONS

DESCRIPTION	THREAD (METRIC)	MATERIAL	TORQUE N·m	TORQUE FT.LB.	TORQUE Kgm
Bolt, center main bearing cap	M12 x 1.25	R100	113	83	11.5
Bolt, front main bearing cap	M10 x 1.25	R100	80	59	8.2
Bolt, self-locking, main bearing cap	M12 x 1.25	R100	113	83	11.5
Bolt, engine breather mounting	M8	R80 Znt	24	17	2.3
Bolt, cylinder head hold-down	M10 x 1.25	R100	83	61	8.5
Bolt, cylinder head extensions	M8	8.8 Znt/Deidr	22	14	2
Bolt, cylinder head extensions	M8	8.8 Znt/Deidr	22	14	2
Nut, intake manifold-to-cylinder head stud	M8	R50 Znt (Stud R80 Znt)	25	18	2.5
Bolt, intake manifold	M8	8.8 Cdt/Deidr	25	18	2.5
Nut, exhaust manifold-to-cylinder head stud	M8	R50 Znt (Stud R80 Znt)	25	18	2.5
Nut, connecting rod bolt	M10 x 1	R80 - BON (Bolt 12 R) 30 Cd 4Pb BON (Bolt 12 R)	75	54	7.5
Bolt, flywheel-to-crankshaft	M12 x 1.25	38 Cd-4Rct-BON or 40Ni-Cr-Mo-Trf-Rct 120-135 Kg/mm^2	145	105	14.5
Nut, belt tensioner	M10 x 1.25	R50 Znt (Stud R100)	44	33	4.5
Bolt, camshaft sprocket	M12 x 1.25	12.9	118	87	12
Bolt, oil pump body and scoop	M8	8.8	22	14	2
Bolt, oil filter	M10 x 1.25	8.8 Znt/Deidr	51	36	5
Nut, alternator, and water pump	M20 x 1.5	R50 Znt Waxed or Oiled (Shaft 40 Cr-Mo-4 BON)	245	181	25
Bolt, oil filter support	M10 x 1.25	8.8 Znt/Deidr	51	36	5
Bolt, water pump pulley	M8 x 1.25	8.8 Znt/Deidr	24	17	2.3
Nut, alternator to crankcase	M12 x 1.25	R80 Znt (Bolt 8.8 Znt/Deidr)	69	51	7

TORQUE SPECIFICATIONS

DESCRIPTION	THREAD (METRIC)	MATERIAL	TORQUE N·m	TORQUE FT. LB.	TORQUE Kgm
Nut, air pump support stud	M10 x 1.25	R50 Znt (Bolt B80 Znt)	51	36	5
Nut, air pump support	M8	R50 Znt (Bolt R80 Znt)	28	20	2.8
Bolt, air pump bracket	M10 x 1.25	R80 Edt	52	38	5.3
Bolt, air pump pulley	20 UNC - 2A	R50 Znt	6	4	0.6
Plug, EGR pipe fitting	M16 x 1.5	R50 Znt	54	40	5.5
Switch, oil pressure	M14 x 1.5	Steel CDT or Znt	31	24	3.3
Switch, water temperature	M16 x 1.5 taper	Brass	49	36	5
Spark plugs	M14 x 1.25	—	37	27	3.8

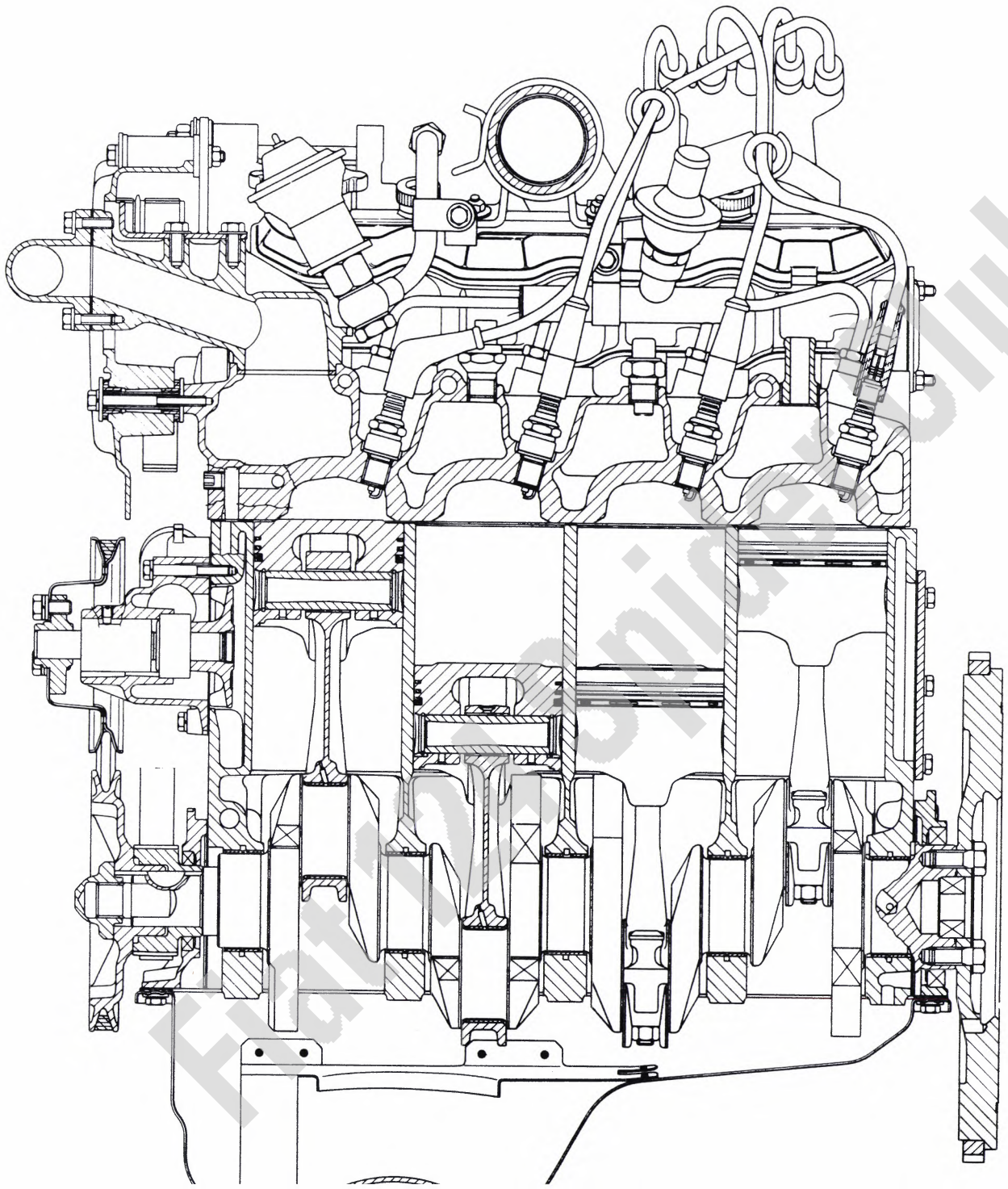
****Components with new coating Znt/EC**

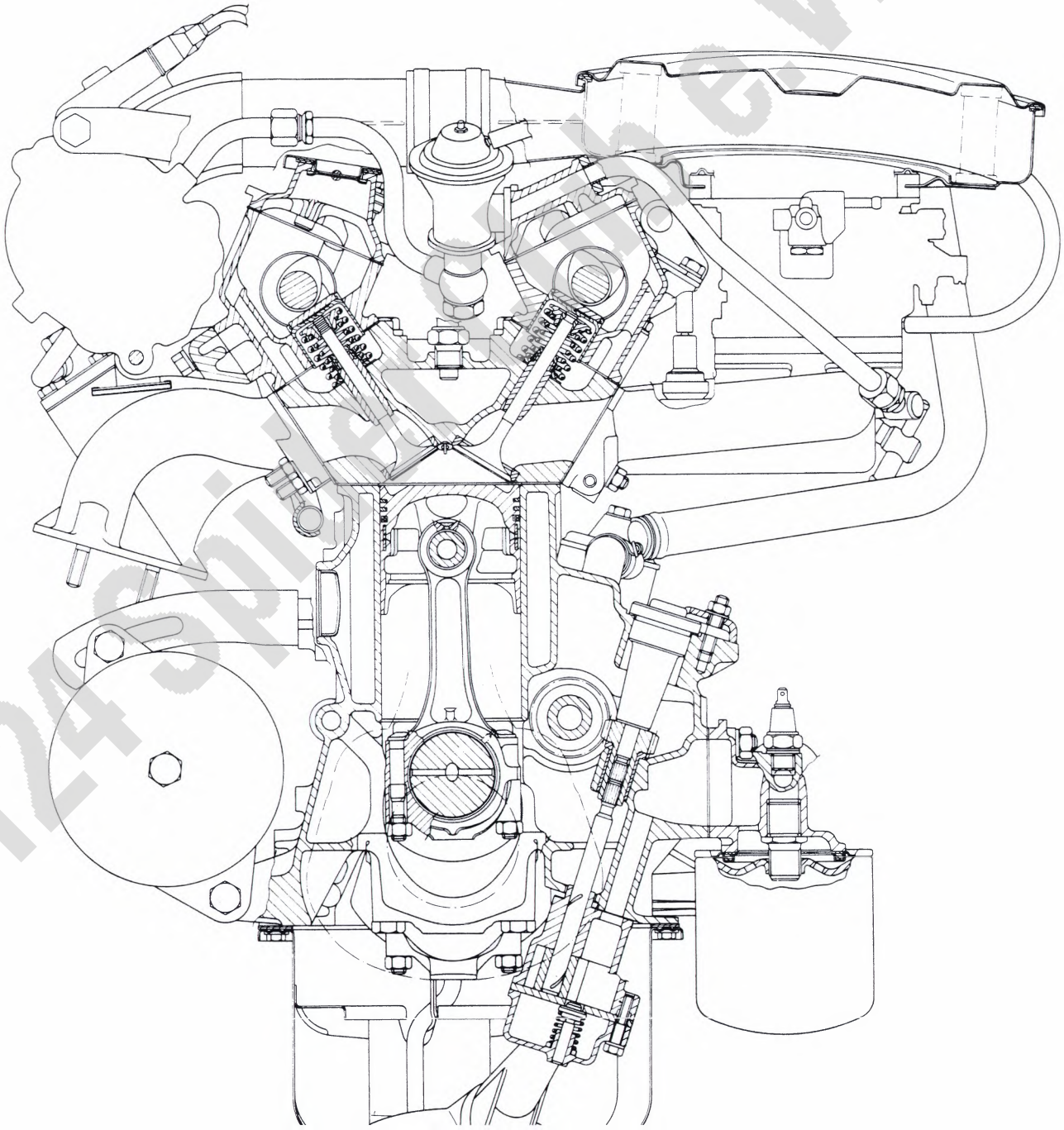
Warning! — Znt/EC coating involves a variation in the tightening torque reference. Components coated with Znt/EC are olive green colored, and torque figures are as follows:

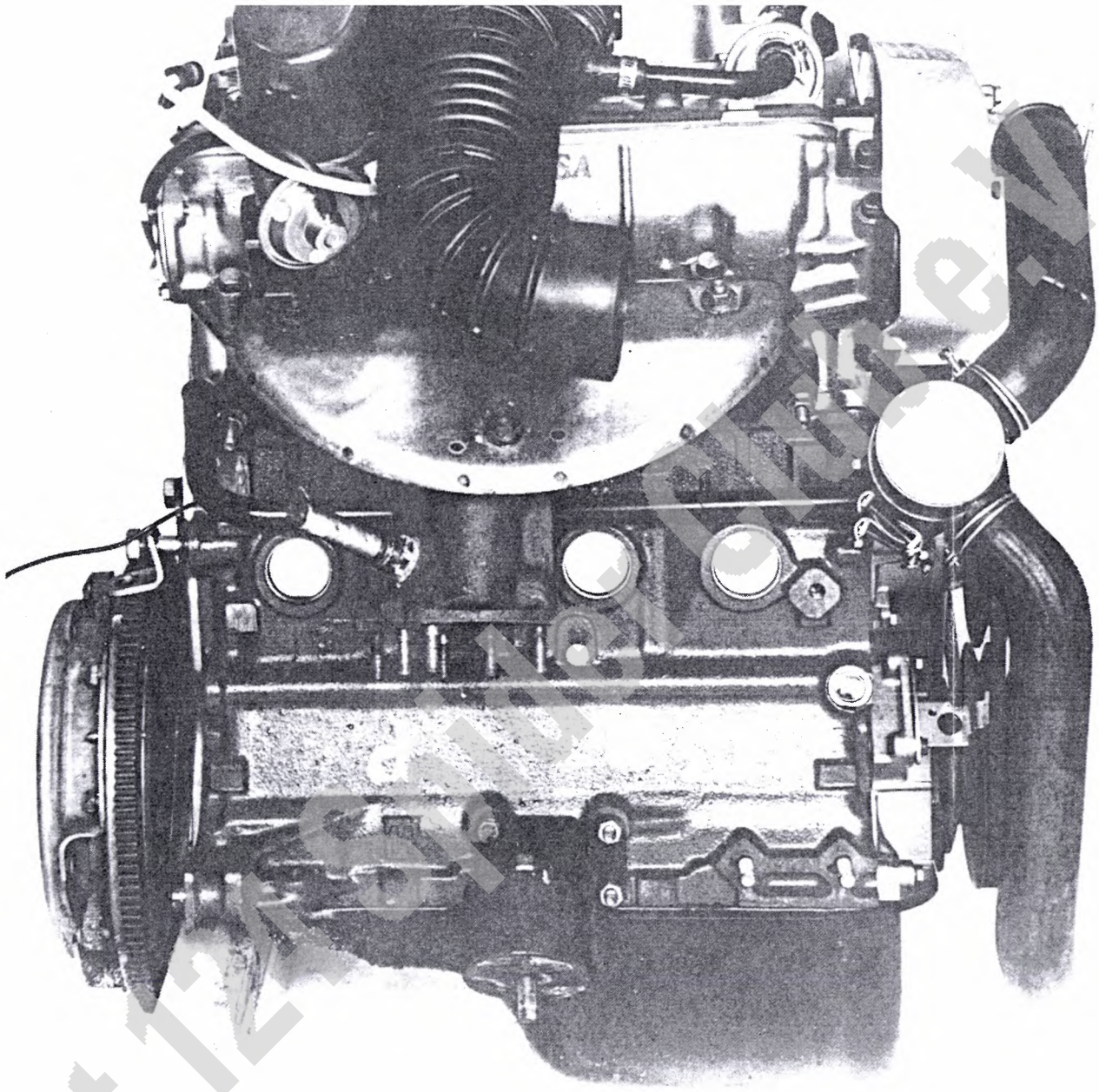
Bolt, air pump bracket	M10 x 1.25	8.8 Znt/EC	71	52	7.2

WITH TURBOCHARGING

DESCRIPTION	TORQUE FT. LB.
Turbocharger to exhaust manifold bolts	20
Exhaust manifold nuts	22
Outlet elbow to turbocharger bolts	22
Outlet elbow to exhaust pipe nuts	22
Turbocharger support bracket to cylinder block bolts	22
Outlet elbow support bracket to cylinder block nuts	30
Plenum support bracket to plenum bolt	12
Spark plugs	14
Lambda sensor	30
Exhaust manifold heat shield	22

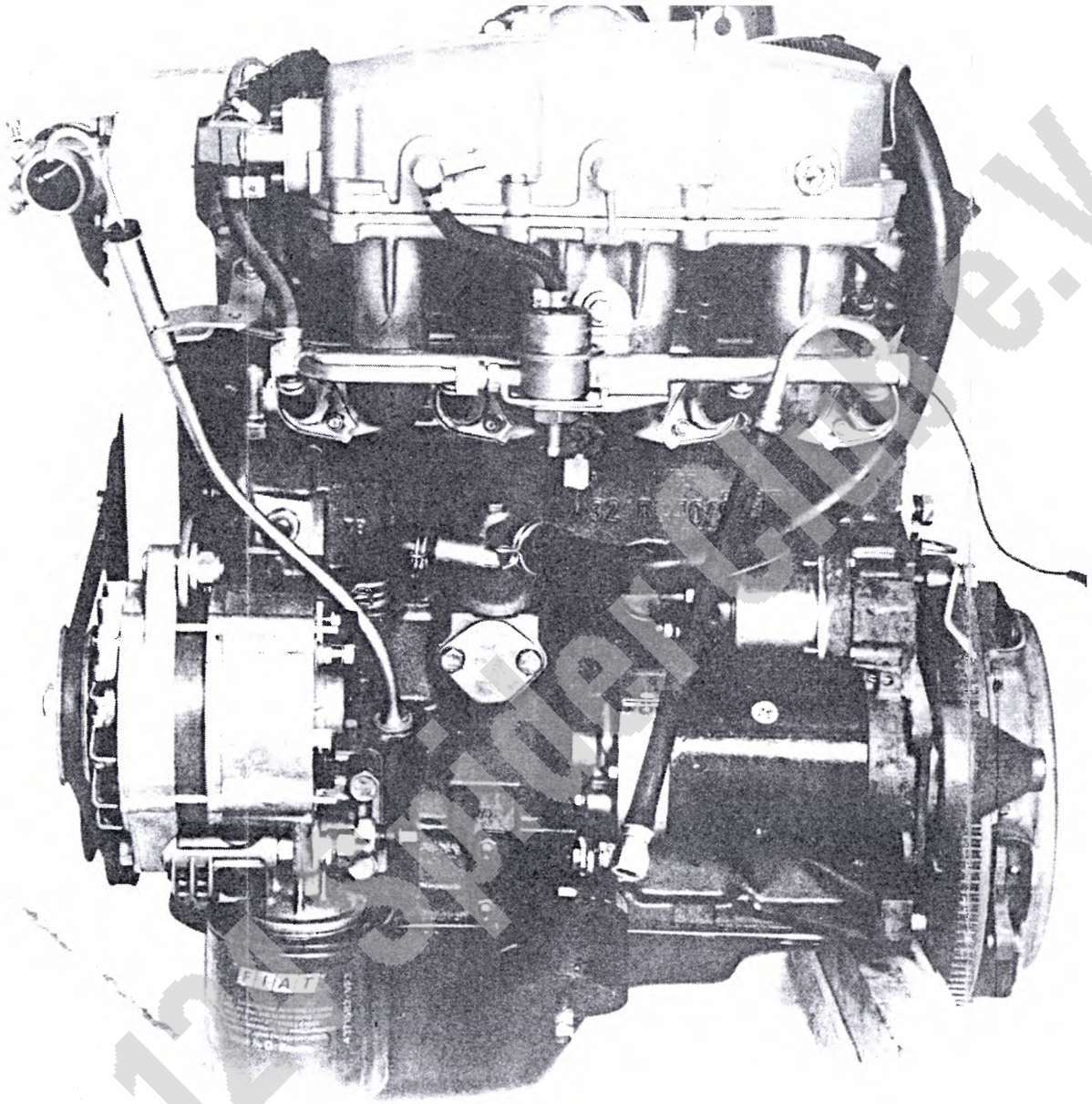




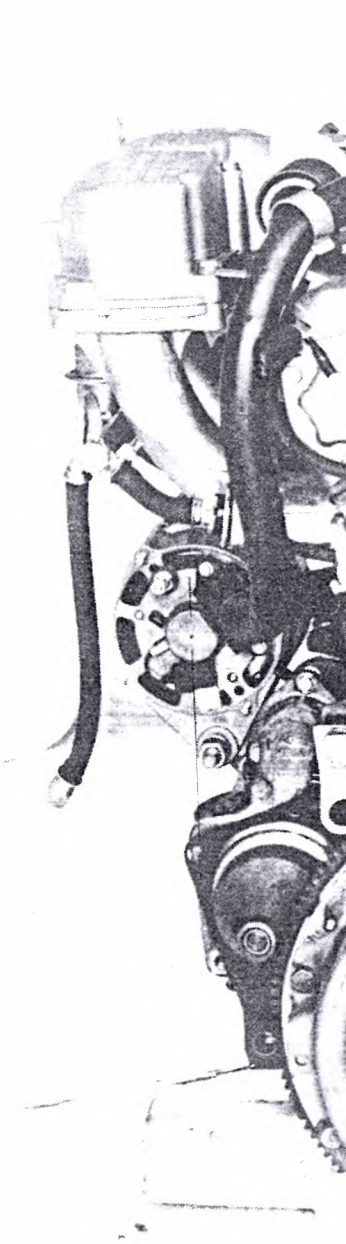


RIGHT SIDE

FUEL INJECTED ENGINE



LEFT SIDE



FUEL INJECTED ENGINE

ENGINE

REMOVAL AND INSTALLATION

Disconnect battery ground cable located in trunk. Loosen fuel tank filler cap to release any fuel pressure.

Remove hood (refer to Body Section). Remove four screws to remove hood spring.

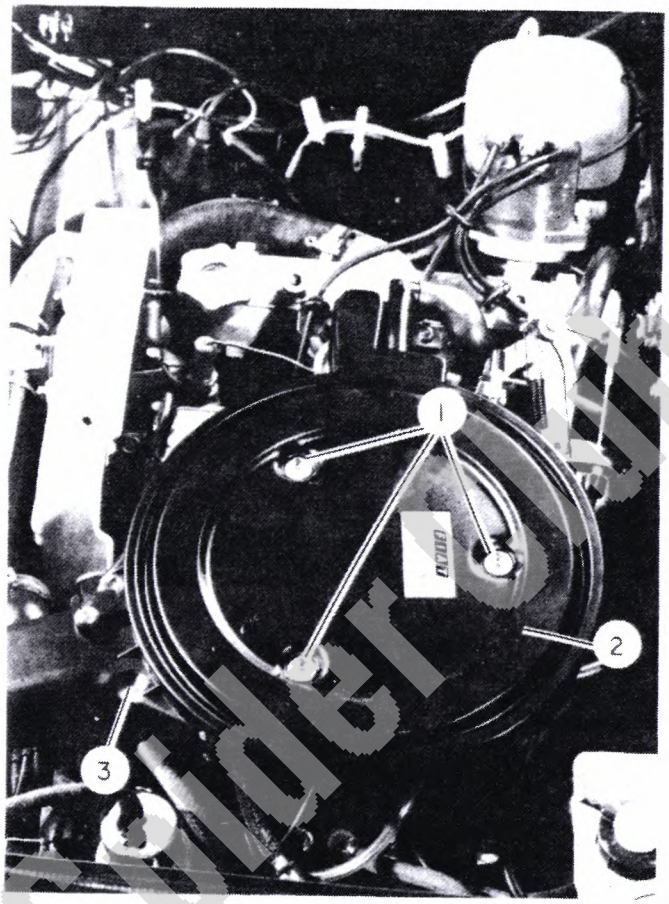
Drain radiator thru plug on lower left side of radiator. Drain engine coolant thru plug in lower right side of block.

The following procedures refer to carburetored engines:

Remove three nuts (1) holding air cleaner top cover (2).

Remove all air and vacuum lines to air cleaner.

Remove four nuts holding air cleaner to carburetor. Lift air cleaner up high enough to disconnect lines underneath. Remove air cleaner assembly (3) and all attached lines.



1. Nut 2. Air cleaner top cover 3. Air cleaner assembly

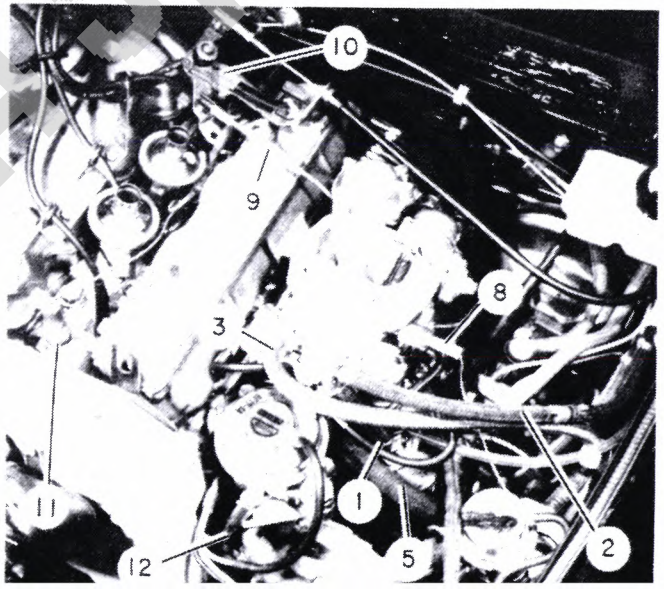
On left side of engine, mark to identify, then disconnect fuel inlet line (1), fuel return line (2), fuel vapor line (3), EGR line (4), power brake vacuum line (5), vapor canister vacuum line (6), gulp valve vacuum lines (7) and carburetor electrical connector to solenoid (8).

Disconnect throttle rod (9) at linkage (10) on top of engine. Remove two nuts attaching linkage to camshaft cover, and lay linkage to one side.

Mark to identify, then disconnect two water temperature switches electrical connectors from top of cylinder head.

Disconnect vacuum line from intake manifold to automatic transmission, if equipped with automatic transmission.

Disconnect electrical leads at alternator and starter. Disconnect oil pressure switch electrical connector at oil filter.



1. Fuel inlet line 2. Fuel return line 3. Fuel vapor line 4. EGR line 5. Power brake vacuum line 6. Vapor canister vacuum line 7. Gulp valve vacuum lines 8. Idle stop solenoid 9. Throttle rod 10. Throttle linkage 11. Water temperature switch

On right side of engine, loosen clamps (1) and disconnect two heater core hoses at firewall.

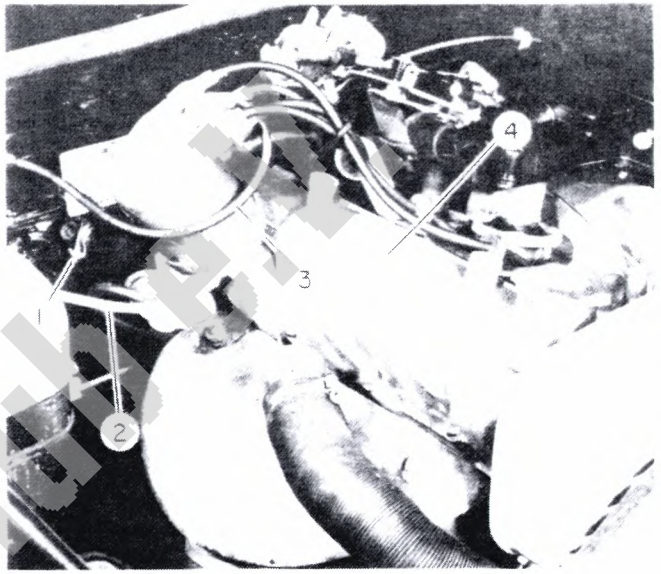
On vehicles with automatic transmission, disconnect dipstick tube from right cam housing.

Disconnect distributor white lead wire (2) connector at electronic control module mounted on right fender shield.

Disconnect coil high tension lead (3) at distributor.

Disconnect module ground wire from rear of right cam housing (4).

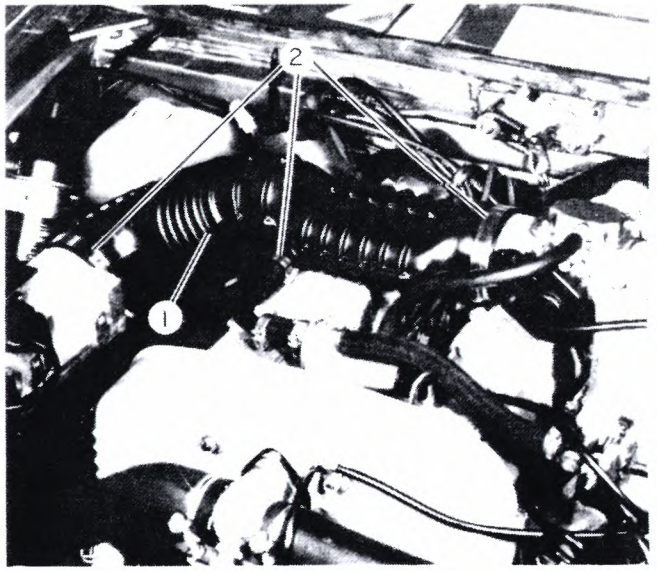
1. Clamp 2. Distributor lead wire 3. High tension lead 4. Right cam housing



The following procedures refer to fuel injected engines:

Remove air intake line (1) by loosening three clamps (2).

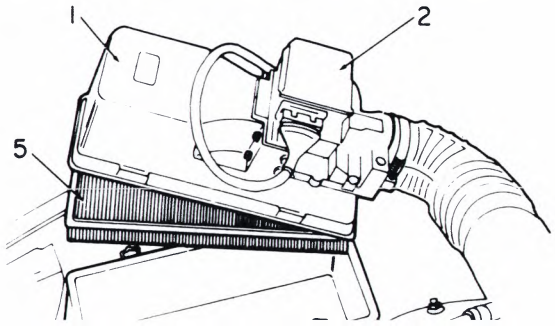
1. Air intake line 2. Clamp



Disconnect electrical connector (1) from air flow sensor (2). Release four catches (3) holding air filter cover to housing (4), and remove filter element (5).

Remove housing by removing three nuts and washers.

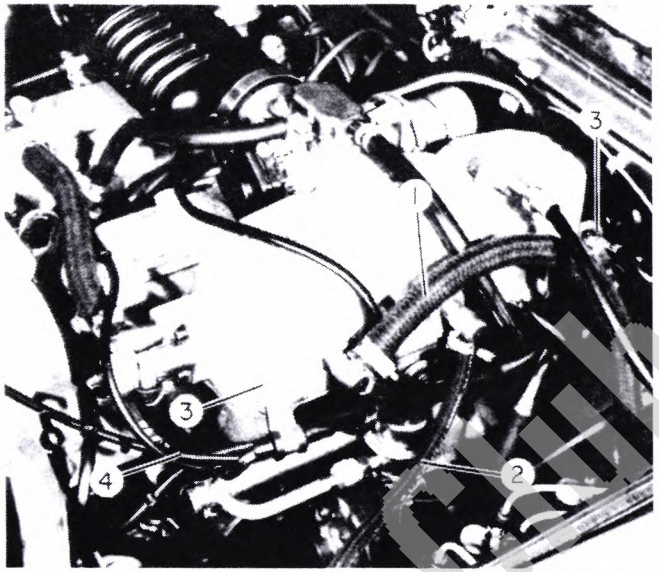
1. Electrical connector 2. Air flow sensor 3. Catch 4. Air filter housing 5. Filter element



Loosen clamps to remove power brake vacuum line (1) and vapor canister vacuum line (2) from intake manifold fittings. Disconnect vacuum line to automatic transmission, if so equipped.

Remove bolts and clamps (3) securing wire harness (4) to intake manifold. Disconnect all electrical connectors coming out of harness (pull connectors straight out).

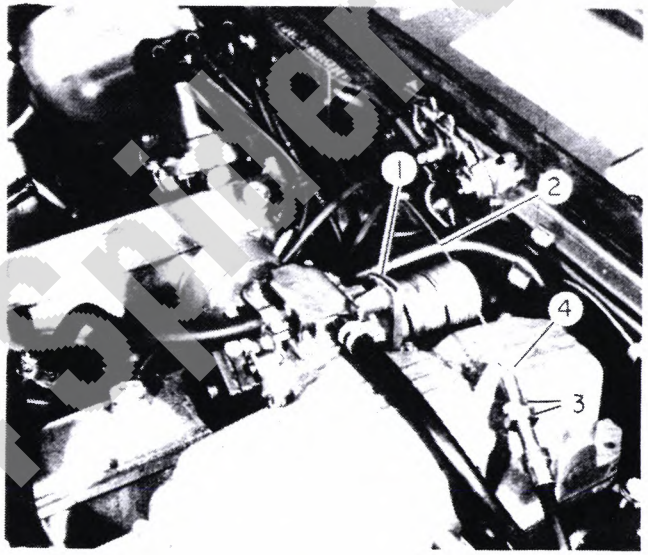
1. Power brake vacuum line 2. Vapor canister vacuum line 3. Clamp 4. Electrical harness



Rotate throttle lever (1) and remove throttle cable (2).

CAUTION: Note for reassembly that both adjustment nuts (3) are on the left side of mount (4). To assemble otherwise will result in erratic throttle operation.

1. Throttle lever 2. Throttle cable 3. Adjustment nuts 4. Throttle cable mount



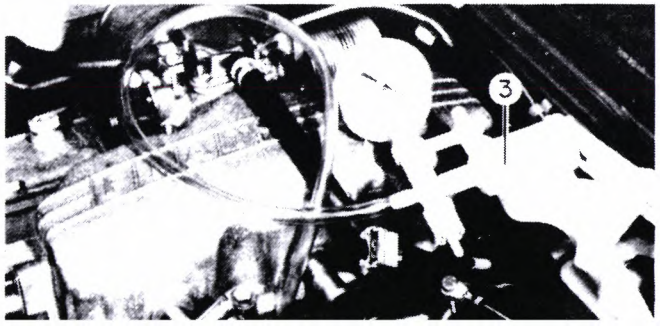
Before disconnecting fuel lines to engine, fuel pressure must first be released.

Remove fuel tank filler cap.

Remove vacuum hose (1) from fuel pressure regulator (2).

Using a hand vacuum pump (3) apply about 25 inches of vacuum to pressure regulator as shown. Fuel system pressure will then be released into fuel tank.

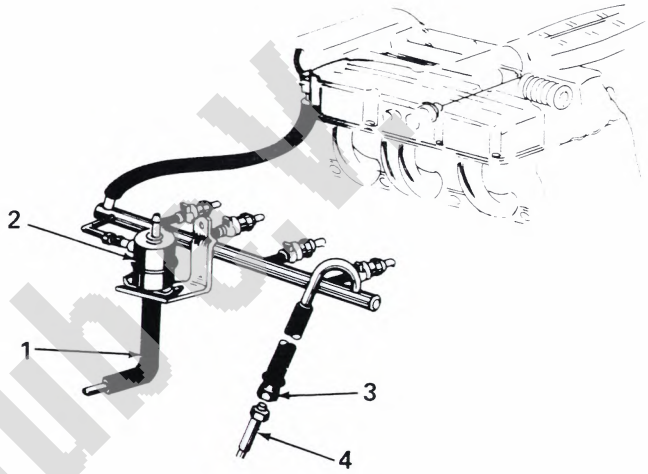
1. Vacuum hose 2. Fuel pressure regulator 3. Hand vacuum pump



WARNING: Take all necessary precautions to prevent a fire when fuel lines are opened.

CAUTION: The fuel injection system is highly susceptible to contamination. Make sure area is clean whenever lines are opened, and that dirt does not enter system.

Disconnect fuel return hose (1) from regulator (2). Disconnect fuel supply flex line fitting (3) from metal line (4) near left fender shield.

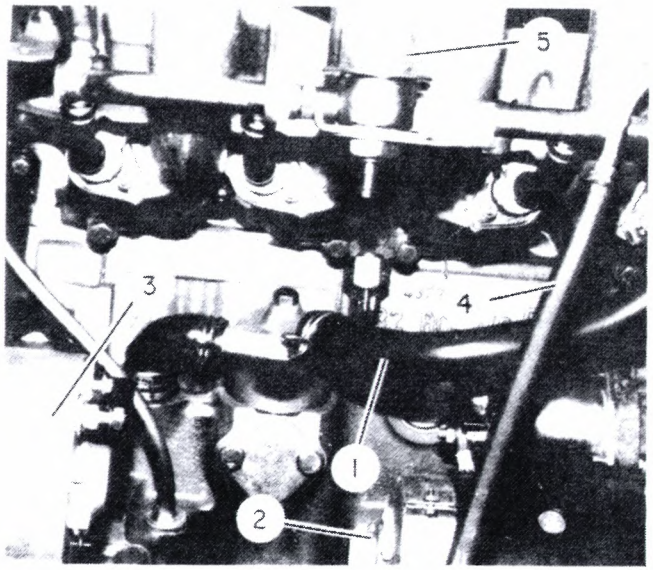


1. Fuel return hose 2. Fuel pressure regulator 3. Fuel supply line 4. Metal fuel supply line from pump

Disconnect crankcase breather hose (1). Disconnect starter (2) and alternator (3) electrical leads.

Disconnect oil pressure electrical connector at oil filter.

Mark to identify, then disconnect two water temperature switches electrical connectors from top of cylinder head.



1. Crankcase breather hose 2. Starter 3. Alternator 4. Fuel supply line 5. Fuel pressure regulator

On right side of engine, loosen clamps and disconnect two heater core hoses at firewall.

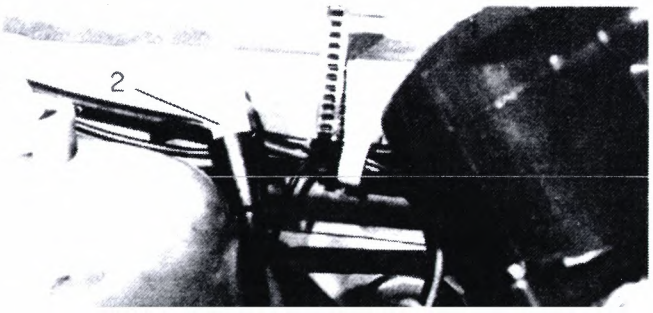
On vehicles with automatic transmission, disconnect dipstick tube from cam housing.

Remove plastic nut (1) and clamp holding wire harness.

Disconnect Lambda sensor connector (2).

Disconnect distributor white lead wire (3) connector at electronic control module.

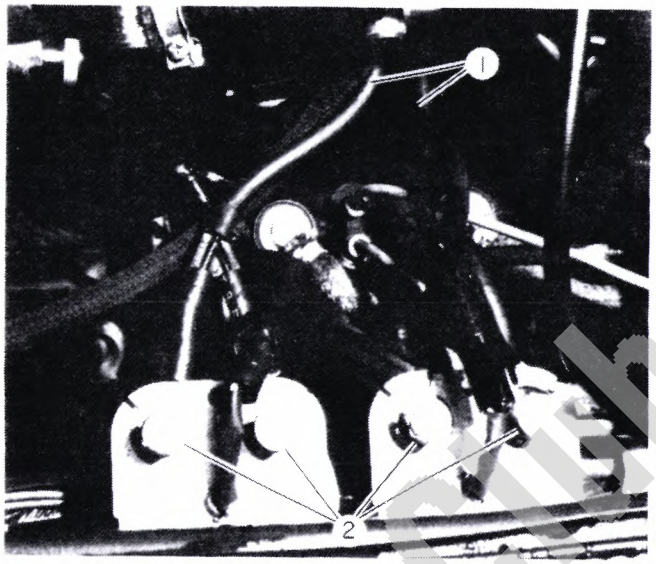
Disconnect coil high tension lead at distributor.



If engine is equipped with a turbocharger, disconnect the following in addition to most items covered under fuel injected engines.

On left side of enigne disconnect vacuum lines (1) to turbo pressure switches (2).

1. Vacuum line 2. Turbo pressure switch



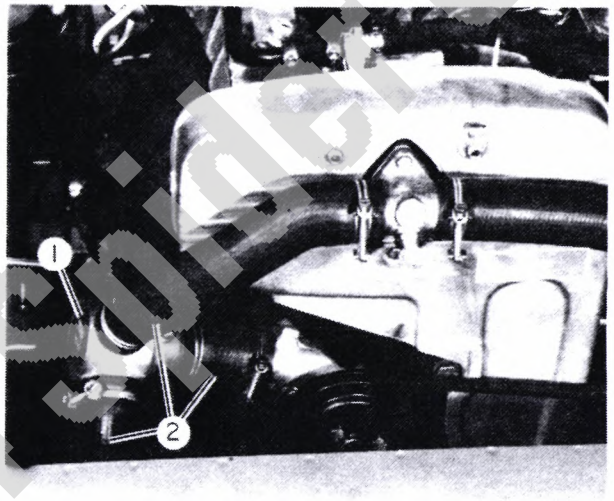
The following procedures refer to all engines:

Remove radiator (refer to Cooling in this section).

Remove controlled bypass thermostat (1) and attached hoses (2) by loosening clamps.

If vehicle is equipped with windshield washer container mounted on left fender well, disconnect electrical connector and fluid line at container, then remove two nuts securing it to body and remove container.

1. Controlled bypass thermostat 2. Coolant hoses



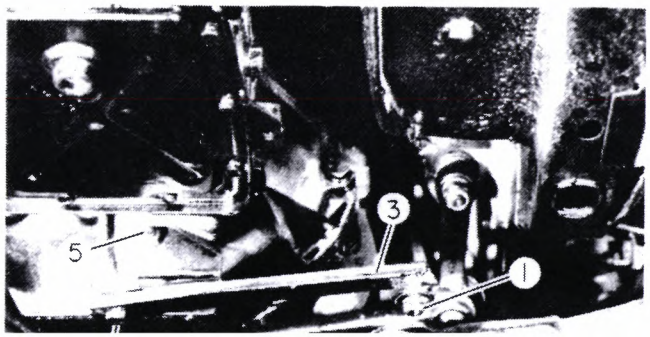
Raise vehicle on lift.

On vehicles without turbocharger, bend locking tabs back and remove nuts securing exhaust pipe to exhaust manifold.

Remove bolt (1) holding exhaust pipe (2) to bracket (3) as shown. Remove bolt (4) and nut (5) holding bracket to transmission.

Pull exhaust pipe away from exhaust manifold.

1. Bolt 2. Exhaust pipe 3. Bracket 4. Bolt 5. Nut

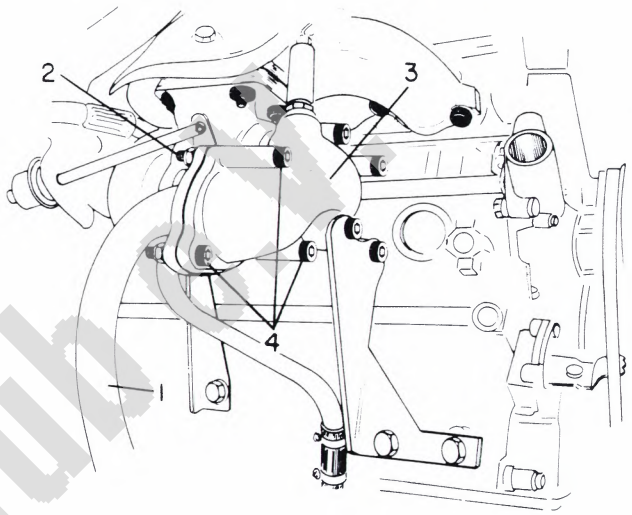


On vehicles with turbocharger, remove 4 nuts (2) and allen bolts (4) holding exhaust pipe (1) to exhaust elbow (3).

Remove bolt holding exhaust pipe to bracket as shown in figure. Remove bolt and nut holding bracket to transmission.

Pull exhaust pipe away from exhaust elbow.

1. Exhaust pipe 2. Nuts 3. Exhaust elbow 4. Bolts



Remove starter (refer to Electrical Section).

Remove four bolts (7) holding flywheel inspection cover (6) to bellhousing (8).

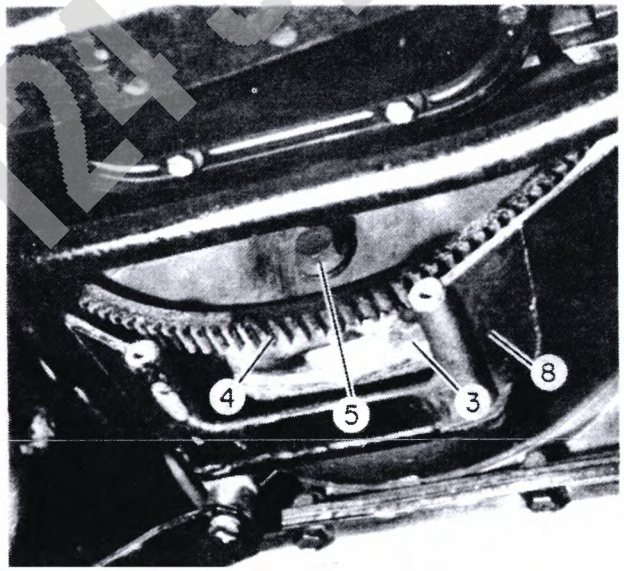
If equipped with automatic transmission, remove three bolts (5) attaching flywheel (4) to torque converter (3). Engine must be rotated to line bolts up with inspection cover opening.

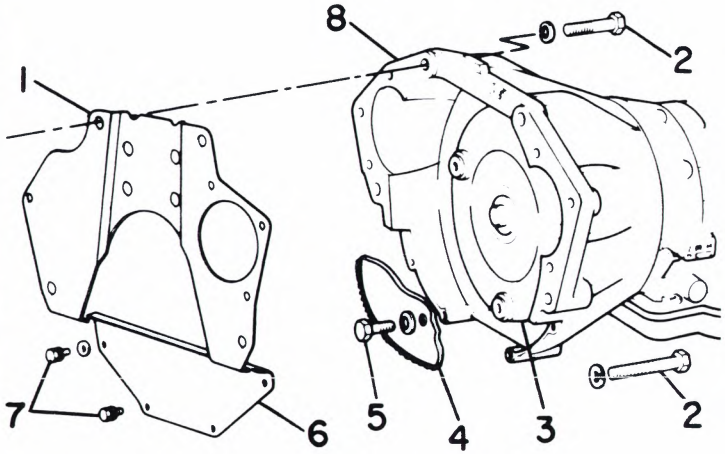
After removing bolts, push converter free from crankshaft as far back as it will go.

CAUTION: During engine removal be sure converter stays on transmission and does not slide forward and fall off.

Using special tool A.55035 or U-joint socket with long extension, remove four bolts (2) attaching bellhousing (8) to engine.

1. Protection plate 2. Bolt 3. Torque converter 4. Flywheel 5. Bolt 6. Inspection cover 7. Bolt 8. Bellhousing





Remove two engine mount nuts thru openings in crossmember (arrow).

Lower vehicle and position floor jack under transmission.

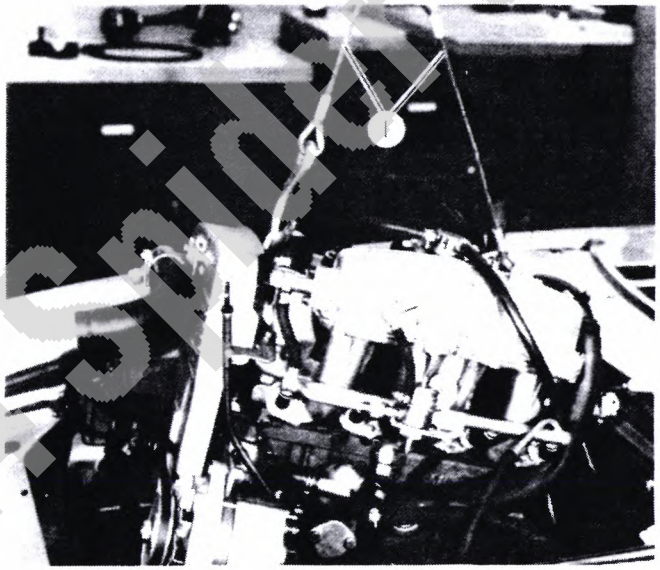
Attach engine lift sling (1). Front lift bracket is attached to engine. For rear attach point, head bolt must be removed and lift bracket secured to it.

NOTE: To ease removal, provide slings of two different lengths to give upward tilt to front of engine as shown.

Lift engine until mount bolts clear crossmember. Move engine forward and up.

With manual transmission, clutch has to clear transmission main shaft, and engine must be moved forward more than with the automatic transmission (raising manual transmission slightly with floor jack will aid in engine removal).

Installation is reverse of removal. Bleed cooling system (refer to Cooling in this section).



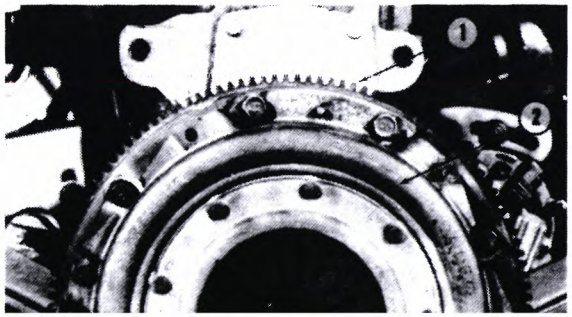
1. Engine lift sling

DISASSEMBLY

Drain oil.

Remove two side mounts with rubber pads from crankcase.

Scribe index marks on clutch (2) and flywheel (1). Remove six bolts (3) and washers holding clutch to flywheel. Remove clutch.

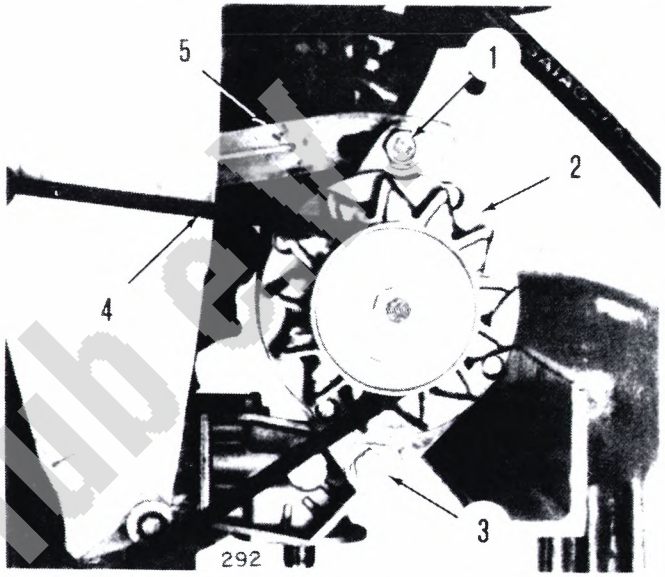


1. Flywheel 2. Clutch 3. Bolts

Remove nut on alternator tensioner bolt (1) and mounting bolt (3), then remove belt (4) and alternator (2).

Remove one bolt to remove tensioner bracket (5).

1. Tensioner bolt 2. Alternator 3. Mounting bolt 4. Belt
5. Tensioner bracket



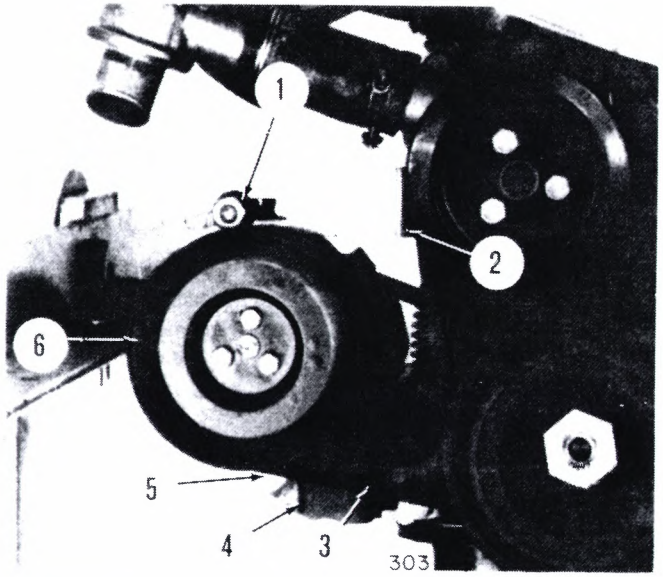
On engines with air pump, remove hose from rear of air pump.

Remove air pump mounting bolt (5) and mounting bolt for tensioner bracket (2).

Remove belt (3) and air pump (6) with attached tensioner bracket (2).

Remove two nuts to remove support bracket (4).

1. Tensioner nut 2. Tensioner bracket 3. Belt 4. Support bracket
5. Mounting bolt 6. Air pump



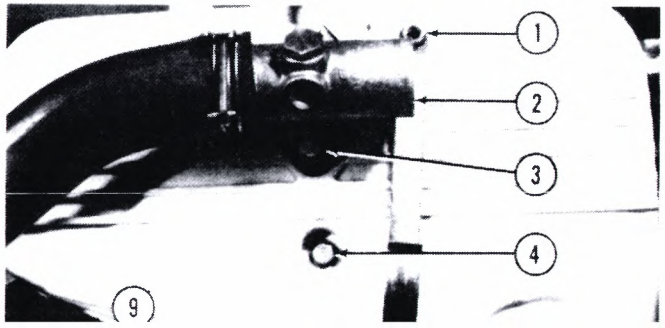
Loosen clamp (8) and disconnect hose.

Remove two bolts (3) and washers, then remove union (2), gasket and attached hoses (9).

Remove two bolts (4) and two nuts (1) to remove timing belt cover (5).

Remove three water pump pulley bolts (6) and remove water pump pulley (7).

1. Nut 2. Union 3. Bolt 4. Bolt 5. Timing belt cover 6. Bolt
7. Pulley 8. Clamp 9. Hoses



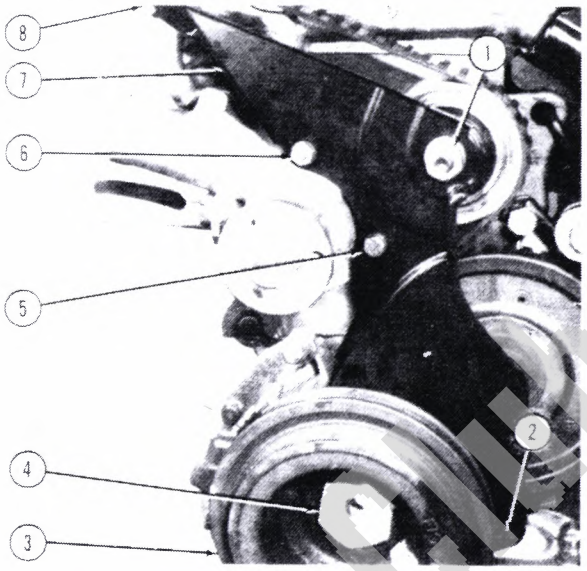
Manually turn engine until holes in camshaft sprockets align with timing pointers.

Block flywheel against turning.

Remove nut (4) holding crankshaft pulley (3). Use 38 mm socket. Remove pulley.

Remove four bolts (2, 5 and 8) and two nuts (1 and 6) holding lower sheet metal timing cover (7). Remove cover.

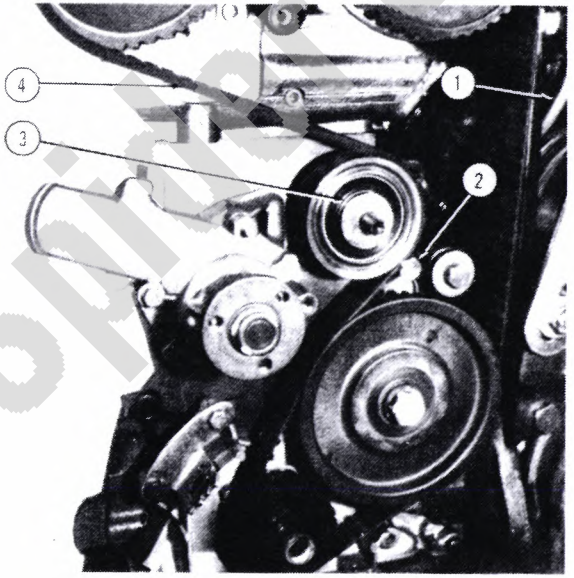
1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut
7. Timing belt cover 8. Bolt



Remove bracket bolt for oil dipstick tube (1). Remove tube.

Remove spacer (3) from tensioner pulley stud. Loosen bolt (2) for tensioner bracket. Pry pulley to release belt tension. Retighten bolt (2) to hold pulley in belt-slackened position. Remove timing belt (4). Discard belt.

1. Oil dipstick tube 2. Bolt 3. Spacer 4. Timing belt



Loosen bolt (7) for tensioner bracket (3) to relieve tension from spring (2).

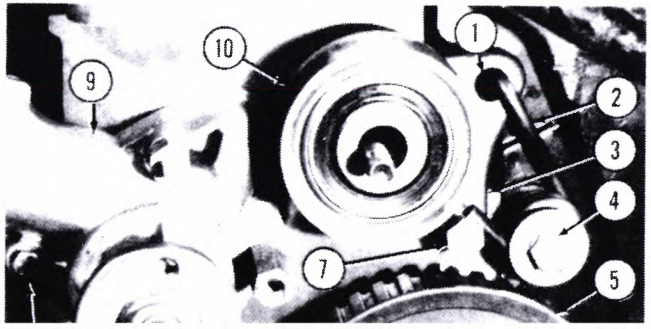
CAUTION: Spring is under high tension.

Remove spring from hole (1) in tensioner bracket.

Remove spring retaining bolt (4). Remove spring. Remove tensioner bracket bolt. Slide off tensioner bracket with pulley (10).

Remove bolt (6) and washer holding sprocket (5) on auxiliary shaft. Hold sprocket with used timing belt. Remove sprocket.

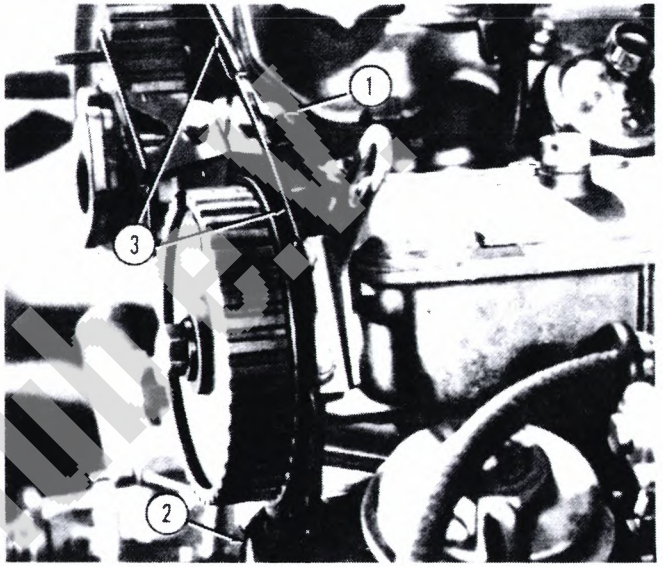
Remove four bolts (8) and washers holding water pump (9).



Remove top bolt (1).

Remove intake manifold bolt (2) holding rear timing belt cover (3) to manifold. Remove rear timing belt covers.

1. Bolt 2. Intake manifold bolt (behind cover) 3. Rear timing belt covers



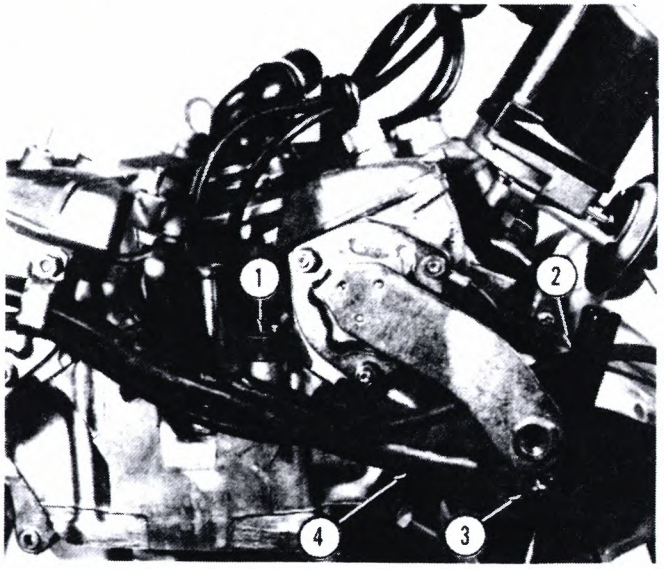
Loosen clamp (3), then disconnect water hose (4) from heater tube (2).

Remove nut holding clamp on heater tube (2) to exhaust manifold.

Remove ten cylinder head bolts (1) and washers. Remove entire cylinder head assembly and gasket.

Disassemble head as specified in section 101.01.

1. Bolt 2. Heater tube 3. Clamp 4. Water hose



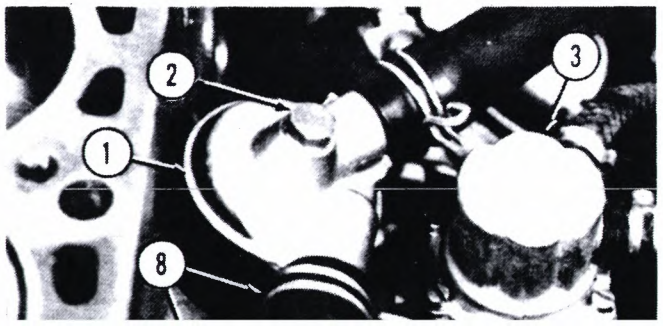
Loosen clamps (8) on oil vapor hose (7), then remove hose.

Remove bolt (2) and washer retaining oil vapor separator (1). Remove separator.

Remove four oil filter support bolts. Remove oil filter support (6) and gasket.

Remove two fuel pump bolts (4). Remove fuel pump (3), spacer (5) and two gaskets (carburetored engines).

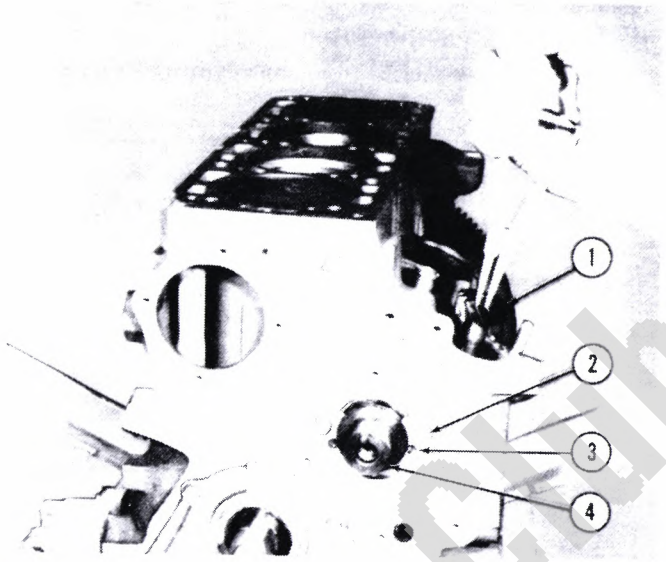
1. Oil vapor separator 2. Bolt 3. Fuel pump 4. Bolt 5. Spacer 6. Oil filter support 7. Oil vapor hose 8. Clamp



Remove three bolts, nut, and washers holding cover for auxiliary shaft. Remove cover and gasket. Remove nut, washer, and clamp holding spacer for oil pump gear (1) in crankcase.

Remove spacer and gasket. Rotate auxiliary shaft to raise oil pump gear. Using thin pliers, remove gear (1). Remove two bolts (2) and washers holding retainer (3) for auxiliary shaft (4). Remove retainer. Pull auxiliary shaft (4) out of crankcase.

1. Gear 2. Bolts 3. Retainer 4. Auxiliary shaft



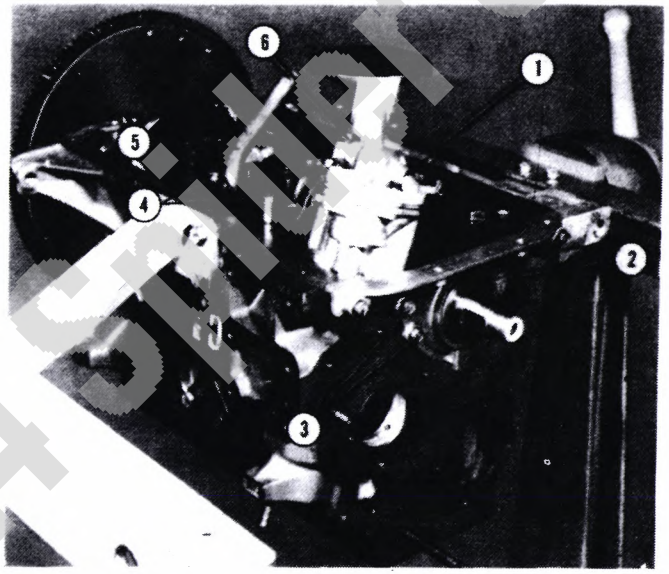
Remove 18 bolts and washers holding oil sump. Remove sump and gasket.

Remove five bolts (3) and washers holding cover (2) for crankcase. Remove cover (2).

Remove two bolts (6) and washers holding oil pump (1). Remove pump (1) and gasket.

Remove two bolts (4) and washers holding oil tube (5). Remove tube.

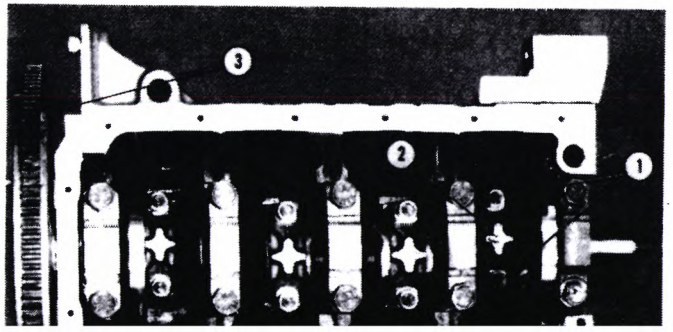
1. Oil pump 2. Cover 3. Bolts 4. Bolts 5. Oil tube 6. Bolt



Remove two nuts (1) and washers holding end cap (2) on connecting rod. Remove cap and bearing insert. Turn crankshaft until piston being removed is at T.D.C. Remove piston and reassemble cap and nuts to connecting rod. Repeat for remaining pistons one at a time.

Remove six bolts and washer plate holding flywheel (3) on crankshaft. Remove flywheel.

1. Nut 2. Cap 3. Flywheel

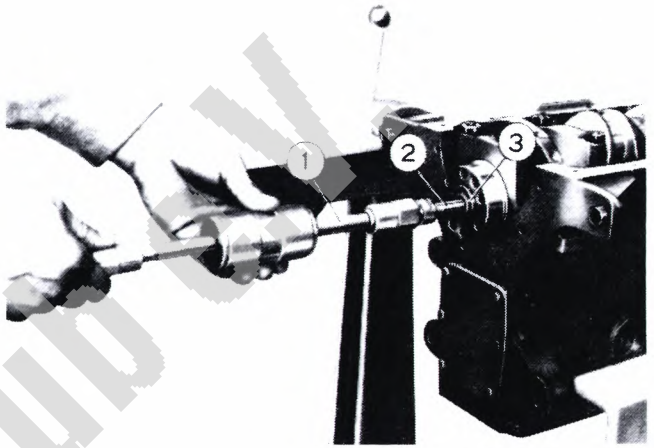


Remove six bolts and washers holding rear cover for crankshaft. Remove cover and gasket.

Remove pilot bearing (3) from crankshaft. Use tool A.40206, A40207, and slide hammer puller.

Remove 10 bolts holding main bearing caps. Remove caps and bearing inserts.

Remove crankshaft, bearing inserts, and thrust rings.

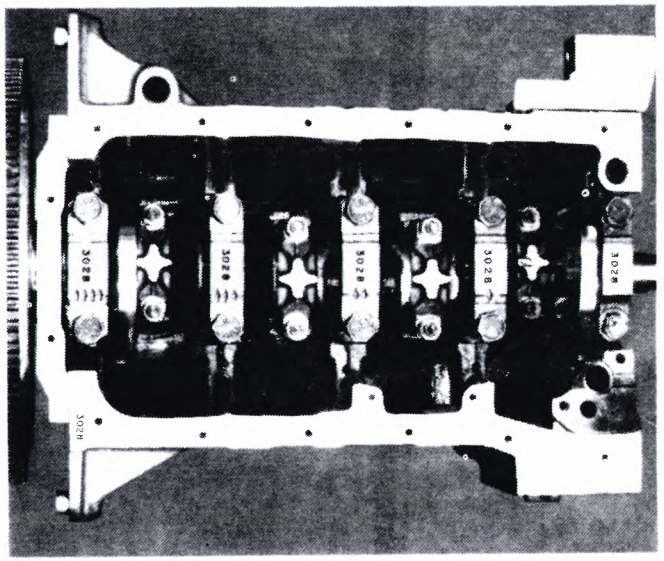


1. Slide hammer puller 2. Tool 3. Pilot bearing

ASSEMBLY

Install crankshaft. Refer to 101.03. Make sure number on caps is same as number on crankcase. Make sure caps are installed at proper location. Cap without notch is at front of crankcase. Then cap with one notch, etc.

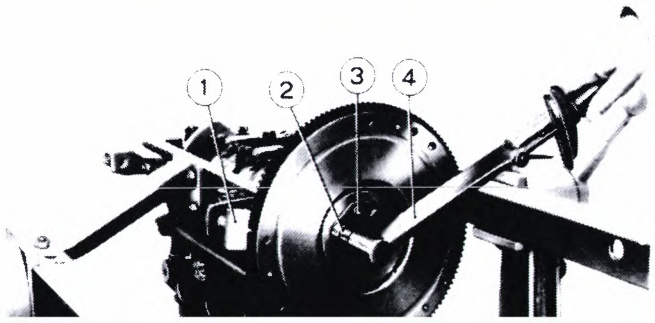
Install pistons. Refer to Section 101.05.



Install bearing for input shaft in seat in crankshaft rear end. Fit oil seal in rear cover for crankshaft. Install cover with six bolts and washers.

Rotate crankshaft until crankpins for No. 1 and No. 4 cylinders are at T.D.C. (crankpins should be at top). Position flywheel on crankshaft with index mark facing 1 and 4 crankpins.

Secure flywheel to crankshaft with washer plate and six bolts. Lock crankshaft against turning. Torque bolts to 105 ft. lbs. (14.5 kgm).

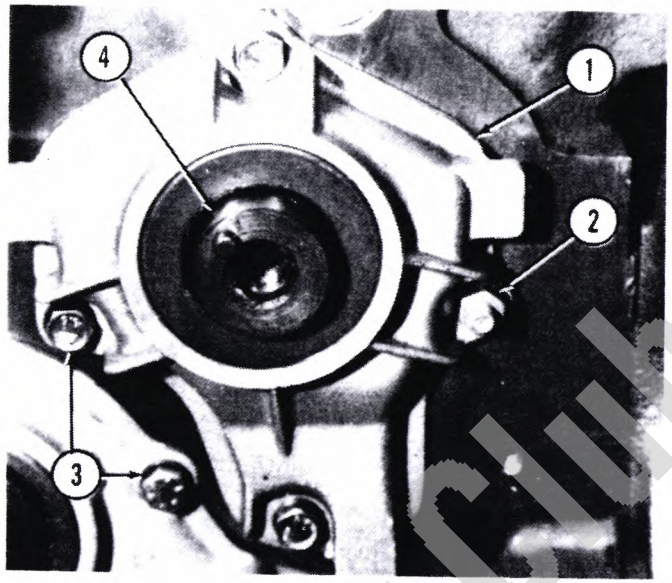


Lubricate bushings for auxiliary shaft with oil. Install auxiliary shaft. Secure shaft with retaining plate, two bolts, and washers.

Place gasket, oil seal and cover (1) on auxiliary shaft (4). Secure cover with three bolts (3), nut (2) and washers.

Place oil pump drive gear in crankcase. Place spacer on gear.

1. Cover 2. Nut 3. Bolts 4. Auxiliary shaft



Place auxiliary shaft sprocket (1) onto shaft. Rotate auxiliary shaft until gear seats. Secure spacer with clamp, washer and nut.

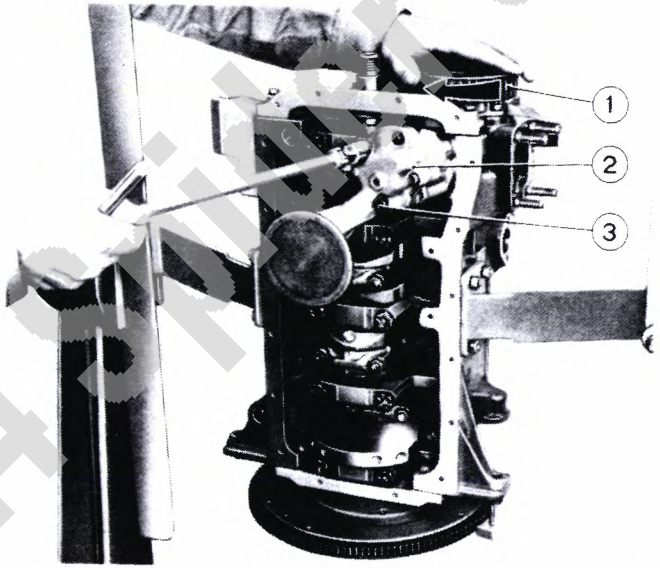
Place oil pump (2) with pickup tube, gasket and drive gear in crankcase. Start bolts (3) thru pump.

Turn auxiliary shaft while tightening bolts securing oil pump.

Install oil line for breather with two bolts and washers in crankcase.

Install oil sump.

1. Auxiliary shaft sprocket 2. Oil pump 3. Bolts

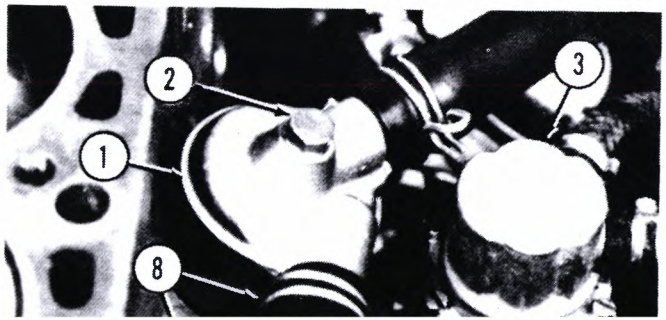


Install two bolts (4), washers, gasket, spacer (5) gasket and fuel pump (3) (carburetored engines).

Install gasket, oil filter support (6) and four bolts.

Install separator (1) and bolt (2). Install oil vapor hose (7) and clamps (8).

1. Oil vapor separator 2. Bolt 3. Fuel pump 4. Bolt 5. Spacer
6. Oil filter support 7. Oil vapor hose 8. Clamp



Lubricate cylinder bores, then turn crankshaft until No. 4 cylinder is at top center.

Place cylinder head gasket on block. Make sure word "ALTO" is up.

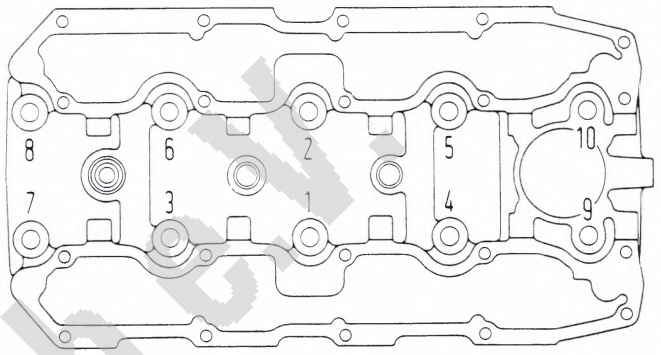
Check that cam sprocket timing marks are aligned with pointers on cam housing, then place cylinder head on block.

Install ten bolts and washers thru cylinder head. Tighten as shown in two steps; 29 ft. lbs. (4 kgm), 61 ft. lbs. (7.5 kgm).

Connect hose from carburetor choke to heater tube. Secure with clamp (carburetored engines).

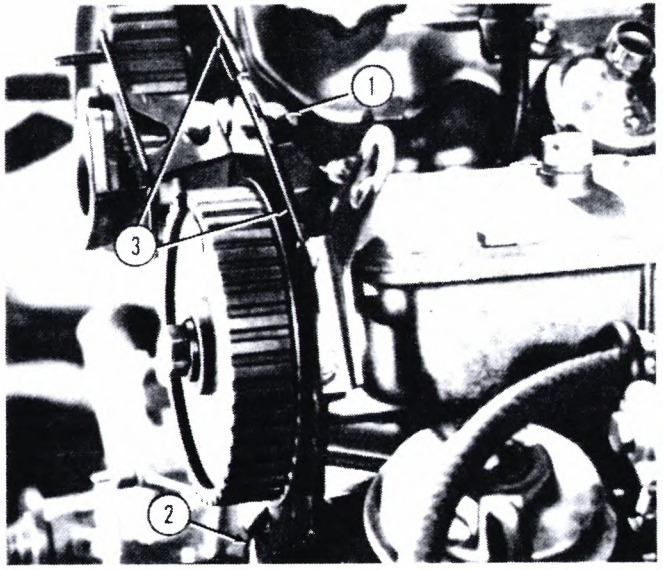
Attach clamp on heater hose to exhaust manifold stud.

Slide crankshaft pulley on crankshaft. Check that crankshaft pulley timing mark aligns with T.D.C. (longest pointer on timing scale).



Install rear timing belt covers (3). Install bolt (2) holding cover to intake manifold. Install top bolt (1).

1. Top bolt 2. Bolt (behind cover) 3. Rear timing belt covers

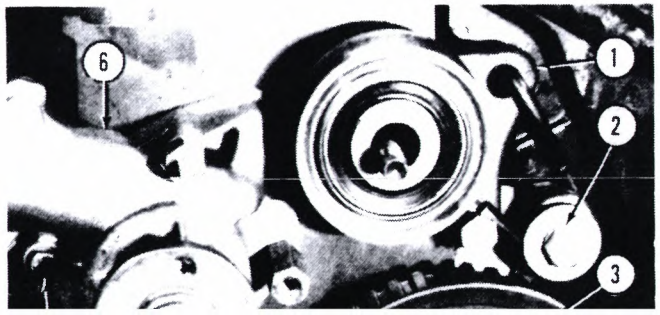


Place water pump (6) and gasket on crankcase. Secure pump with four bolts (5) and washers.

Install sprocket (4) and bolt on auxiliary shaft. Using old timing belt to hold sprocket, torque bolt to 87 ft. lbs. (12 kgm). Install tensioner bracket (1) with pulley and tensioner bracket bolt. Install spring and spring retaining bolt (2). Place spring in hole in tensioner bracket.

CAUTION: Spring is under high tension when set.

Turn auxiliary shaft sprocket to align hole (3) in sprocket with



With tensioner bracket bolt (4) slightly loose, pry tensioner pulley (11) to belt-slackened position and tighten tensioner bracket bolt.

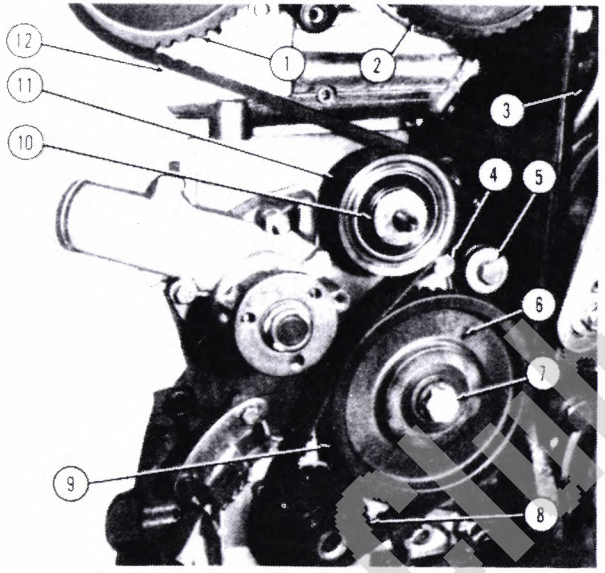
Wrap new timing belt (12) over crankshaft sprocket (8), auxiliary shaft sprocket (9), intake camshaft sprocket (2) and exhaust camshaft sprocket (1).

Make sure all play is between exhaust camshaft sprocket (1) and tensioner pulley (11).

Place timing belt over tensioner pulley. Loosen tensioner bracket bolt (4) and allow tensioner pulley to take out play. DO NOT apply additional force to tensioner pulley.

Turn crankshaft two full turns. Check that timing is correct, then tighten tensioner bracket bolt.

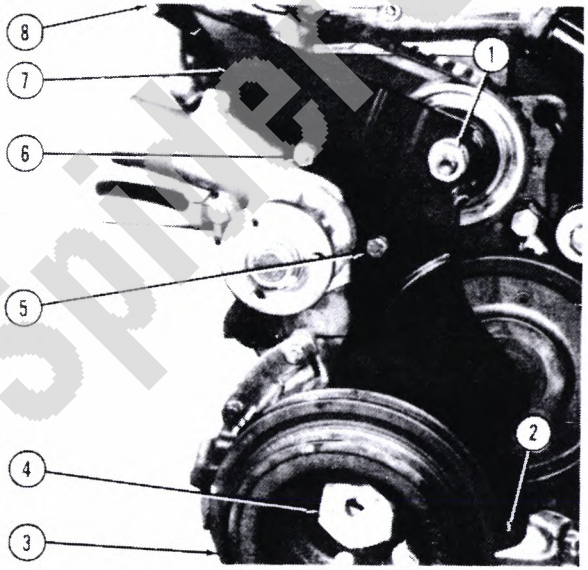
Install spacer (10) on tensioner pulley stud. Install oil dipstick tube (3) and bracket bolt.



1. Exhaust camshaft sprocket 2. Intake camshaft sprocket 3. Oil dipstick tube 4. Tensioner bracket bolt 5. Spring retaining bolt 6. Hole 7. Bolt 8. Crankshaft sprocket 9. Auxiliary shaft sprocket 10. Spacer 11. Tensioner pulley 12. Belt

Install lower sheet metal timing belt cover with four bolts (2, 5 and 8) and two nuts (1 and 6). Torque nut (1) to 33 ft. lbs. (4.5 kgm).

Coat crankshaft pulley (3) inside diameter with anti-seize compound. Place pulley on crankshaft. Secure pulley with nut (4). With flywheel blocked, torque nut to 181 ft. lbs. (25 kgm).



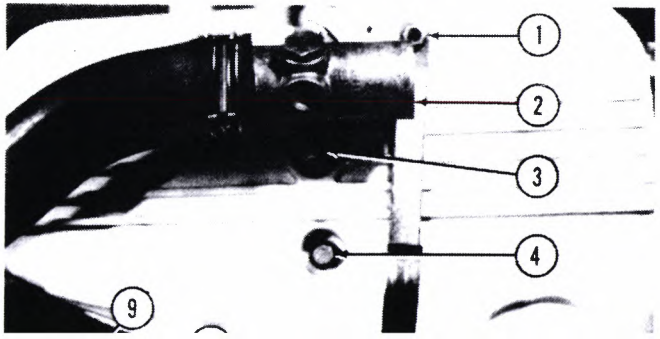
1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut 7. Timing belt cover 8. Bolt

Install water pump pulley (7) and three bolts (6).

Install timing belt cover (5) and retain with two bolts (4) and two nuts (1).

Install union gasket, union (2) and two bolts (3) and washers.

Connect hose and tighten clamp (8).



1. Nut 2. Union 3. Bolt 4. Bolt 5. Timing belt cover 6. Bolt 7. Water pump pulley 8. Clamp 9. Hoses

On engine with air pump, install air pump support bracket (4) using two nuts. Tighten nuts to 20 ft. lbs. (2.8 kgm).

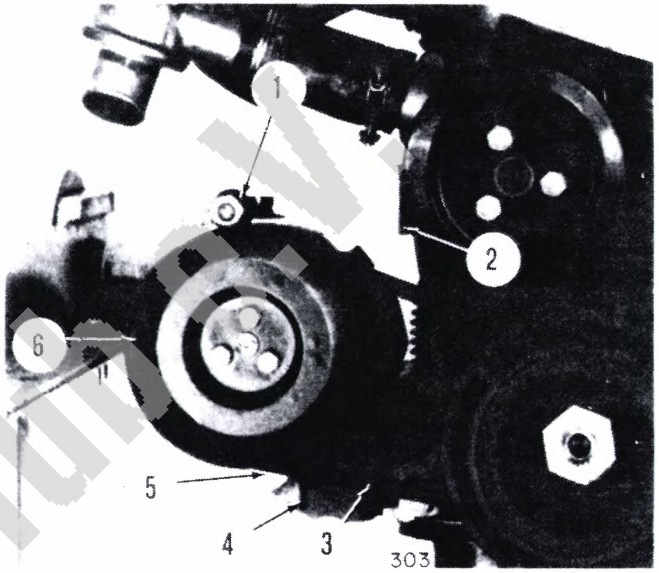
Using mounting bolt (5) and bolt for tensioner bracket (2), install air pump (6). Tighten bolt for tensioner bracket to 38 ft. lbs. (52 ft. lbs. for Znt/EC coating*).

Install belt (3). Adjust belt tension, then tighten tensioner nut (1) to 18 ft. lbs.

Tighten mounting bolt (5) to 38 ft. lbs.

*Znt/EC coated components are olive green colored.

1. Tensioner nut 3. Tensioner bracket 3. Belt 4. Support bracket
5. Mounting bolt 6. Air pump



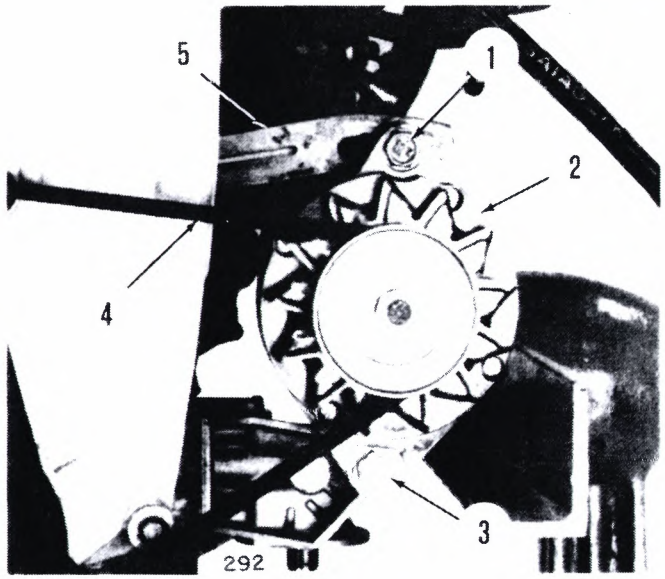
Install tensioner bracket (5). Tighten nut to 51 ft. lbs. (7.05 kgm).

Using alternator mounting bolt (3) and tensioner bolt (1), install alternator (2).

Install belt (4). Adjust belt tension, then tighten nut for tensioner bolt to 32 ft. lbs. (4.4 kgm).

Tighten mounting bolt to 51 ft. lbs. (7.05 kgm).

1. Tensioner bolt 2. Alternator 3. Mounting bolt 4. Belt
5. Tensioner bracket



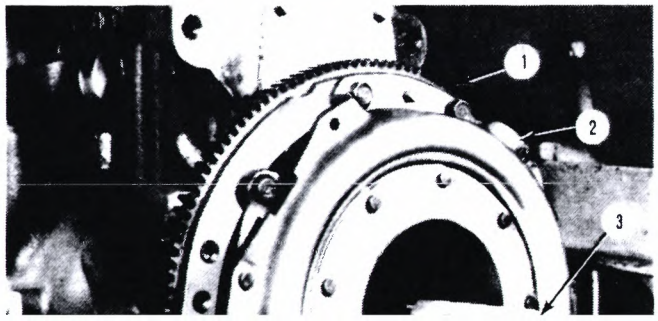
Place protruding part of clutch disc away from flywheel (1).

Align scribe marks on clutch pressure plate (2) with scribe mark on flywheel (1).

Install six bolts (4) finger tight.

Install clutch centering tool (3) A.70081, then fully tighten bolts (4).

Attach engine to crane. Remove support arms. Install two side mounts with rubber pads on crankcase.



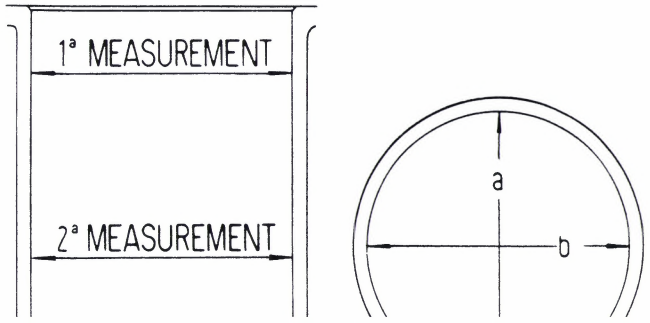
CRANKCASE

CHECKING CYLINDER BORES

Carefully examine cylinder bore surface. If only slight scoring or scratches are found, dress bores. Use extra fine emery cloth wrapped around a hone. Zero dial indicator (1) using ring gauge A.96146 (2).

1. Dial indicator 2. Ring gauge A.96146

Check cylinder bore at three points both lengthwise and crosswise.

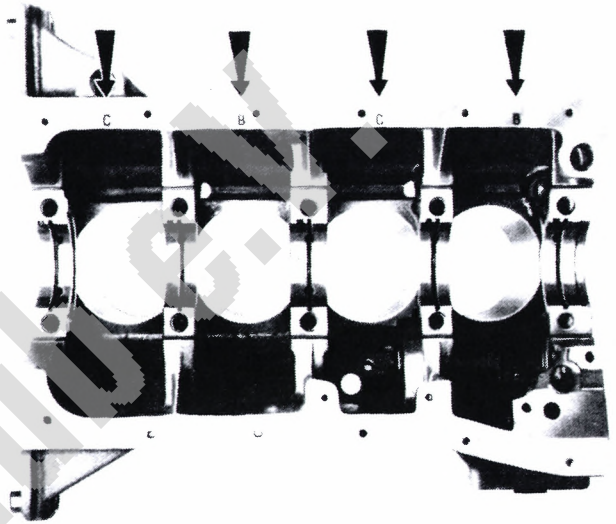


The bore class is indicated by letters stamped on the bottom of crankcase (indicated by arrows).

Cylinder bore diameter may vary from 3.3070 to 3.3090 inches (84.000 to 84.050 mm).

Bores are selected in 0.004 inch (0.01 mm) classes.

A = 84.000 – 84.010 mm
C = 84.020 – 84.030 mm
E = 84.040 – 84.050 mm



CYLINDER HEAD (Carburetored)

REMOVAL AND INSTALLATION (Engine in Vehicle)

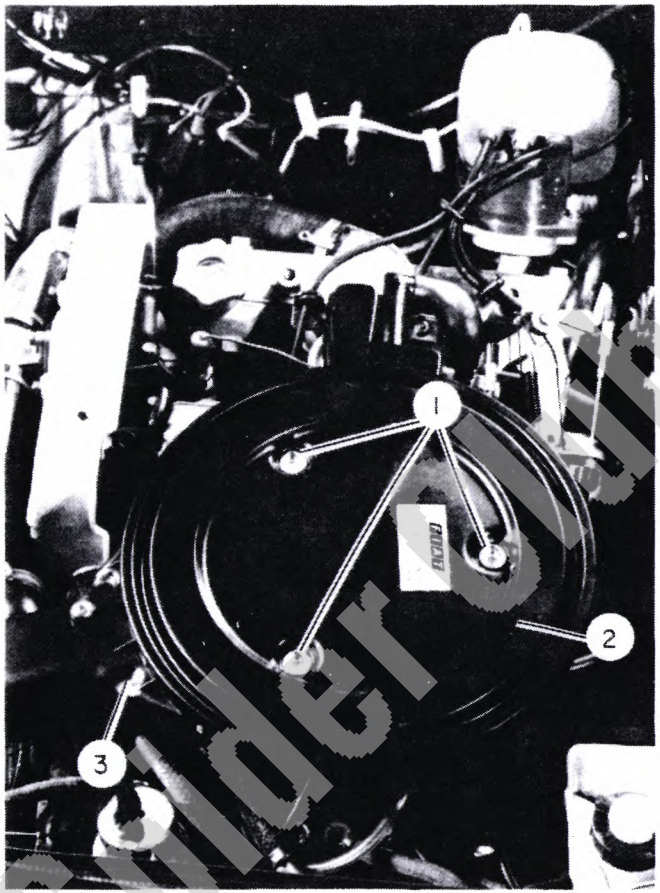
Disconnect battery ground cable located in trunk. Loosen fuel tank filler cap to release any fuel pressure.

Drain radiator thru plug on lower left side of radiator. Drain engine coolant thru plug in lower right side of block.

Remove three nuts (1) holding air cleaner top cover (2). Remove all air and vacuum lines to air cleaner.

Remove four nuts holding air cleaner to carburetor. Lift air cleaner up high enough to remove lines underneath. Remove air cleaner assembly (3) and all attached lines.

1. Nut 2. Air cleaner top cover 3. Air cleaner assembly



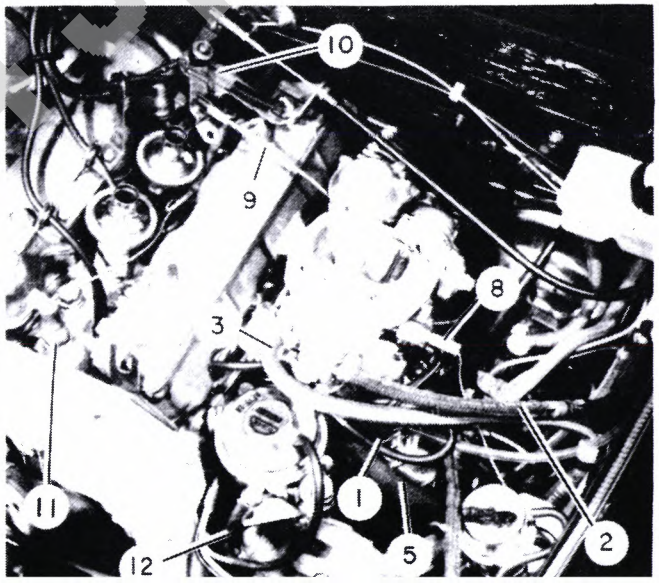
On left side of engine, mark to identify, then remove fuel inlet line (1), fuel return line (2), fuel vapor line (3), EGR line (4), power brake vacuum line (5), purge tank vacuum line (6), gulp valve vacuum lines (7) and carburetor electrical connector (8).

Disconnect throttle rod (9) at carburetor. Remove two nuts attaching linkage (10) to camshaft cover, and lay linkage to one side.

Remove bolt holding oil dipstick assembly (12) to intake manifold.

Disconnect vacuum line from intake manifold to automatic transmission, if equipped with automatic transmission.

1. Fuel inlet line 2. Fuel return line 3. Fuel vapor line 4. EGR line 5. Power brake vacuum line 6. Purge tank vacuum line 7. Gulp valve vacuum lines 8. Idle stop solenoid 9. Throttle rod 10. Throttle linkage 11. Engine overheat switch 12. Oil dipstick assembly



Mark to identify, then disconnect two water temperature electrical connectors (1) from top of cylinder head.

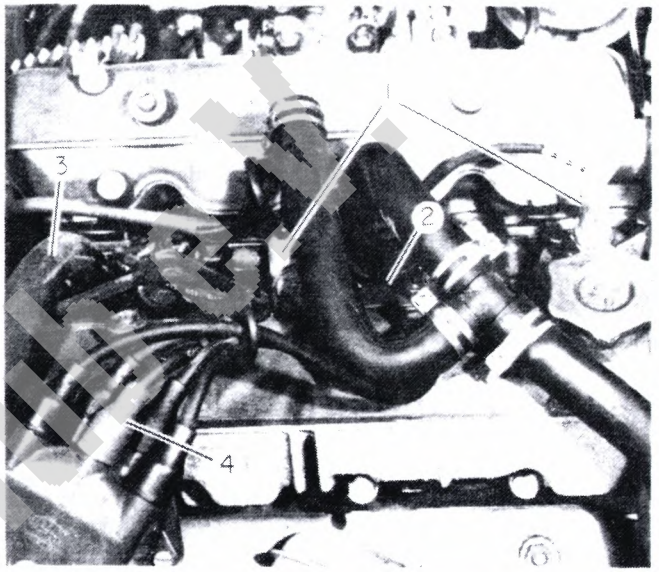
Loosen clamps and remove air hoses (2) from check valve (two reed valves for engines without air pump). Loosen clamp and remove heater hose (3).

If equipped with automatic transmission, remove bolt holding dipstick assembly to rear of right cam housing.

On vehicles with electronic ignition (1979 and on), disconnect white distributor lead wire from electronic control module mounted on right fender shield. Disconnect black ground wire from module, at rear of cylinder head.

On vehicles with standard breaker-point ignition (up to 1978), disconnect two wire connectors at distributor.

Disconnect coil high voltage lead (4) from distributor.



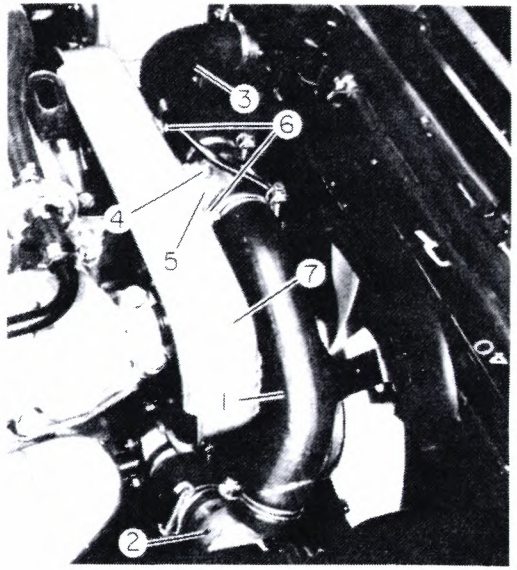
1. Water temperature electrical connector 2. Air hoses 3. Heater hose 4. Coil high voltage lead

Loosen clamp and remove coolant hose (1) from controlled bypass thermostat (2). Loosen clamp on radiator hose (3) and remove from radiator.

Remove two bolts (4) to remove union (5) and attached hoses.

Remove drive belts from crankshaft pulley.

Remove two nuts (6) and bolts to remove timing belt cover (7).



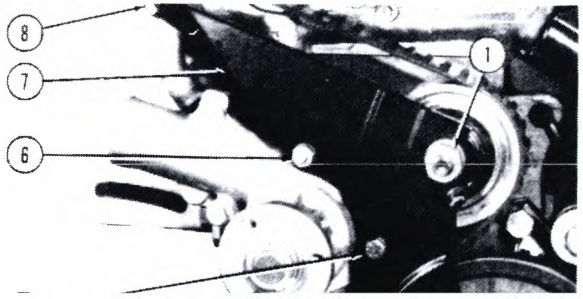
1. Coolant hose 2. Controlled bypass thermostat 3. Radiator hose 4. Bolt 5. Union 6. Nut 7. Timing belt cover

Manually turn engine until holes in camshaft sprockets align with timing pointers.

Block flywheel against turning.

Remove nut (4) holding crankshaft pulley (3). Use 38 mm socket. Remove pulley.

Remove four bolts (2, 5 and 8) and two nuts (1 and 6) holding lower sheet metal timing shield (7). Remove shield.



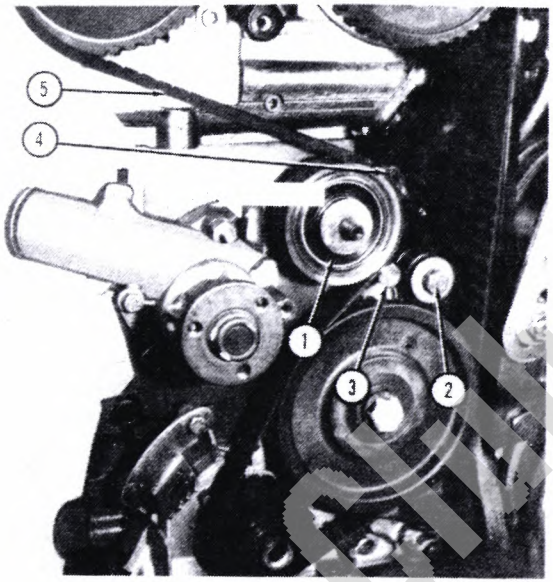
1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut

Loosen bolt (3) for tensioner bracket (4). Pry pulley in direction of arrow to release belt tension. Reinstall nut on pulley (1) and tighten it and bolt (3) to hold pulley in belt slackened position.

Remove timing belt (5). Mark belt as "not reusable".

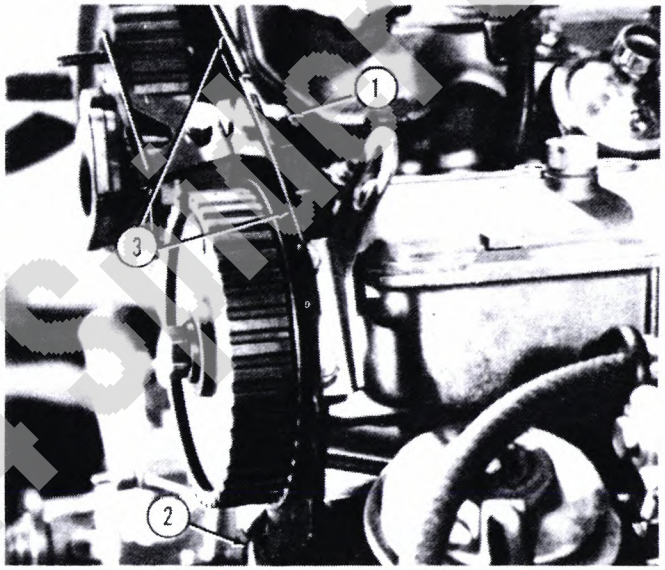
Loosen but do not remove tensioner spring retaining bolt (2).

1. Tensioner pulley 2. Spring retaining bolt 3. Bolt 4. Tensioner bracket 5. Timing belt



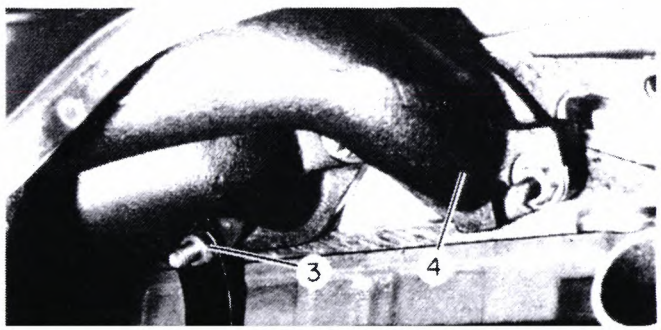
Remove bolts (1 and 2) to remove timing belt shields (3).

1. Bolt 2. Bolt (behind cover) 3. Timing belt shields



Remove nuts securing exhaust pipe to exahust manifold (4). Disconnect metal heater line (1) by removing two nuts at flange (2) and one nut (3) on exhaust manifold. Remove ten cylinder head bolts and washers. Remove cylinder head and gasket.

1. Metal heater line 2. Flange 3. Nut 4. Exhaust manifold



Install cylinder head in reverse order of removal.

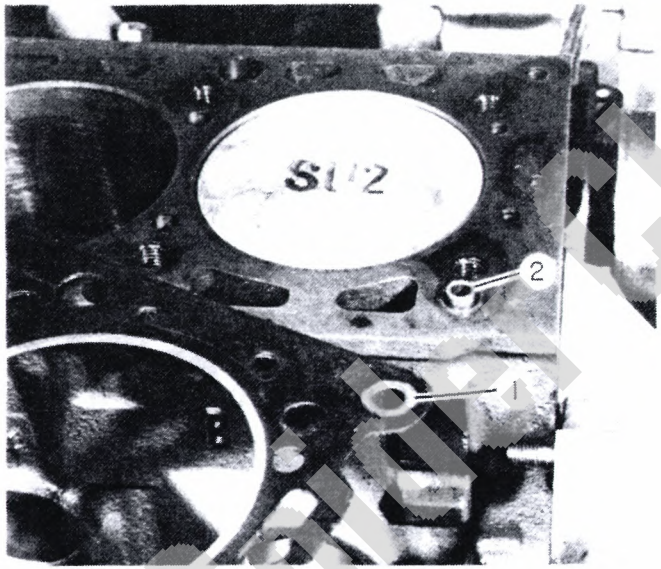
Make sure word "ALTO" (top) on head gasket (1) is facing up, and that two guide dowels (2) are in place in cylinder block.

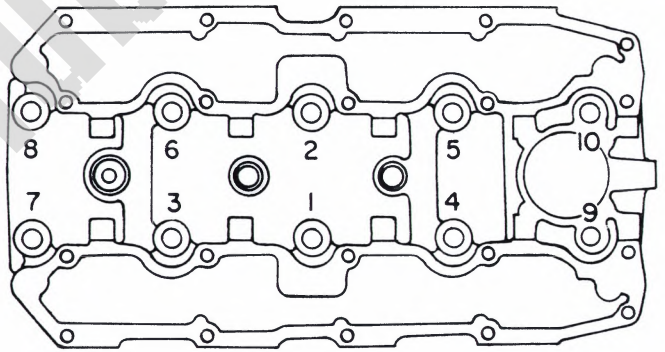
Install timing belt (refer to Camshaft Drive in this section).

Refill and bleed cooling system (refer to Radiator in this section).

Tighten head bolts in order shown. Torque in at least two stages, final torque will be 61 ft lbs (8.5 kgm).

1. Cylinder head gasket 2. Guide dowel





CYLINDER HEAD
(Fuel Injected and Turbo-Charged)

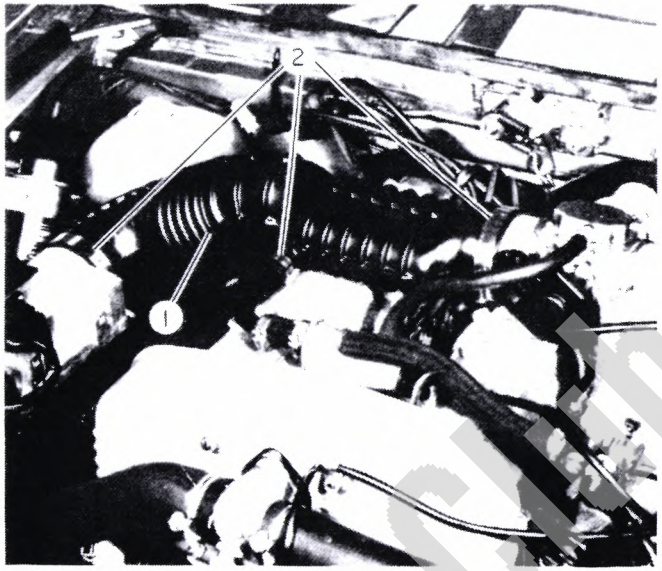
REMOVAL AND INSTALLATION (Engine in Vehicle)

Disconnect battery ground cable located in trunk.

Loosen fuel tank filler cap to release any fuel pressure.

Drain radiator thru plug in lower left side of radiator. Drain engine coolant thru plug in lower right side of block.

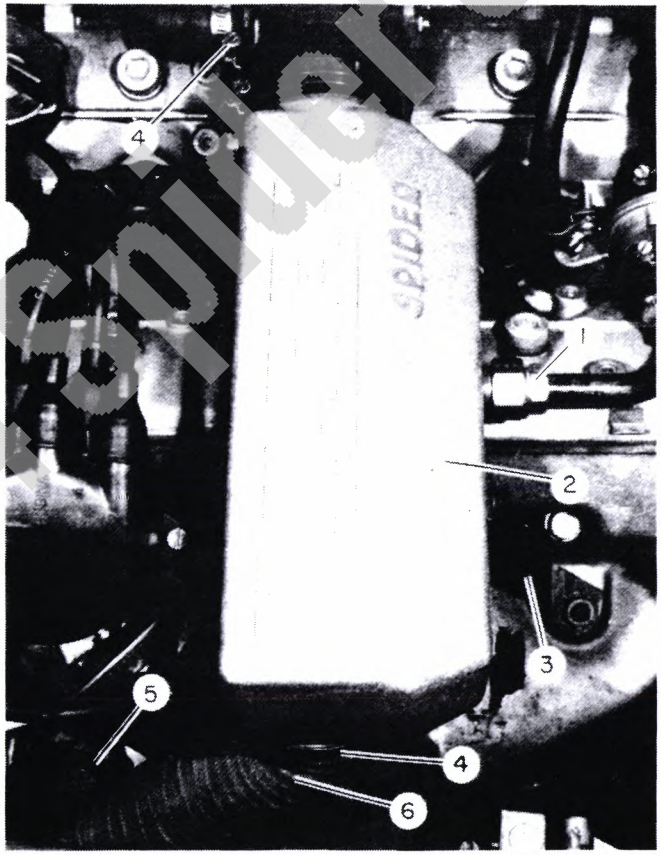
Remove air intake line (1) by loosening three clamps (2).



1. Air intake line 2. Clamp

On turbo-charged engines, first remove auxiliary air regulator fitting (1) to compressor discharge plenum (2). Then remove bracket (3) and clamps (4) to remove plenum.

Loosen clamp (5) on air outlet hose (6) to remove hose.

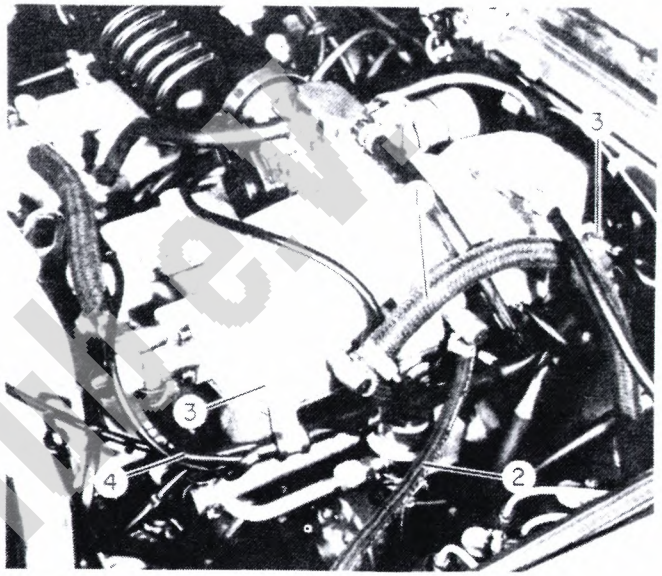


1. Fitting 2. Compressor discharge plenum 3. Bracket 4. Clamp
5. Clamp 6. Compressor air outlet hose

Loosen clamps to remove power brake vacuum line (1) and vapor canister vacuum line (2) from intake manifold fittings. Also disconnect vacuum line to automatic transmission, if so equipped.

Remove bolts and clamps (3) securing wire harness (4) to intake manifold. Disconnect all electrical connectors coming out of harness (pull connectors straight out).

1. Power brake vacuum line 2. Vapor canister vacuum line 3. Clamp 4. Wire harness

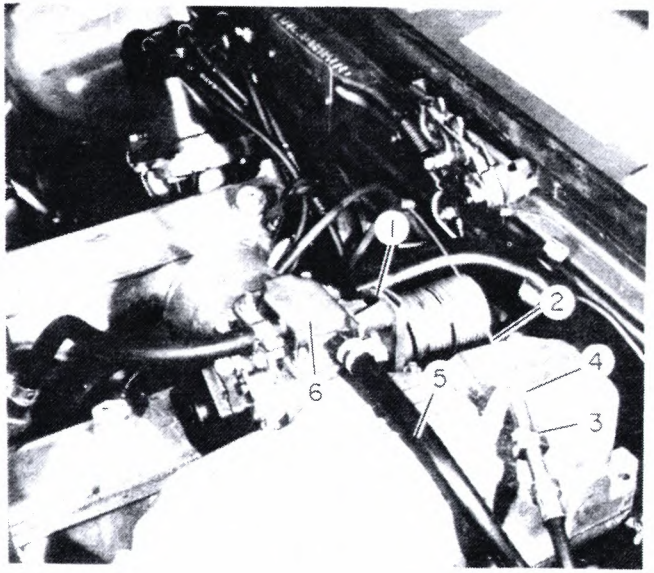


Rotate throttle lever (1) and remove throttle cable (2).

CAUTION: Note for reassembly that both adjustment nuts (3) are on the left side of mount (4). To assemble otherwise will result in erratic throttle operation.

Loosen clamp and remove coolant line (5) to throttle body heater (6).

1. Throttle lever 2. Throttle cable 3. Adjustment nuts 4. Mount 5. Heater hose 6. Throttle body heater



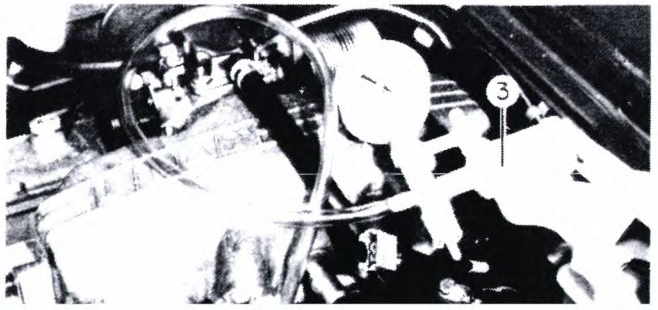
Before disconnecting fuel lines to engine, fuel pressure must first be released.

Remove fuel tank filler cap.

Remove vacuum hose (1) from fuel pressure regulator (2).

Using a hand vacuum pump (3) apply about 25 inches of vacuum to pressure regulator as shown. Fuel system pressure will then be released into fuel tank.

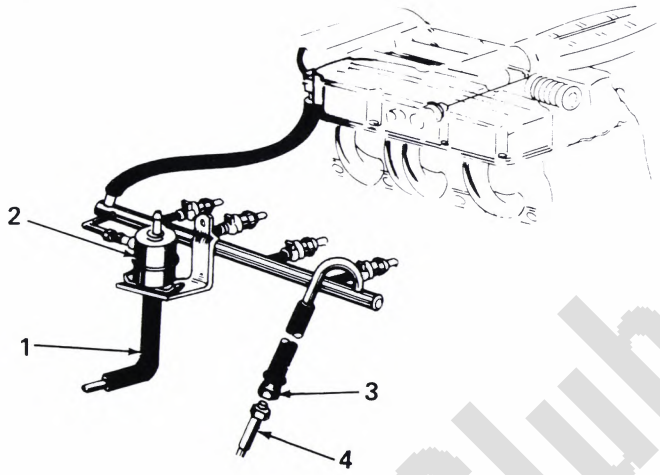
1. Vacuum hose 2. Fuel pressure regulator 3. Hand vacuum pump



WARNING: Take all necessary precautions to prevent a fire when fuel lines are opened.

CAUTION: The fuel injection system is highly susceptible to contamination. Make sure area is clean whenever lines are opened up, and that dirt does not enter system.

Disconnect fuel return hose (1) from regulator (2). Disconnect fuel supply flex line fitting (3) from metal line (4) near left fender shield.



1. Fuel return hose 2. Fuel pressure regulator 3. Fuel supply line 4. Metal fuel supply line from pump

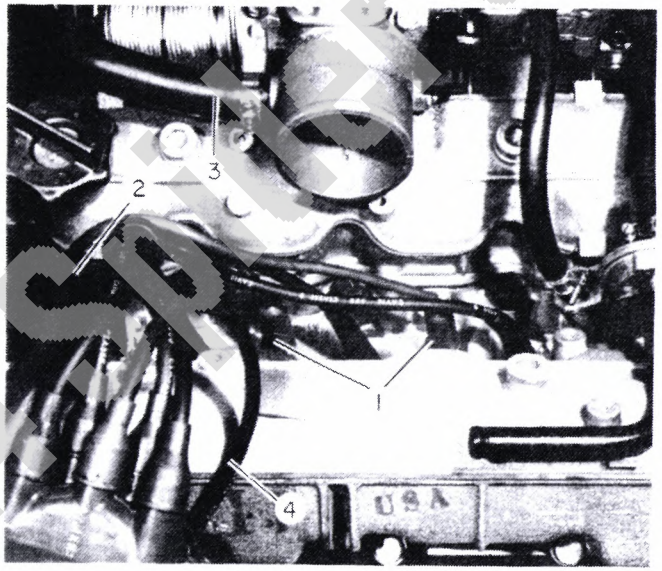
Mark to identify, then disconnect two water temperature electrical connectors (1) from top of cylinder head.

Loosen clamp and remove heater hose (2). Loosen clamp and remove crankcase breather hose (3).

If equipped with automatic transmission, remove bolt holding dipstick assembly to rear of right cam housing.

Disconnect white distributor lead wire from electronic control module on right fender shield. Disconnect black ground wire from module to rear of cylinder head.

Disconnect coil high voltage lead (4) from distributor.



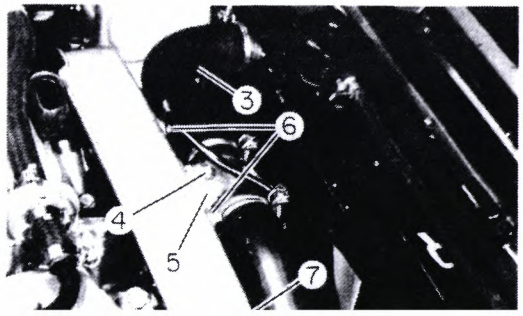
1. Water temperature electrical connectors 2. Heater hose 3. Crankcase breather hose 4. Coil high voltage lead

Loosen clamp and remove coolant hose (1) from controlled bypass thermostat (2). Loosen clamp on radiator hose (3) and remove from radiator.

Remove two bolts (4) to remove union (5) and attached hoses.

Remove drive belts from crankshaft pulley.

Remove two nuts (6) and bolts to remove timing belt cover (7).



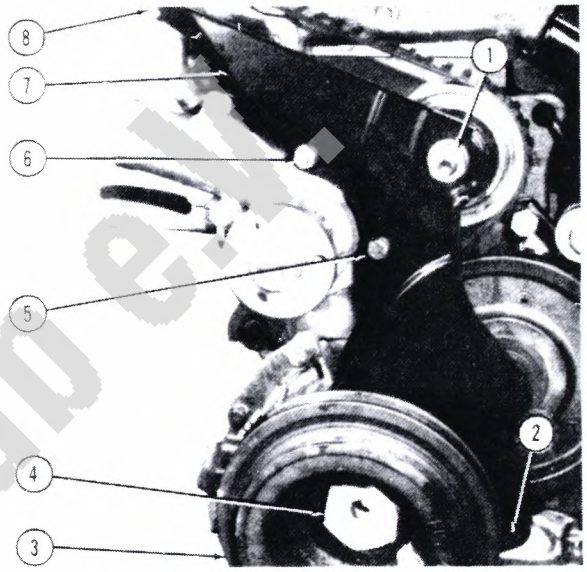
1. Coolant hose 2. Controlled bypass thermostat 3. Radiator hose 4. Bolt 5. Union 6. Nut 7. Timing belt cover

Manually turn engine until holes in camshaft sprockets align with timing pointers.

Block flywheel against turning.

Remove nut (4) holding crankshaft pulley (3). Use 38 mm socket. Remove pulley.

Remove four bolts (2, 5 and 8) and two nuts (1 and 6) holding lower sheet metal timing shield (7). Remove shield.

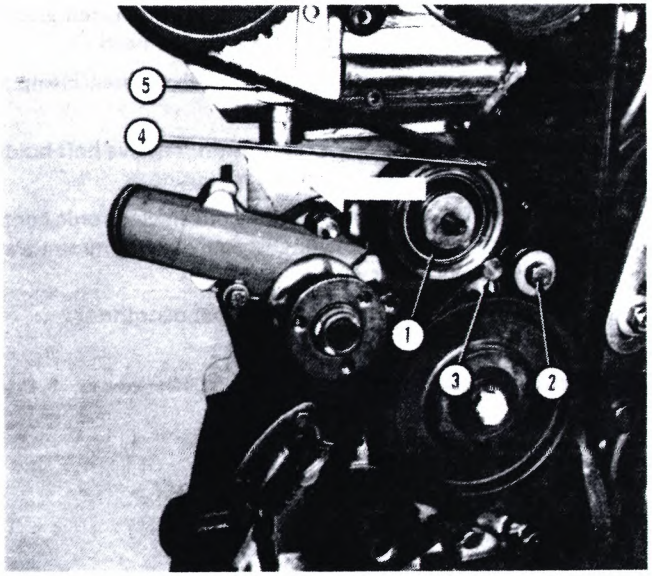


1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut
7. Timing belt shield 8. Bolt

Loosen bolt (3) for tensioner bracket (4). Pry pulley in direction of arrow to release belt tension. Reinstall nut on pulley (1) and tighten it and bolt (3) to hold pulley in belt slackened position.

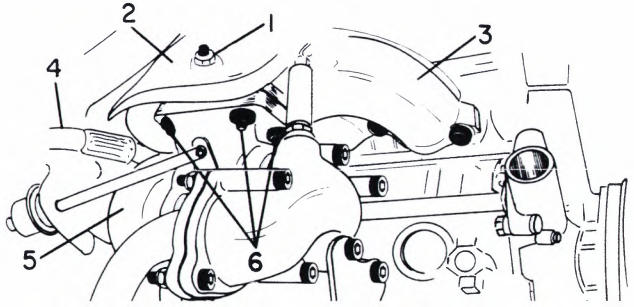
Remove timing belt (5). Mark belt as "not reusable".

Loosen but do not remove tensioner spring retaining bolt (2). Remove bolts to remove timing belt shields.



1. Tensioner pulley 2. Spring retaining bolt 3. Bolt 4. Tensioner bracket 5. Timing belt

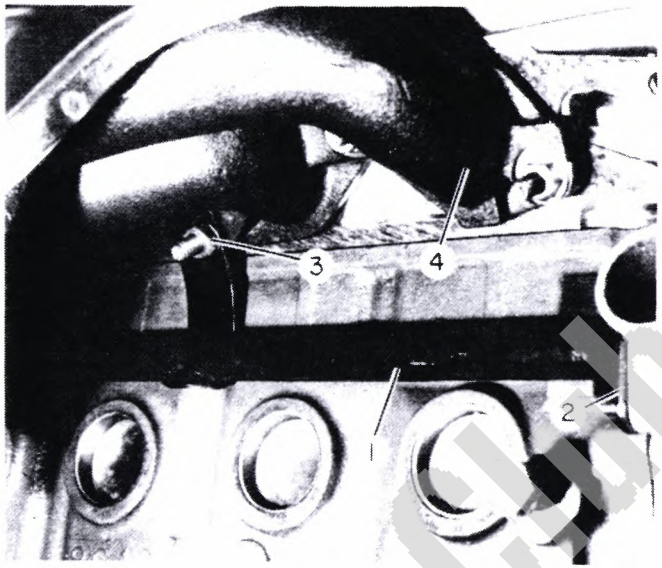
Remove nuts securing exhaust pipe to exhaust manifold. On turbo-charged engines remove nuts (1) holding shield (2) to exhaust manifold (3). Remove oil pressure line (4) to turbo unit (5). Remove three Allen head bolts (6) attaching turbo exhaust elbow to exhaust manifold.



1. Nut 2. Shield 3. Exhaust manifold 4. Oil pressure line
5. Turbo unit 6. Bolt

Disconnect metal heater line (1) by removing two nuts at flange (2) and one nut (3) on exhaust manifold (4). Remove ten cylinder head bolts and washers. Remove cylinder head and gasket.

1. Metal heater line 2. Flange 3. Nut 4. Exhaust manifold



Install cylinder head in reverse order of removal.

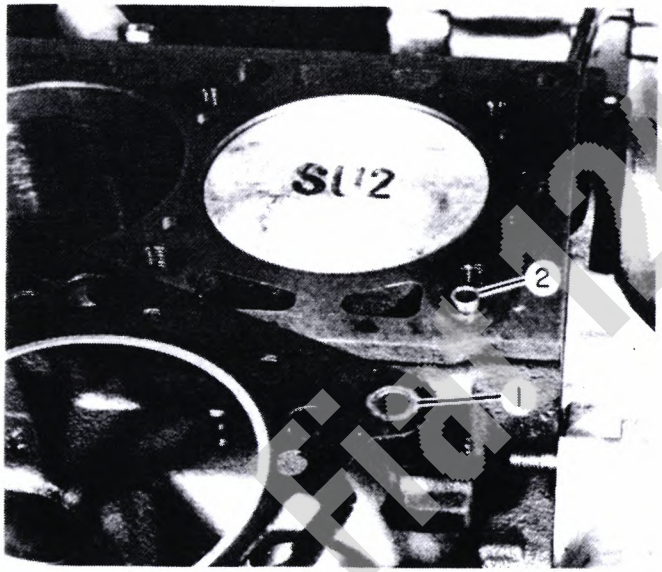
Make sure word "ALTO" (top) on head gasket (1) is facing up, and that two guide dowels (2) are in place in cylinder block.

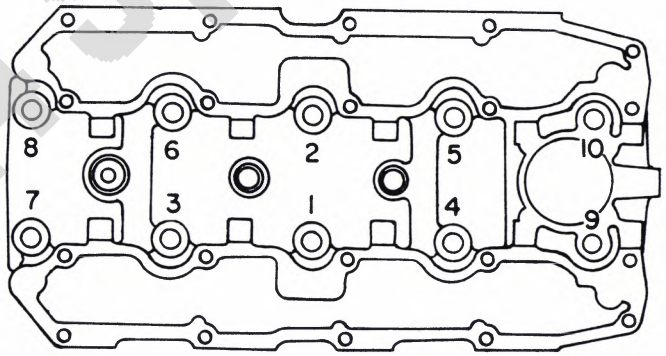
Install timing belt (refer to Camshaft Drive in this section).

Refill and bleed cooling system (refer to Radiator in this section).

Tighten head bolts in order shown. Torque in at least two stages, final torque will be 61 ft lbs (8.5 kgm).

1. Cylinder head gasket 2. Guide dowel





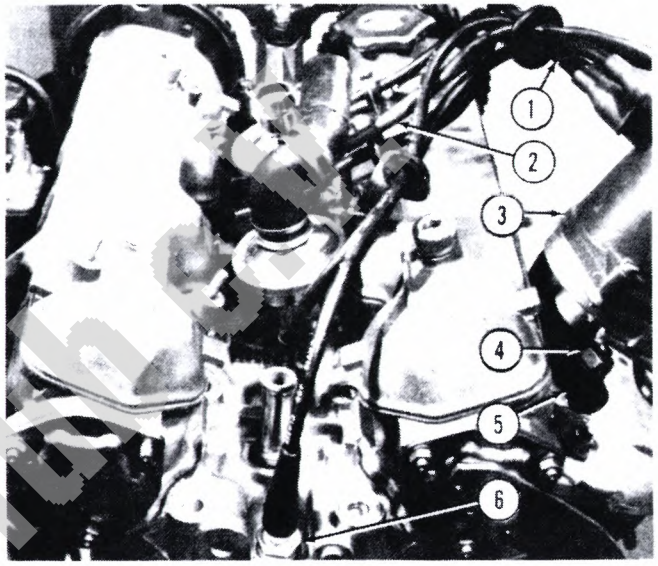
DISASSEMBLY AND ASSEMBLY (Carburetored)

Disconnect high voltage cables (1) from spark plugs (5).

Remove dirt from spark plug wells, then remove spark plugs.

Remove nut (4), washer and bracket (5), then remove distributor (3).

1. High voltage cables 2. Wire 3. Distributor 4. Nut 5. Bracket 6. Spark plug



Remove water temperature sending unit (2).

On cars with air induction, remove reed valves (1).

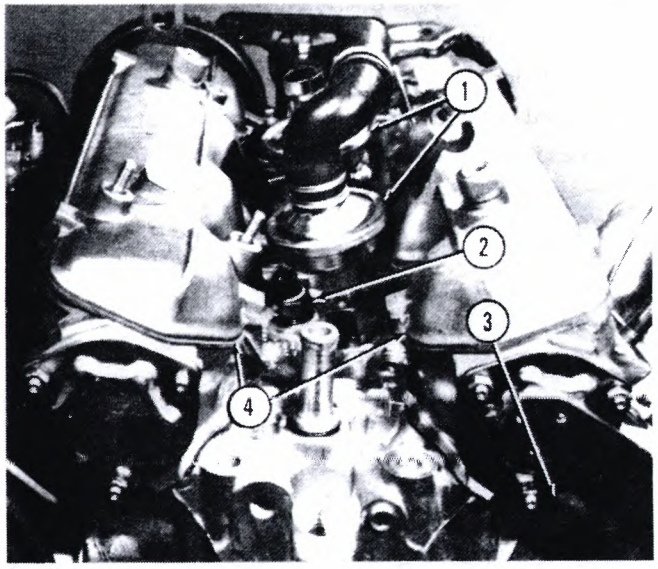
On cars with air pump, remove air injection check valve.

Remove three nuts holding shield to exhaust manifold.

Remove five nuts and remove exhaust manifold (3).

Remove four bolts holding camshaft covers (4). Remove covers and gaskets.

1. Reed valves 2. Temperature sending unit 3. Exhaust manifold 4. Camshaft covers



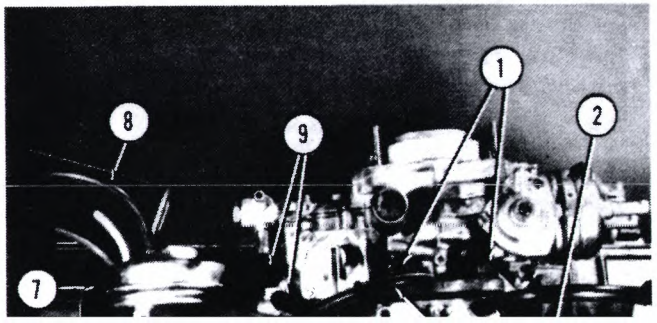
Disconnect hose (8) from EGR valve (7). Remove two bolts (6), then remove EGR valve.

Remove two vacuum hoses (9) from front of carburetor and two vacuum hoses (3) from side of carburetor.

Remove four nuts (1) and washers, remove the carburetor and spacer.

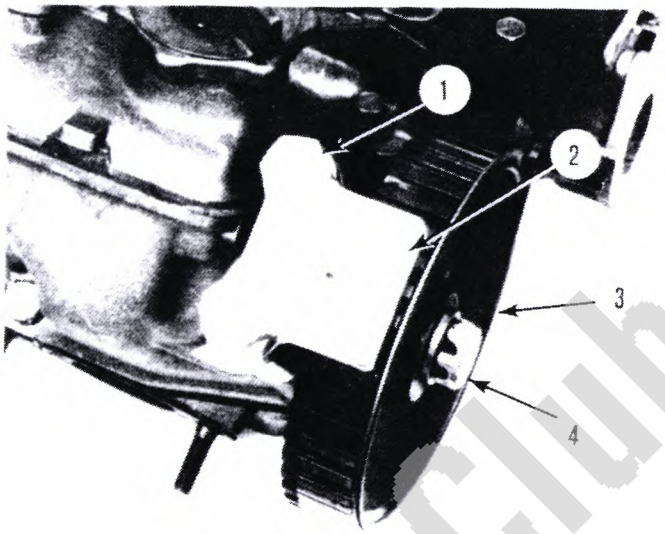
Remove two camhousing bolts holding vacuum tube brackets (2) to camhousing.

Remove four bolts (4), two nuts and washers. Remove intake manifold and gasket.



Remove two front camhousing bolts (1). Install tool A.60446 using bolts (1). Remove bolt (4) and washer. Remove camshaft pulley (3). Repeat for other side.

1. Bolt 2. Tool A.60446 3. Exhaust camshaft pulley 4. Bolt



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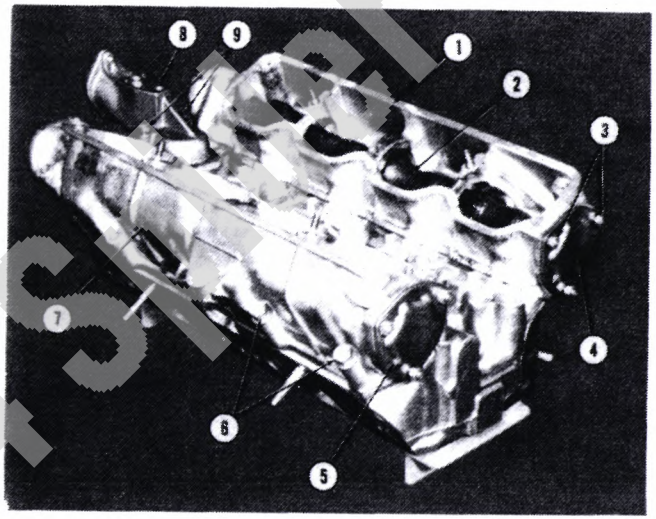
Remove three nuts (3) holding camshaft covers (4 and 5). Remove camshafts (2).

Remove bolts (6) holding camhousings (1 and 7). Remove housings and gaskets.

Remove two bolts (9) and washer holding water extension (8). Remove extension and gasket.

Assemble in reverse order.

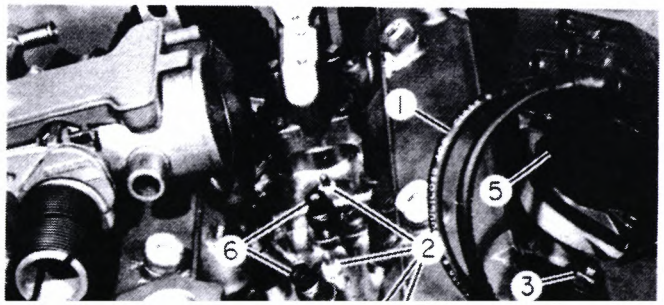
1. Exhaust camhousing 2. Camshaft 3. Nuts 4. Cover 5. Cover
6. Camhousing bolts 7. Intake camhousing 8. Water extension
9. Bolts



DISASSEMBLY AND ASSEMBLY
(Fuel Injected and Turbo-Charged)

Disconnect high voltage cables (1) from spark plugs (2). Remove dirt from spark plug wells, then remove spark plugs. Remove nut (3), washer and bracket (4), then remove distributor (5). Remove water temperature sending units (6).

1. High voltage cables 2. Spark plug 3. Nut 4. Bracket
5. Distributor 6. Water temperature sending unit

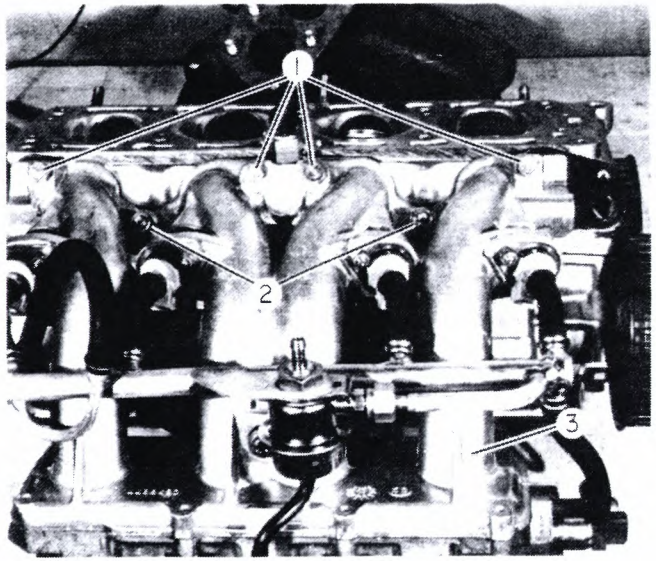


Remove three nuts holding heat shield (1) to exhaust manifold (2). Remove five nuts and remove exhaust manifold.

1. Heat shield 2. Exhaust manifold

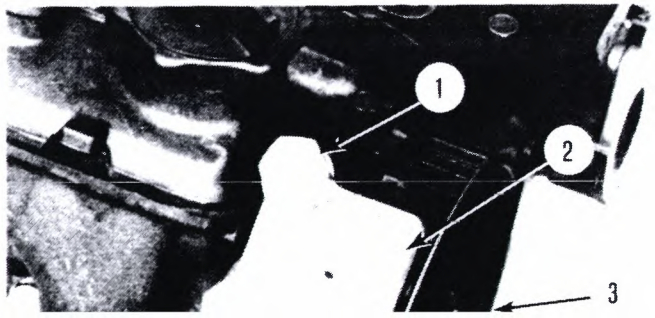
Remove four bolts (1) and two nuts (2) to remove intake manifold (3).

1. Bolt 2. Nut 3. Intake manifold



Remove two front camhousing bolts (1). Install tool A.60446 using bolts (1). Remove bolt (4) and washer. Remove camshaft pulley (3). Repeat for other side.

1. Bolt 2. Tool A.60446 3. Exhaust camshaft pulley 4. Bolt



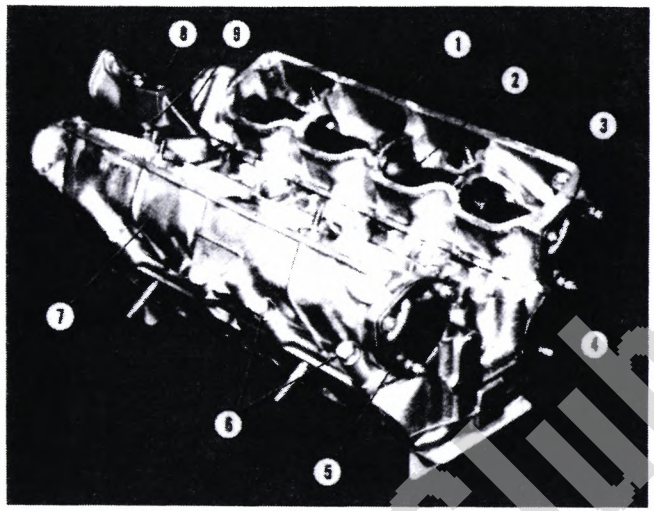
Remove three nuts (3) holding camshaft covers (4 and 5). Remove camshafts (2).

Remove bolts (6) holding camhousings (1 and 7). Remove housings and gaskets.

Remove two bolts (9) and washer holding water extension (8). Remove extension and gasket.

Assemble in reverse order.

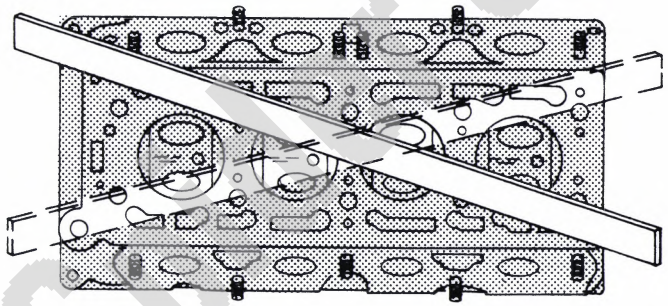
1. Exhaust camhousing 2. Camshaft 3. Nuts 4. Cover 5. Cover
6. Camhousing bolts 7. Intake camhousing 8. Water extension
9. Bolts



CHECKING CYLINDER HEAD GASKET SURFACE

Using a straight edge, check head for distortion. Lay straight edge across diagonals of gasket surface and lengthwise in the middle. The gap between head and straight edge must not exceed 0.002 inch. If gap exceeds this, reface cylinder head gasket surface.

Do not remove more material than necessary. Check depth of combustion chambers to make sure it has not been reduced below allowable limits.

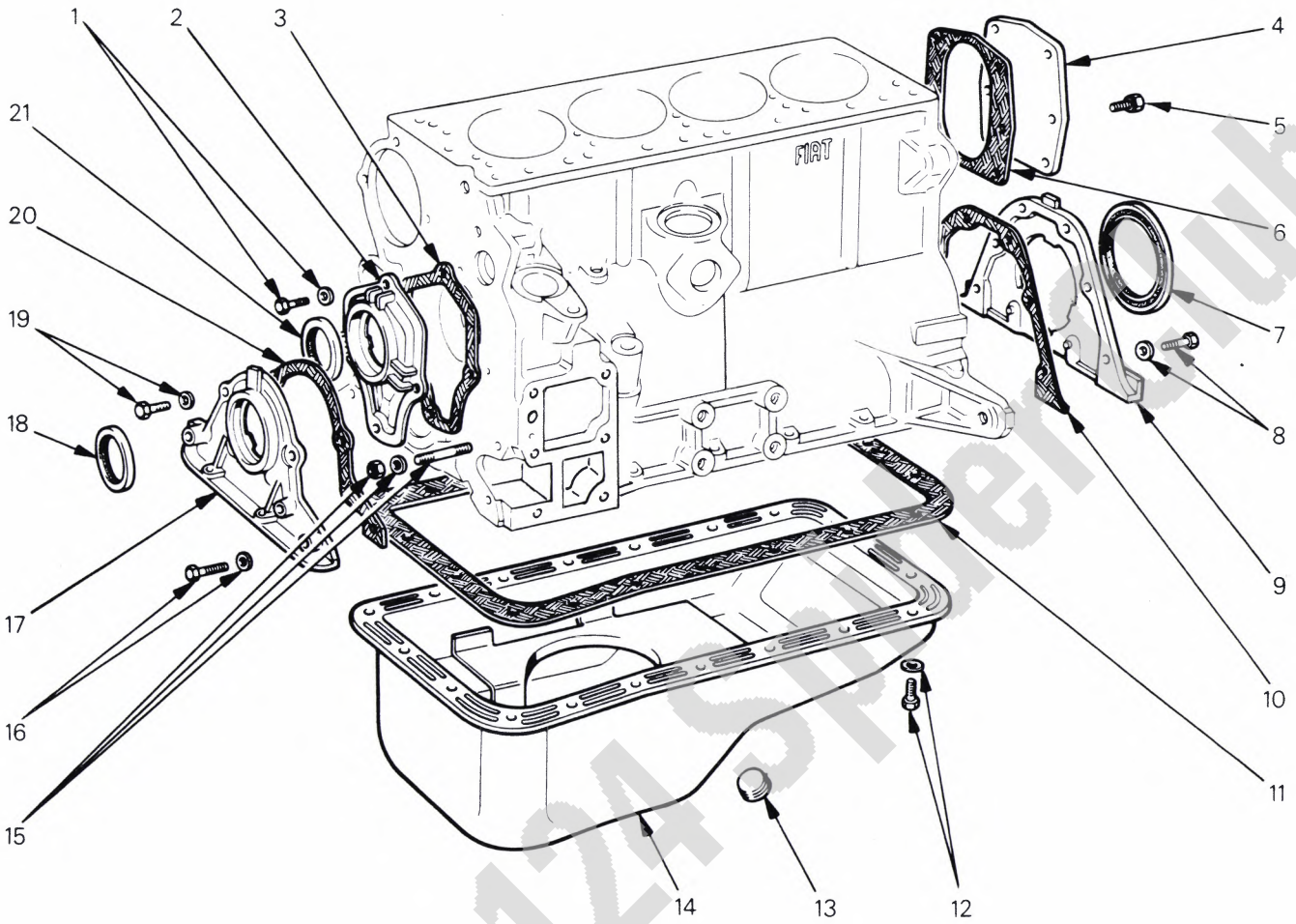


CHECKING DEPTH OF COMBUSTION CHAMBERS

Place gauge A.96229 (1) in center of combustion chamber. Check gap between gauge and surface of gasket. Use a feeler gauge (3).

Gap should not exceed 0.01 in. (0.25 mm).

1. Tool A.96229 2. Cylinder head 3. Feeler gauge



1. Bolt and lockwasher
2. Auxiliary shaft cover
3. Gasket
4. Cover
5. Bolt
6. Gasket
7. Oil seal
8. Bolt and lockwasher
12. Bolt and lockwasher
13. Drain plug
14. Oil sump
15. Stud, lockwasher, and nut
16. Bolt and lockwasher
17. Front cover
18. Oil seal
19. Bolt and lockwasher

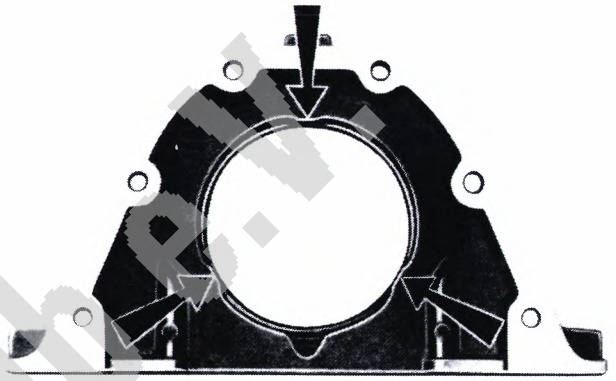
OIL SUMP AND CRANKCASE COVERS

REPLACEMENT

When overhauling engine, replace oil seals at crankshaft and auxiliary shaft.

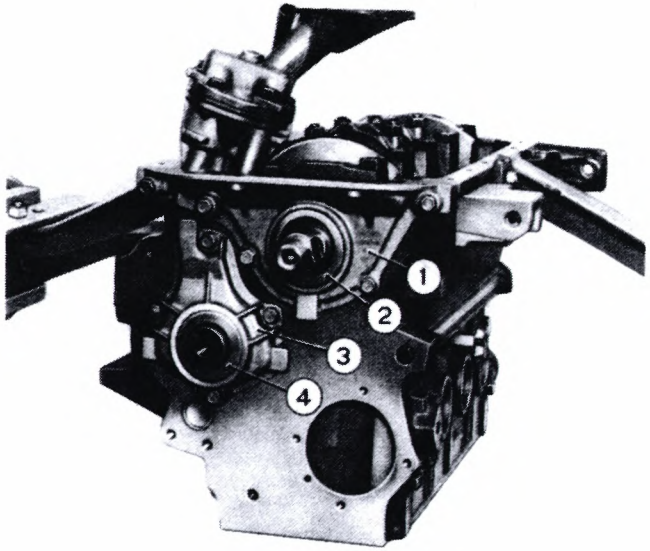
Crankcase cover with oil seal

Arrows show indexes for positioning rear cover on crankshaft flange.



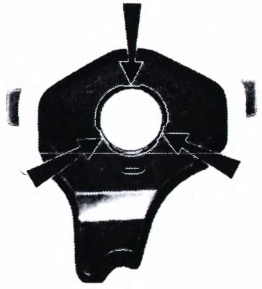
Engine front view

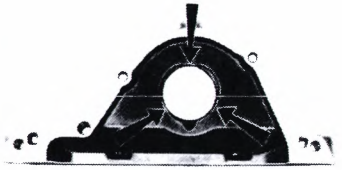
1. Crankshaft front cover
2. Crankshaft front oil seal
3. Auxiliary shaft cover
4. Auxiliary shaft oil seal

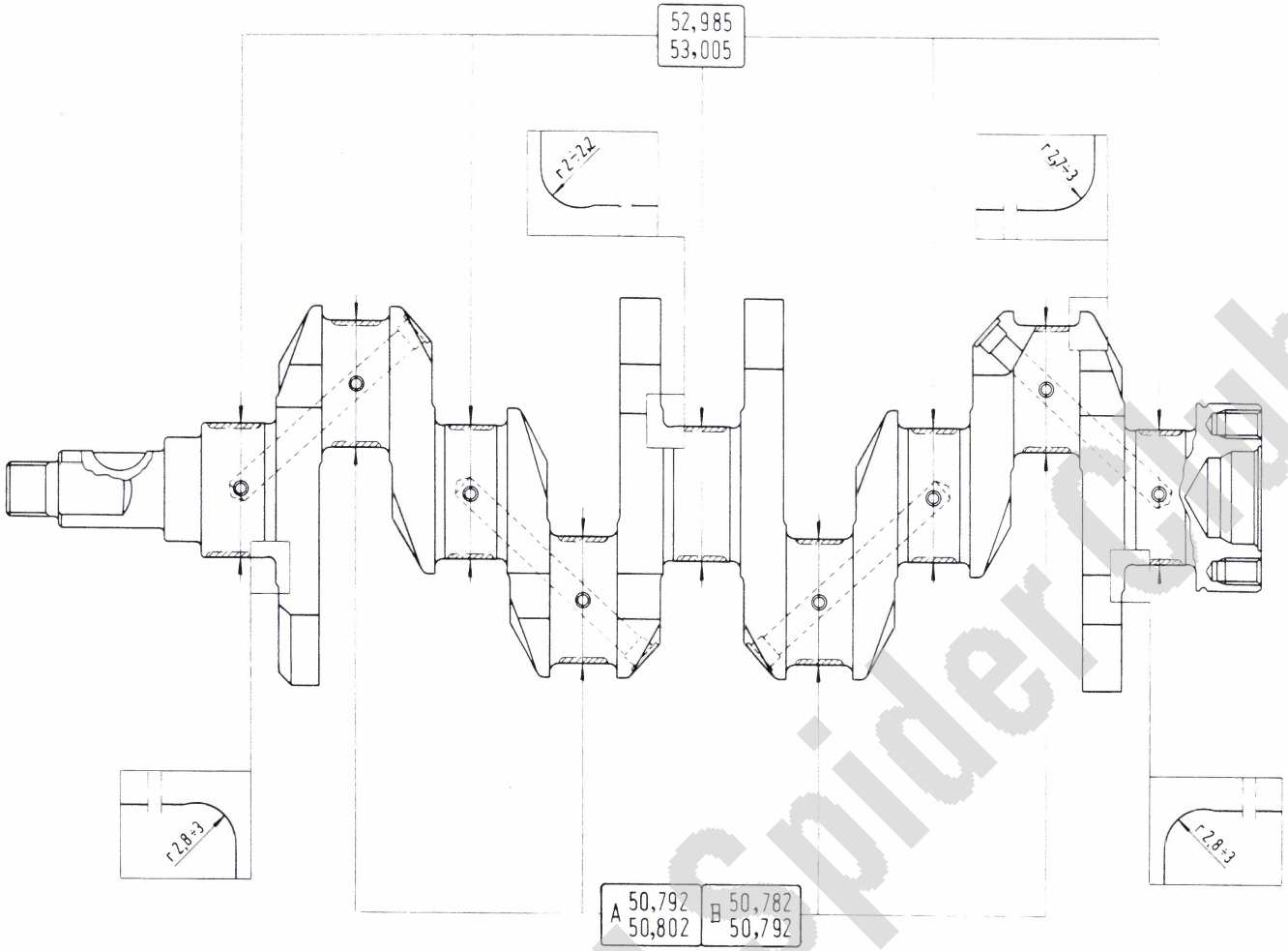


Auxiliary shaft and crankshaft covers with oil seals

Arrows show indexes for positioning covers on shafts.







INSPECTING

Journals and Crankpins

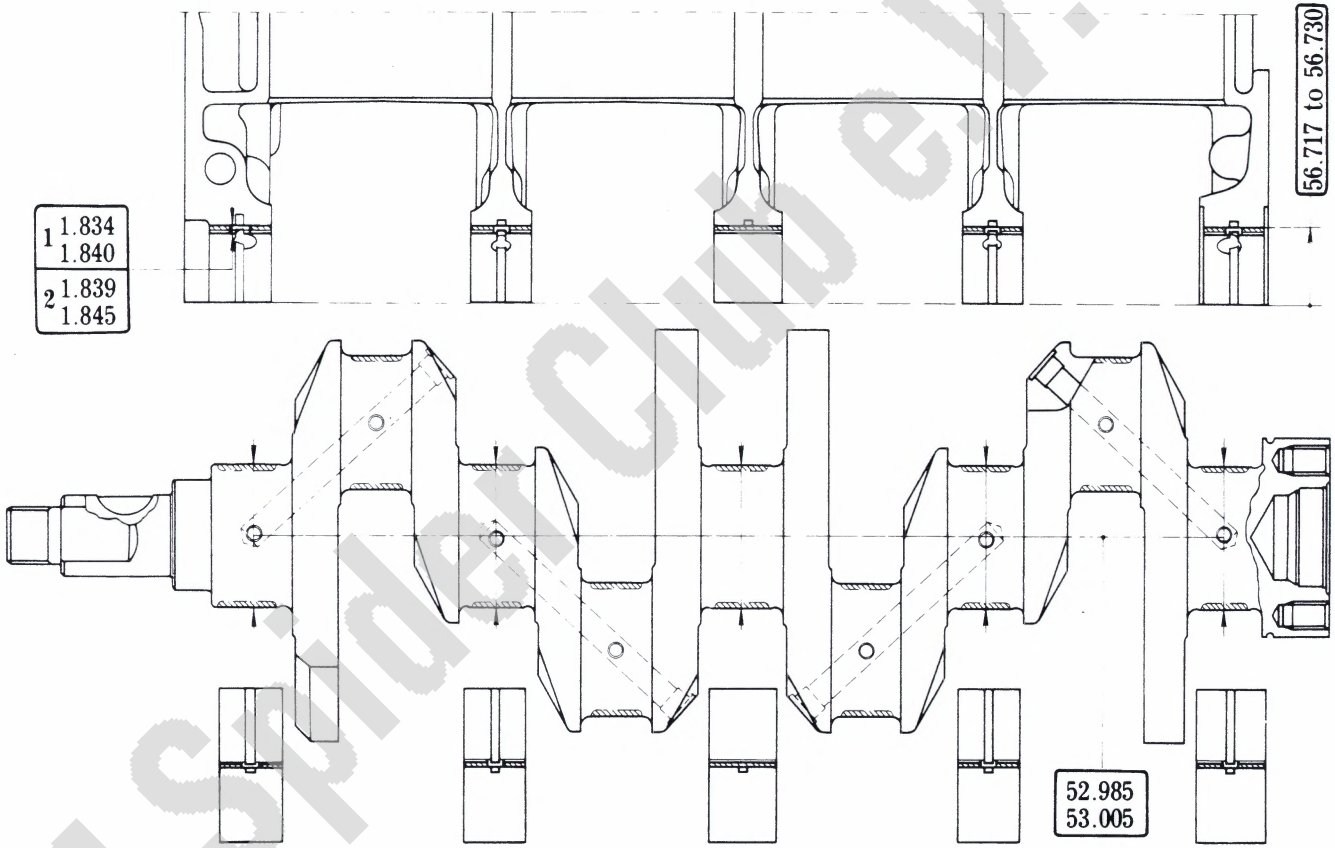
Inspect crankshaft for cracks.

Inspect crankshaft for scoring on journals. Slight scoring can be refinished using extra-fine carborundum stone.

Deep scoring, or if journals show an out-of-round condition in excess of .0002 in. (0.005 mm), must be corrected by grinding journals to next undersize.

Main bearing journals and crankpins should be reground to the undersize diameters called for in the Specifications if they are damaged or worn.

After grinding and polishing, clean crankshaft to remove every trace of abrasive material. Flush the oilways several times.

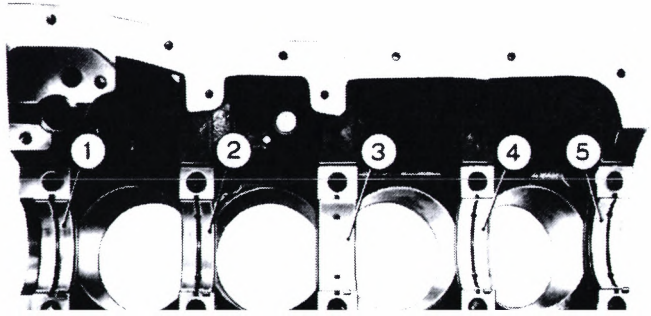


MAIN DATA OF CRANKSHAFT MAIN BEARINGS AND SADDLE BORES IN CRANKCASE

Bearings

If bearings show signs of scoring, seizing or excessive wear, replace them.

If bearings are good, check clearance between bearings and crankshaft.



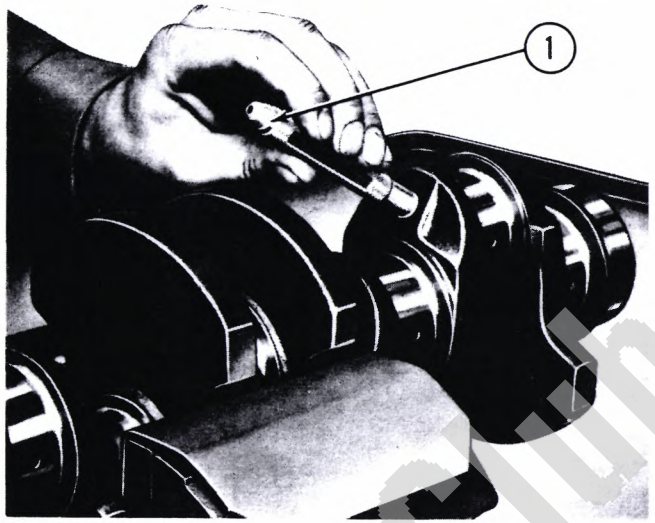
1. Front bearing 2. Intermediate front bearing 3. Center bearing, without oil groove 4. Intermeidate rear bearing 5. Rear bearing

After journals have been ground to size and polished, crankshaft must be thoroughly cleaned to remove all metal and abrasive particles.

To clean oilways properly, welch plugs must be removed. Then ream plug bores using reamer A.94016. Thoroughly flush oilways with solvent and blow dry with compressed air.

After completing above operations, drive new welch plugs into place with driver A.86010 (1) and stake them with a punch.

1. Driver A.86010



Crankshaft Balance

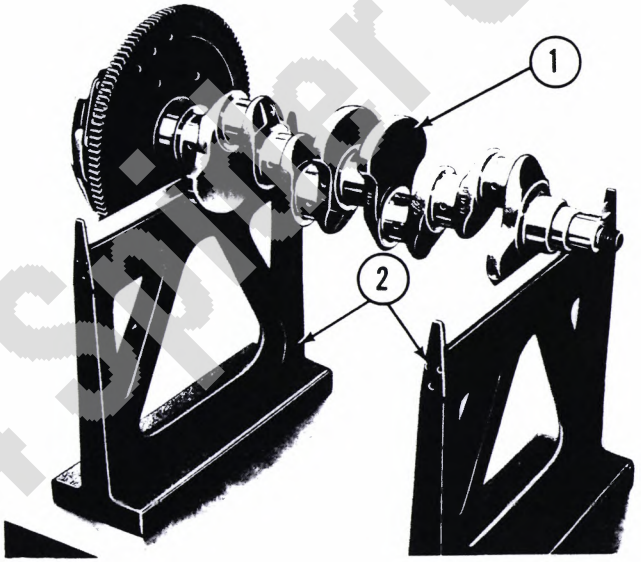
Place two parallel blocks (2) on a surface plate.

Set crankshaft-flywheel-clutch assembly (1) on parallel blocks.

If assembly shows a tendency to roll towards one side, stick some putty on opposite side until assembly stops moving. Weighing amount of putty used will provide an indication of unbalanced weight.

To correct situation, drill holes on flywheel at point D (next figure) as required to remove corresponding weight of metal.

1. Crankshaft-flywheel-clutch assembly 2. Parallel blocks



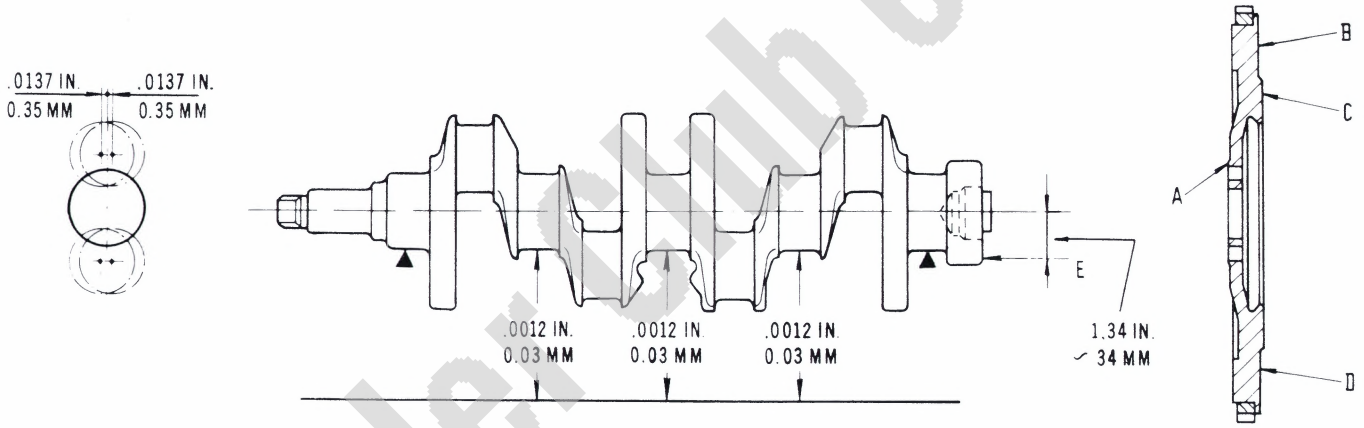
Flywheel and Ring Gear

Inspect condition of ring gear teeth. If there is any obvious damage, replace ring gear.

A hydraulic press should be used to install new ring gear onto flywheel, after heating gear to 176°F (80°C) in an oil bath.

Make sure flywheel contact surfaces with crankshaft and clutch driven disc are smooth and free from scratches or scores. Surfaces should also be perfectly flat and at right angles to flywheel rotation axis.

Rotate flywheel centered on crankshaft: a dial indicator resting at points B and C should not show variations in excess of .004 in. (0.1 mm).



A-B-C-E = points for checking alignment and squareness with respect to rotation axis.
D = drilling points for crankshaft-flywheel-clutch assembly balancing holes.

Checking Main Bearing Journals and Crankpins for Misalignment

Rest crankshaft ends on two parallel blocks and check the following with a dial indicator.

Main journal misalignment: maximum allowable tolerance .0012 in. (0.03 mm) (total dial gauge reading).

Crankpin misalignment: maximum allowable tolerance, with respect to journals, ±.0137 in. (±0.35 mm).

Main bearing journal and crankpin out-of-round: maximum allowable tolerance after regrinding, .0002 in. (0.005 mm).

Main bearing journals and crankpins taper: maximum allowable tolerance after regrinding, .0002 in. (0.005 mm).

Squareness of flywheel resting face to crankshaft centerline: when rotating crankshaft, a dial indicator resting laterally some 1.34 in. (34 mm) from crankshaft centerline, should not show variations in excess of .001 in. (0.025 mm).

If inspection of main bearing journals and crankpins alignment reveals distortions, the shaft should be straightened using a hydraulic press, taking care not to subject shaft to excessive stress which could damage its internal structure.

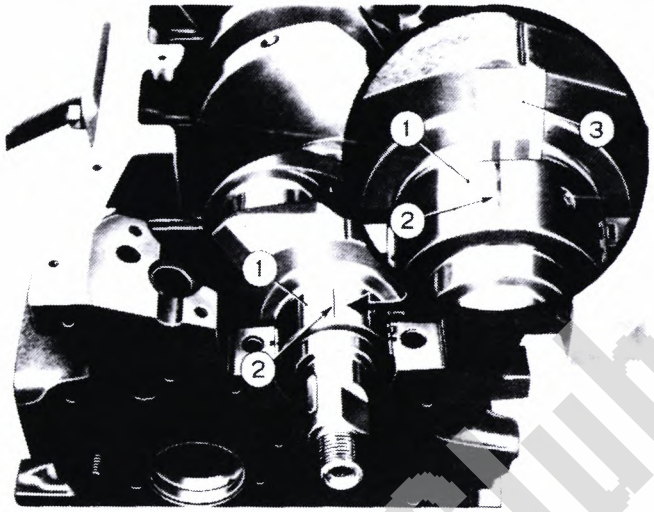
Place a length of calibrated plastic wire (2) on journal (1).

Install bearing caps and shells. Torque cap bolts to 83 ft. lbs. (11.5 kgm).

Torque smaller bolt for front cap to 59 ft. lbs. (8.2 kgm). Remove caps.

Compare width of wire to scale (3) to determine clearance. If clearance is not between 0.0012 to 0.0030 in. (0.032 to 0.077 mm), replace bearings with undersize ones.

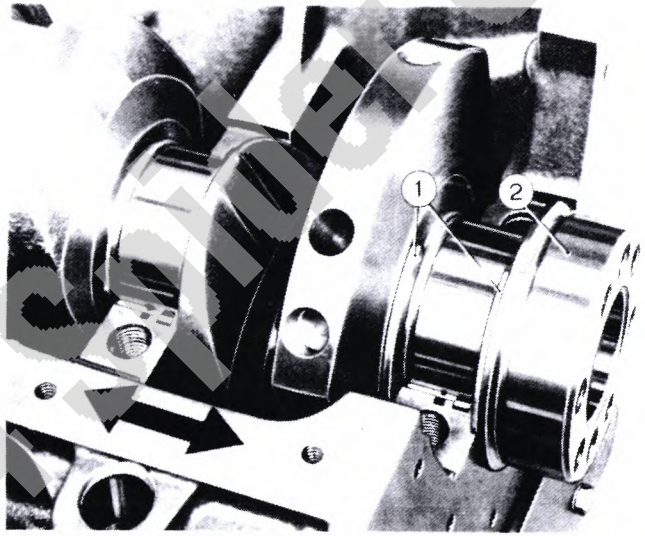
1. Journal 2. Calibrated wire 3. Scale



Check crankshaft end play using a dial indicator. Move the crankshaft (2) axially (arrows) using two screwdrivers. If end play is not between 0.0021 to 0.0120 inch (0.055 to 0.305 mm), replace thrust rings (1).

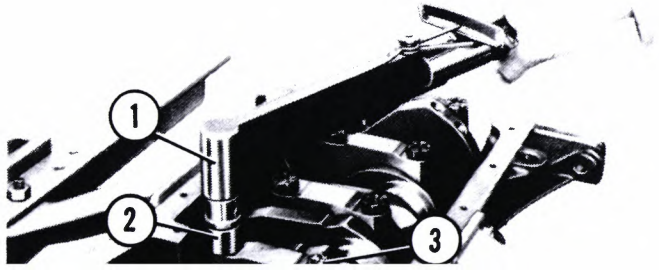
Make sure side of thrust ring with groove faces shoulder of crankshaft.

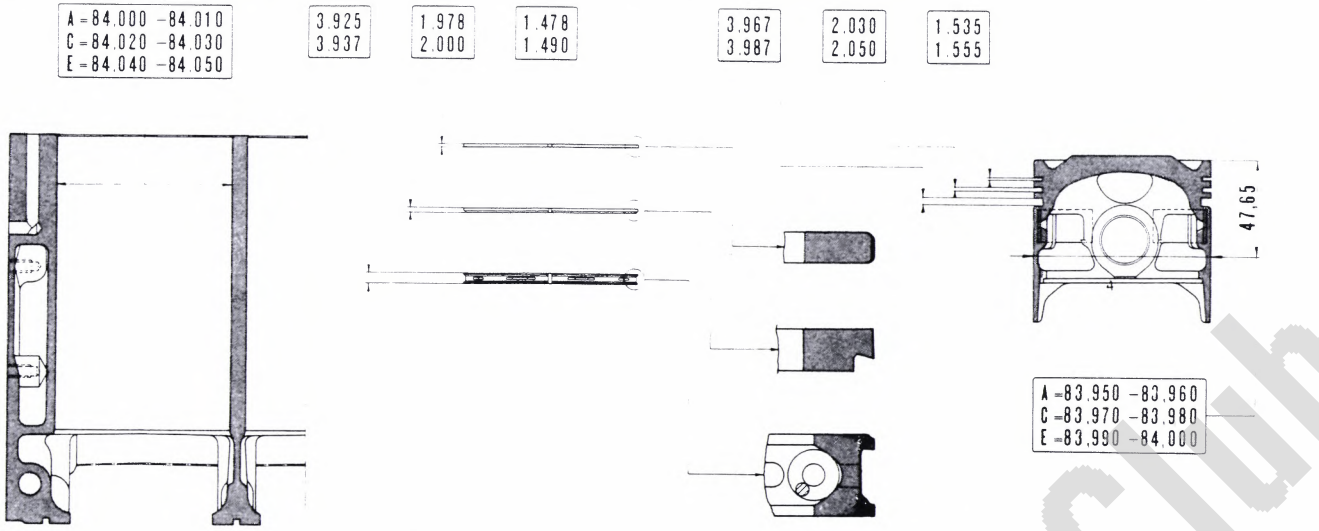
1. Thrust rings 2. Crankshaft



Install bearing cap (4). Torque cap bolts to 83 ft. lbs. (11.5 kgm). Torque smaller cap bolt (5) to 59 ft. lbs. (8.2 kgm).

1. Torque wrench 2. Socket 3. Cap bolt 4. Main bearing cap
5. Small cap bolt





MAIN DATA OF CYLINDER BORE, PISTON, AND RINGS

PISTONS

Piston class and piston bore class are identified by letter and number stamped on underside of piston bosses. Piston pin class is stamped on pin surface.

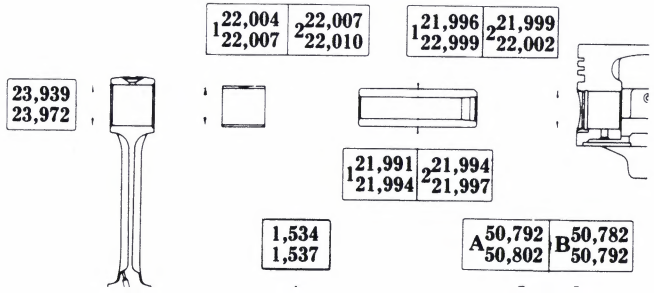
1. Piston pin class 2. Piston class 3. Connecting rod matching number

INSPECTING

Before assembling, check that the four pistons are the same weight within ±0.18 oz. (±5 g).

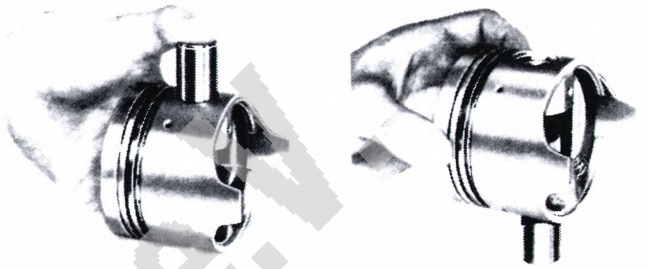
The fit clearance of the piston pin in the small end bushing is 0.0004 to 0.0006 inch (0.010 to 0.016 mm).

The fit clearance of the piston pin in the piston boss is 0.0001 to 0.0003 inch (0.002 to 0.008 mm).



To check pin fit in piston bore, coat piston bore.

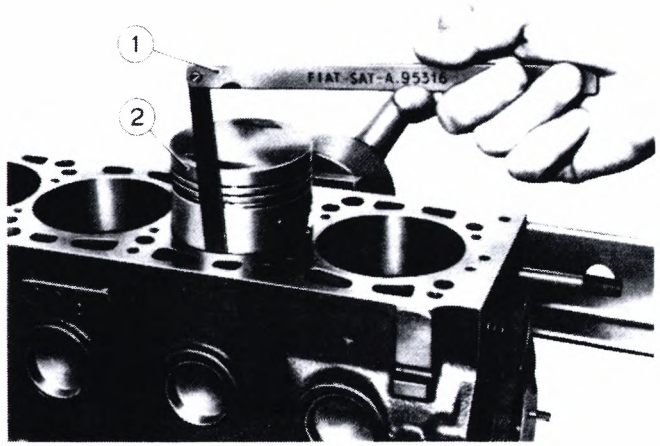
Pin should slide in by thumb pressure and should not fall out when piston is held in vertical position.



Check piston clearance in cylinder bore. Use a feeler gauge.

Clearance should be 0.0016 to 0.0024 inch (0.040 to 0.060 mm) measured at right angles to the pin at 1.876 inches (47.65 mm) from the piston head.

1. Feeler gauge 2. Piston



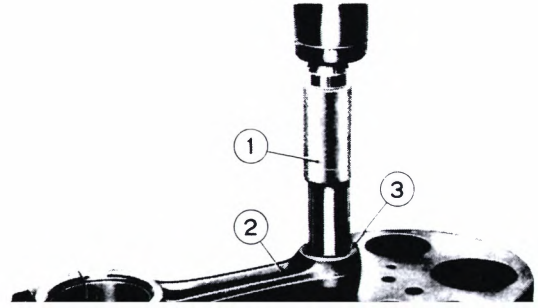
CONNECTING ROD

REPLACING BUSHING

To replace small end bushing, use a press. After installing, grind bushing to obtain the specified clearnace for the piston pin.

Grind bushing to eliminate any out-of-round condition or scoring.

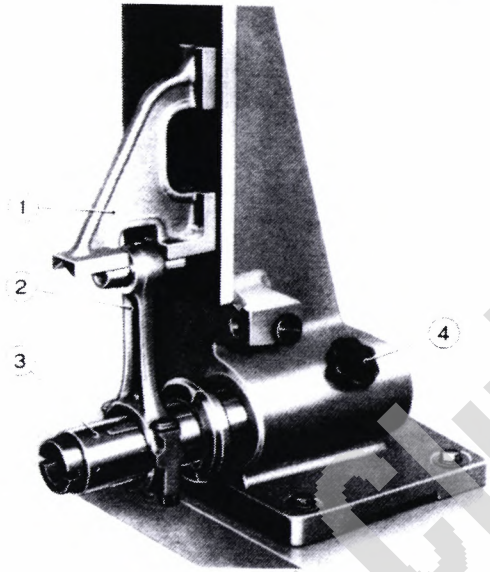
1. Bushing installer 2. Connecting rod 3. Small end bushing



INSPECTING

Check alignment of big-end and small-end axes measured at 4.92 in. (125 mm) from shank.

Maximum allowable misalignment is 0.0031 inch (0.08 mm).

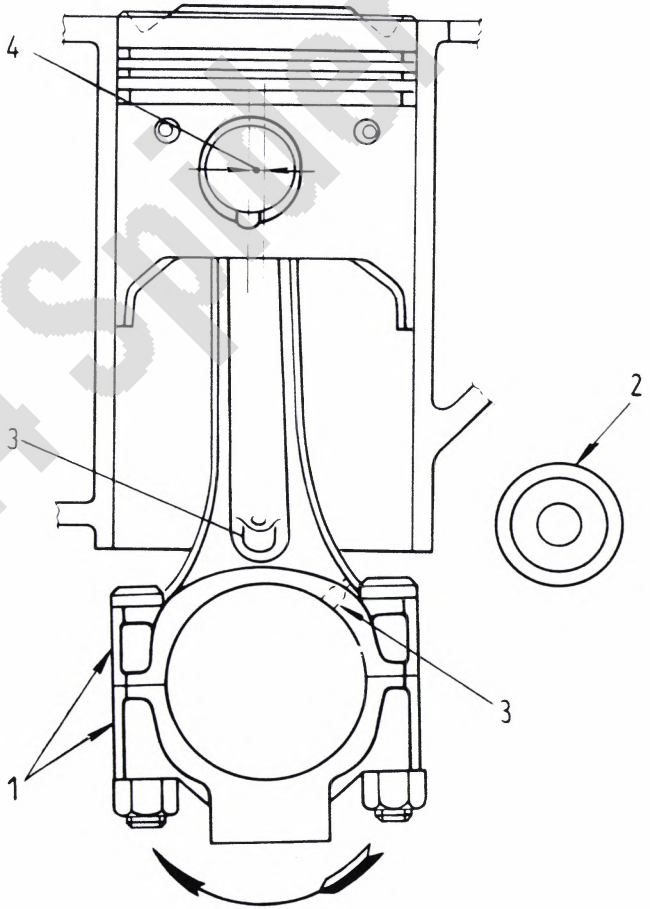


1. Square 2. Connecting rod and pin 3. Expansible blade arbor
4. Arbor lock

Piston boss bore is 0.08 inch (2 mm) offset.

When assembling piston to connecting rod, make sure number on connecting rod faces the piston bore offset.

When installing the assembly, make sure numbers on connecting rod face away from side with auxiliary shaft.



Install piston pin. Secure pin with circlips. Make sure gap in circlip is not in line with slot in piston.

1. Location of connecting rod to cylinder matching number
2. Auxiliary shaft 3. Oil holes 4. Piston pin offset

RINGS

INSTALLING

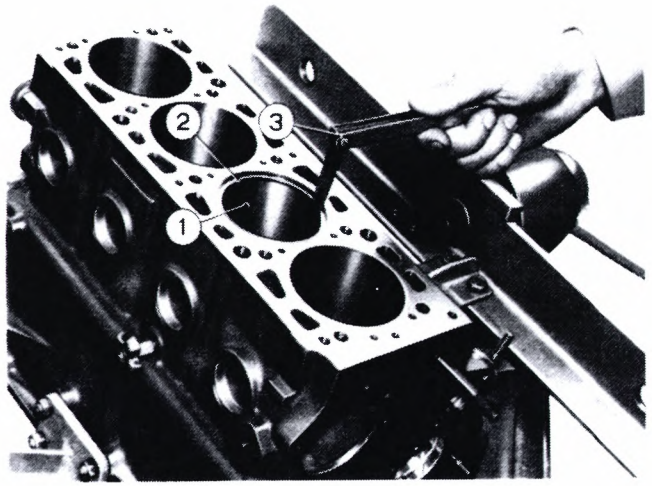
Before installing rings on pistons, push rings down in groove. Check clearance with feeler gauge. See Specifications.

1. Ring 2. Piston 3. Feeler gauge

Push rings squarely into cylinder bore. Using feeler gauge, check ring end gap. See Specifications.

When installing rings, stagger end gaps 120° apart.

1. Cylinder bore 2. Ring 3. Feeler gauge

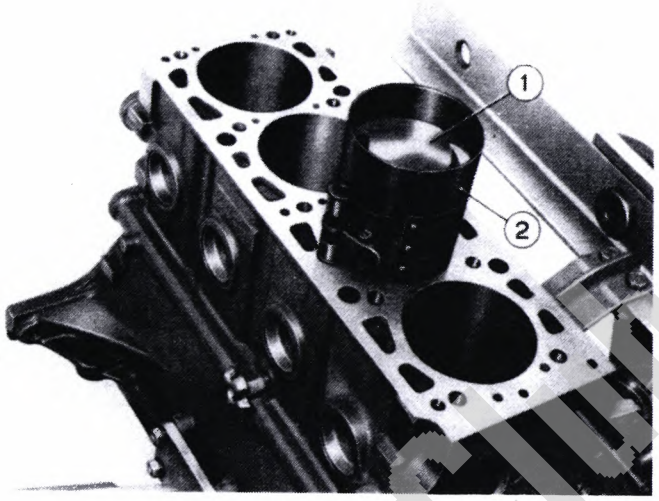


INSTALLATION

Make sure cylinder bores are lubricated with light engine oil before installing connecting rod-piston assemblies.

Install assemblies with numbers on connecting rods facing away from auxiliary shaft.

1. Piston 2. Ring compressor



Place a length of calibrated wire on crankpin. Install connecting rod cap. Torque cap nuts to 38 ft. lbs. (5.1 kgm).

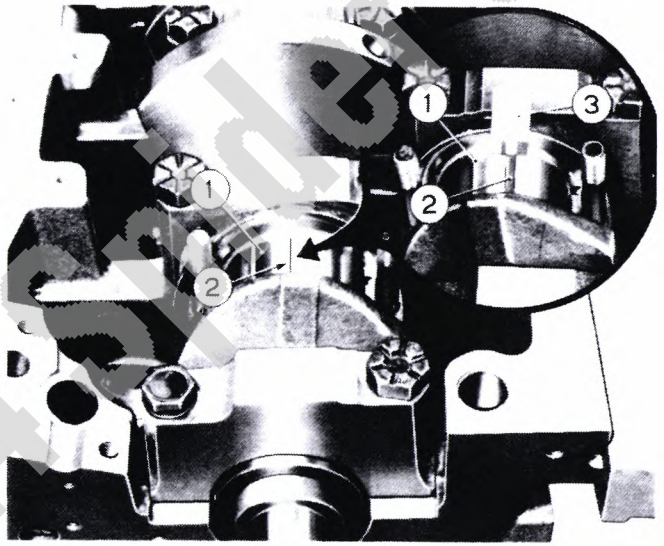
Remove caps.

Compare width of wire with scale to determine clearance.

Clearance should be:

0.0008 to 0.0025 in. (0.021 to 0.065 mm)

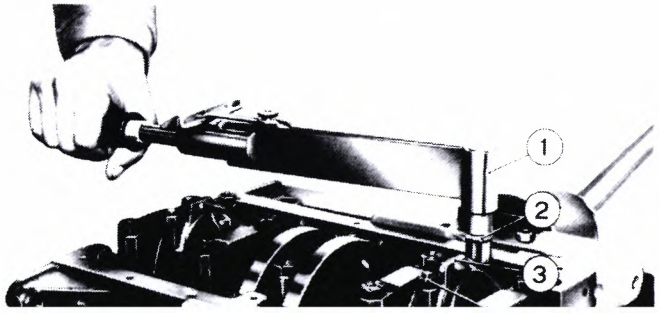
1. Crankpin 2. Calibrated wire 3. Scale



Install caps and nuts.

Torque nuts to value specified in Engine Specifications.

1. Torque wrench 2. Socket 3. Cap 4. Cap nut



TIMING BELT

REPLACING (Engine in car)

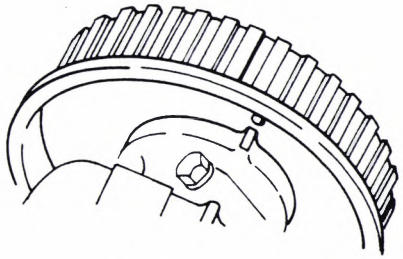
CAUTION: Timing belts cannot be reused. Once tension is relieved, replace timing belt. When a timing belt is removed, do not turn camshaft independent of engine. Valves may be damaged.

Disconnect battery ground cable.

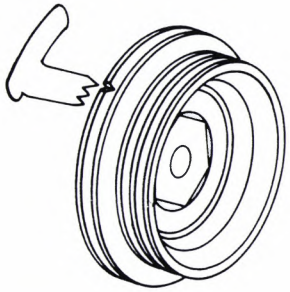
Remove spark plugs.

Turn engine to set timing mark as shown.

Engine is set to fire on No. 4 cylinder.



CAMSHAFT TIMING



CRANKSHAFT TIMING

Remove heated air hose from exhaust shroud and air cleaner (carburetored engines only).

Remove all drive belts from crankshaft pulley.

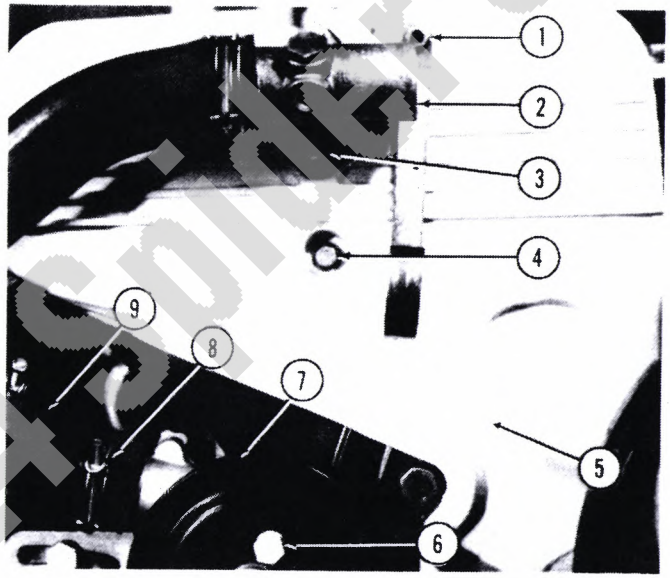
Partially drain cooling system.

Remove upper radiator hose from union (2).

Remove two bolts (3) and washers, then pull union (2) away from cylinder head.

Remove two bolts (4) and two nuts (1) to remove timing belt cover (5).

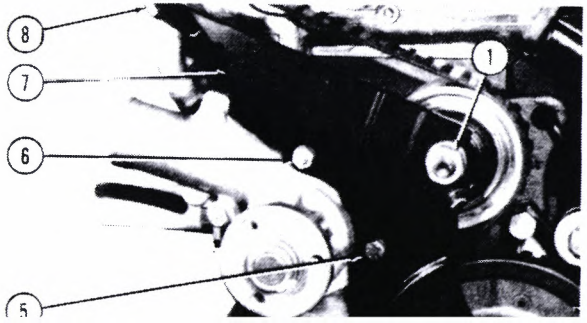
Remove three water pump pulley bolts (6) and remove water pump pulley.



1. Nut 2. Union 3. Bolt 4. Bolt 5. Timing belt cover 6. Bolt
7. Pulley 8. Clamp 9. Hose

Remove nut (4) holding crankshaft pulley (3). Use 38 mm socket. Remove pulley.

Remove four bolts (2, 5 and 8) and two nuts (1 and 6) holding lower sheet metal timing cover (7). Remove cover.

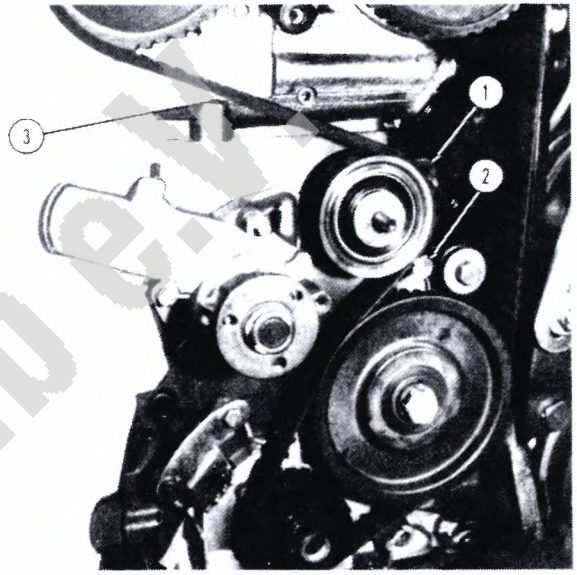


1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut
7. Timing belt cover 8. Bolt

Loosen bolt (2) for tensioner bracket (1). Pry pulley to release belt tension. Retighten bolt (2) to hold pulley in belt-slackened position.

Remove timing belt (3). Mark belt as not reuseable.

1. Tensioner bracket 2. Bolt 3. Timing belt



Turn auxiliary shaft sprocket to align hole (6) in sprocket with sprocket bolt (7) and spring retaining bolt (5).

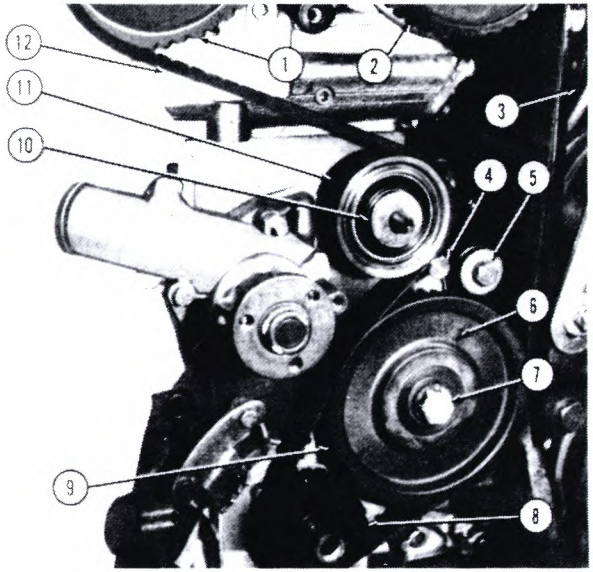
Wrap new timing belt (12) over crankshaft sprocket (8), auxiliary shaft sprocket (9), intake camshaft sprocket (2) and exhaust camshaft sprocket (1).

Make sure all play is between exhaust camshaft sprocket (1) and tensioner pulley (11).

Place timing belt over tensioner pulley. Loosen tensioner bracket bolt (4) and allow tensioner pulley to take out play. DO NOT apply additional force to tensioner pulley.

Turn crankshaft two full turns. Check that timing is correct, then tighten tensioner bracket bolt.

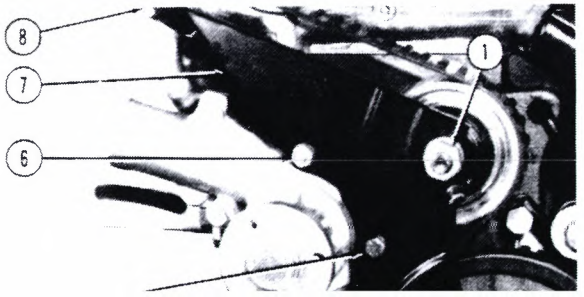
1. Exhaust camshaft sprocket 2. Intake camshaft sprocket 3. Oil dipstick tube 4. Tensioner bracket bolt 5. Spring retaining bolt 6. Hole 7. Bolt 8. Crankshaft sprocket 9. Auxiliary shaft sprocket 10. Spacer 11. Tensioner pulley 12. Belt



Install lower sheet metal timing belt cover with four bolts (2, 5 and 8) and two nuts (1 and 6). Torque nut (1) to 33 ft. lbs. (4.5 kgm).

Coat crankshaft pulley (3) inside diameter with anti-seize compound. Place pulley on crankshaft. Secure pulley with nut (4). With flywheel blocked, torque nut to 181 ft. lbs. (25 kgm).

1. Nut 2. Bolt 3. Crankshaft pulley 4. Nut 5. Bolt 6. Nut 7. Timing belt cover 8. Bolt



Install water pump pulley (7) using three bolts (6).

Install timing belt cover (5) and retain with two bolts (4) and two nuts (1).

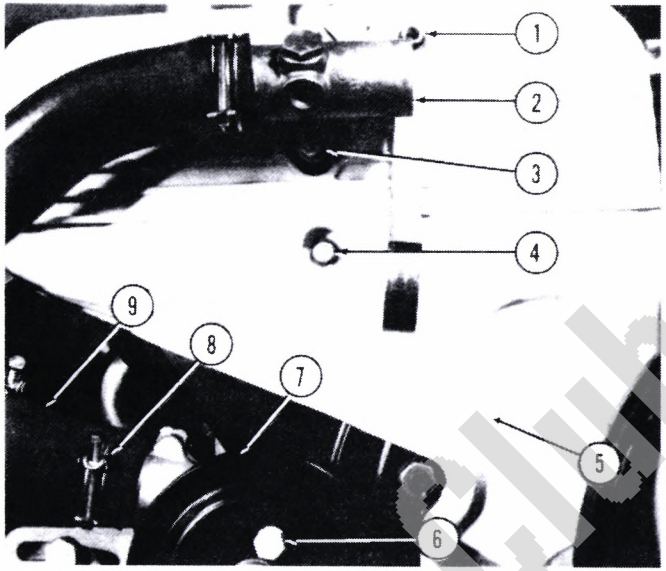
Install drive belts on crankshaft pulley and tension to specifications.

Install union gasket, union (2) and two bolts (3) and washers. Attach upper radiator hose to union.

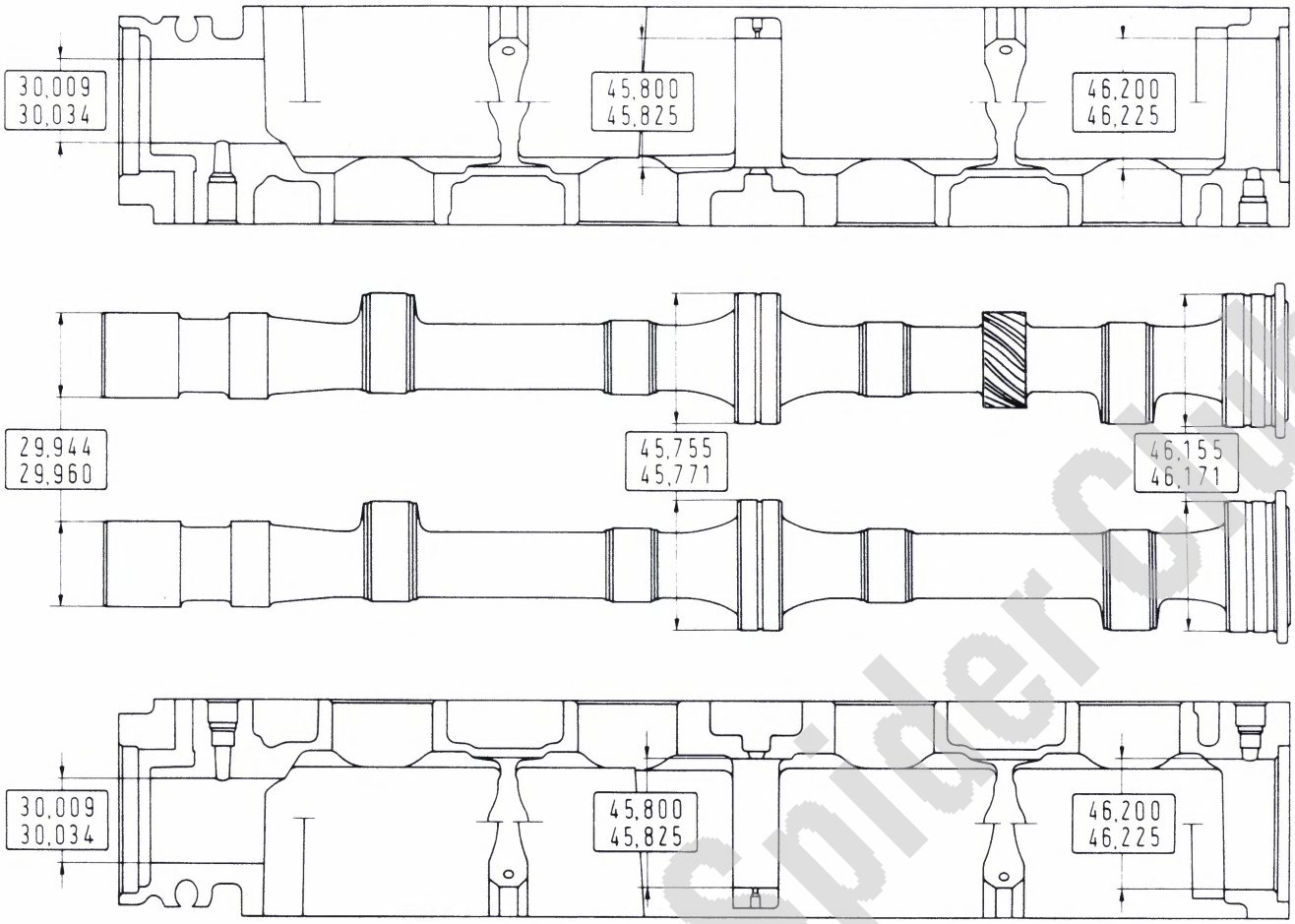
Install heated air hose on exhaust shroud and air cleaner (carburetored engines only).

Install spark plugs.

Fill cooling system.



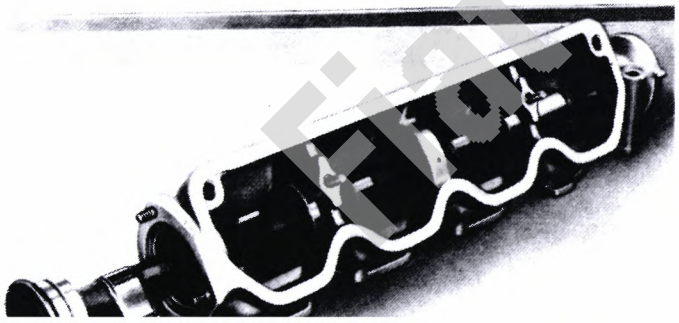
1. Nut 2. Union 3. Bolt 4. Bolt 5. Timing belt cover 6. Bolt 7. Pulley 8. Clamp 9. Hose

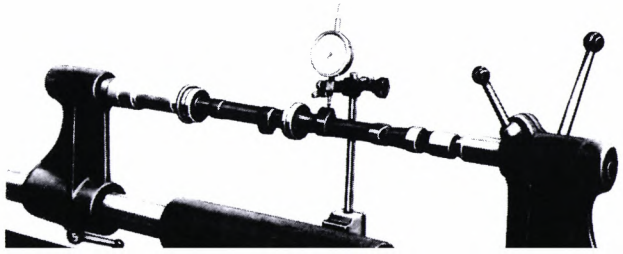


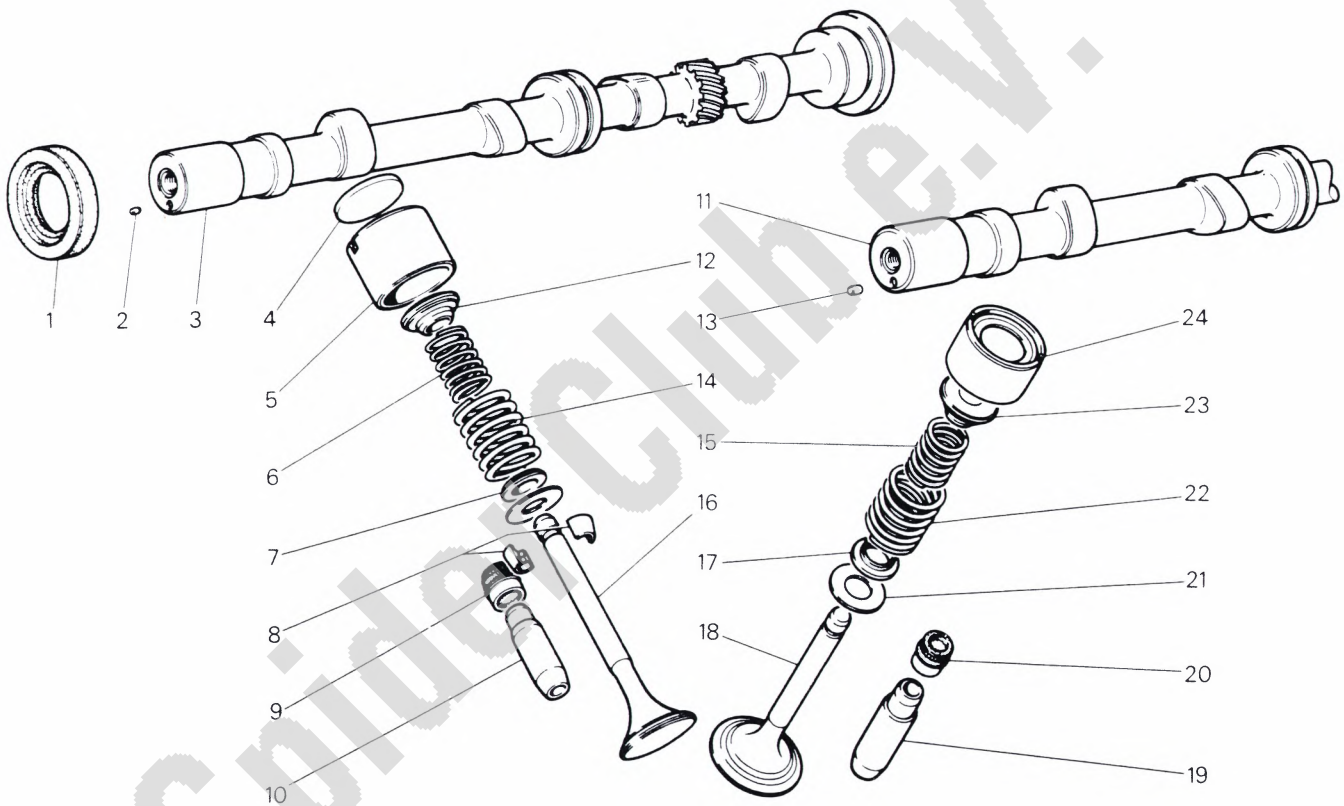
MAIN DATA OF CAMSHAFTS AND SEATS IN CAMHOUSING

INSPECTION

Place camshaft between points. Set dial indicator to check both intake and exhaust camshaft lobe lift. Lobe lift (without play) should be 0.3765 in. (9.564 mm) for both. Check runout. Runout must not exceed 0.0008 in. (0.02 mm).







1. Camshaft seal
2. Exhaust camshaft dowel
3. Exhaust camshaft
4. Tappet plate
5. Exhaust valve tappet
6. Exhaust valve inner spring
7. Lower cup
8. Locks
9. Exhaust valve oil seal
10. Exhaust valve guide
11. Intake camshaft
12. Upper cup
13. Dowel
14. Exhaust valve outer spring
15. Intake valve inner spring
16. Exhaust valve
17. Lower cup
18. Intake valve
19. Intake valve guide
20. Oil seal
21. Washer
22. Intake valve outer spring
23. Upper cup
24. Intake valve tappet

VALVE MECHANISM COMPONENTS

TAPPET CLEARANCE (Engine Cold)

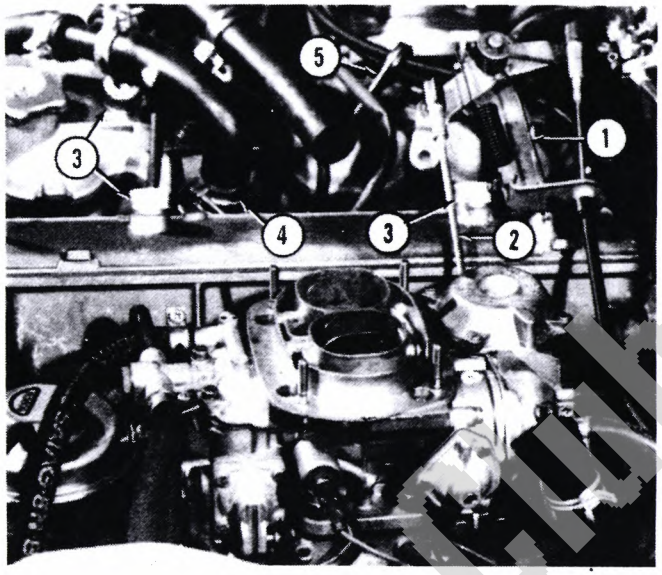
On carburetored engines, remove air cleaner.

Remove two nuts to disconnect accelerator linkage (1) from cam cover. Lay linkage to one side.

On engines with air pump, remove hose from air pump check valve (4).

Remove spark plug wires from support (5).

Remove four bolts (3) holding cam covers. Remove covers and gaskets.



1. Accelerator linkage 2. Accelerator rod 3. Bolt 4. Check valve 5. Support bracket

On fuel injected engines, loosen clamps (1) to remove air inlet hose (2).

NOTE: On turbo-charged engines, remove auxiliary air regulator fitting from compressor discharge plenum, loosen clamps and mounting bracket to remove plenum.

Loosen auxiliary air regulator (3) line clamp (4) and pull line off regulator.

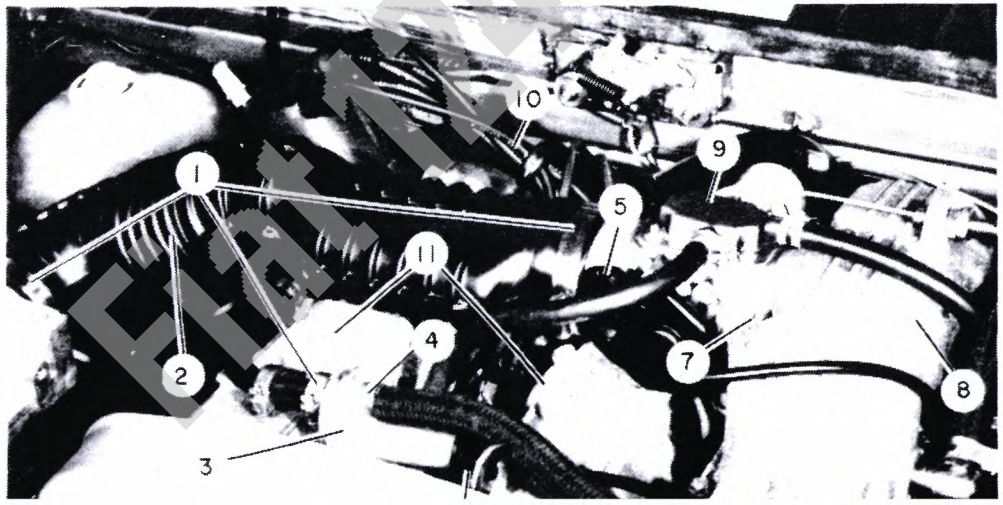
Disconnect electrical connectors (5) on throttle body and auxiliary air regulator.

Remove six bolts (6) and two nuts (7) to separate intake manifold halfs (8). Without disconnecting throttle body heater (9) hoses, place intake manifold half away from cam cover.

Remove spark plug wires (10) from support.

Remove four bolts (11) holding cam covers. Remove covers and gaskets.

1. Clamp 2. Air inlet hose 3. Auxiliary air regulator 4. Clamp 5. Electrical connector 6. Bolt 7. Nut 8. Intake manifold 9. Throttle body heater 10. Spark plug wires 11. Bolt

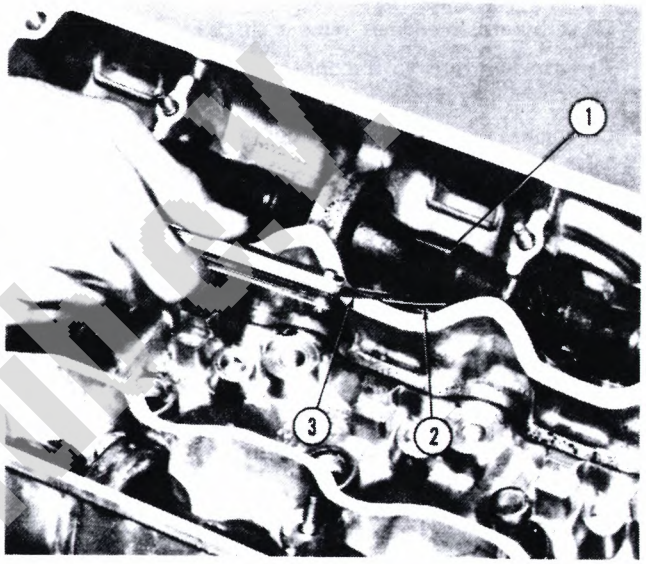


Position camshaft so that lobe (1) for valve being checked is pointing up and at right angle to valve.

Measure clearance between camshaft (1) and tappet plate (2).

Clearance: Intake - 0.015 to 0.019 in.
(0.41 to 0.48 mm)
Exhaust - 0.018 to 0.021 in.
(0.46 to 0.53 mm)

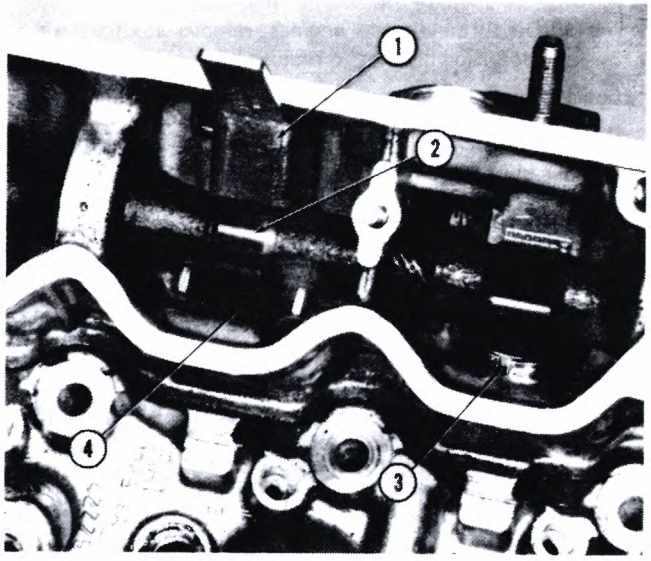
1. Camshaft lobe 2. Tappet 3. Feeler gauge



Rotate tappet (4) so that notch (3) is facing out as shown.

If adjusting is necessary, pry tappet down using tool A.60443. If tool is not available, rotate camshaft (2) down to depress tappet. Install clamping tool A.60594 (1).

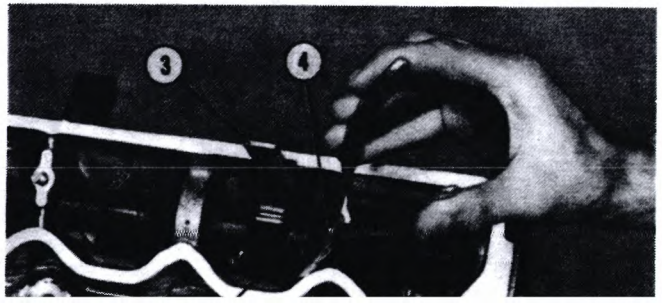
1. Clamping tool A.60594 2. Camshaft lobe 3. Notch on tappet
4. Tappet



Rotate camshaft up to gain clearance between lobe and tappet plate (2).

Lift plate thru notch (1) with scribe. Remove plate with tool A.87001 (4). Install new tappet.

NOTE: Tappet plate thickness is stamped on face of plate. Install this face toward tappets. If number on plate(s) is not visible, determine needed thickeness with a micrometer.



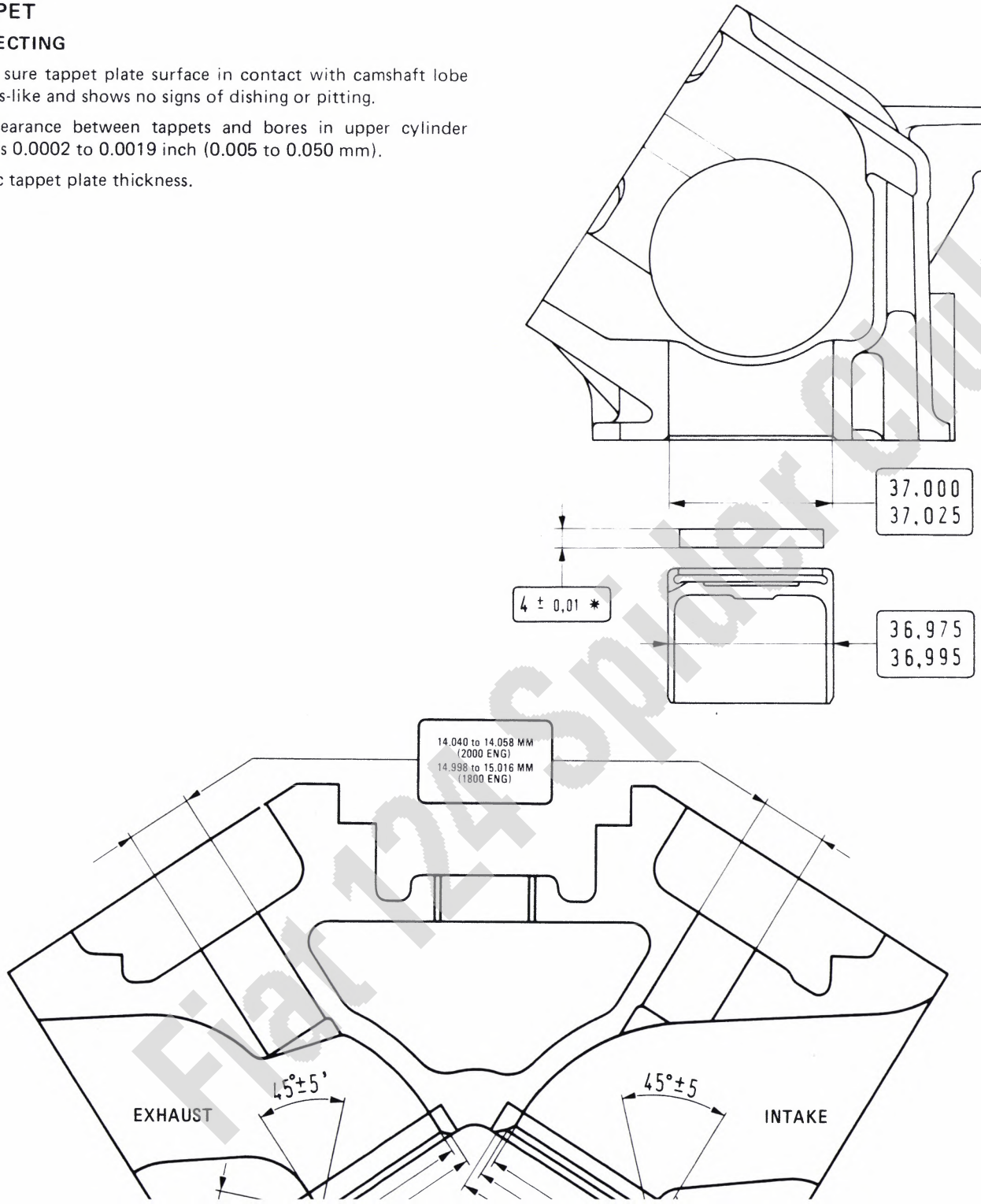
TAPPET

INSPECTING

Make sure tappet plate surface in contact with camshaft lobe is glass-like and shows no signs of dishing or pitting.

Fit clearance between tappets and bores in upper cylinder head is 0.0002 to 0.0019 inch (0.005 to 0.050 mm).

*Basic tappet plate thickness.



REFACING

Valve seats in cylinder head must not show evidence of pitting in contact face. If pitted, they must be refaced.

Make sure grinding stones have a taper of 45° ±5'.

Perform the refacing operation by hand.

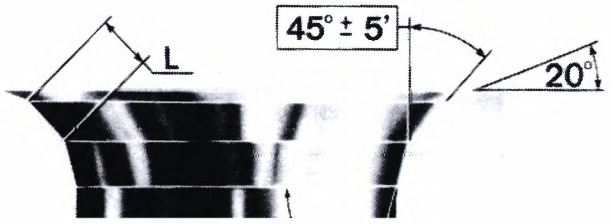
Reface valve seat using 45°.

1. Valve seat 2. Grinding stone 3. Pilot

Narrow seat width. Use a 20° valve seat reamer and a 75° reamer alternately.

1. Valve seat 2. Cutter 3. Pilot

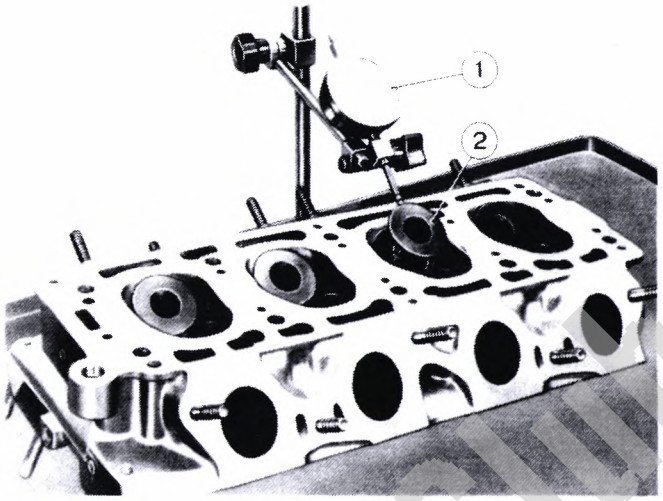
The width of intake and exhaust valve seats, after narrowing should be L = 0.08 inch (2 mm) approximately.



Valve stem must not be distorted or cracked. If necessary, replace valve.

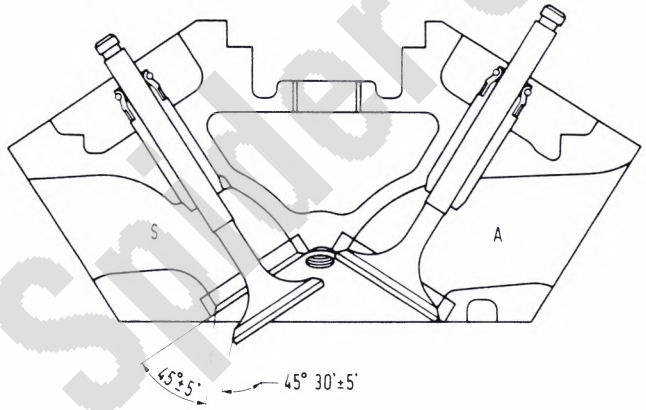
Maximum runout in a full turn, guided by stem with dial indicator resting at center of contact face, should not exceed 0.0012 inch (0.03 mm).

1. Dial indicator 2. Intake valve



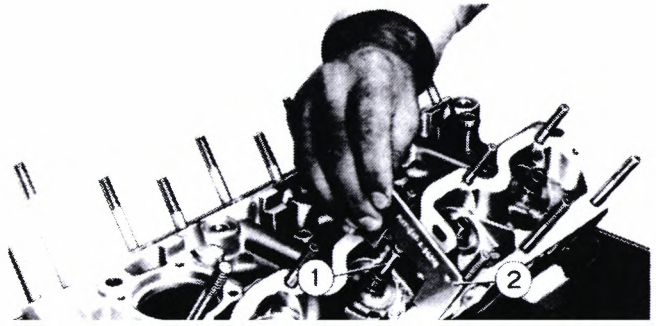
Check valve face for wear or damage. If necessary, reface valve.

After refacing, check that the thickness of the valve at edge of head is not less than 0.02 inch (0.5 mm).



After refacing, valve will seat lower in its seat and result in excessive valve stem (2) height. Check height of valve stem above cylinder head with gage A.96218 (1) as shown. If height exceeds gage check, valve stem must be ground off to reduce height within limits.

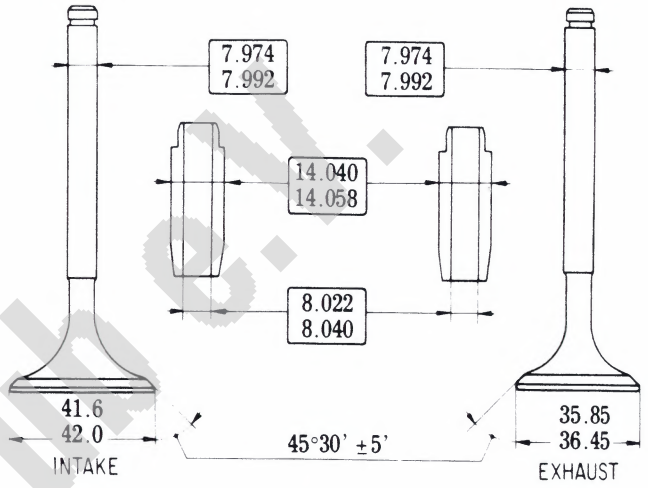
1. Gage A.96218 2. Valve stem



VALVE GUIDES AND SPRINGS

REPLACING

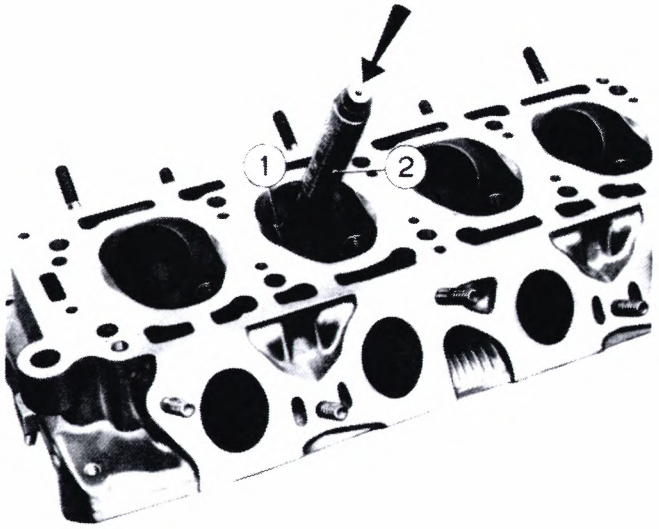
Valve stem to valve guide clearance is 0.0012 to 0.0026 inch (0.030 to 0.066 mm).



Valve guides (1) should be replaced whenever an excessive clearance between valve stem and guide cannot be corrected by replacing the valve or if guides become loose in their bores in the head.

Use tool A.60395 (2) to remove guides.

1. Valve guides 2. Tool A.60395

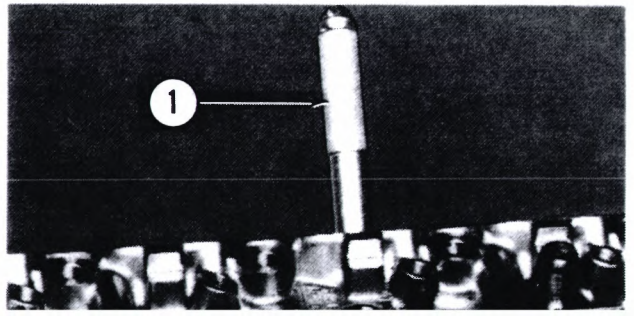


Press guides into lower cylinder head.

Use tool A.60462.

The interference between guide and bore is 0.0024 to 0.0042 in. (0.063 to 0.108 mm).

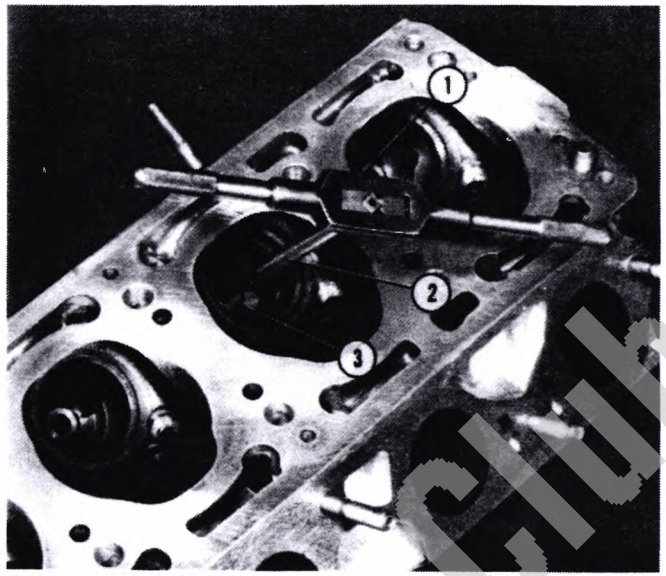
1. Tool A.60462



Replacement guides (3) are prefinished to size on the inside diameter.

If press fitting causes minor faults, refinish guide. Use reamer A.90310 (2).

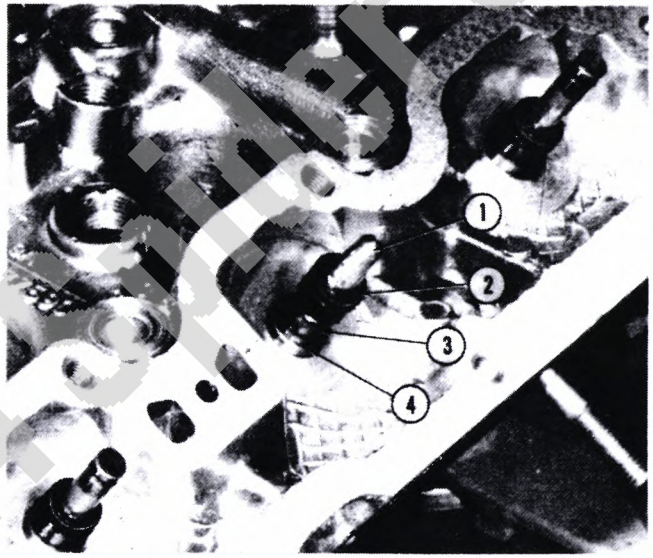
1. Mandrel 2. Reamer A.90310 3. Valve guide



Install oil seal (2) on valve guides (4) as follows:

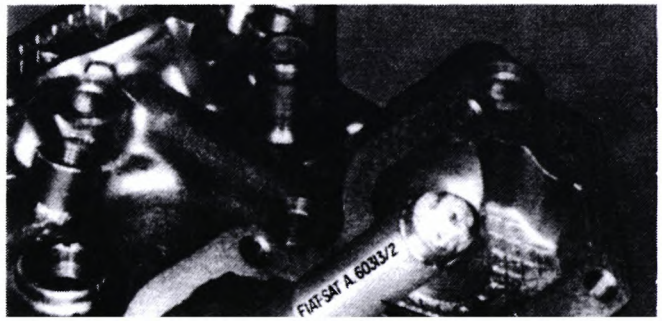
Place oil seal on pilot A.60313 (1). Mount pilot on valve stem (3). Slide seal over stem.

1. Pilot 2. Oil seal 3. Valve stem 4. Valve guide



Press oil seal onto milled upper end of valve guide (2). Use installer A.60313/2 (1).

1. Installer A.60313/2 2. Valve guide



Test spring tension using fixture AP.5049.

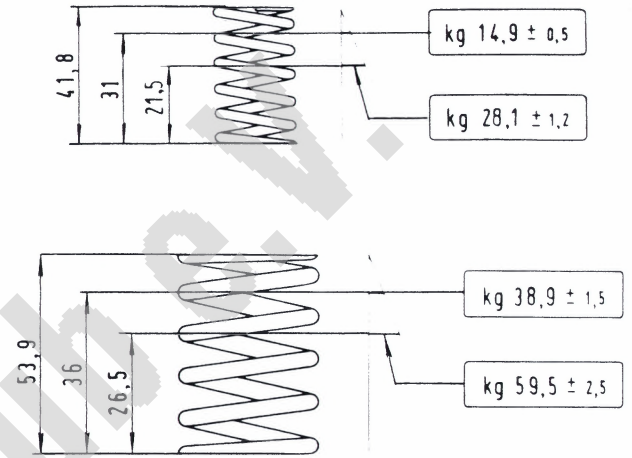
Main data for testing valve inner springs.

41.8 mm = 1.646 in	14.9 ± 0.5 kg = 33 ± 1.1 lbs
31 mm = 1.220 in	28.1 ± 1.2 kg = 64 ± 2.6 lbs
21.5 mm = .846 in	

Then compare the tension and deflection data read on the test fixture with the spring specifications shown on opposite figures.

Main data for testing valve outer springs.

53.9 mm = 2.122 in	38.9 ± 1.5 kg = 85 ± 3.3 lbs
36 mm = 1.417 in	59.5 ± 2.5 kg = 141 ± 5.5 lbs
26.5 mm = 1.043 in	



MAIN DATA FOR TESTING VALVE SPRINGS

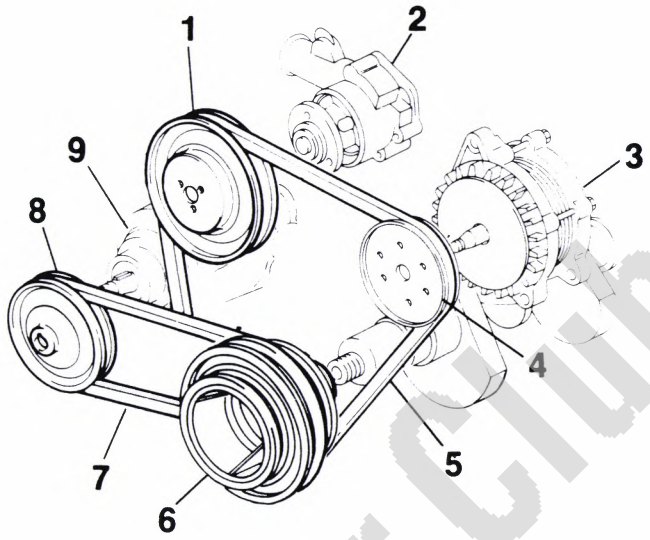
REPLACING AND ADJUSTING DRIVE BELTS

To replace drive belts, loosen alternator (3) mount bolts. Remove belt (5).

On vehicles with air pump, loosen air pump (9) mount bolts. Remove belt (7).

Air Pump Belt

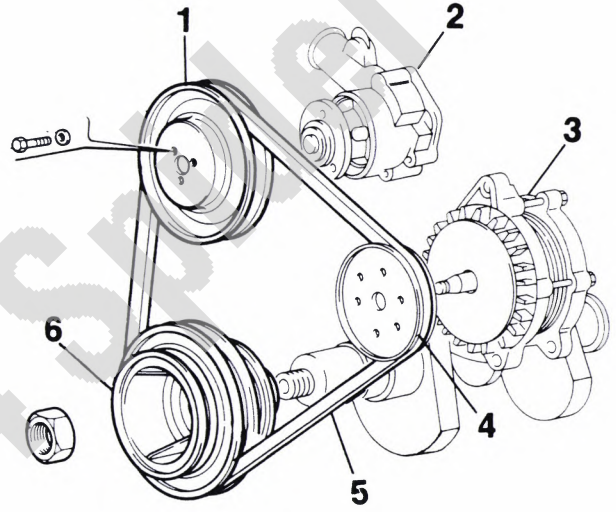
Install new belt (7) on air pump pulley (8) and crankshaft pulley (6). Install belt on rear groove of pulley (6). Fully tighten air pump belt (7) and air pump mount bolts. Check for about ½ inch belt deflection with moderate finger pressure.



1. Water pump pulley 2. Water pump 3. Alternator
4. Alternator pulley 5. Water pump/alternator belt
6. Crankshaft pulley 7. Air pump belt 8. Air pump pulley
9. Air pump

Alternator/Water Pump Belt

Install new belt (5) on water pump pulley (1), alternator pulley (4) and center groove on crankshaft pulley (6). Fully tighten belt (5) and alternator mount bolts. Check for about ½ inch belt deflection with moderate finger pressure.

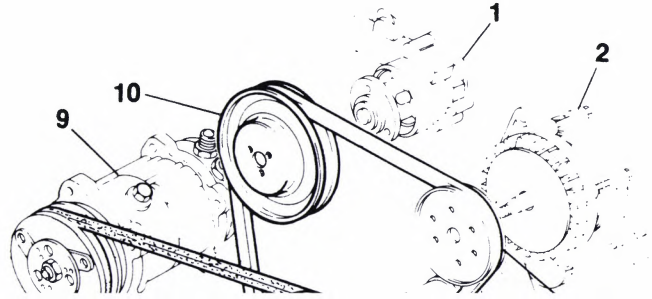


1. Water pump pulley 2. Water pump 3. Alternator
4. Alternator pulley 5. Water pump/alternator belt
6. Crankshaft pulley

A.C. Belt Without Turbo

Install new belt (6) over rear groove on crankshaft pulley (5) and front groove on compressor clutch (8). Make sure belt is under eccentric idler pulley (7). Make sure compressor (9) mounting bolts are tight.

Rotate idler pulley (7) down to set belt tention. Tighten bolt holding eccentric to bracket. Check for about ½ inch belt deflection with moderate finger pressure.



A.C. Belt With Turbo

Place new belt (6) over front groove of compressor clutch (8) and front groove of crankshaft pulley (5).

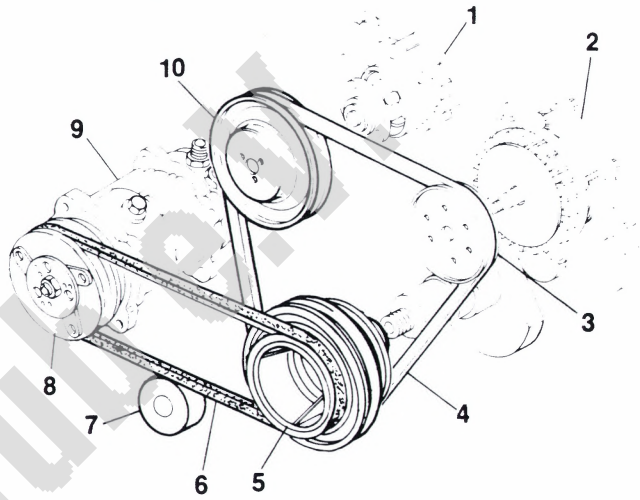
NOTE: Belt is exact fit and must be gently jumped over crankshaft pulley by turning engine with wrench (tool No. 50121).

Gently pull top of compressor (9) out and tighten upper front mounting bolt. Tighten lower front mounting bolt and then remaining two rear mounting bolts.

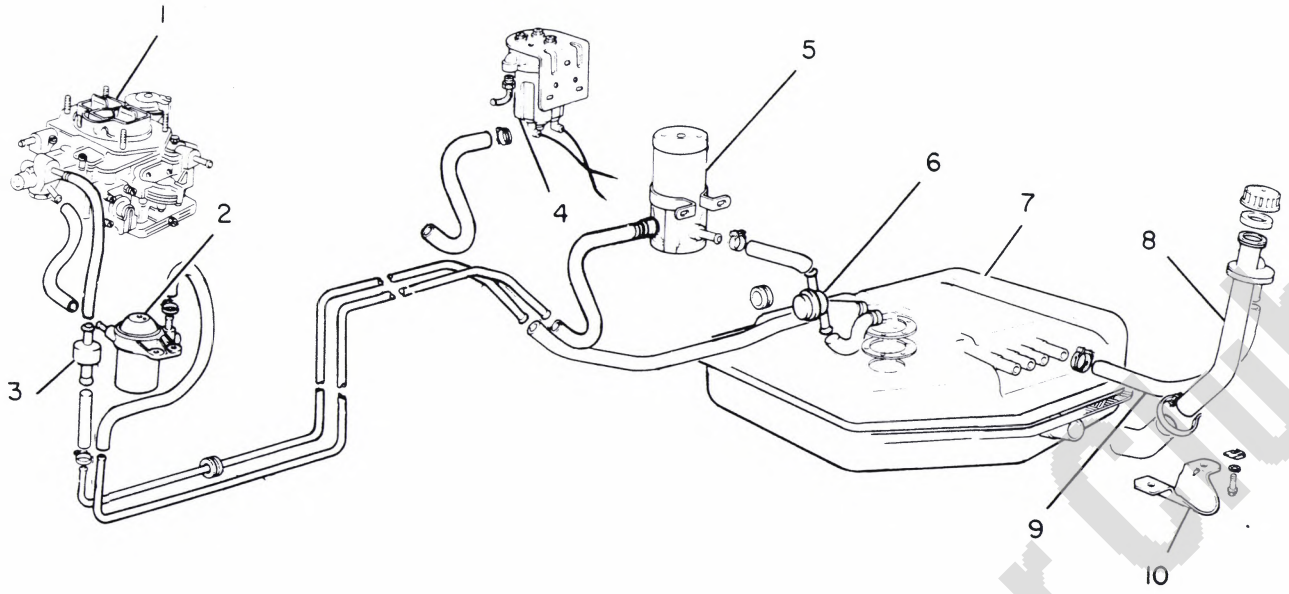
NOTE: This sets the drive belt tension.

Rotate eccentric idler pulley (7) up slightly against the belt (6). Tighten the bolt holding eccentric to compressor bracket.

NOTE: The drive belt (6) is at its proper tension when compressor (9) was adjusted. The idler pulley (7) is used for future belt adjustment if and when necessary.

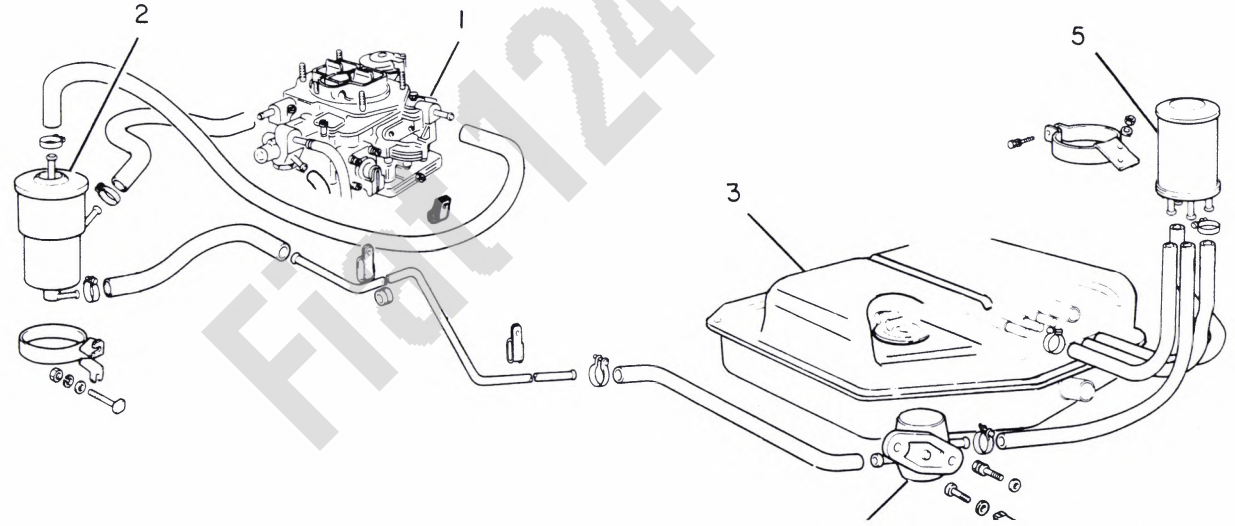


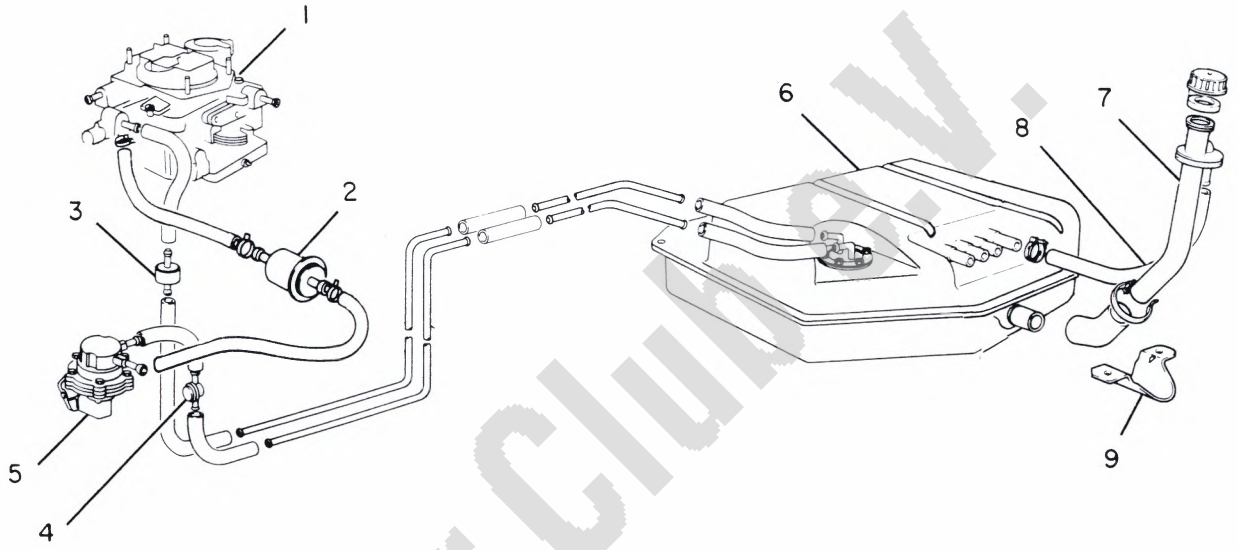
1. Water pump 2. Alternator 3. Alternator pulley
4. Water pump/alternator belt 5. Crankshaft pulley 6. A.C. belt
7. Eccentric idler pulley 8. Compressor clutch 9. Compressor
10. Water pump pulley



1. Carburetor
2. Fuel filter
3. Check valve
4. Fuel pump, Carter (replacement for Corona)
5. Fuel pump, Corona
6. Check valve
7. Fuel tank
8. Filler line
9. Overflow line
10. Filler line shield

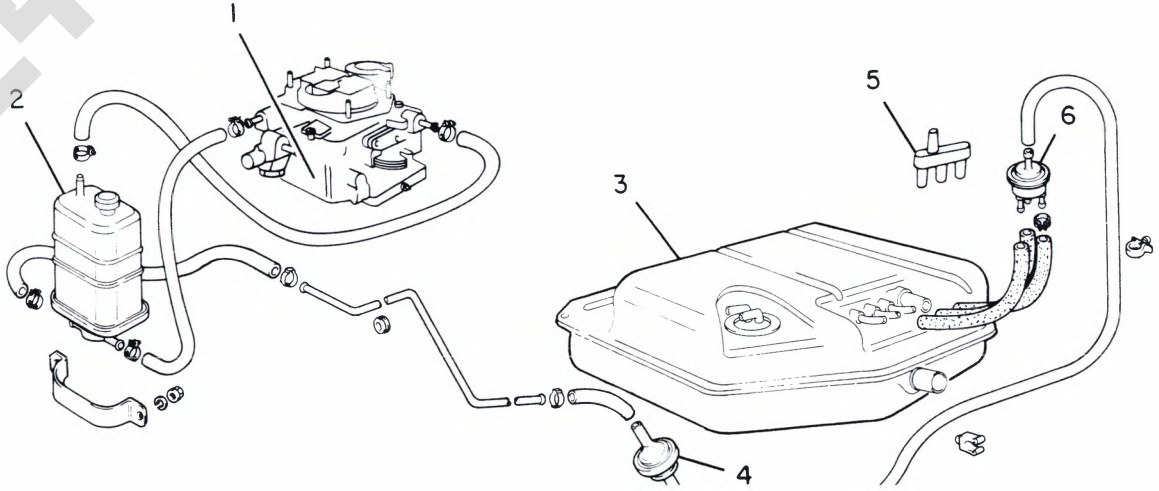
FUEL TANK AND LINES (1975 to early 1977)

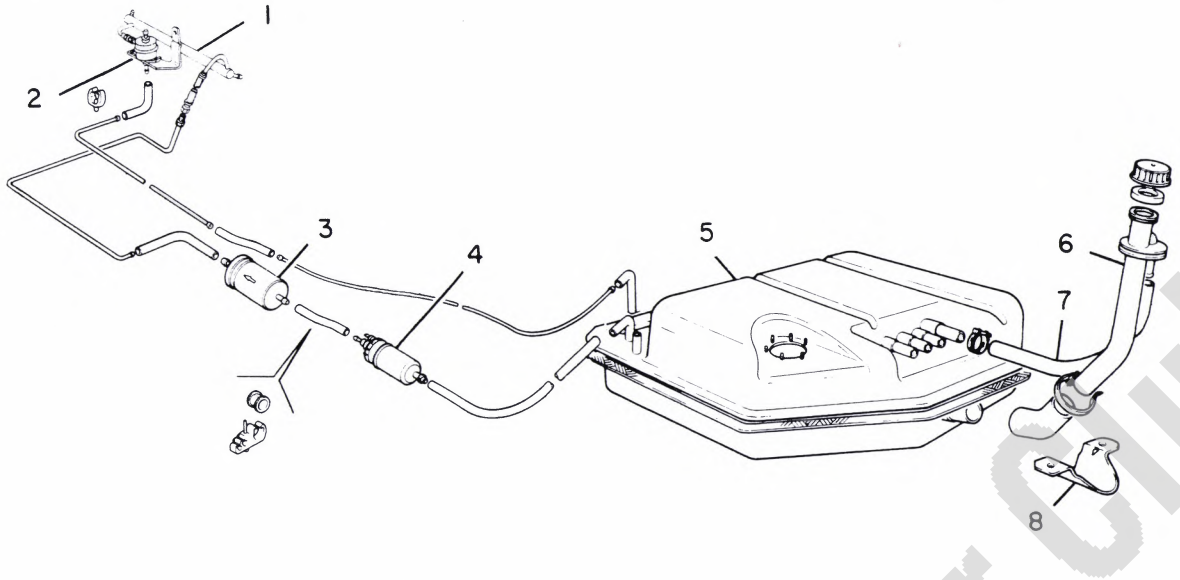




1. Carburetor
2. Fuel filter
3. Check valve
4. Check valve
5. Fuel pump
6. Fuel tank
7. Filler line
8. Overflow line
9. Filler line shield

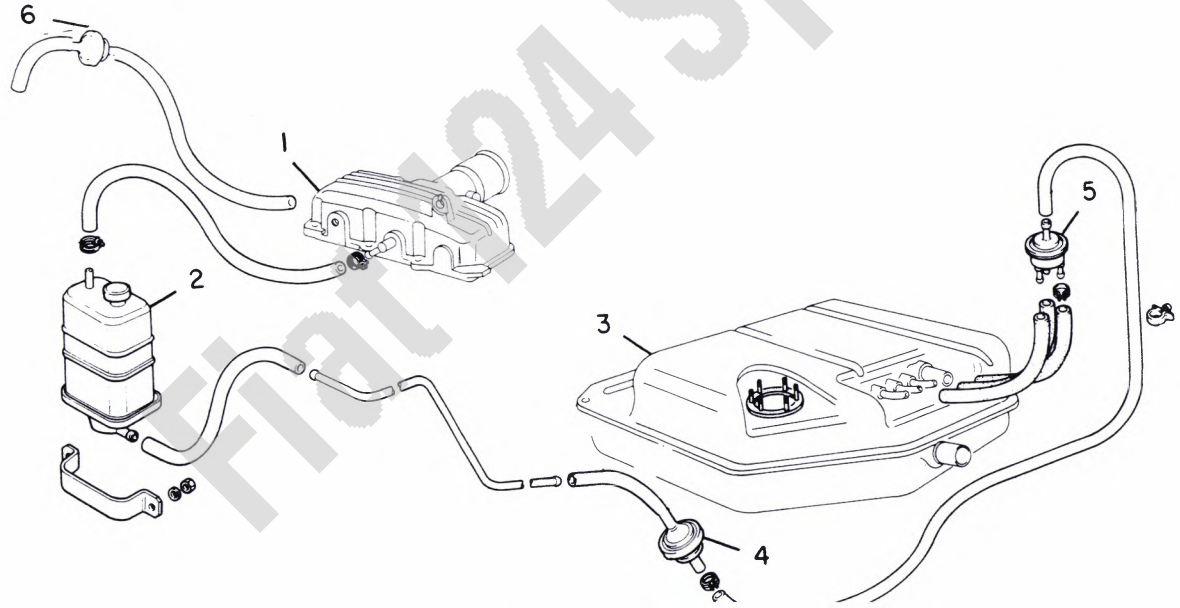
FUEL TANK AND LINES (1977 to early 1980)





1. Fuel manifold
2. Fuel pressure regulator
3. Fuel filter
4. Fuel pump
5. Fuel tank
6. Filler line
7. Overflow line
8. Filler line shield

FUEL TANK AND LINES (1980 and on, fuel injected)



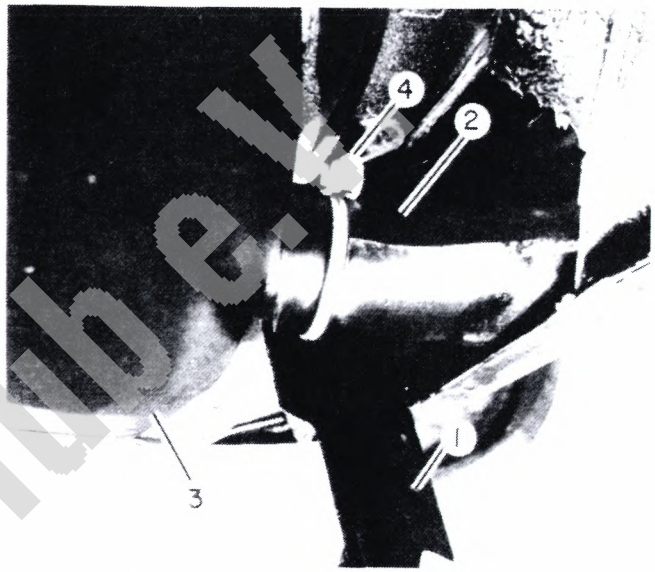
FUEL TANK

REMOVAL AND INSTALLATION

Drain or siphon fuel tank.

From under vehicle, remove two screws holding filler line shield (1). Loosen clamp (4) holding filler line (2) to tank (3) and pull line from tank.

1. Filler line shield 2. Filler line 3. Fuel tank 4. Clamp



Open trunk and remove carpeting, spare tire cover, fuel tank cover and spare tire.

Disconnect two electrical connectors (1) from fuel sending unit (2).

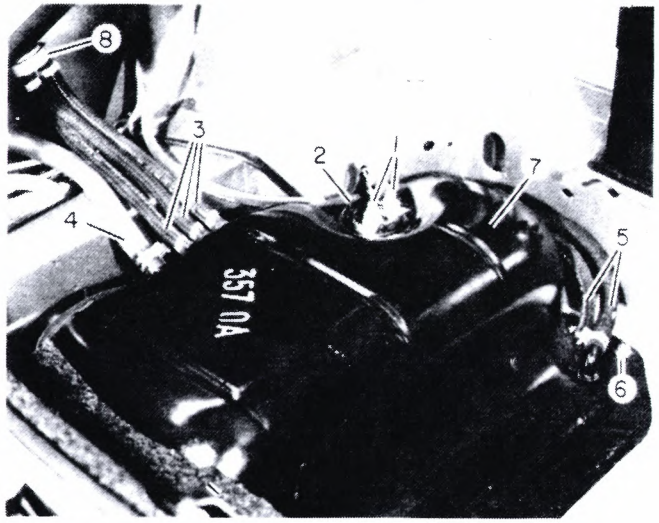
Loosen clamps on fuel vapor lines (3) and overflow line (4). Pull lines off.

Loosen clamps on fuel lines (5) and pull lines off (on carburetored vehicles, fuel lines are attached to sending unit).

Remove four nuts (6) holding tank (7) to body. Lift tank out of trunk area.

Installation is reverse of removal.

1. Electrical connector 2. Fuel sending unit 3. Fuel vapor lines
4. Overflow line 5. Fuel lines 6. Nut 7. Fuel tank
8. Vapor/liquid separator



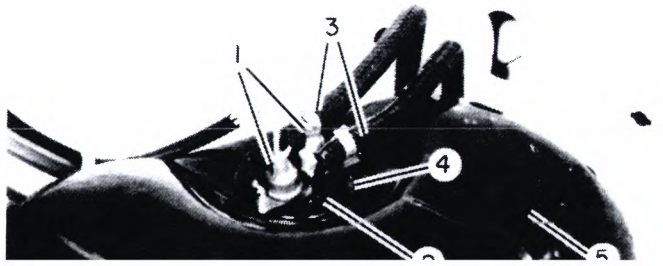
SENDING UNIT

REMOVAL AND INSTALLATION

Open trunk and remove carpeting and fuel tank cover.

Disconnect two electrical connectors (1) from fuel sending unit (2). On carburetored vehicles (shown) loosen clamps on two fuel lines (3) and remove lines.

Remove six nuts (4) holding sending unit to tank (5) and carefully remove sending unit and gasket.



FUEL PUMP (1975 to early 1977)

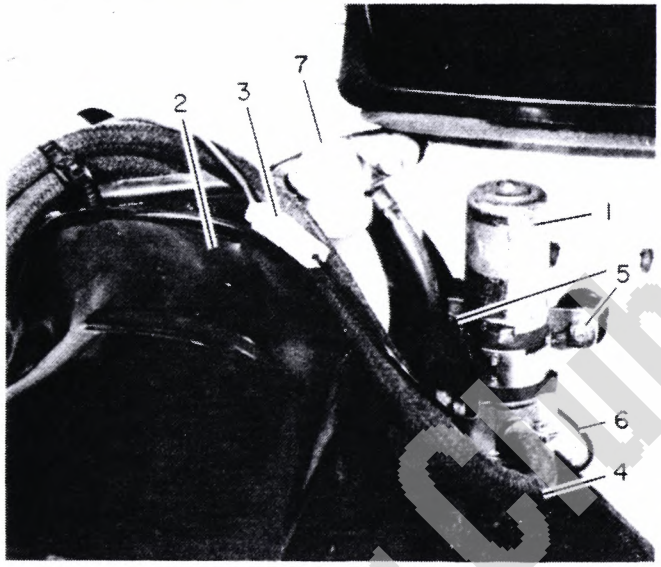
REMOVAL AND INSTALLATION

The electric fuel pump (1), either a Carter or a Corona (shown), is located in trunk area next to fuel tank (2).

From trunk compartment, remove carpeting, fuel tank cover, spare tire cover and spare tire.

Disconnect electrical connector (3) to pump. Loosen clamps on fuel inlet and outlet lines (4) and pull lines from pump. Remove two nuts (5) holding pump to body, remove pump.

Installation is reverse of removal.



1. Fuel pump 2. Fuel tank 3. Electrical connector 4. Fuel lines
5. Nut 6. Ground wire 7. Vapor system pressure relief valve

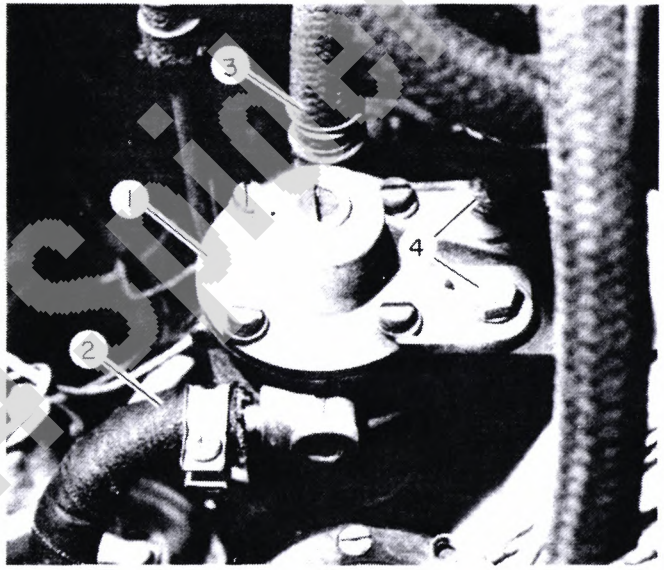
FUEL FILTER/PRESSURE REGULATOR (1975 to early 1977)

REMOVAL AND INSTALLATION

The fuel filter/pressure regulator (1) is located in engine compartment, mounted on left side just forward of and below carburetor.

Loosen clamps on inlet (2) and outlet (3) lines and pull lines from filter/pressure regulator. Remove two bolts (4) holding unit to body and remove filter/pressure regulator.

Installation is reverse of removal.



1. Fuel filter/pressure regulator 2. Fuel inlet line 3. Fule outlet line
4. Bolt

FUEL PUMP (1977 to early 1980)

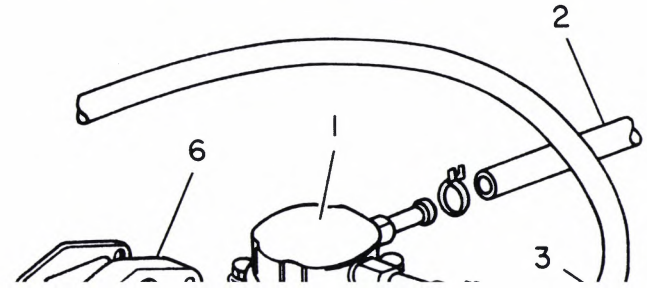
REMOVAL AND INSTALLATION

The mechanical fuel pump (1) is bolted to left side of engine.

From underneath vehicle, remove front splash pan.

Loosen clamps on inlet (2) and outlet (3) lines and pull lines from pump. Remove two bolts (4) holding pump to engine and remove pump.

Installation is reverse of removal. Install new gaskets (5).



FUEL FILTER (1977 to early 1980)

REMOVAL AND INSTALLATION

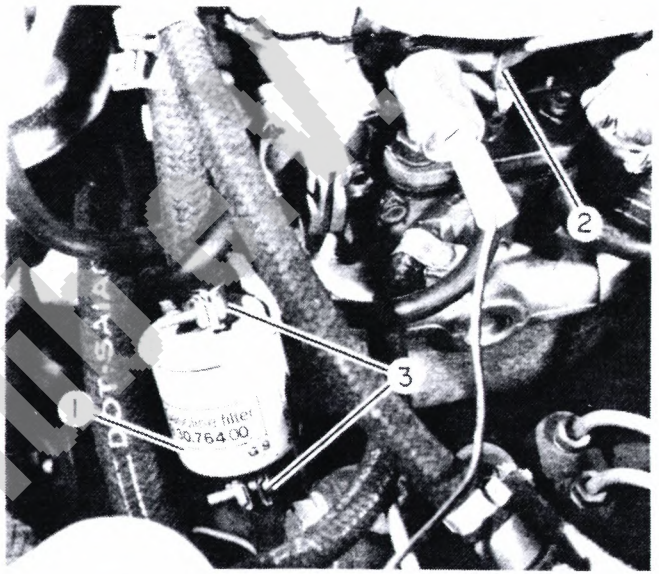
The fuel filter (1) is located in engine compartment near carburetor (2).

Loosen clamps (3) on inlet and outlet lines and pull lines from filter.

Installation is reverse of removal.

NOTE: Be certain that arrow on filter points towards carburetor.

1. Fuel filter 2. Carburetor 3. Clamp



FUEL PUMP (1980 and on, Fuel Injected)

REMOVAL AND INSTALLATION

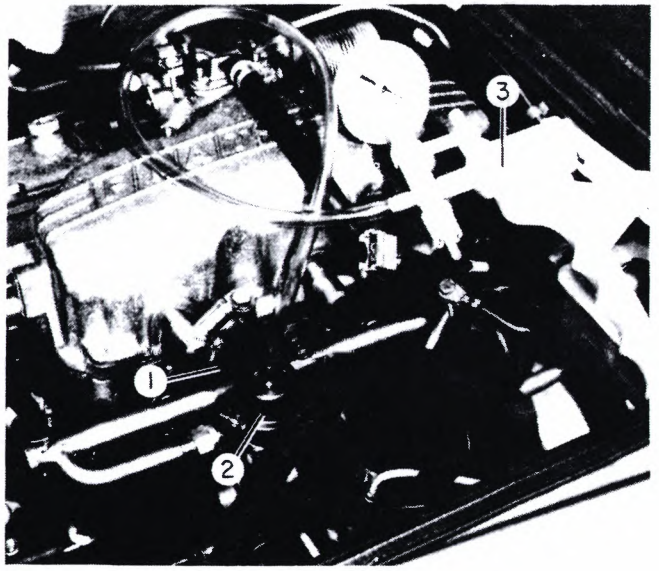
Before disconnecting fuel lines, fuel pressure must first be released.

Remove fuel tank filler cap.

Remove vacuum hose (1) from fuel pressure regulator (2).

Using a hand vacuum pump (3) apply about 25 inches of vacuum to pressure regulator as shown. Fuel system pressure will then be released into fuel tank.

1. Vacuum hose 2. Fuel pressure regulator 3. Hand vacuum pump



The electric fuel pump (1) is located underneath vehicle on left side, just forward of rear axle.

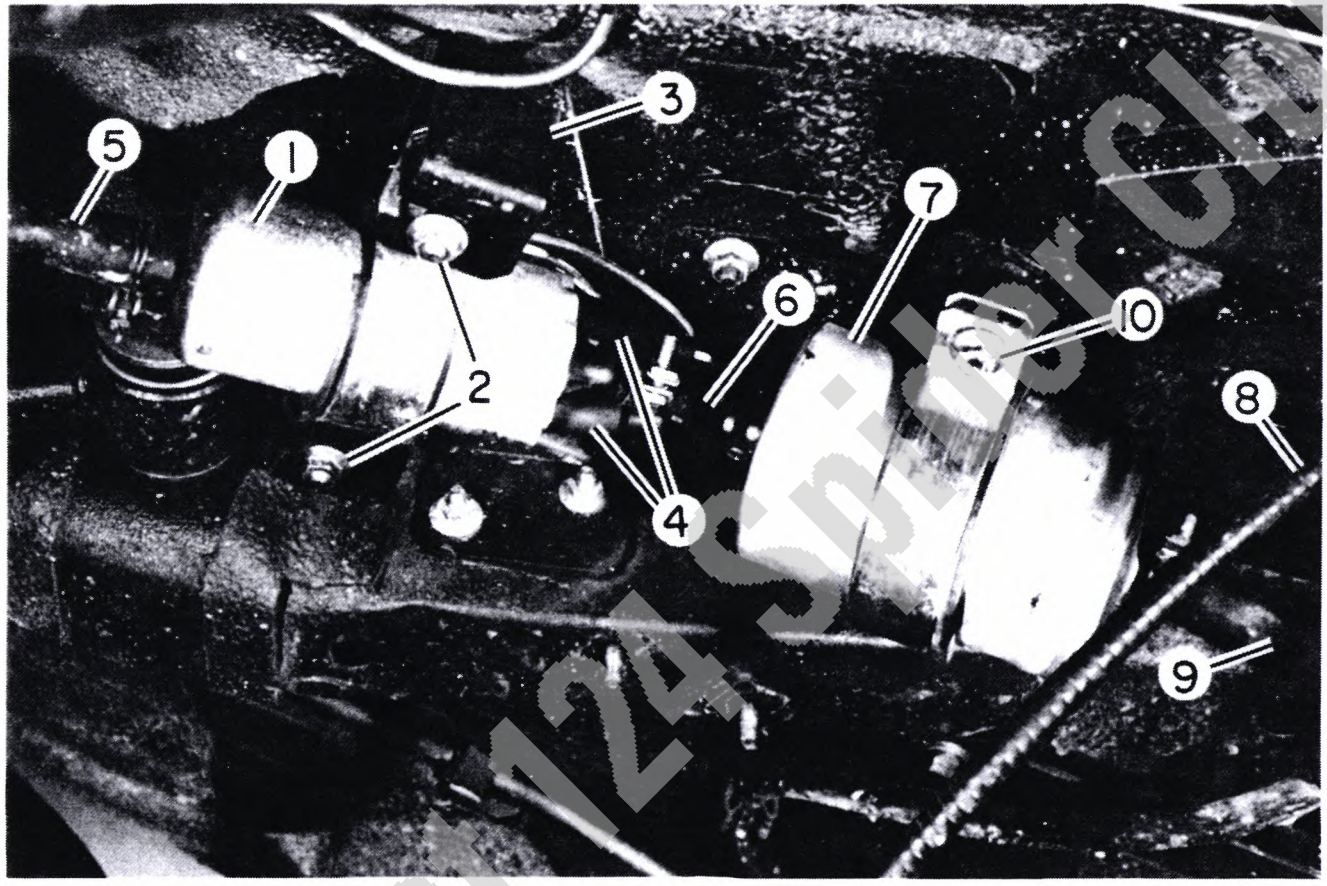
Loosen two nuts (2) holding shield and pump to body mount (3), remove shield.

Disconnect two electrical connectors (4) from pump.

Loosen clamps on fuel inlet (5) and outlet (6) lines and pull lines from pump. Remove pump from outlet.

Installation is reverse of removal.

1. Fuel pump 2. Nut 3. Mount 4. Electrical connector 5. Fuel pump inlet line 6. Fuel line, pump to filter 7. Fuel filter 8. Emergency brake cable 9. Filter outline line 10. Nut



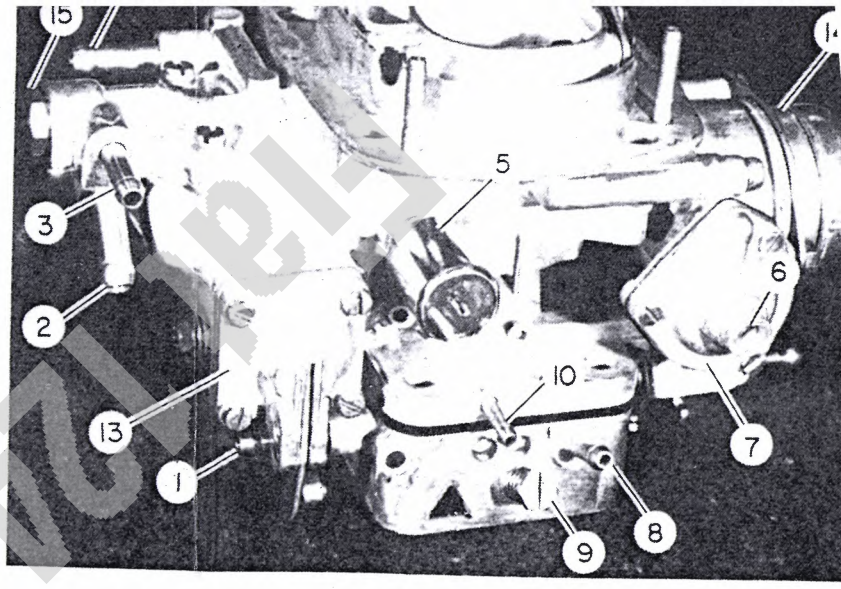
FUEL FILTER (1980 and on, Fuel Injected)

REMOVAL AND INSTALLATION

The fuel filter (7) is located underneath vehicle on left side, just forward of rear axle.

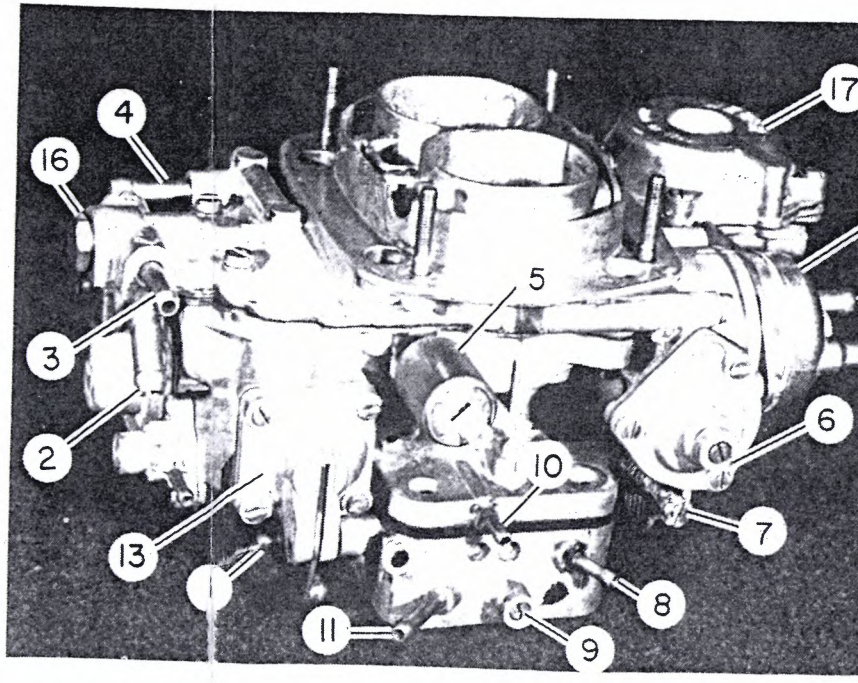
Before disconnecting fuel lines, system pressure must first be released (see procedure under FUEL PUMP).

Remove two bracket nuts holding emergency brake cable (8) to body. Lower cable out of way as shown.



1. Crankcase blow-by connection
2. Fuel inlet
3. Fuel return
4. Float bowl vapor outlet
5. Idle stop solenoid
6. Choke valve control diaphragm
7. Idle speed adj
8. Vapor caniste
9. Idle mixture s

WEBER TYPE 32



1. Crankcase blow-by connection
2. Fuel inlet
3. Fuel return
6. Choke valve control diaphragm
7. Idle speed adjustment screw
8. Distributor vacuum signal
11. V
12. F
13. M

Model	Year	Size	Carburetor	MM	MM	MM	MM	Jet MM	MM	MM	MM	Full Choke MM
124 Cpe & Spider	70–71	1438	26/34DHSA1	*23 **27	1.20 1.40	0.45 0.70	F43 F6	1.80 1.50	0.50	1.75	*** 6.0	1.20/1.25
124 Cpe & Spider	71–73	1608	28/36DHSA2	*23 **28	1.25 1.55	0.50 0.70	F43 F6	1.95 1.50	0.50	1.75	*** 6	1.20/1.25
124 Cpe & Spider	73	1592	28/36DHSA3	*23 **28	1.25 1.55	0.50 0.70	F43 F6	1.95 1.50	0.50	1.75	*** 6	1.20/1.25
124 Cpe & Spider	74	1756	34DMSA 1/100	*25 **27	1.45 1.45	0.50 0.60	F61 F61	1.80 1.65	0.55	1.75	*** 6.25	1.40/1.45
124 Cpe & Spider	75–76	1756	32ADFA 2/100 (49 State)	*23	1.25	0.50	F74	1.85 1.70	0.50	1.75	***	1.05/1.15
			32ADFA 5/100 (Calif)	**25	1.40	0.60	F74	1.80 1.70			6.5	
124 Spider	77	1756	32ADFA 12/100 (49 State)	*23	1.25	0.50	F73	1.85 1.70	0.50	1.75	6.5	1.05/1.15
			32ADFA 15/101 (Calif)	**25	1.40	0.60	F7	1.75 1.70				
124 Spider	78	1756	32ADFA 11/100 (49 State)	*23	1.25	0.50	F73	1.85 1.70	0.50	1.75	***	1.05/1.15
			32ADFA 14/101 (Calif)	*25	1.40	0.60	F7	1.75 1.70			6.5	
Spider 2000	79	1995	28/32ADHA3/179 (49 ST–S/T)	*22	1.20	0.55	F84	1.75	0.50	1.75	***	1.00/1.10
			28/32ADHA4/179 (49 ST–A/T)	**24	1.15	0.60	F7	1.60			6.5	1.05/1.15
			28/32ADHA7/179 (Calif–S/T)	*22	1.20	0.55	F84	1.70 1.70	0.50	1.75	***	1.00/1.10
			28/32ADHA8/179 (Calif–A/T)	**24	1.15	0.60	F7	1.65 1.70			6.5	1.05/1.15
Spider 2000	80	1995	28/32ADHA7/180 (Std. Trans.)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.70 1.70	0.50	1.75	*** 6.5	1.00/1.10
49 ST ONLY			28/32ADHA8/180 (Auto. Trans.)	*22 **24	1.20 1.15	0.55 0.60	F84 F7	1.65 1.70	0.50	1.75	*** 6.5	1.00/1.10

*Primary Duct
**Secondary Duct
***Tolerance ± 0.25 MM

AIR CLEANER

REMOVAL AND INSTALLATION (Without Fuel Injection)

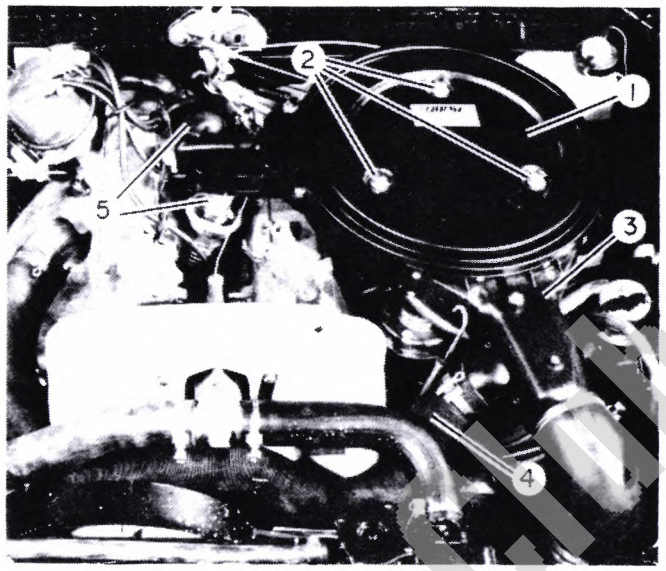
Remove three nuts (2) holding cover (1) on air cleaner assembly (3). Remove filter element.

On engines with air induction (shown), remove reed valve hoses (5) from air cleaner. On engines with air pump, remove air injection hose from air cleaner.

If equipped with hot air hose (4), loosen clamp and remove hose from snorkel.

Remove four nuts holding air cleaner to carburetor. Lift air cleaner, then disconnect two hoses from bottom. Remove air cleaner.

Install in reverse order. Make sure metal bushings are installed in rubber spacer.



1. Cover 2. Nut 3. Air cleaner assembly 4. Hot air hose
5. Reed valve hose

AIR CLEANER

REMOVAL AND INSTALLATION (With Fuel Injection)

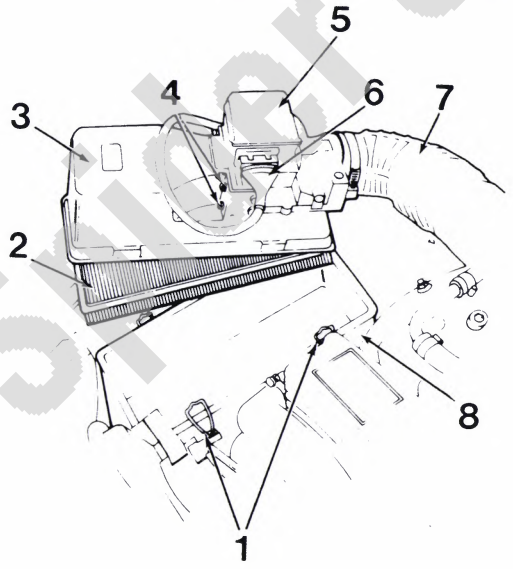
NOTE: The air filter element should be changed every 30,000 miles. If vehicle is frequently driven in heavy traffic or sandy or dusty areas, it is recommended to replace filter every 15,000 miles.

Using a screwdriver, release the four catches (1).

Lift the cover (3) off and remove the filter (2).

Install new filter and replace cover.

Secure catches by pressing on curved section.



1. Catch 2. Filter 3. Cover 4. Bolts 5. Air flow sensor
6. Connector 7. Air hose 8. Housing

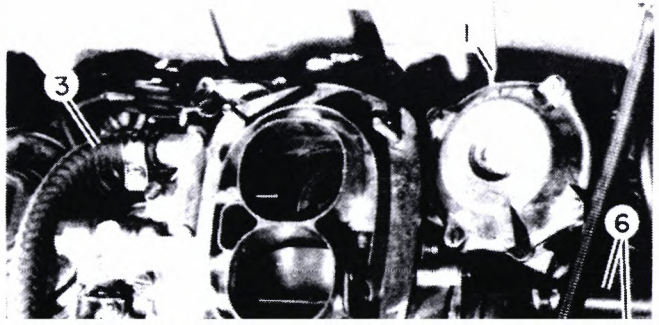
CARBURETOR

REMOVAL AND INSTALLATION

Remove air cleaner.

Remove spring clip and disconnect accelerator rod (1). Disconnect wire from idle stop solenoid (2). Disconnect vacuum lines from carburetor. Disconnect float bowl vapor line (3). Disconnect fuel inlet (4) and return (5) lines. Disconnect hot water lines (6) to automatic choke.

Remove four nuts at base of carburetor and remove carburetor.



NOTE: As an aid to connecting vacuum lines, there are color

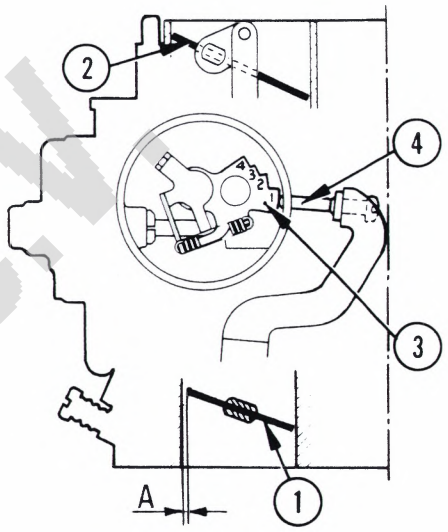
AUTOMATIC CHOKE

CHECKS AND ADJUSTMENTS

Remove carburetor from car. Remove 3 screws holding automatic choke cover. Remove cover and gasket.

Choke Fast Idle

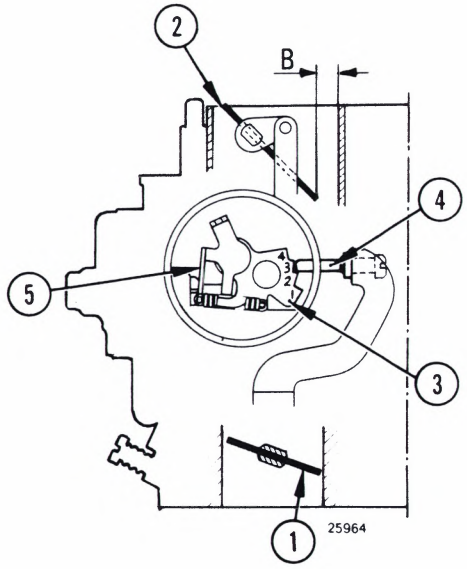
Set fast idle screw (4) on first (highest) step of cam (3). Check that primary throttle opening (dimension A) is 1.05 to 1.15 mm (0.042 to 0.046 in.). If dimension A is not correct, adjust screw (4).



1. Primary throttle plate 2. Choke plate 3. Fast idle cam
4. Fast idle adjustment screw

Fast Idle Cam

Set fast idle screw (4) on third step of cam (3). Check that choke plate opening (dimension B) is 6.25 to 6.74 mm (0.246 to 0.266 in.). Use 1/4 inch and 17/64 inch drill bits to check dimension. If dimension B is not correct carefully bend arm (5).



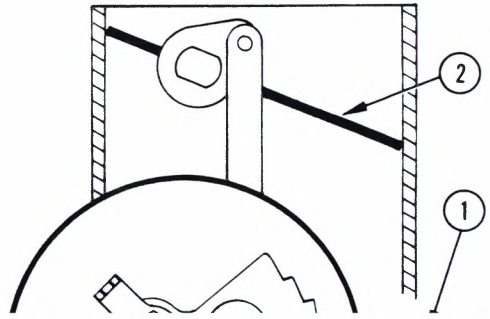
1. Primary throttle plate 2. Choke plate 3. Fast idle cam
4. Fast idle screw 5. Choke lever arm

Choke Unloader

Pull fast idle linkage (1) back. Close choke plate (2). Release linkage (1).

Measure gap (c) between lever (3) and shoulder of bushing (4). A spark plug gap gauge of the bent wire type can be used.

Gap should be 0.3 to 1.0 mm (0.012 to 0.039 in.). If gap is not correct, carefully bend tang (3).



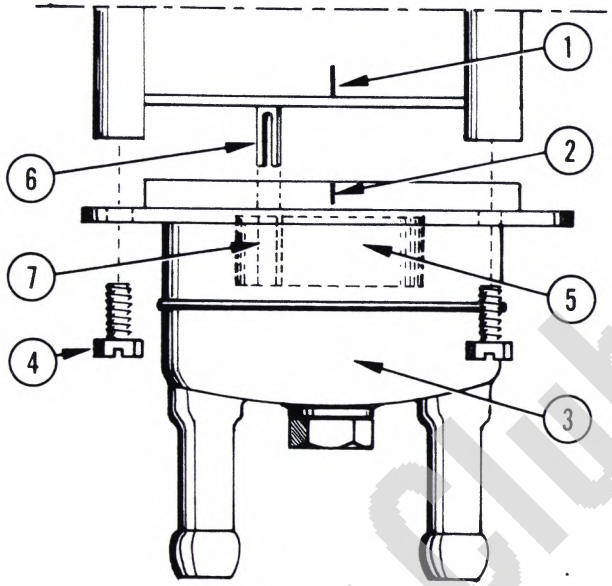
1. Fast idle linkage 2. Choke plate 3. Tang 4. Spring bushing

Choke Cover Indexing

Place choke cover (3) on housing so that lug (7) on spring (5) inside cover is in fork (6) of choke opening lever. Rotate cover to align index marks (2) on cover with marks (1) on housing. Secure cover (3) with 3 screws (4).

With index marks aligned and carburetor at room temperature of 77°F, check that choke plate closes fully and remains closed when primary throttle is opened.

1. Housing mark 2. Cover mark 3. Choke cover 4. Screw
5. Thermostatic spring 6. Choke opening lever fork 7. Spring lug



SECONDARY THROTTLE PLATE GAP

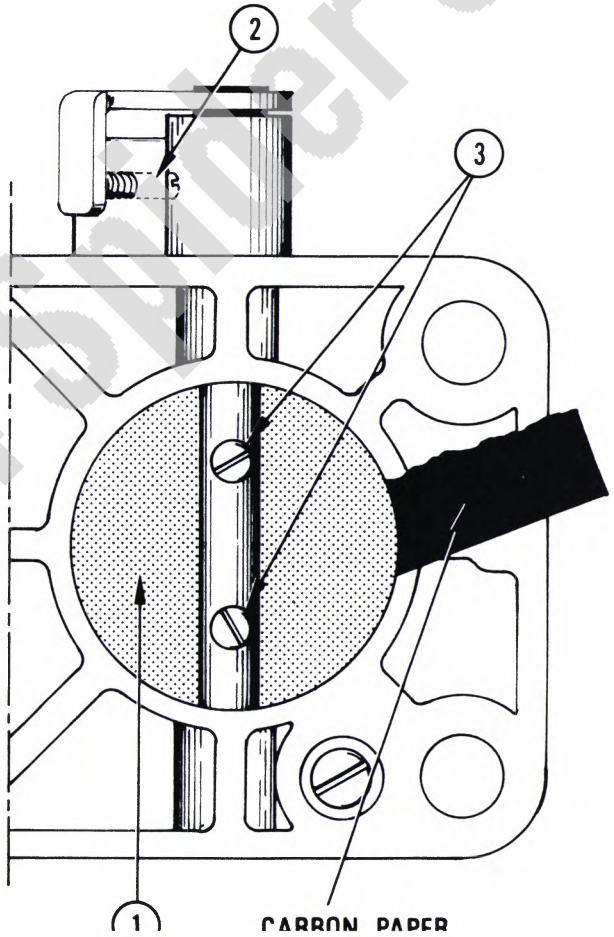
CHECK AND ADJUSTMENT

With throttle linkage released, secondary throttle plate (1) should have an opening of 0.04 to 0.05 mm (0.0015 to 0.0019 in.). This dimension is about the thickness of a piece of typewriter carbon paper.

To check opening, open secondary throttle plate (1). Place a strip of carbon paper inside barrel. Release secondary throttle plate. Turn screw (2) as necessary until a resistance is felt when pulling strip out of barrel without tearing it.

Using a light from behind throttle plate (1), check that gap is even around plate. If not, loosen 2 screws (3) holding plate to shaft. Center plate and tighten screws. Check gap again.

1. Throttle plate 2. Secondary throttle plate screw
3. Throttle plate mounting screws

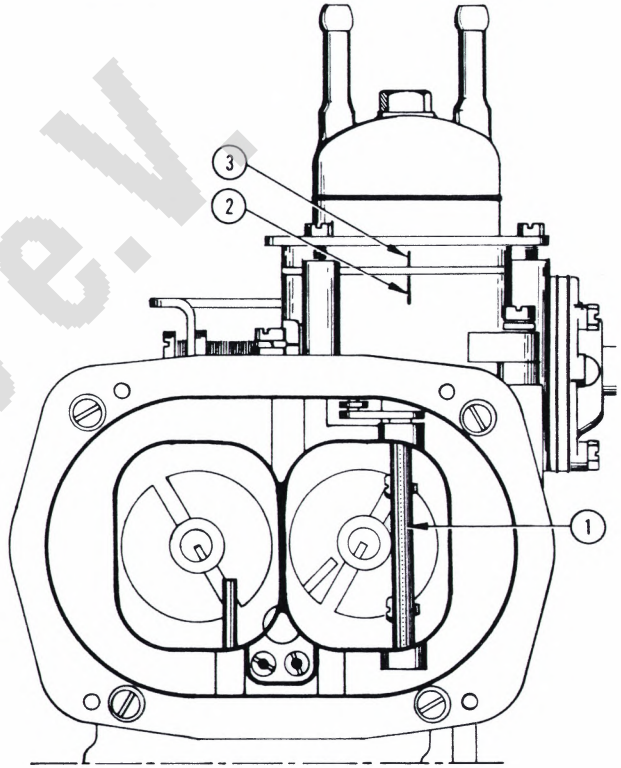


Open Position of Choke Plate

Run engine until it reaches normal operating temperature (radiator fan starts running).

Check that choke plate (1) is fully open.

If plate is not fully open check linkage for binding. Check that plate is centered in barrel. If plate is centered and not binding, check alignment of marks (2 and 3) on choke housing. If marks are aligned, replace the thermostatic spring in choke housing.

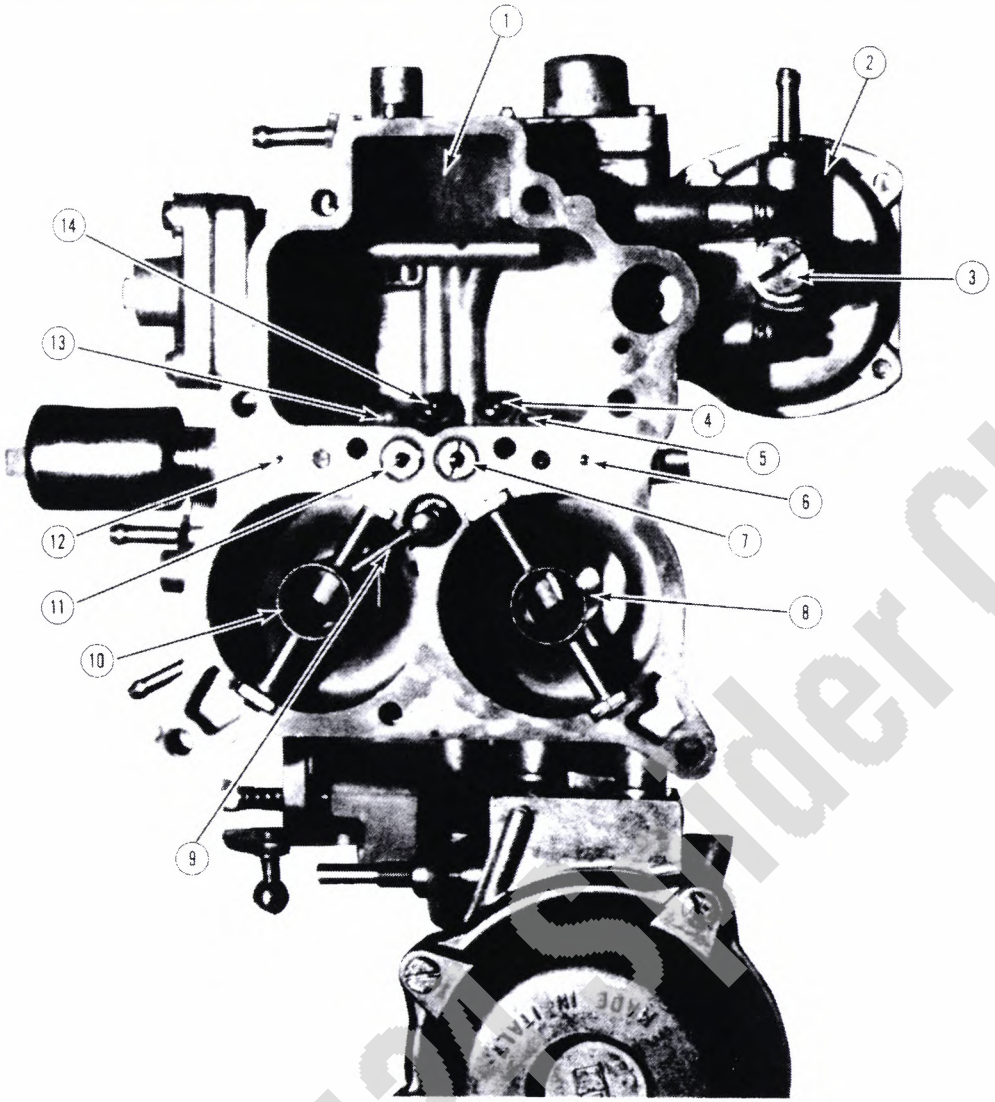


1. Choke plate 2. Housing alignment mark 3. Cover alignment mark

Air Cleaner Cover Indexing (1975 to 1978)

If air cleaner is not installed, install it. Before installing cover, align letter on cover with arrow on air cleaner duct as follows:

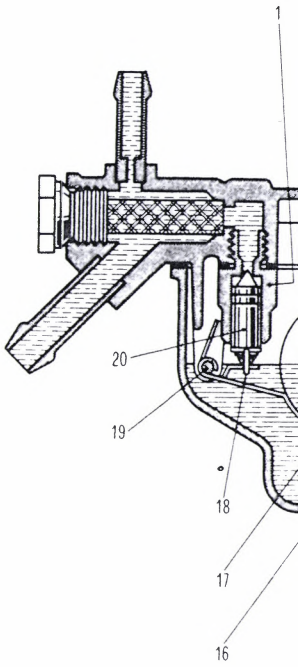
I = outside temperatures 60°F (15°C) or less
E = outside temperatures above 60°F (15°C)



1. Float bowl
2. Fast idle diaphragm (not functional on 28/32 ADHA)
3. Fast idle adjustment screw (not functional on 28/32 ADHA)
4. Main jet-secondary
5. High speed gas inlet
6. High speed air passage
7. Air correction jet-secondary
8. Secondary venturi
9. Acceleration pump nozzle
10. Primary venturi
11. Air correction jet-primary
12. High speed air passage
13. High speed gas inlet
14. Main jet-primary
15. Idle shutoff control
16. Secondary throttle control (28/32 ADHA only)

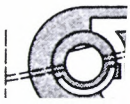
CARBURETOR WITH TOP COVER REMOVED

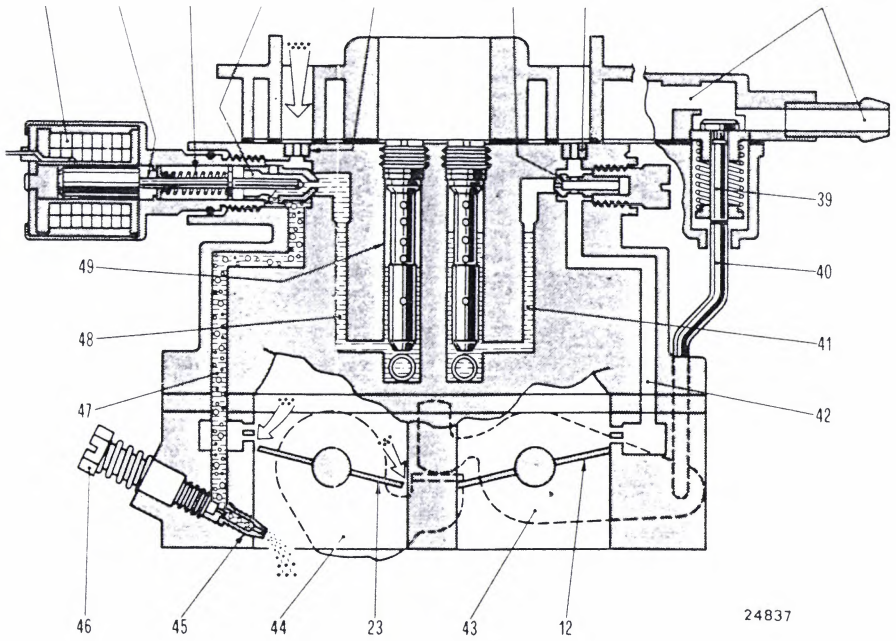
1. Needle valve
2. Calibrated bushing for power fuel passage at high speed
3. Air passage calibrated bushing
4. Power mixture air passage
5. Power fuel calibrated orifice
6. Main air bleeder jet
7. Auxiliary venturi
8. Spray tube
9. Primary venturi
10. Power fuel passage at high speed
11. Secondary shaft
12. Secondary throttle valve
13. Emulsion tube
14. Main jet well
15. Main jet
16. Fuel bowl
17. Float
18. Needle return hook
19. Hinge pin
20. Valve needle
21. Secondary shaft actuating lever
22. Idler lever
23. Primary throttle valve
24. Primary shaft
25. Throttle operating lever
26. Suction duct, fuel vapors from activated carbon filter
27. Calibrated orifice for blow-by gas suction at idle
28. Blow-by gas duct
29. Rotary valve
30. Blow-by passage slot
31. Idle stop solenoid
32. Piston
33. Piston spring
34. Main idling jet
35. Main idling air calibrated bushing
36. Secondary idling jet
37. Secondary idling air calibrated bushing
38. Duct, conveying bowl vapors to activated carbon filter
39. Valve, fuel vapors discharge from fuel bowl
40. Control rod, valve 39
41. Secondary idling fuel passage
42. Secondary idling mixture passage
43. Idler lever
44. Cam, controlling accelerator pump and closing bowl vapors discharge duct
45. Idling mixture calibrated bushing
46. Idling mixture adjusting screw
47. Main idling mixture passage
48. Main idling fuel passage
49. Emulsion tube
50. Primary throat transfer orifices
51. Secondary throat transfer orifices
52. Idle speed adjusting screw
54. Accelerating pump spray nozzle
55. Ball valve
56. Fuel vapors discharge calibrated bushing
57. Diaphragm spring
58. Accelerating pump diaphragm
59. Accelerating pump delivery extension spring
60. Accelerating pump actuating lever
61. Accelerating pump delivery valve
62. Accelerating pump fuel passage
63. Choke valve control shaft
64. Lever
65. Throttle valve rod
66. Choke throttle valve
67. Choke fast idle adjustment cam
68. Choke fast idle adjustment screw
69. Spring
70. Cam 67 return spring
71. Vacuum passage
72. Vacuum diaphragm device
73. Rod
74. Choke valve opening lever
75. Bi-metal spiral spring
76. Water heating connection
77. Bushing
78. Idler lever
79. Tie rod
80. Diaphragm controlling opening of primary throttle
81. Vacuum tapping line on intake manifold
82. Fast idle adjustment screw
83. Air suction orifice

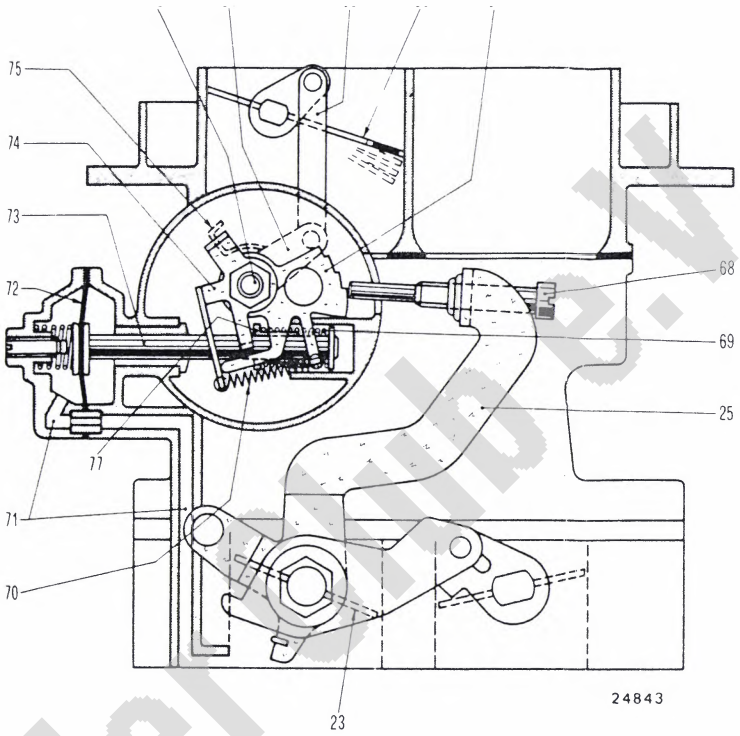


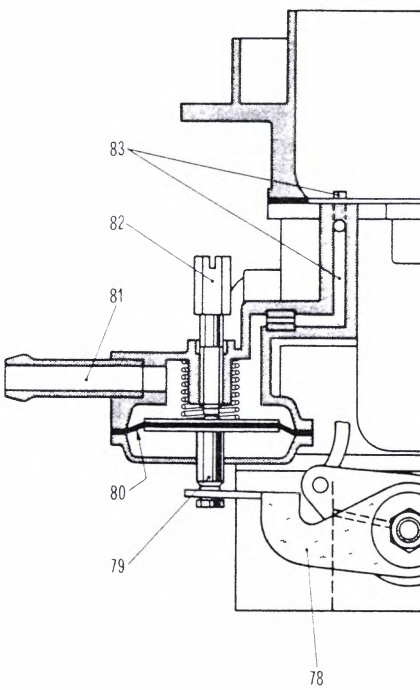
DIFFERE

REC

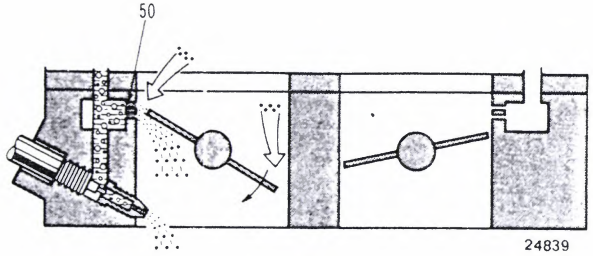


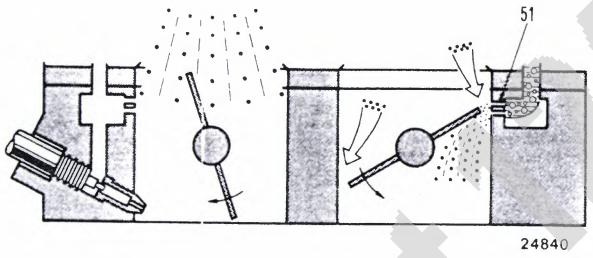


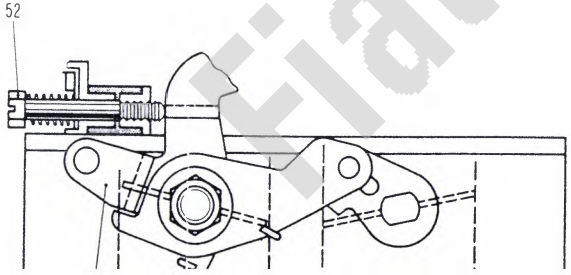


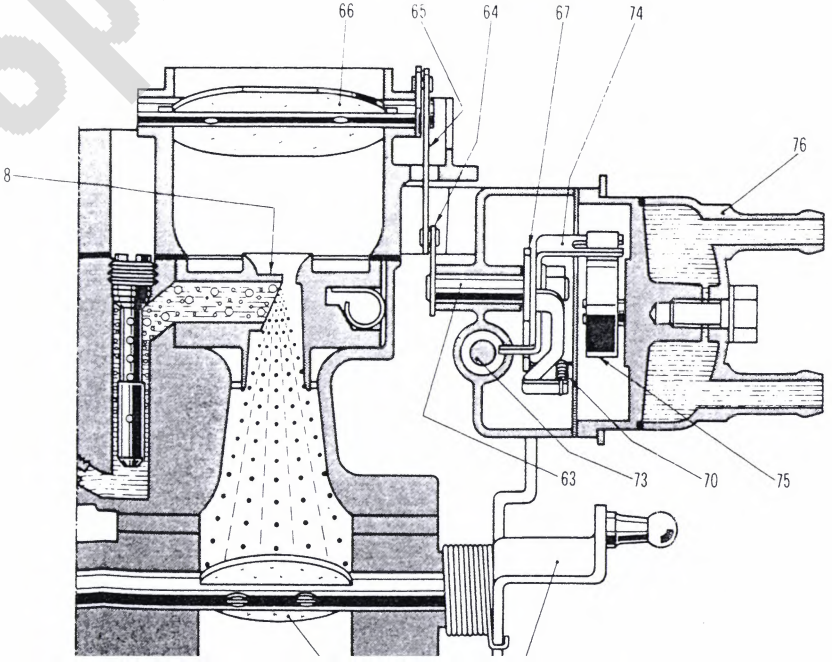


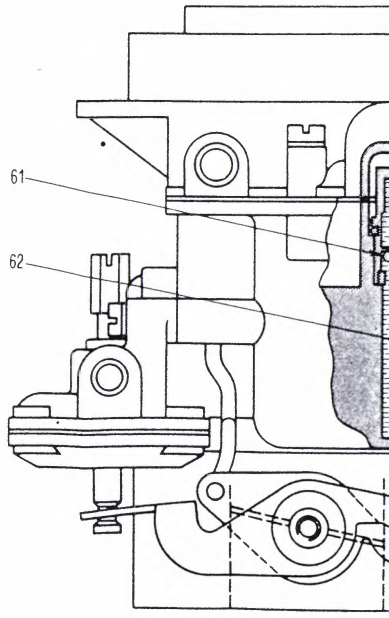
ACCELERAT

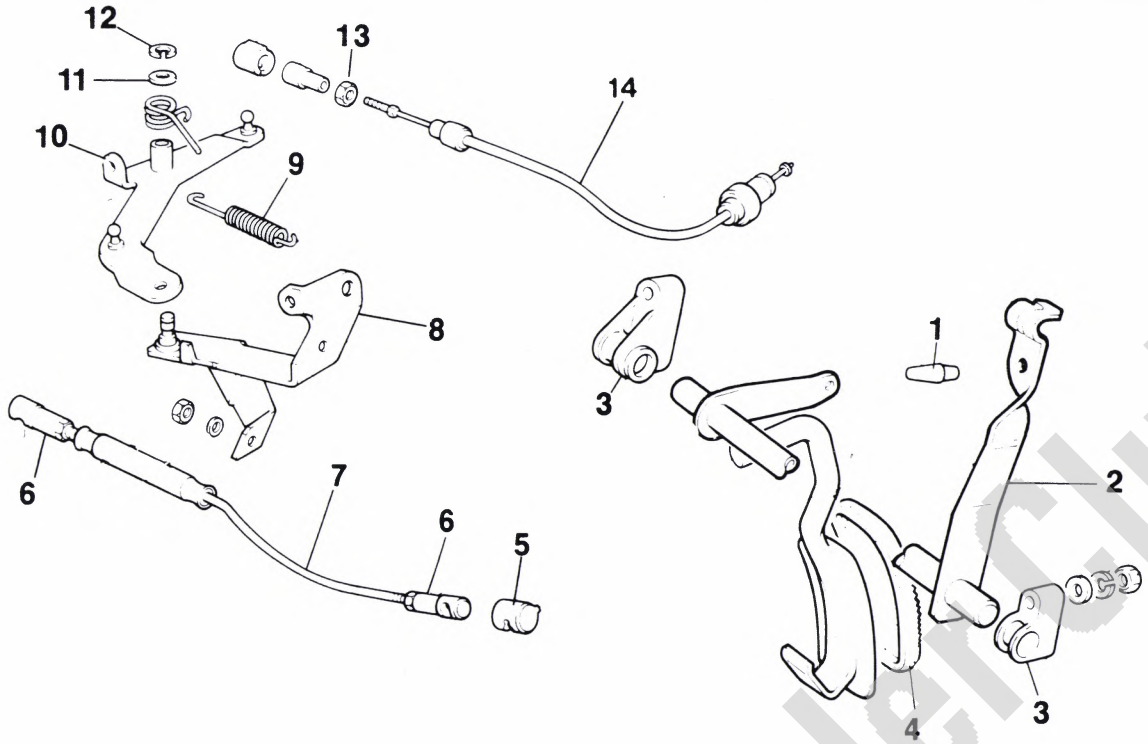






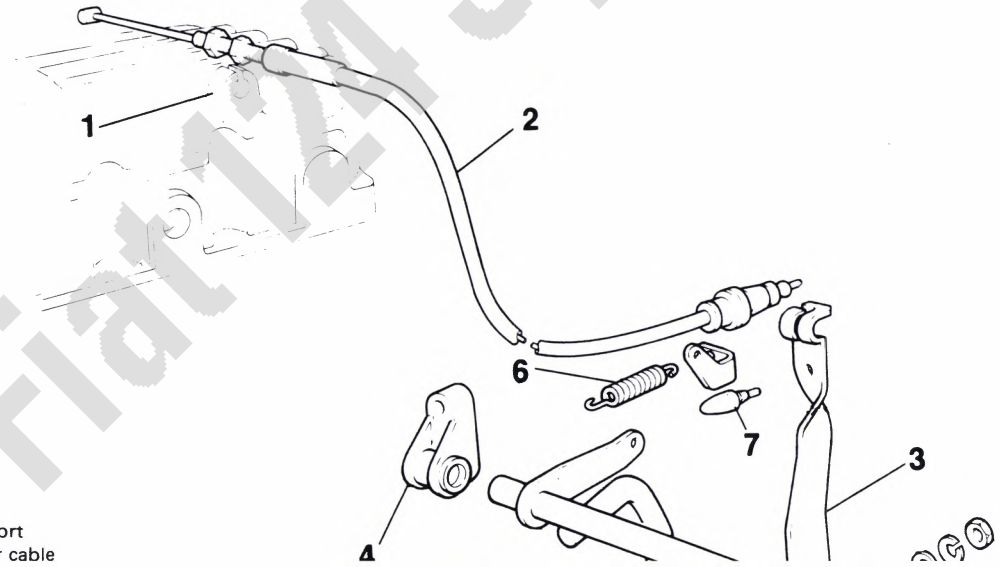






1. Stop
2. Accelerator pedal assembly
3. Pedal support
4. Pedal pad
5. Clip
6. Cable end
7. Throttle rod
8. Ballcrank support
9. Return spring
10. Bellcrank
11. Spring
12. Snap ring
13. Adjustment nut
14. Accelerator cable

CARBURETOR ACCELERATOR LINKAGE



1. Cable support
2. Accelerator cable

ACCELERATOR AND KICK-DOWN CABLE ADJUSTMENT

Make sure engine idle speed is set correctly.

Accelerator Cable

Pull back slightly on cable housing (5) until just prior to moving throttle lever (3).

Check for approximately 1 mm of clearance between adjustment nuts (6) and support (4).

If necessary, adjust nuts (6) to obtain clearance.

Kick-Down Cable

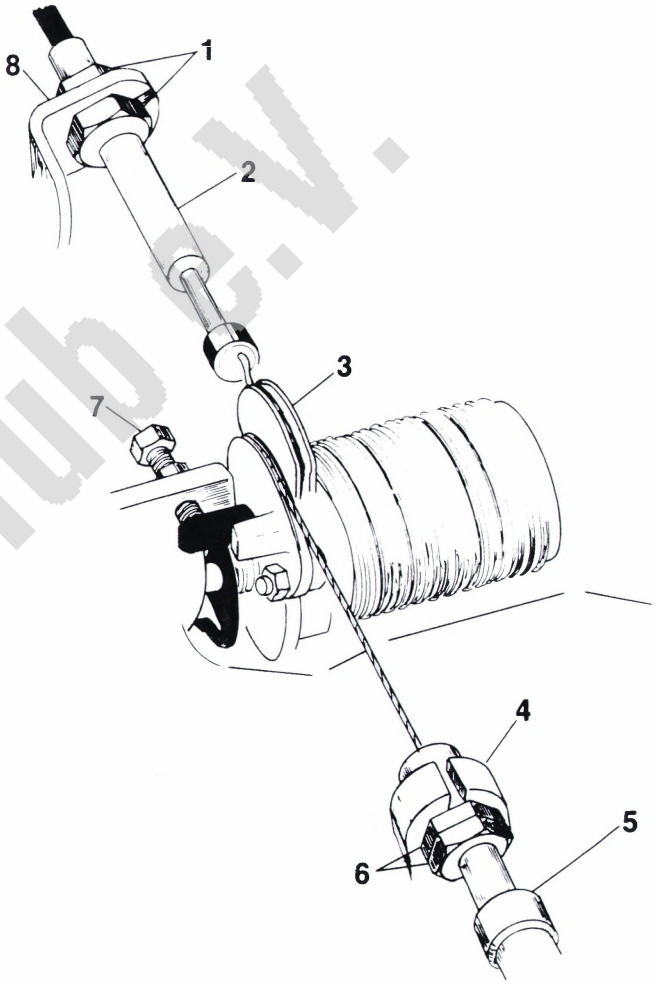
Depress accelerator until throttle lever (3) contacts maximum opening stop (7).

Check that kick-down cable (2) starts to pull at this point.

Fully depress accelerator. Check that kick-down cable (2) extends 0.35 to 0.43 in. (9 to 11 mm).

If necessary, adjust nuts (1) on housing (8) to obtain correct extension of cable.

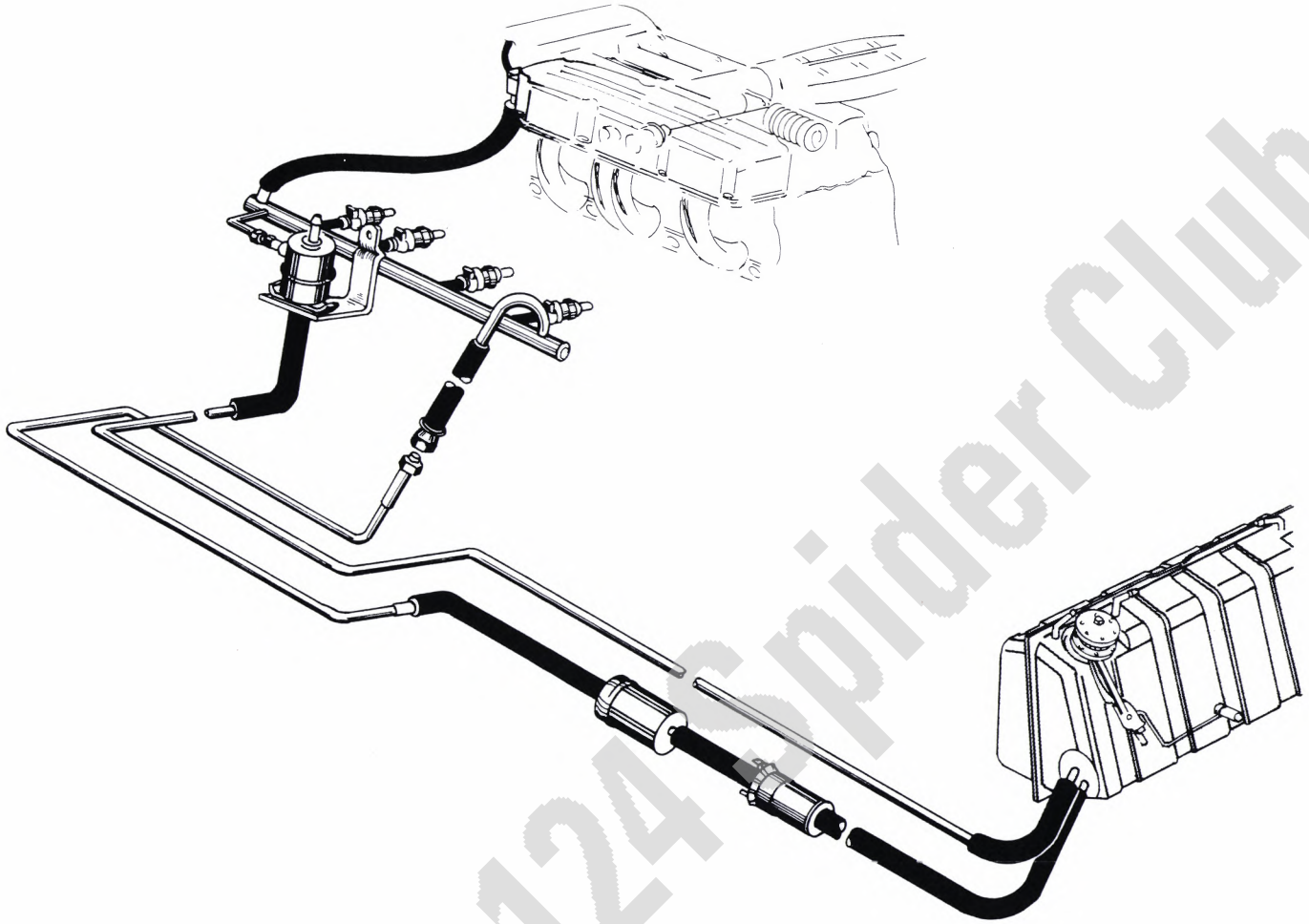
1. Adjustment nuts 2. Kick-down cable 3. Throttle lever 4. Support 5. Accelerator cable 6. Adjustment nuts 7. Maximum opening stop 8. Housing



FUEL SYSTEM

The fuel system consists of:

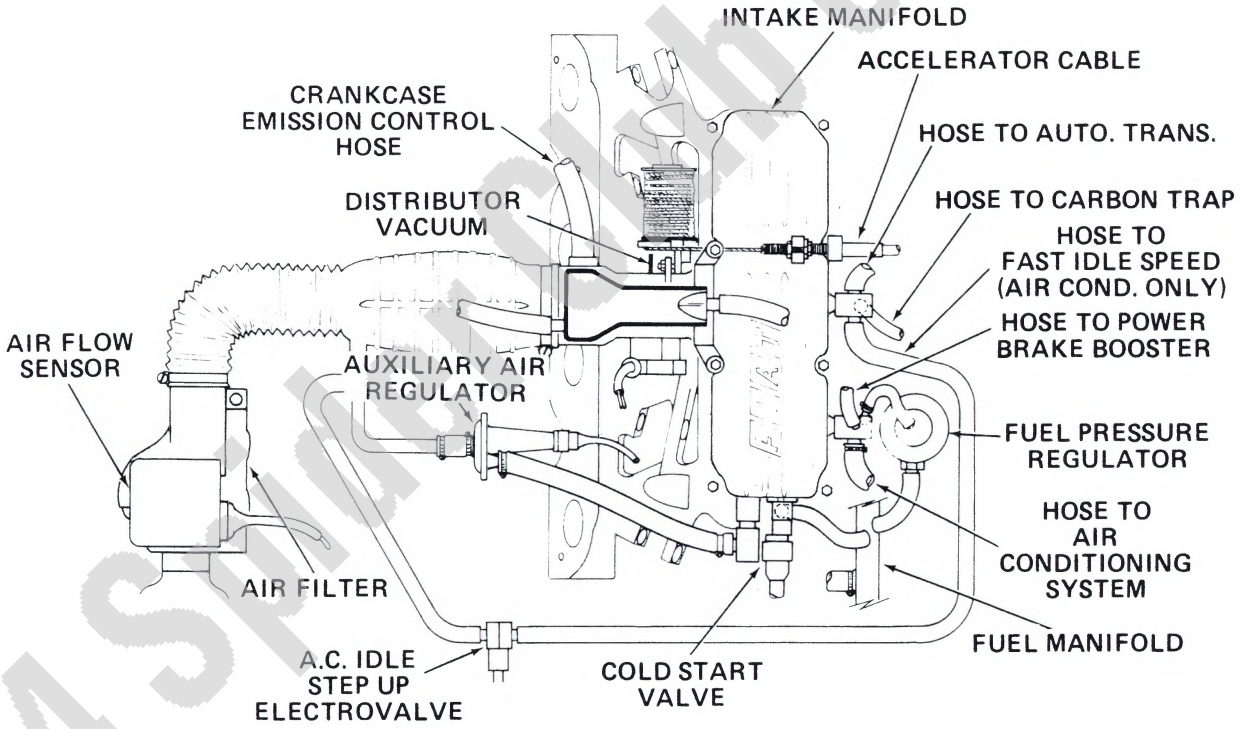
- Fuel tank
- Fuel pump
- Fuel filter
- Fuel manifold
- Pressure regulator
- Injectors
- Cold start valve



AIR INTAKE SYSTEM

The air intake system consists of:

- Air filter
- Air flow sensor
- Auxiliary air regulator
- Vacuum signal for fuel pressure regulator
- Bypass channel for air conditioning



NOTE: Air leaking into the system after the air flow sensor will not be sensed. This will result in a wrong fuel/air mixture and will affect engine operation.

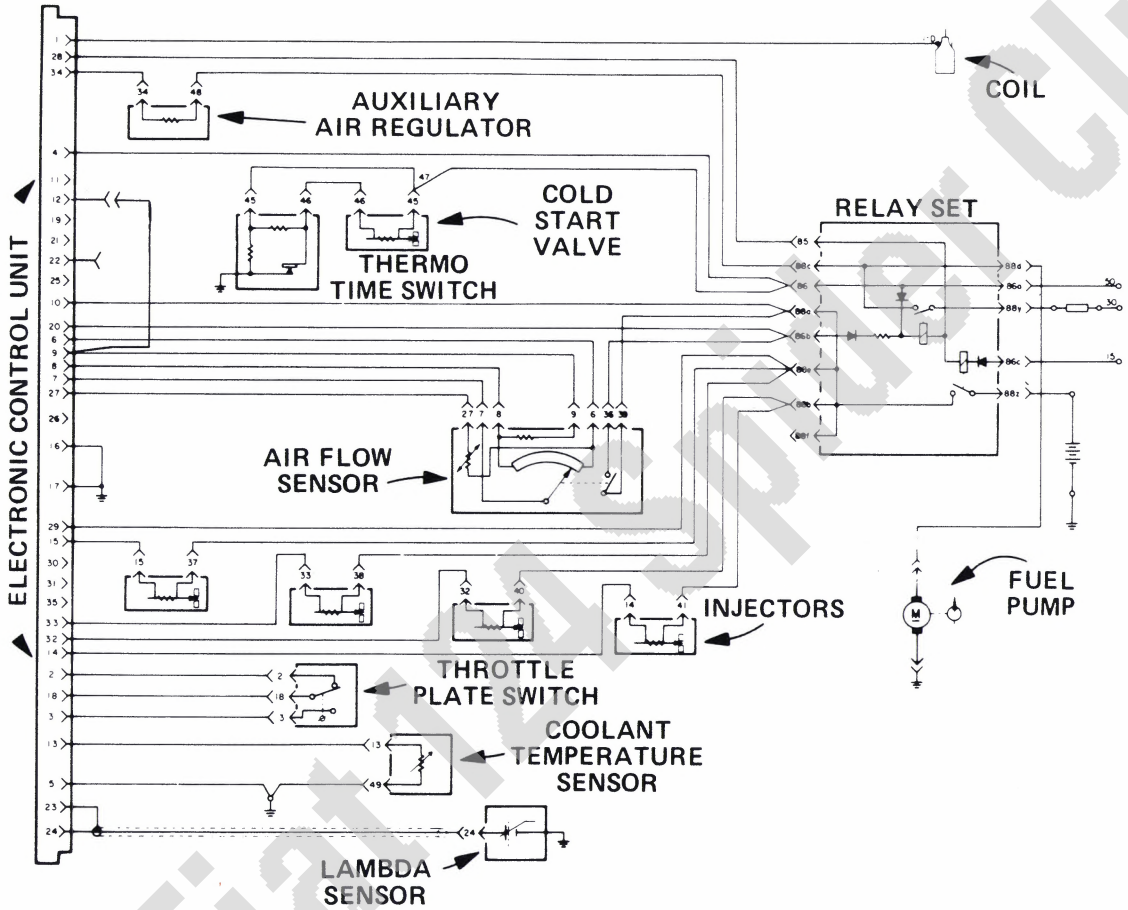
ELECTRICAL SYSTEM

The electrical system consists of:

- Relay set
- Electronic control unit
- Air flow sensor
- Cold start valve and thermo time switch circuit
- Throttle plate switch
- Air temperature sensor
- Coolant temperature sensor

In addition to the fuel injection electrical system, the following items are used:

- Battery
- Ignition coil
- Ignition switch cranking position
- Inline fuse

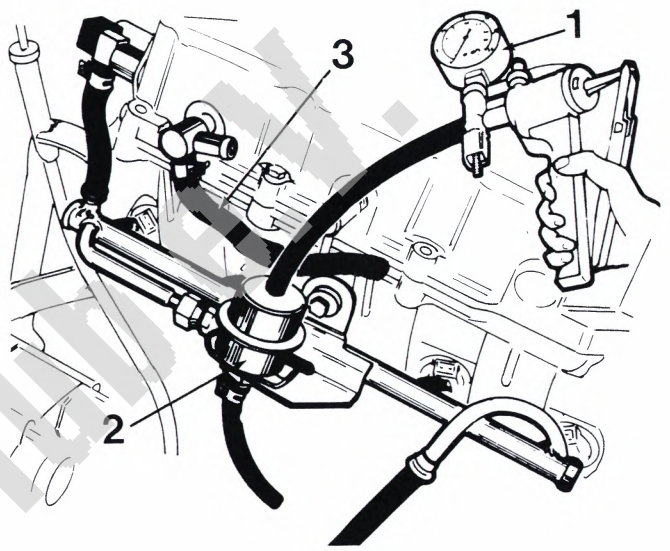


RELIEVING FUEL PRESSURE

CAUTION: Relieve fuel system pressure before disconnecting fuel lines.

Remove vacuum hose (3) from fuel pressure regulator (2).

Connect vacuum pump (1) to regulator (2). Pump vacuum up to 20 inches.



1. Vacuum pump 2. Pressure regulator 3. Vacuum hose

FUEL PRESSURE CHECK

NOTE: Use this check to determine if fuel pump is operating properly and to check for restrictions in fuel lines.

Relieve fuel system pressure as directed in above procedure.

Provide a container to catch any fuel. Use caution to prevent any dirt from entering system.

Loosen clamp holding fuel hose to cold start valve. Pull hose off valve.

CAUTION: Use care in pulling hose off valve. Valve body is plastic.

Connect "Y" fitting on gauge assembly to fuel hose. Secure hose with clamp.

Connect hose on gauge tool A.958754 to cold start valve. Secure hose with clamp.

Disconnect vacuum hose from fuel pressure regulator. Disconnect hose from air flow sensor.

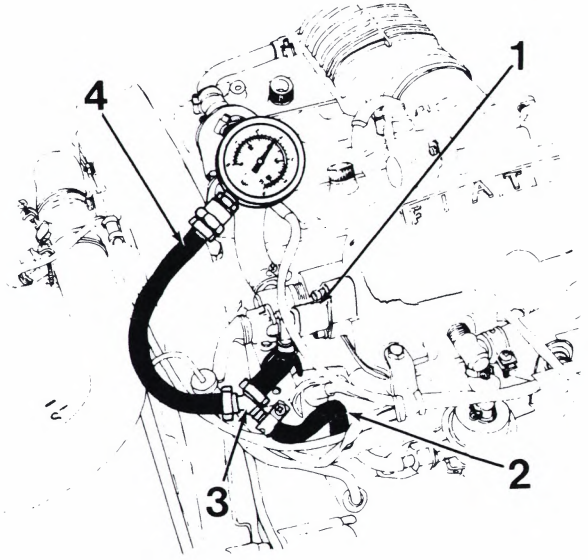
With ignition key switched to "MAR" (on) position, move air flow sensor until fuel pump is energized. Check pressure reading. Pressure should be 33 to 39 psi (2.3 to 2.7 bar).

Start engine and operate at idle.

Connect vacuum hose to pressure regulator. Check pressure reading. Pressure should be approximately 28 psi (2 bar).

Releive fuel system pressure. Remove gauge assembly and reconnect hoses.

NOTE: Fuel pump output pressure is 39-45 psi (2.7 to 3.2 bar). To check pressure, connect gauge directly to fuel sup-

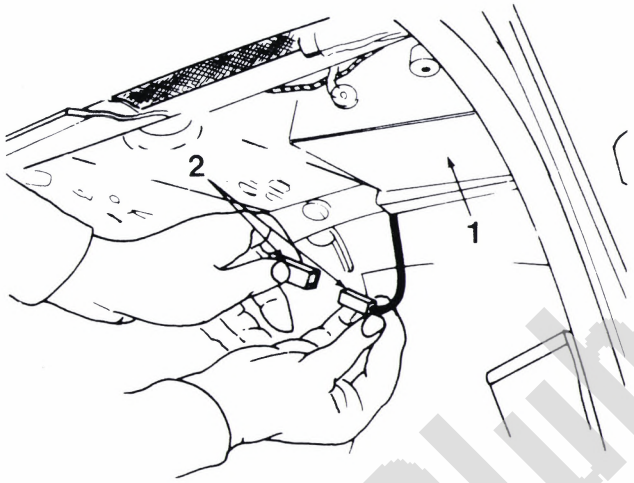


HIGH ALTITUDE VEHICLES

NOTE: Vehicles operated at a location above 4,000 feet are considered High Altitude vehicles. These vehicles should be adjusted for high altitude operation.

Check the engine compartment for the Update Label next to the E.P.A. Conformity Tag. If the Update Label is not in the engine compartment obtain a label.

Connect the two small connectors on the ECU harness together. Set idle speed as directed below and affix the Update Label next to the E.P.A. Label in the engine compartment.



1. Electronic Control Unit (ECU) 2. Small connectors

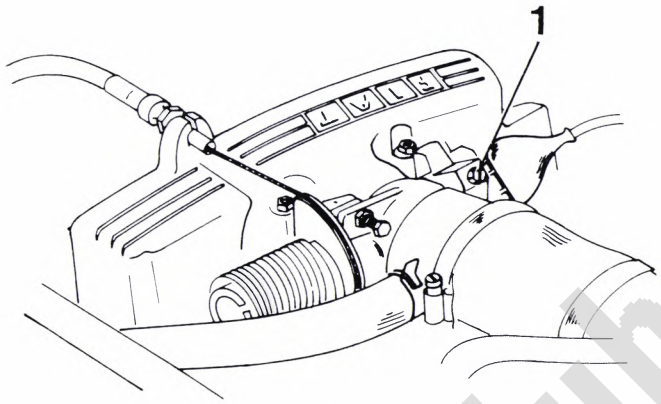
IDLE SPEED ADJUSTMENT

NOTE: Engine must be at normal operating temperature with cooling fan off when adjusting idle speed.

Connect tachometer. Run engine until it reaches normal operating temperature.

Adjust idle speed adjustment screw (1) to obtain 800 to 900 rpm.

1. Idle speed adjustment screw



MIXTURE CHECKING AND ADJUSTMENT

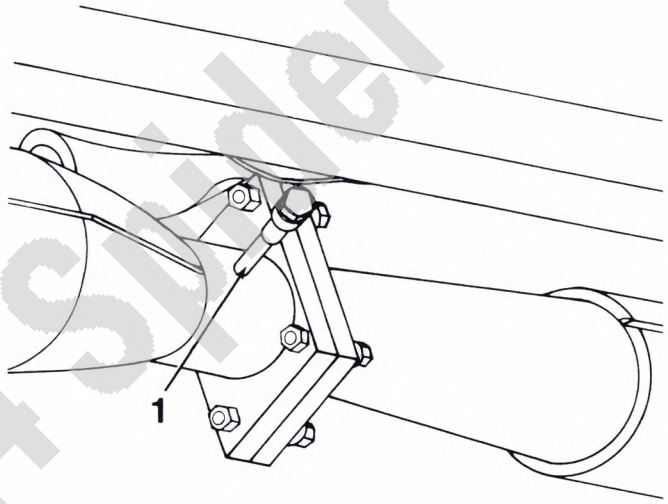
To check mixture, first connect test equipment as follows.

Remove plug (1) from CO pickup fitting. Install adapter probe (tool 4467) in pickup. Connect hose from CO analyzer to probe. Turn analyzer on to allow for proper warmup of equipment.

Start engine and allow it to reach normal operating temperature.

NOTE: Engine is at normal operating temperature when cooling fan has been on twice.

1. Plug

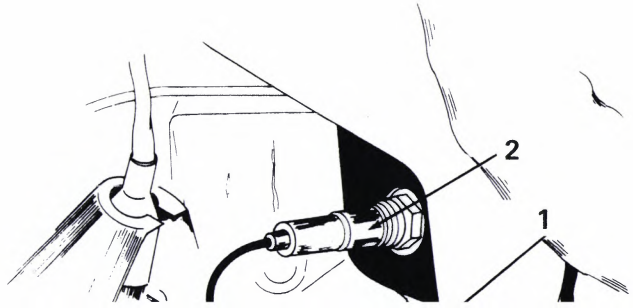


Zero analyzer according to manufacturer's instructions.

Disconnect harness connector (1) from Lambda sensor connector, making sure that wire cannot ground out.

Check CO reading. Reading should be 0.5% to 0.9%.

1. Lambda sensor connector 2. Lambda sensor



To adjust mixture, proceed as follows:

NOTE: On 1981 and later models, Federal law prohibits routine adjustment of mixture. Adjust mixture only if major engine repairs have been performed or main fuel injection components have been replaced.

If mixture screw is concealed by a plastic plug, remove plug.

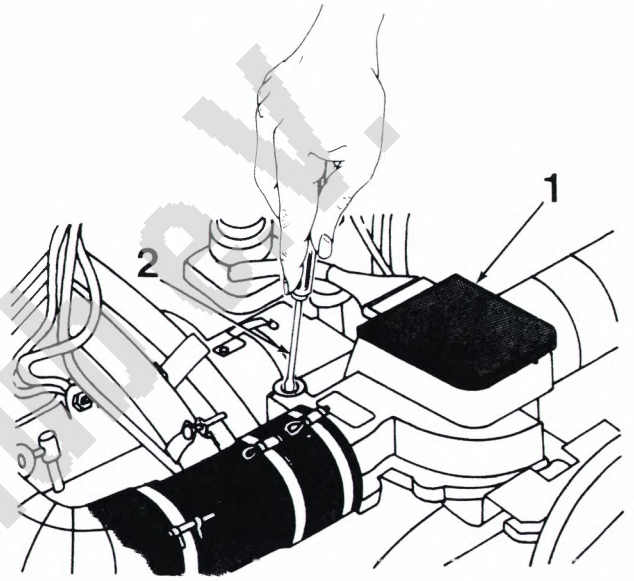
If mixture screw is concealed by an aluminum plug, refer to MIXTURE ADJUSTMENT SCREW PLUG REMOVAL AND INSTALLATION before performing this procedure.

Turn adjustment screw clockwise to increase CO level, and counterclockwise to decrease CO level.

Install plug in air flow sensor (1).

WARNING: In the next step, be very careful in removing probe and installing plug. Exhaust pipe could be very hot.

Remove CO analyzer and probe. Install plug in exhaust pickup.



1. Air flow sensor 2. Screwdriver

MIXTURE ADJUSTMENT SCREW PLUG

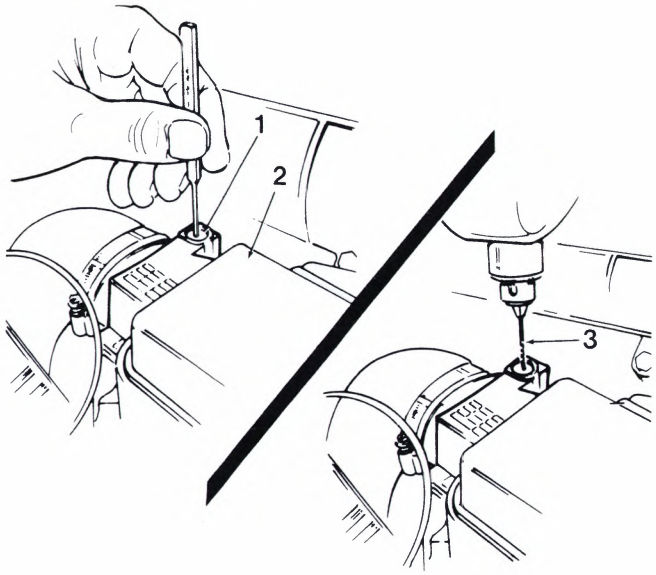
REMOVAL

NOTE: On 1981 and later models, Federal law prohibits routine adjustment of mixture. Remove aluminum adjustment screw plug to adjust mixture only if major engine repairs have been performed or main fuel injection components have been replaced.

Center punch aluminum plug (1) sealing mixture adjustment screw in the air flow sensor (2).

Drill a 3/32 in. (2.5 mm) hole, approximately 9/64 to 5/32 in. (3.5 to 4 mm) deep, in the center of plug.

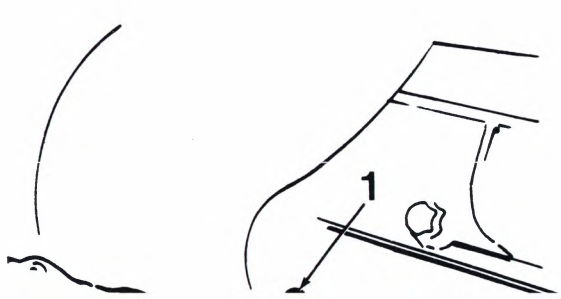
NOTE: Clean all metal shavings from around area.



1. Aluminum plug 2. Air flow sensor 3. 3/32 in. (2.5 mm) drill

Screw a 1/8 in. (3 mm) sheet metal screw (1) into drilled hole.

Grasp the screw with a pair of pliers and lift screw and aluminum plug (2) out from air flow sensor.



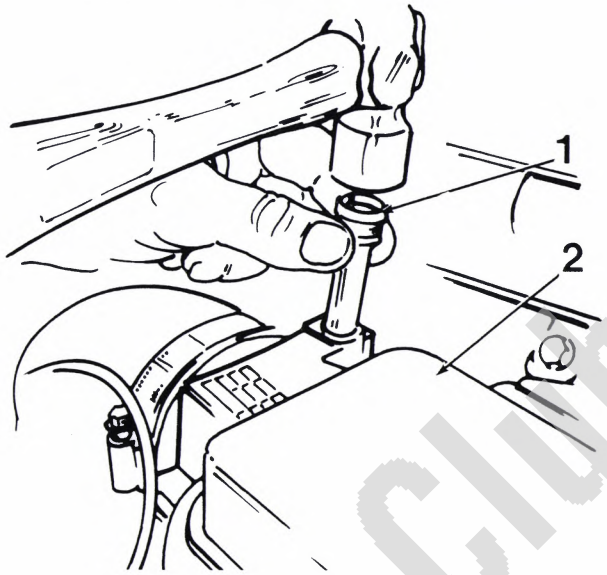
1. 1/8 in. (3 mm) screw 2. Aluminum plug

INSTALLATION

NOTE: To comply with Federal law, replacement plug must be installed after mixture adjustment.

Seat new replacement plug (1) in recess of air flow sensor (2). Use a hammer to drive plug in flush with unit.

1. Plug 2. Air flow sensor



ELECTRONIC CONTROL UNIT

REMOVAL AND INSTALLATION

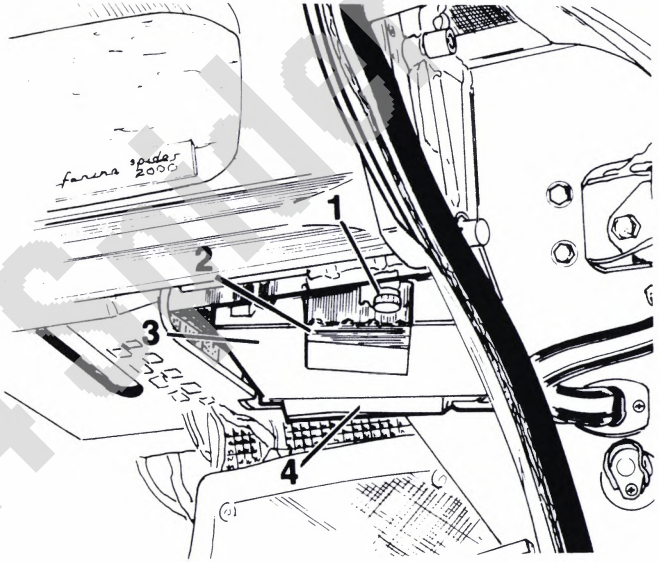
On vehicles with A.C., remove front nut holding evaporator under dashboard. Swing evaporator forward and down to gain access to control unit.

Loosen and remove plastic nut (1) holding bracket (1) in car. Lower control unit (3) and pull it back free of front bracket (4).

Release spring slip holding connector to control unit. Remove control unit.

Install in reverse order.

1. Plastic nut 2. Mounting bracket 3. Electronic control unit
4. Front bracket



LAMBDA SENSOR

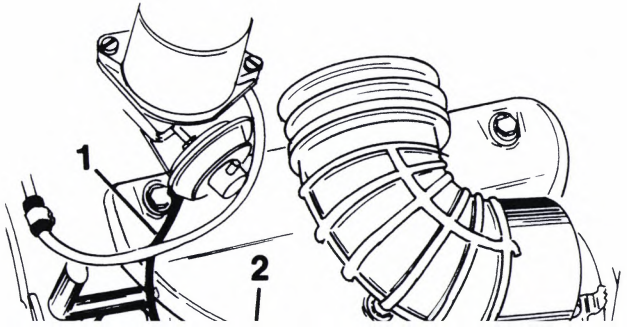
REMOVAL AND INSTALLATION

NOTE: The Lambda sensor must be replaced every 30,000 miles.

Allow exhaust system to cool.

On vehicles without turbo, disconnect cable (1) for sensor (2) from connector.

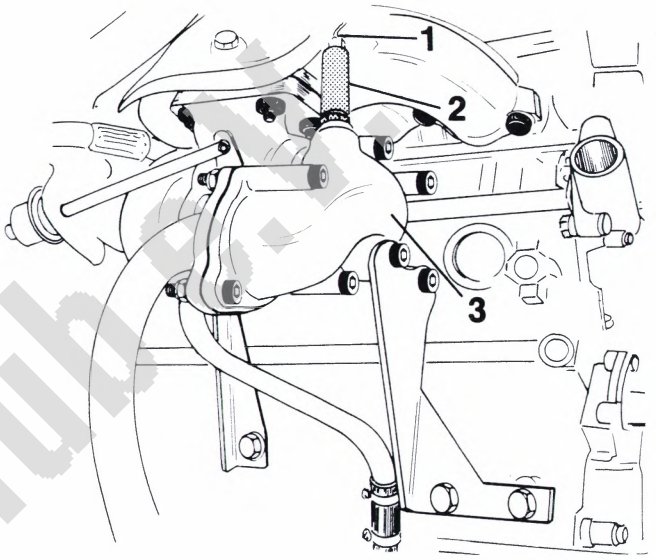
Remove sensor from exhaust manifold (3).



On vehicles with turbo, disconnect cable (1) from sensor (2).

Remove sensor from exhaust outlet elbow (3).

1. Cable 2. Lambda sensor 3. Exhaust outlet elbow

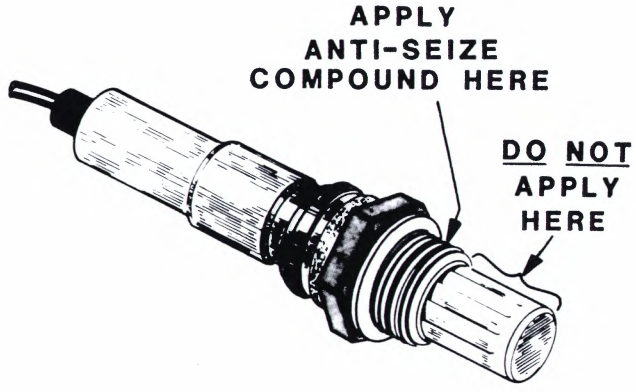


Coat threads of new Lambda sensor with anti-seize, anti-rust grease.

CAUTION: Do not allow grease to get on sensor surface. This will contaminate sensor and require replacement.

Thread sensor into exhaust pipe (non-turbo) or exhaust outlet elbow (turbo). Torque sensor to 30 to 36 ft lbs (4.2 to 5.0 mkg).

Connect cable to sensor.



INDICATOR RESET

NOTE: Lambda sensor indicator comes on at 30,000 miles to indicate replacement of sensor. To turn indicator off, the switch unit must be reset.

Switch unit is located under dashboard to the right of steering column.

Remove wire (3) securing cap screw (2). Remove cap screw.

Insert a small screwdriver through housing and press on switch contact. Contact will reset to high point on wheel.

THROTTLE PLATE SWITCH

REMOVAL AND INSTALLATION

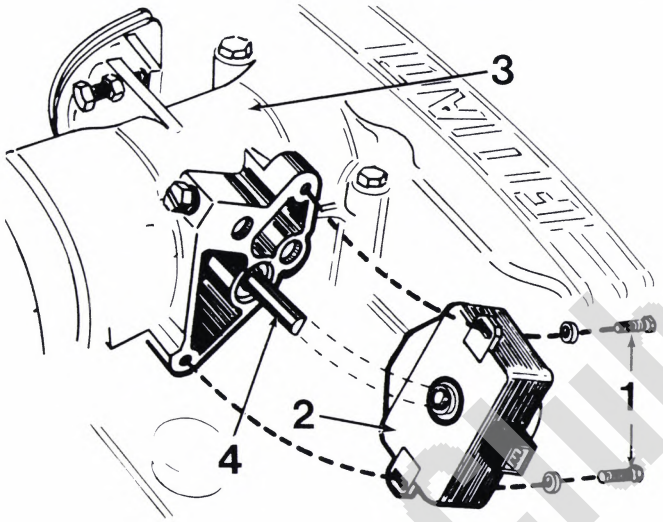
Disconnect throttle plate switch.

Remove two screws (1) and washers holding switch (2) to throttle housing (3).

Remove switch by slowly pulling switch out from housing.

Install in reverse order. Make sure switch is properly aligned with throttle shaft (4).

1. Screws 2. Switch 3. Throttle housing 4. Throttle shaft

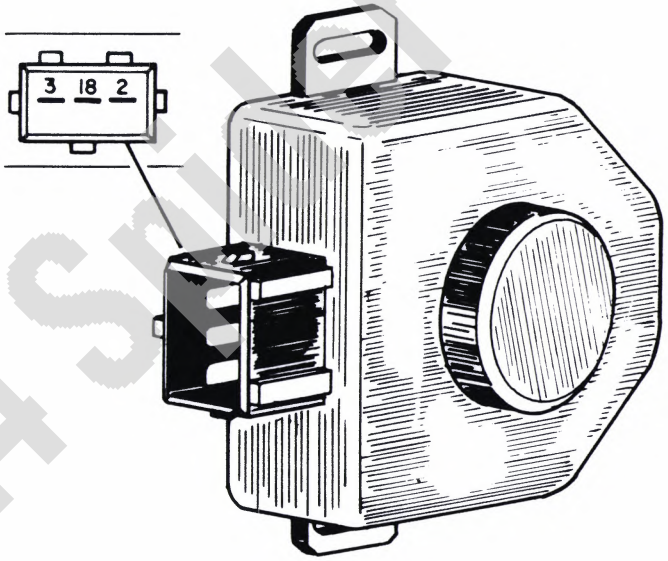


ADJUSTMENT

Make sure idle speed is correct.

Disconnect electrical connector from throttle plate switch.

Connect an ohmmeter between terminals 2 and 18 of the throttle plate switch.

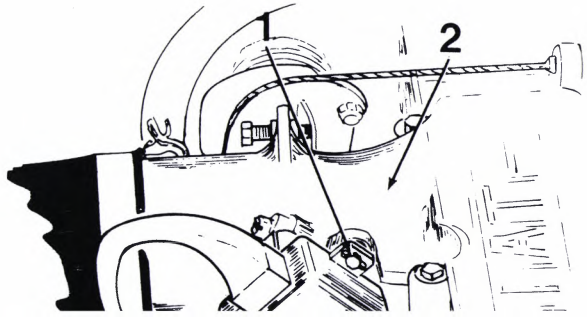


Loosen two screws (1) holding throttle plate switch (3) to throttle housing (2).

With engine off, rotate switch clockwise until ohmmeter indicates a closed circuit.

At the exact point the ohmmeter indicates a closed circuit, tighten the two screws holding switch.

Recheck the adjustment and replace the connector to the throttle plate switch.



FUEL PRESSURE REGULATOR

REMOVAL AND INSTALLATION

Relieve fuel pressure as directed under RELIEVING FUEL PRESSURE.

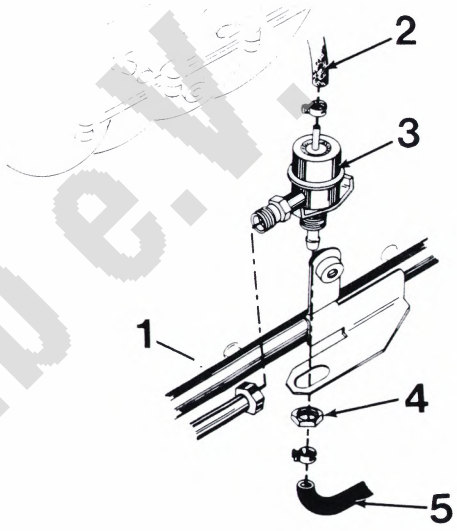
Provide a container to catch any fuel. Use care to prevent any dirt from entering system.

Disconnect vacuum hose (2) and fuel return hose (5) from pressure regulator (3).

Disconnect fuel manifold (1) connection from pressure regulator (3).

Remove nut (4) holding regulator to fuel manifold. Remove pressure regulator.

Install in reverse order. Check all fuel connections for leaks.



1. Fuel manifold 2. Vacuum hose 3. Pressure regulator 4. Nut
5. Fuel return hose

COLD START VALVE

REMOVAL AND INSTALLATION

Relieve fuel pressure as directed under RELIEVING FUEL PRESSURE.

Provide a container to catch any fuel. Use care to prevent any dirt from entering system.

Disconnect electrical connector (7) from cold start valve (2).

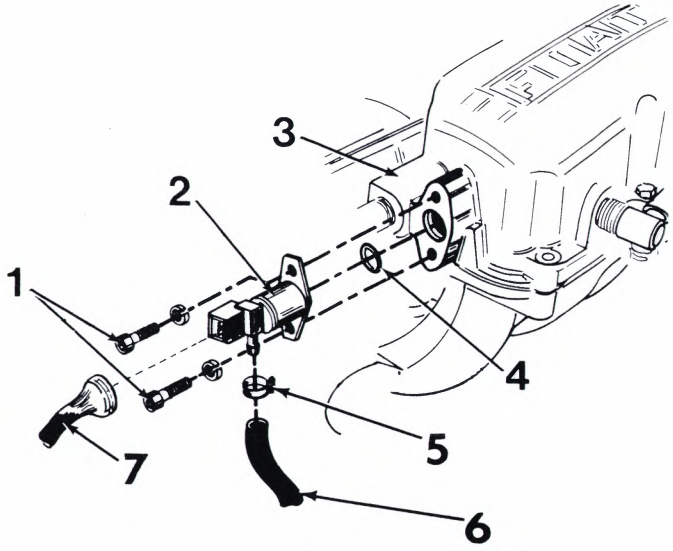
Remove clamp (5) holding fuel line (6) on valve. Pull fuel hose off valve.

CAUTION: Use care in pulling fuel hose off valve. Valve body is plastic.

Using 5 mm Allen wrench, remove two screws (1) and washers holding valve in intake manifold (3). Remove valve and "O" ring (4).

Install in reverse order. Make sure fuel hose is completely installed on valve and hose clamp is tight.

Check fuel connections for leaks.



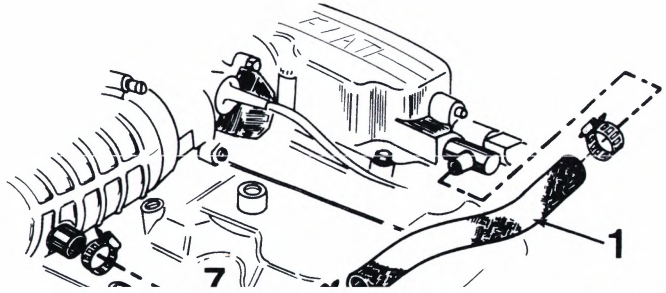
1. Allen screw 2. Cold start valve 3. Intake manifold 4. "O" ring
5. Clamp 6. Fuel hose 7. Electrical connector

AUXILIARY AIR REGULATOR

REMOVAL AND INSTALLATION

Disconnect air hoses (1 and 5) from regulator (4). Disconnect electrical connector (2).

Remove two 10 mm bolts (3) and washers holding regulator to cylinder head.



AIR FLOW SENSOR

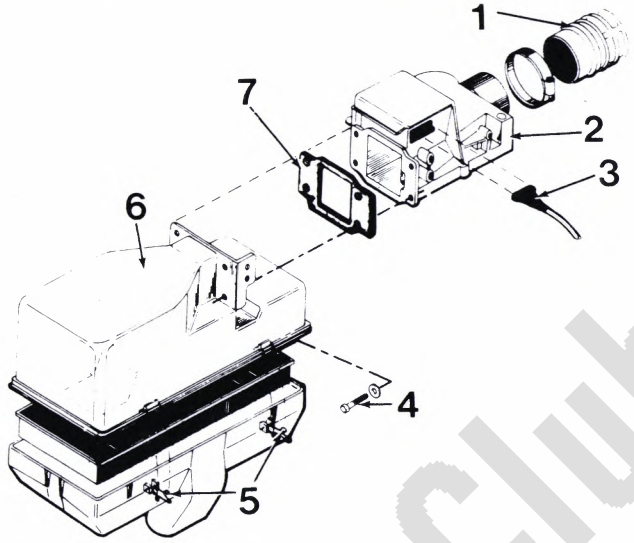
REMOVAL AND INSTALLATION

Disconnect air hose (1) from air flow sensor (2). Disconnect electrical connector (3).

Remove air cleaner cover (6) by releasing four clips (5).

Remove four bolts (4) and washers holding air flow sensor (2) to air cleaner cover (6). Remove air flow sensor (2) and gasket (7).

Install in reverse order, making sure air hose connection is tight.



1. Air hose 2. Air flow sensor 3. Electrical connector 4. Bolt
5. Clip 6. Air cleaner cover 7. Gasket

FUEL INJECTORS

REMOVAL

Relieve fuel system pressure as directed under RELIEVING FUEL PRESSURE.

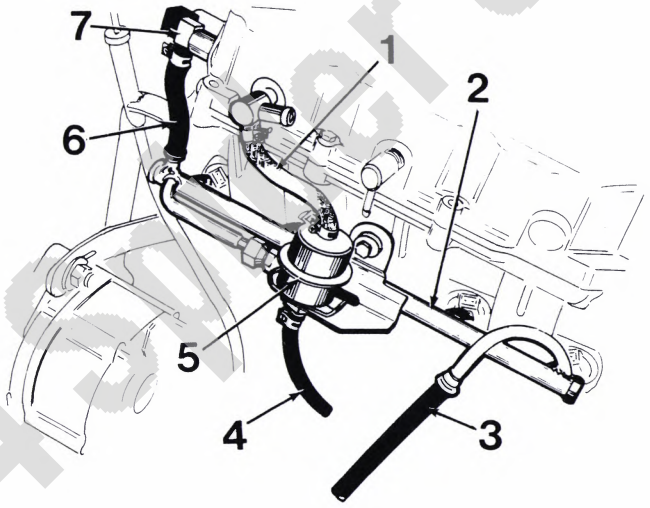
Provide a container to catch any fuel. Use care to prevent any dirt from entering system.

NOTE: Before disconnecting any fuel hoses, place a rag beneath them to catch any spilled fuel.

Disconnect the following:

- electrical connectors from injectors,
- fuel supply hose (3) from pipe. Use a 12 mm wrench to hold fuel line and a 17 mm wrench to turn fuel hose connection.
- fuel return hose (4) from pressure regulator (5),
- vacuum hose (1) from regulator (5),
- fuel hose (6) from cold start valve (7).

CAUTION: Use care in pulling fuel hose off valve. Valve body is plastic.

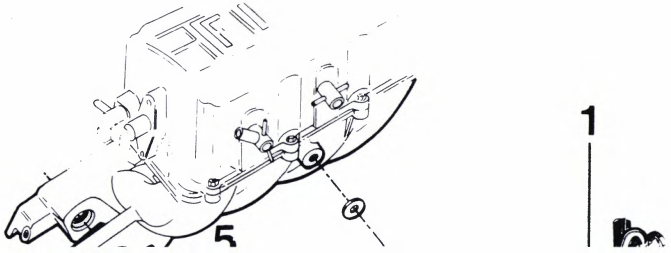


1. Vacuum hose 2. Fuel manifold 3. Fuel supply hose 4. Fuel return hose 5. Pressure regulator 6. Fuel hose 7. Cold start valve

Remove 10 mm bolt (2) holding fuel manifold (1) to intake manifold.

Remove four 10 mm nuts (3) and washers holding injector retainers (4) to intake manifold.

Remove fuel manifold (1) complete with injectors (6) and regulator. Be careful of rubber bushings (5) in intake manifold. They may fall out.



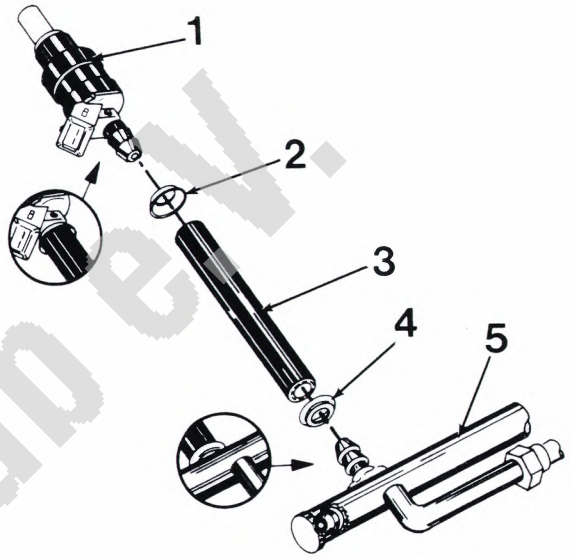
NOTE: When replacing a defective injector, replace injector and hose.

To replace injector, pull hose (3) off fuel manifold (5). Use a twisting, rocking motion while pulling on hose.

To replace a damaged hose from a good injector, cut hose at both ends and remove it.

When installing the new hose or injector, place collars (2 and 4) over shoulder of injector (1) and manifold (5).

Push hose (3) on injector (1) and manifold (5) until hose end is inside collars (2 and 4) and collars are tight against shoulder.



1. Fuel injector 2. Collar 3. Hose 4. Collar 5. Fuel manifold

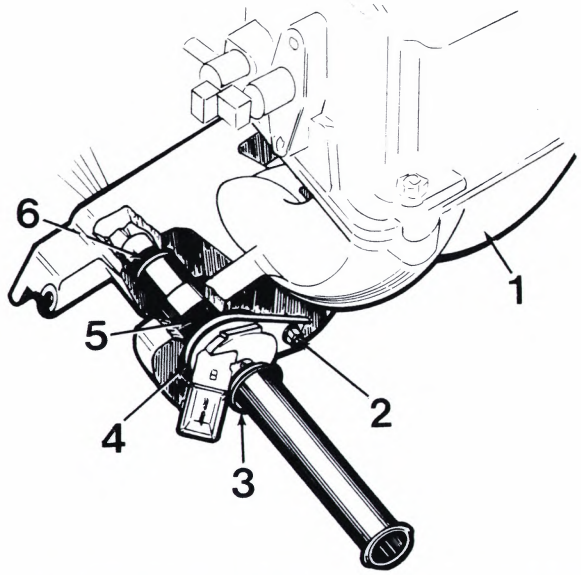
INSTALLATION

Place retainers (4) on injectors (3). Slide large bushing (5) on injector until seated in groove in injectors. Place small bushings (6) on tip of injectors.

Reinstall injectors and fuel manifold in reverse order, making sure:

- all components are clean
- rubber bushings are not damaged
- rubber bushings are installed in intake manifold properly
- injectors are installed in small bushings airtight
- retainers holding nuts are tight

Check all fuel connections for leaks.



1. Intake manifold 2. Nut 3. Fuel injector 4. Retainer 5. Large bushing 6. Small bushing

THROTTLE PLATE

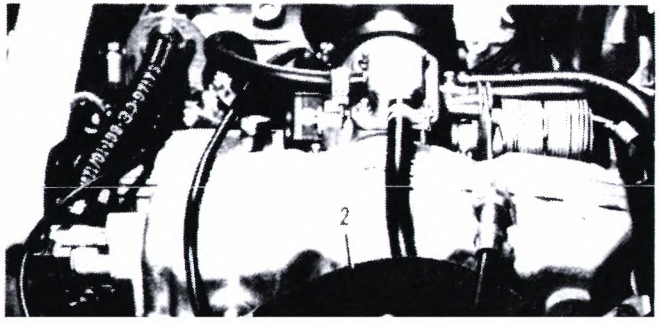
REMOVAL AND INSTALLATION

NOTE: The upper air intake should be removed for ease of access to throttle plate.

Mark lines, hoses, and wires prior to removal to identify them for installation.

Relieve fuel pressure as directed under RELIEVING FUEL PRESSURE.

Disconnect from intake manifold ( ) vacuum hoses for:



Disconnect electrical connectors from cold start valve (4) and throttle plate switch (3).

Disconnect auxiliary air regulator air hose (5) from intake manifold (1). Loosen clamp and disconnect air hose (6) from throttle housing.

On vehicles without turbocharger, disconnect crankcase emission hose (7) from throttle housing.

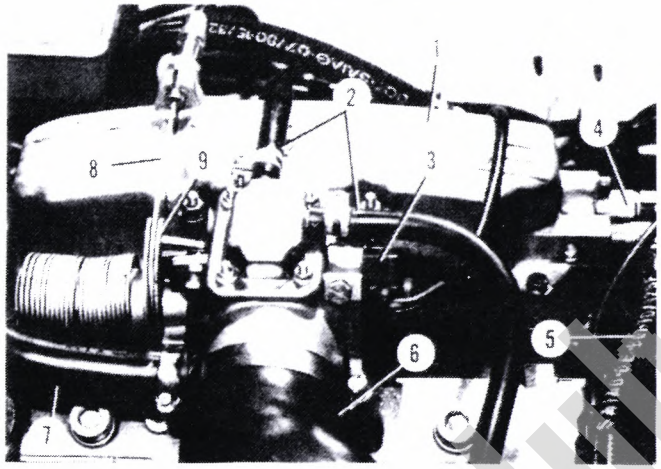
Disconnect distributor vacuum hose from throttle housing.

Disconnect accelerator cable (8) from throttle lever (9). Remove cable from support on intake manifold.

Disconnect fuel hose from cold start valve (4).

CAUTION: Use care in pulling fuel hose off valve. Valve body is plastic.

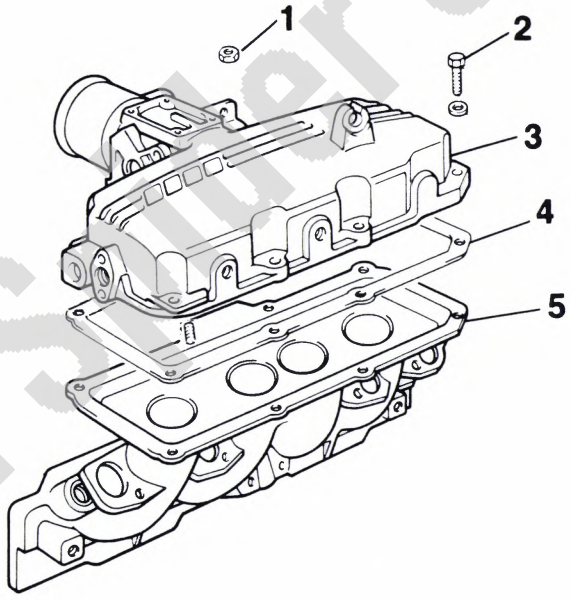
Disconnect two water hoses (2) from throttle plate heater.



1. Intake manifold 2. Water hose 3. Throttle plate switch
4. Cold start valve 5. Auxiliary air regulator hose 6. Main air hose
7. Crankcase emission hose 8. Accelerator cable 9. Throttle lever

Remove the six bolts (2) and two nuts (1) holding upper section (3) to lower section (5) of intake manifold.

Carefully lift upper section off.



1. Nut 2. Bolt 3. Upper section 4. Gasket 5. Lower section

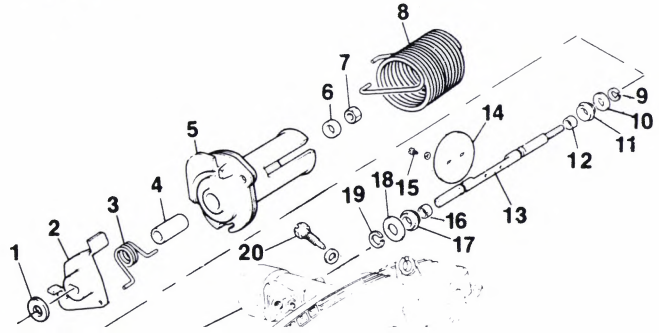
Remove two screws and washers and remove throttle plate switch.

Working through throttle housing, remove two screws (15) and washers holding throttle plate (14) to throttle shaft (13). Remove throttle plate.

If necessary to remove throttle shaft, remove snap ring (19). Pull shaft out of housing.

Assemble and install in reverse order.

Check all air and fuel connections for leaks.



After installation, adjust throttle plate as follows:

NOTE: Engine must be at normal operating temperature and cooling fan off when adjusting idle speed.

Connect tachometer. Run engine until it reaches normal operating temperature.

On cars with automatic transmission, apply hand brake and place gearshift lever in "D".

Turn idle speed adjustment screw (2) in all the way.

Adjust stop screw (1) to obtain:

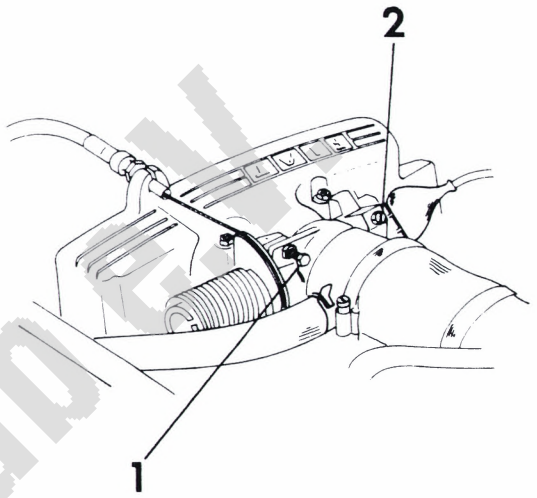
- Manual Transmission – 700 to 800 rpm
- Automatic Transmission – 600 to 700 rpm

Hold stop screw (1) and tighten locknut.

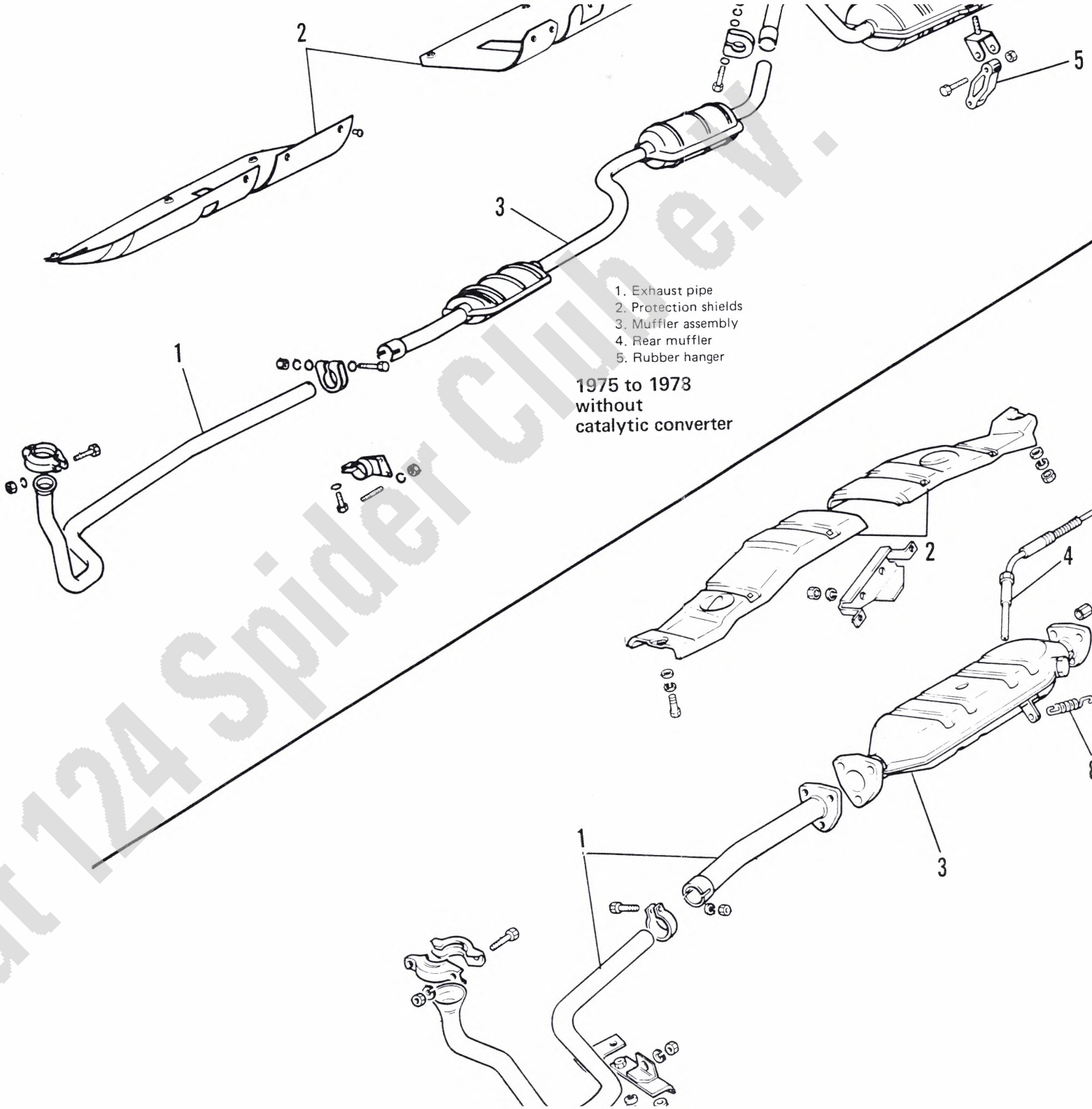
Adjust idle speed adjustment screw (2) to obtain:

- Manual Transmission – 800 to 900 rpm
- Automatic Transmission – 700 to 800 rpm

Check that throttle plate switch is adjusted properly as directed under THROTTLE PLATE SWITCH ADJUSTMENT.

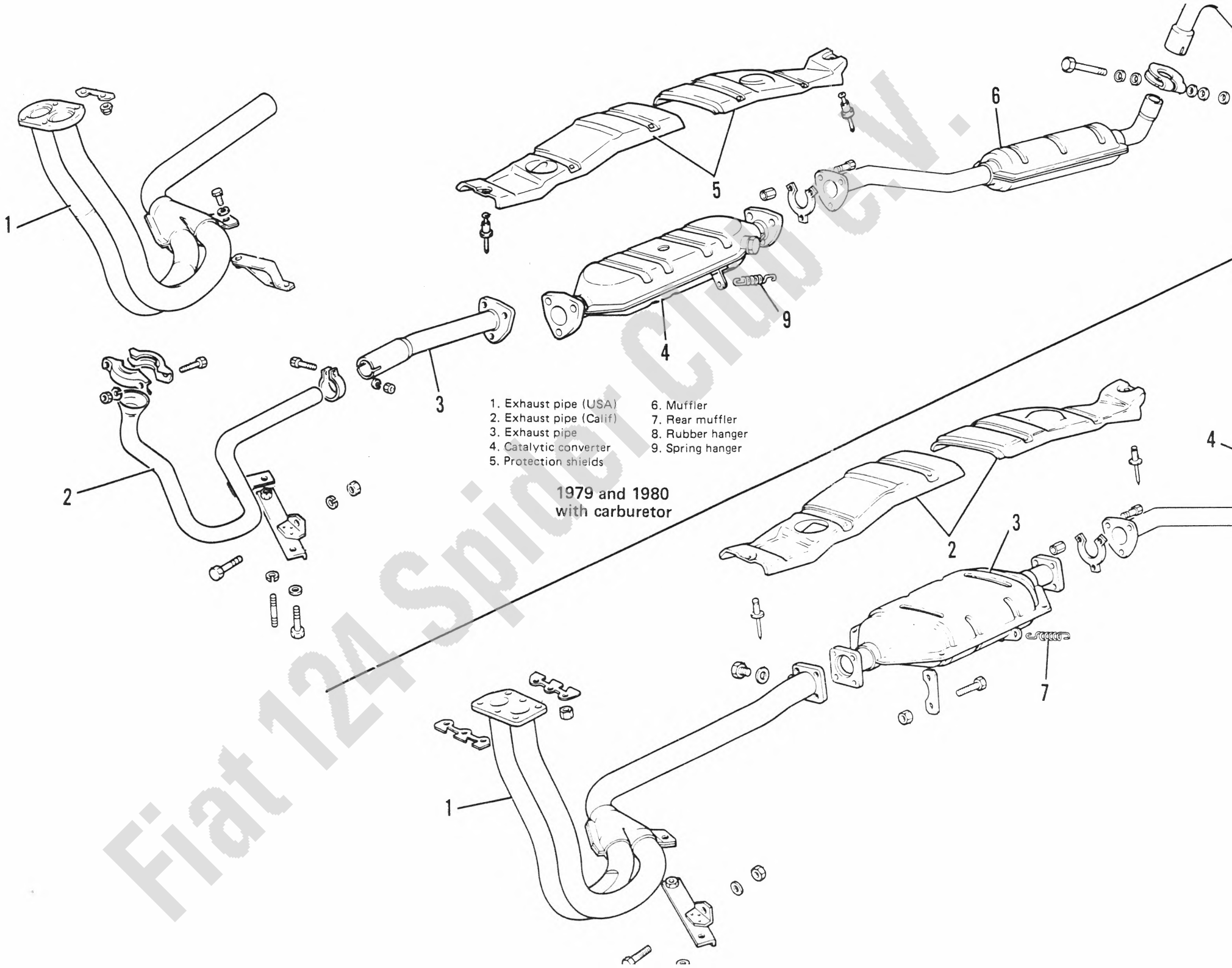


1. Throttle stop screw 2. Idle speed adjustment screw



1. Exhaust pipe
2. Protection shields
3. Muffler assembly
4. Rear muffler
5. Rubber hanger

1975 to 1973 without catalytic converter



1. Exhaust pipe (USA)
2. Exhaust pipe (Calif)
3. Exhaust pipe
4. Catalytic converter
5. Protection shields
6. Muffler
7. Rear muffler
8. Rubber hanger
9. Spring hanger

1979 and 1980 with carburetor

CATALYTIC CONVERTER

REMOVAL AND INSTALLATION

WARNING: Make sure catalytic converter (4) has cooled down before working on it.

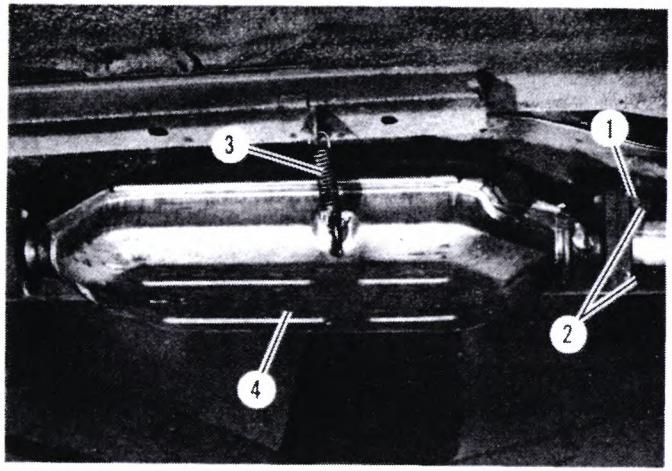
On 1975 to 1978 vehicles, remove thermocouple from catalytic converter.

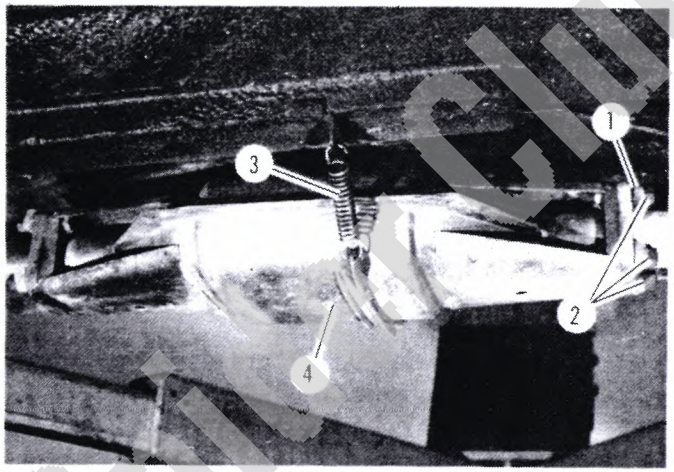
Bend locking rings (1) clear of nuts (2) securing converter to exhaust pipes.

Disconnect spring hangers (2) from converter. Remove converter.

Installation is reverse of removal.

1. Locking ring 2. Nut 3. Spring hanger 4. Catalytic converter





AIR PUMP (1975 to 1978)

REMOVAL AND INSTALLATION

Remove timing belt cover (1). Remove pump drive belt.

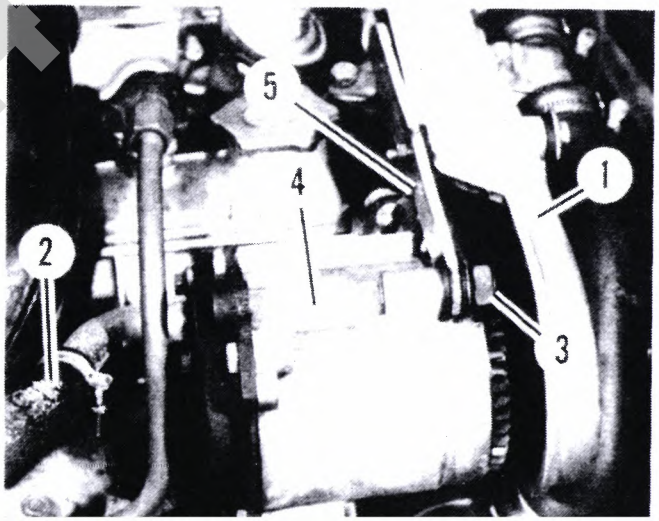
Loosen clamp and disconnect hose (2) from air pump (4).

Remove tensioner nut (3) and washers holding pump to bracket (5). Remove bolt (6), nut, washer and shield holding pump to cylinder head. Remove pump.

When installing pump, make sure to install shield on back side of mounting lugs.

Adjust belt tension.

1. Timing belt cover 2. Air outlet hose 3. Tensioner nut
4. Air pump 5. Bracket 6. Mounting bolt



AIR PUMP (1979 and 1980 carburetored)

REMOVAL AND INSTALLATION

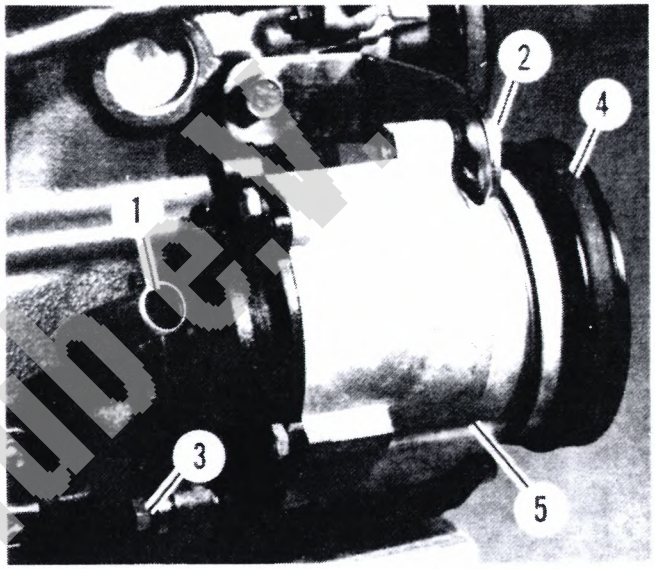
Loosen clamp and remove air hose from pump outlet (1).

Loosen tensioner bolt (2) and mounting bolt (3) to remove belt (4). Then remove bolts to remove pump (5).

Install in reverse order.

Adjust belt tension.

1. Air pump outlet 2. Tensioner bolt 3. Mounting bolt
4. Drive belt 5. Air pump



AIR MANIFOLD (1975 to 1978)

REMOVAL AND INSTALLATION

Remove air cleaner.

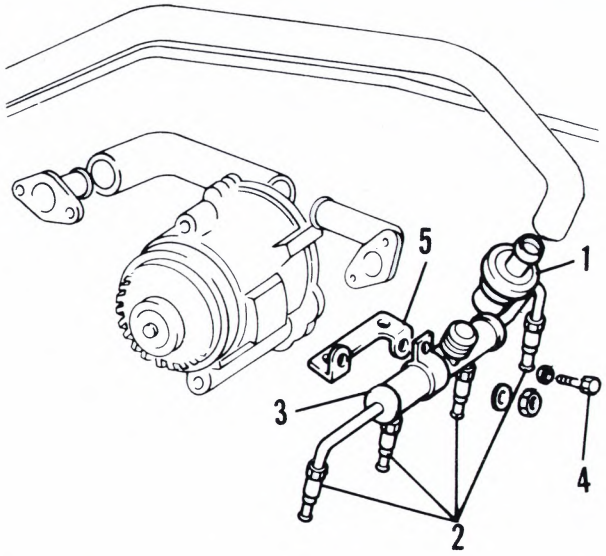
Disconnect hose to check valve (1).

Remove bolt (4), washer, and nut holding air manifold (3) to bracket (5).

Using tool A.5016, disconnect tubes (2) from cylinder head. Remove air manifold.

Install in reverse order.

1. Check valve 2. Tube 3. Air manifold 4. Bolt 5. Bracket



AIR PUMP CHECK VALVE (1979 and 1980 carburetored)

REMOVAL AND INSTALLATION

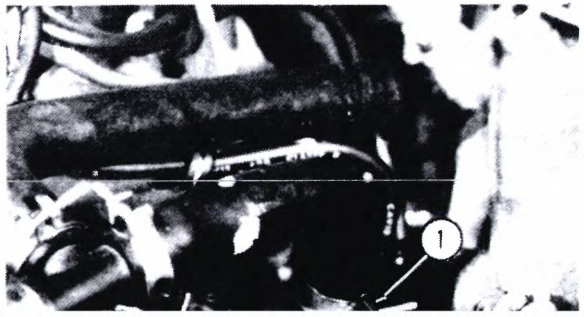
Remove air cleaner.

Loosen clamp (1) and remove hose from check valve.

Using wrench, remove check valve from cylinder head.

Install in reverse order.

1. Clamp 2. Check valve



EGR VALVE (1975 to 1978)

REMOVAL AND INSTALLATION

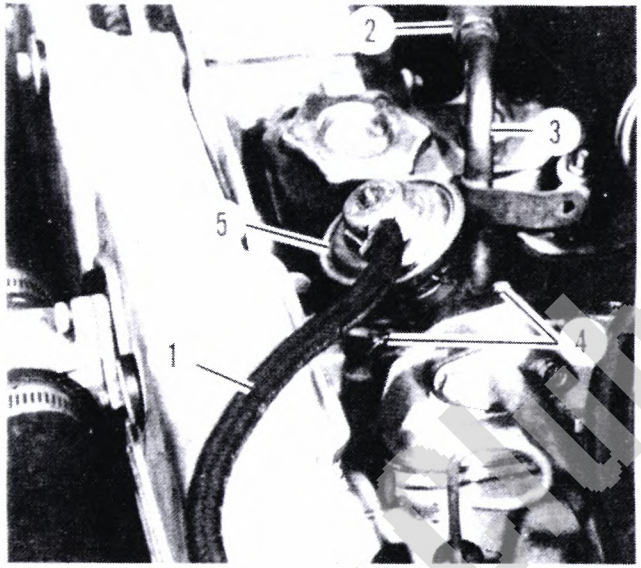
Loosen clamp and disconnect vacuum line (1).

Disconnect line fitting (2) from line attached to valve. Remove bolt, nut and washer holding line (3) to bracket on cam cover.

Remove two bolts (4) and washers holding EGR valve (5) to cam cover. Remove valve.

Install in reverse order.

1. Vacuum line 2. Line fitting 3. Valve line 4. Bolt 5. EGR valve



EGR VALVE (1979 and 1980 carburetored)

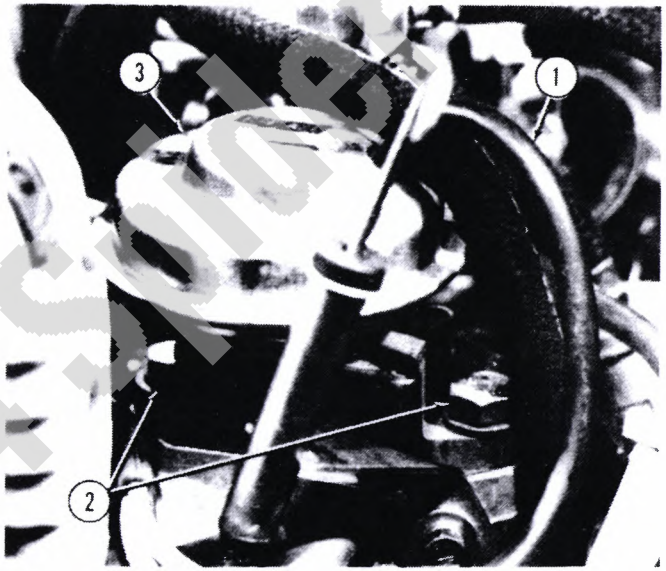
REMOVAL AND INSTALLATION

Disconnect vacuum hose (1) from EGR valve (3).

Remove two bolts (2) and washers, then remove EGR valve and gasket from intake manifold.

Install in reverse order. Use a new gasket.

1. Vacuum hose 2. Bolts 3. EGR valve



REED VALVES (1979)

REMOVAL AND INSTALLATION

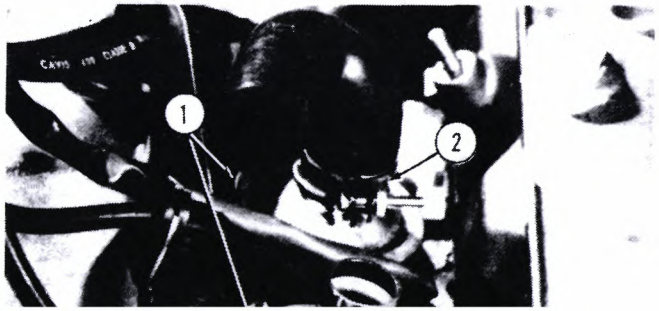
Remove air cleaner.

Loosen clamp (2) and remove hose from reed valve (1).

Using wrench, remove reed valves from cylinder head.

Install in reverse order.

1. Reed valves 2. Clamp



REED VALVE FILTER (1979)

REMOVAL AND INSTALLATION

Loosen clamp (1) and remove hose from air induction filter housing (2).

Remove two bolts (3) and washers and remove air induction filter housing from air cleaner. Remove filter.

Install in reverse order.

1. Clamp 2. Air induction filter housing 3. Bolts

PCV CONTROL VALVE (Carburetored engines)

REMOVAL AND INSTALLATION

Remove carburetor (refer to Carburetor section).

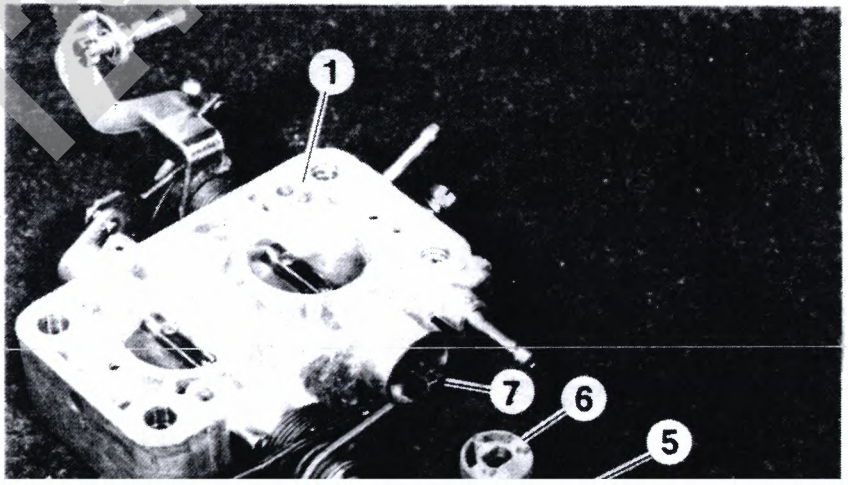
Separate throttle base (1) from carburetor body.

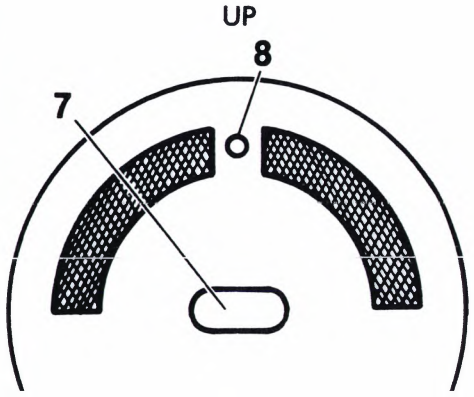
Remove nut (2), washer (3), cam (4), retainer spring (5) and valve (6) from slotted shaft (7).

Install in reverse order.

CAUTION: Valve is slotted to fit easily on shaft if installed correctly, but it can be forced on incorrectly, resulting in crankcase pressurization and high oil consumption. There are three raised knobs on the valve. When installed correctly, they face out and a single knob (8) will be up, as shown.

1. Throttle base 2. Nut 3. Washer 4. Cam 5. Retainer spring 6. PCV valve 7. Throttle shaft 8. Raised knob





(Carburetored engines)

This is a closed system designed to prevent any emission of blow-by gases and oil vapors into the atmosphere.

At closed throttle (see detail 4a) the blow-by gases are drawn into the intake manifold through the calibrated orifice of control valve incorporated in carburetor.

At wide open throttle (see detail 4b) part of the blow-by gases is drawn into the intake manifold through the open duct of the control valve. The remainder flows directly to the "clean" side of the air cleaner.

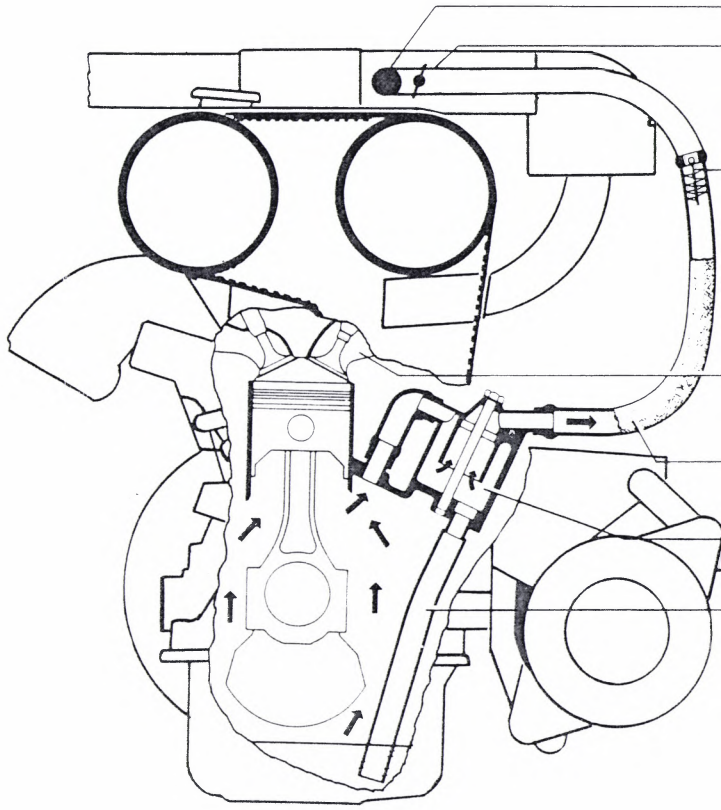
1. Emission feedback line to air cleaner 2. Flame trap 3. Air cleaner-to-control valve line 4. Control valve 4a. Control valve in engine idling condition 4b. Control valve in engine beyond idle condition 5. Intake manifold 6. Sump-to-air cleaner line 7. Cyclone liquid/vapor separator 8. Oil drain into sump

CRANKCASE EMISSION CONTROL SYSTEM
(Fuel Injected and Turbocharged engines)

This is a closed system designed to prevent any emission of blow-by gases and oil vapors into the atmosphere.

These gases and vapors are piped to an orifice upstream of the throttle plate and are then drawn into the engine when the throttle plate is open.

1. Emission feedback port 2. Throttle plate 3. Flame trap
4. Intake manifold 5. Sump-to-air intake line 6. Cyclonic trap
7. Oil drain line into sump

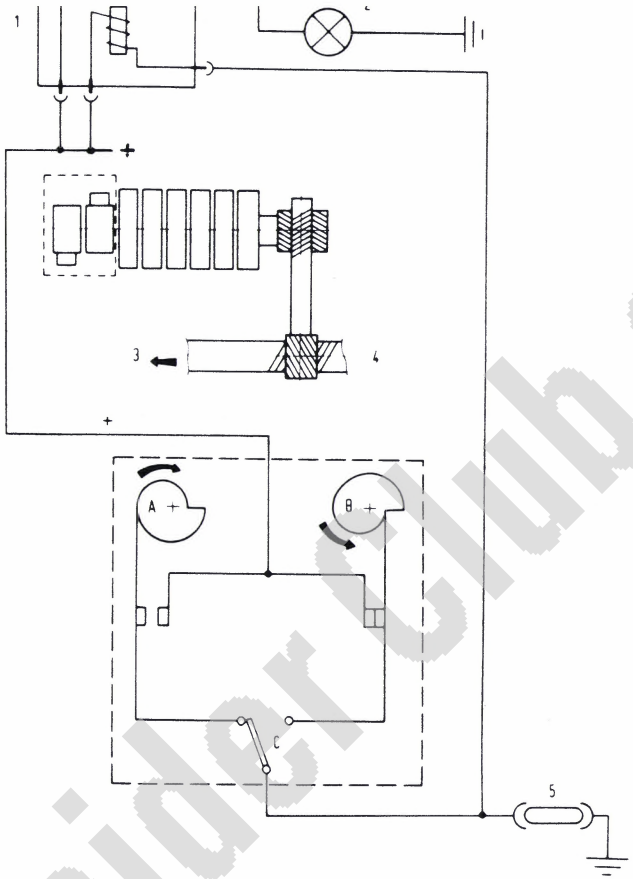


The maintenance reminder system is controlled by relay (1). With proper power and ground the relay is energized.

This opens the circuit to the lights. Cam drums A and B in odometer switch are driven by the speedometer cable and are set to close their contacts at 25,000 ± 1 miles. Closing the contact applies power to fuse (5) causing fuse to blow. This removes ground from relay (1) causing lights to come on.

The maintenance reminder system is no longer necessary. If servicing is required, the system should be eliminated.

1. Normally closed relay 2. "EGR" and "Catalyst" indicator lights
3. To speedometer 4. To transmission 5. Fuse A and B cam drums
C. Resetting switch



should be deactivated. The odometer switch (1) is located on the front right side of drivers footwell.

CATALYTIC TEMPERATURE WARNING CONTROL UNIT (1975 and 1976)

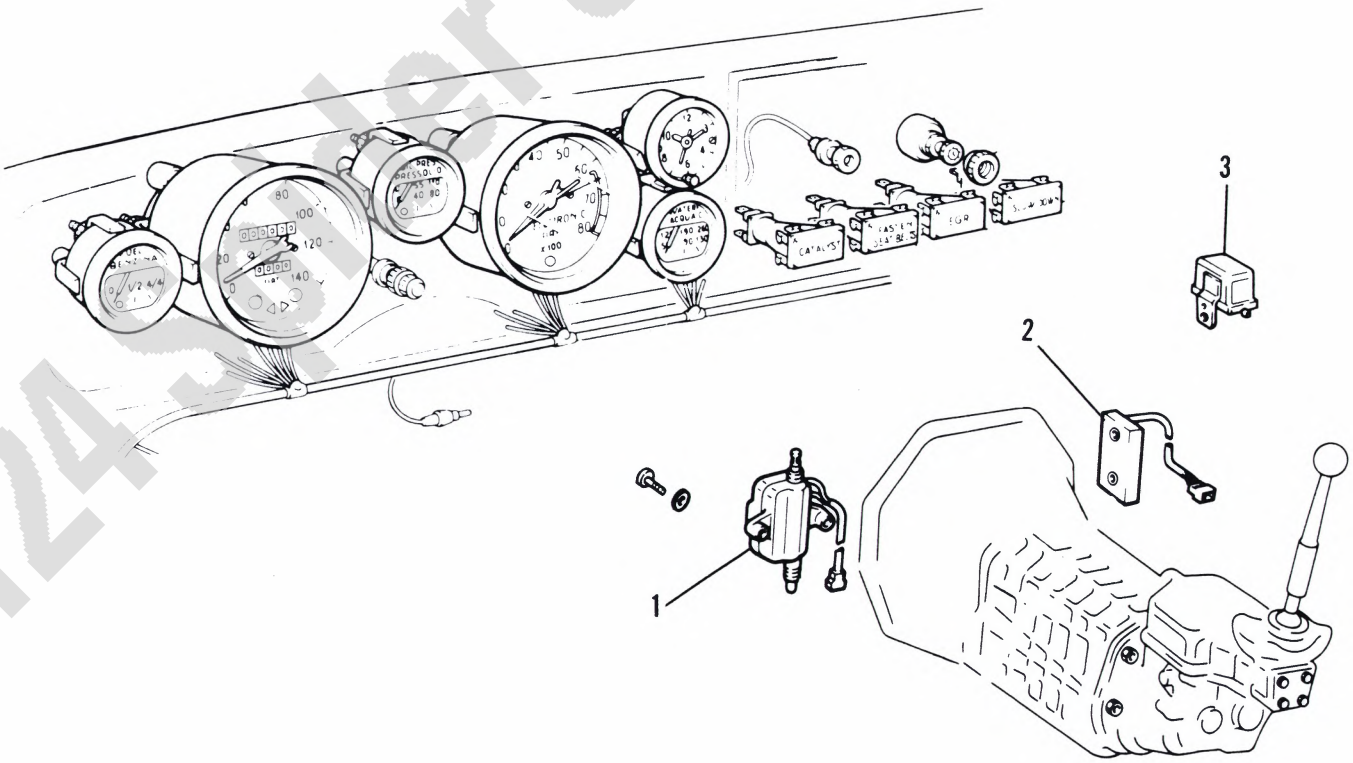
The control unit senses the temperature of the converter by means of a thermocouple. When converter temperature reaches 982 ± °50° C (1800 ± °50° F), the control unit causes the "SLOW DOWN" warning light to flash. If the temperature continues to increase, the frequency of the light increases.

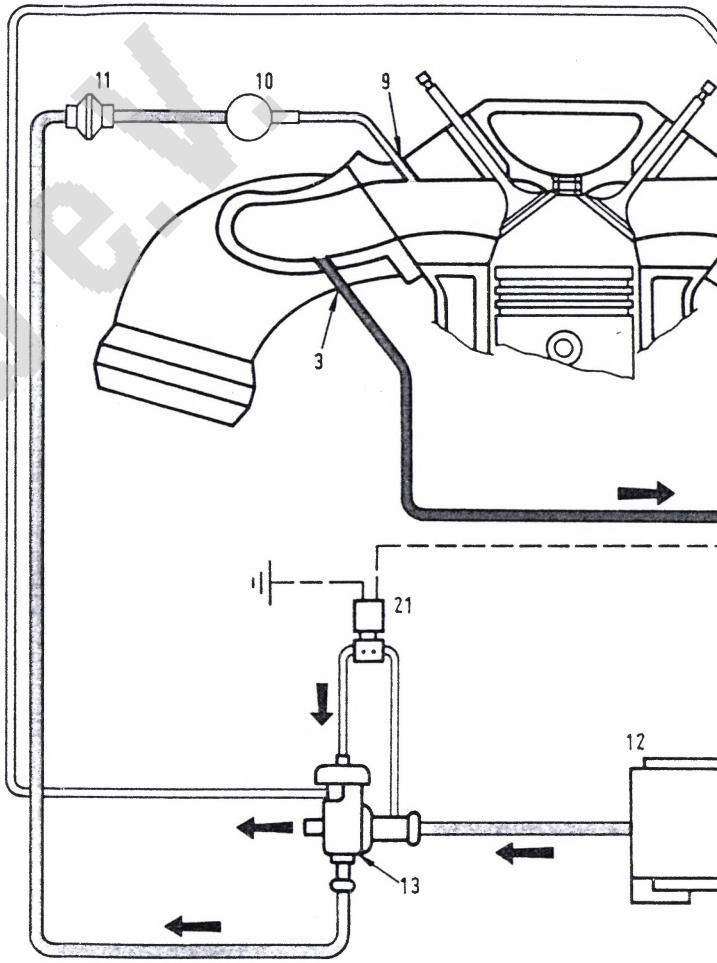
The control unit (2) is located under the glove box.

CATALYTIC TEMPERATURE PROTECTION TACHYMETRIC SWITCH (1975 and 1976)

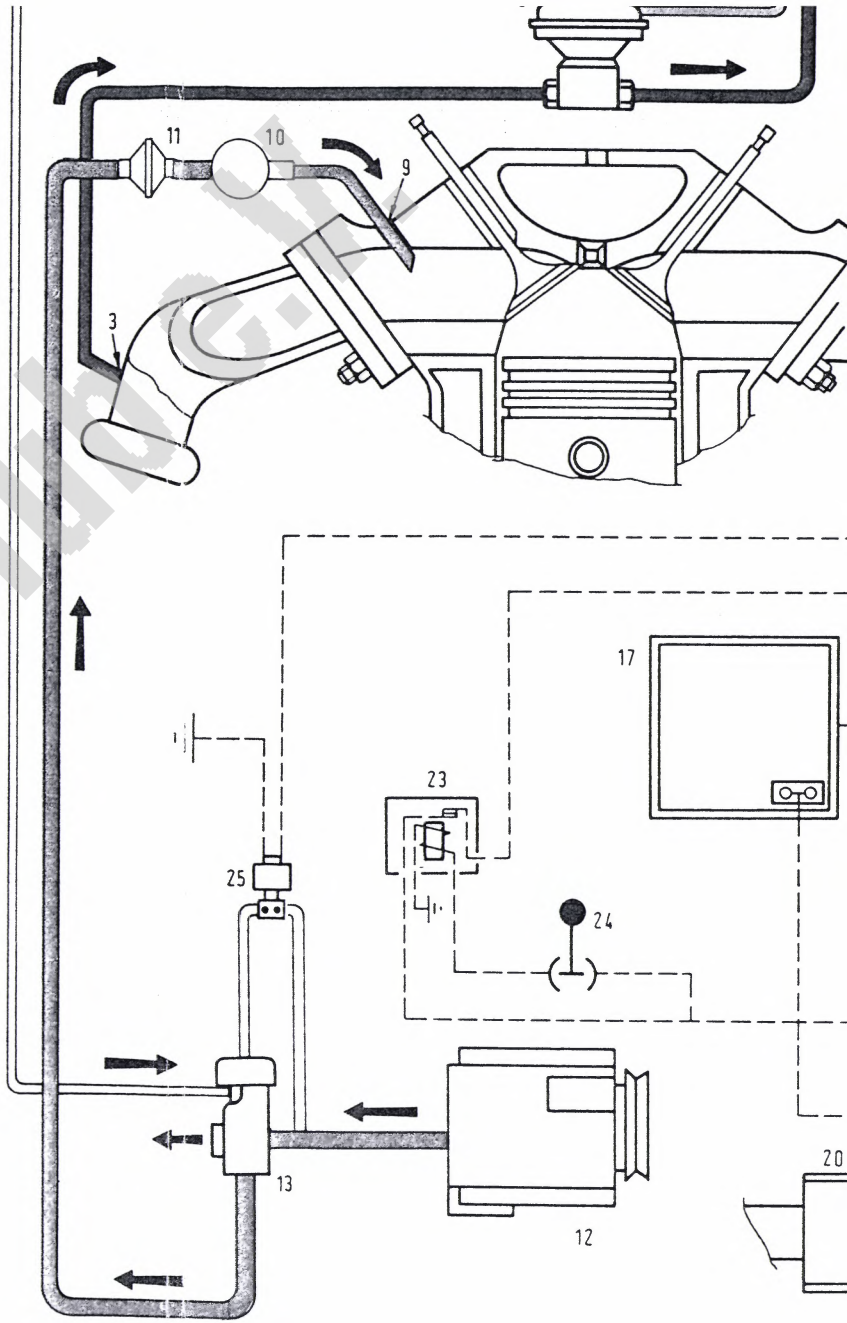
To prevent excessive temperatures in the converter, the fuel is shut off from the carburetor during decelerations. The tachymetric switch senses engine speed from the coil. With the throttle closed during decelerations above 2650 ± 50 rpm, the switch energies the idle shutoff solenoid. This shuts off idle fuel flow inside the carburetor. The tachymetric switch (3) is located under the glove box.

1. 25,000 mile control switch 2. Catalytic temperature control unit 3. Tachymetric switch





1. Fast idle capsule
2. Continuity hole
3. Exhaust gas recirculation intake
4. EGR valve control vacuum intak
5. Fast idle valve control vacuum i
6. EGR valve control thermovalve
7. Diverter valve control vacuum ir
8. EGR valve
9. Air injector
10. Air injection manifold
11. Check valve
12. Air pump
13. Diverter valve
14. Ignition contact matched switch



1. Fast idle capsule
2. Continuity hole
3. Exhaust gas recirculation intake
4. EGR valve control vacuum intake
5. Fast idle valve control vacuum intake
6. EGR valve control thermovalve
7. Diverter valve control vacuum intake
8. EGR valve
9. Air injector
10. Air injection manifold
11. Check valve
12. Air injection pump
13. Diverter valve
14. Inhibitor switch
15. Tachymetric switch (operates at 2650 ± 50 rpm)
16. From ignition coil
17. Control unit
18. Warning device panel*
19. Od
20. Ca
21. Th
22. Th
23. Ma
24. Ge mis
25. Ele
26. Ele

THERMOVALVES (1979 and 1980 carburetored)

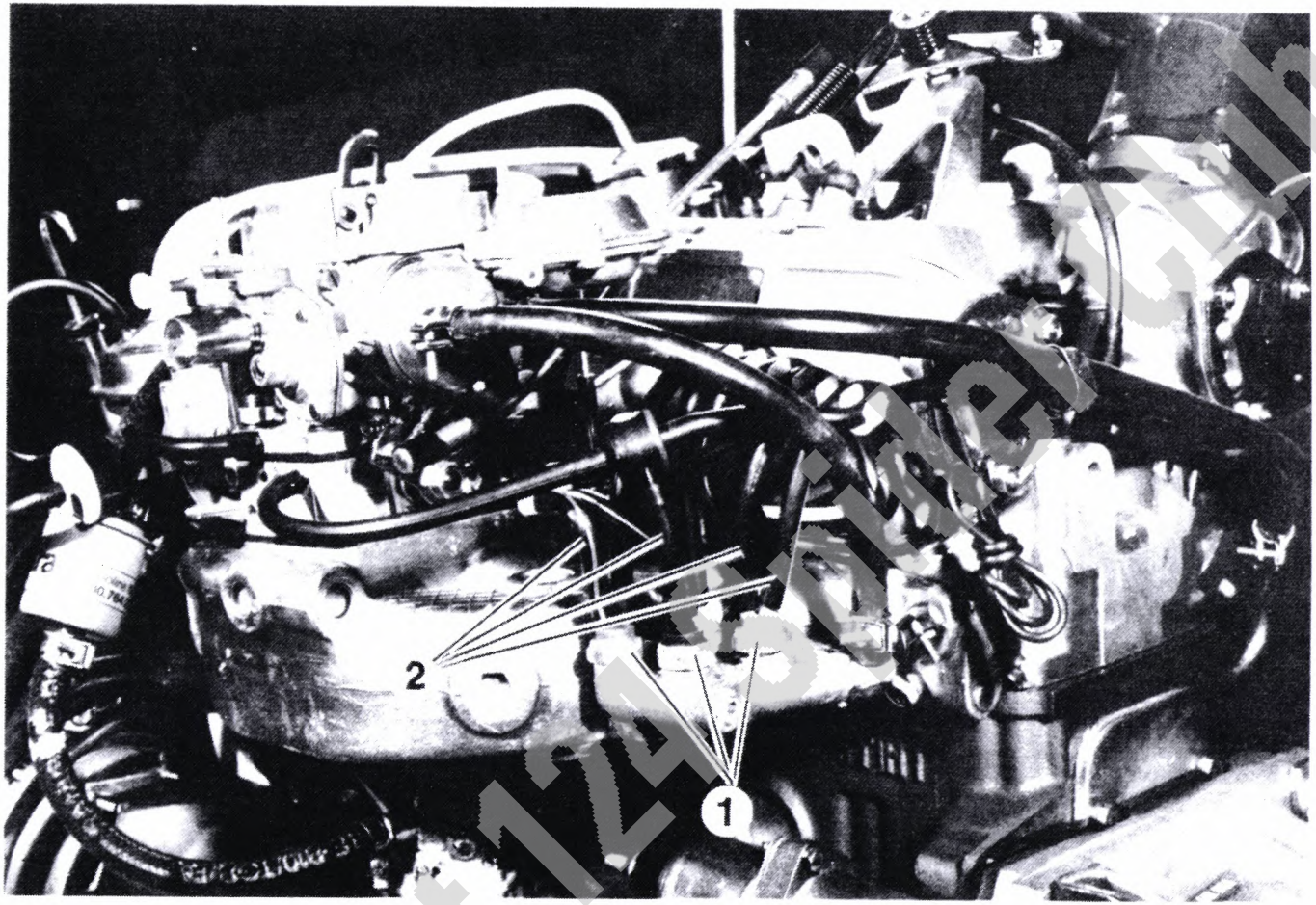
REMOVAL AND INSTALLATION

Drain cooling system to a level below thermovalves (1).

Remove vacuum lines (2) from thermovalve to be removed, noting that lines and valve are color coded. Remove thermovalve.

Install in reverse order. Refill and bleed cooling system (refer to Radiator section).

1. Thermovalves 2. Vacuum lines



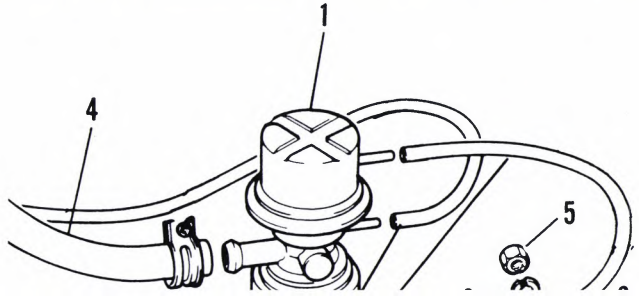
GULP VALVE AND ELECTRO VALVE (1979 and 1980 carburetored)

REMOVAL AND INSTALLATION

Gulp valve (1) and electro valve (2) are located together in the engine compartment mounted on the left fender shield.

Disconnect vacuum lines (3), air line (4) and electrical connector on valves.

Remove one nut (5) and washer to remove gulp valve.



The vacuum lines and thermovalves have been color coded for ease of corrections.

The color codes are:

Carburetor – Power Valve – Yellow

NOTE: Delay valve to be installed with black face toward carburetor.

– Vacuum Acclerator Pump – Green

Ignition Vacuum Advance – Black

NOTE: Delay valve to be installed with brown face toward distributor.

EGR – Red

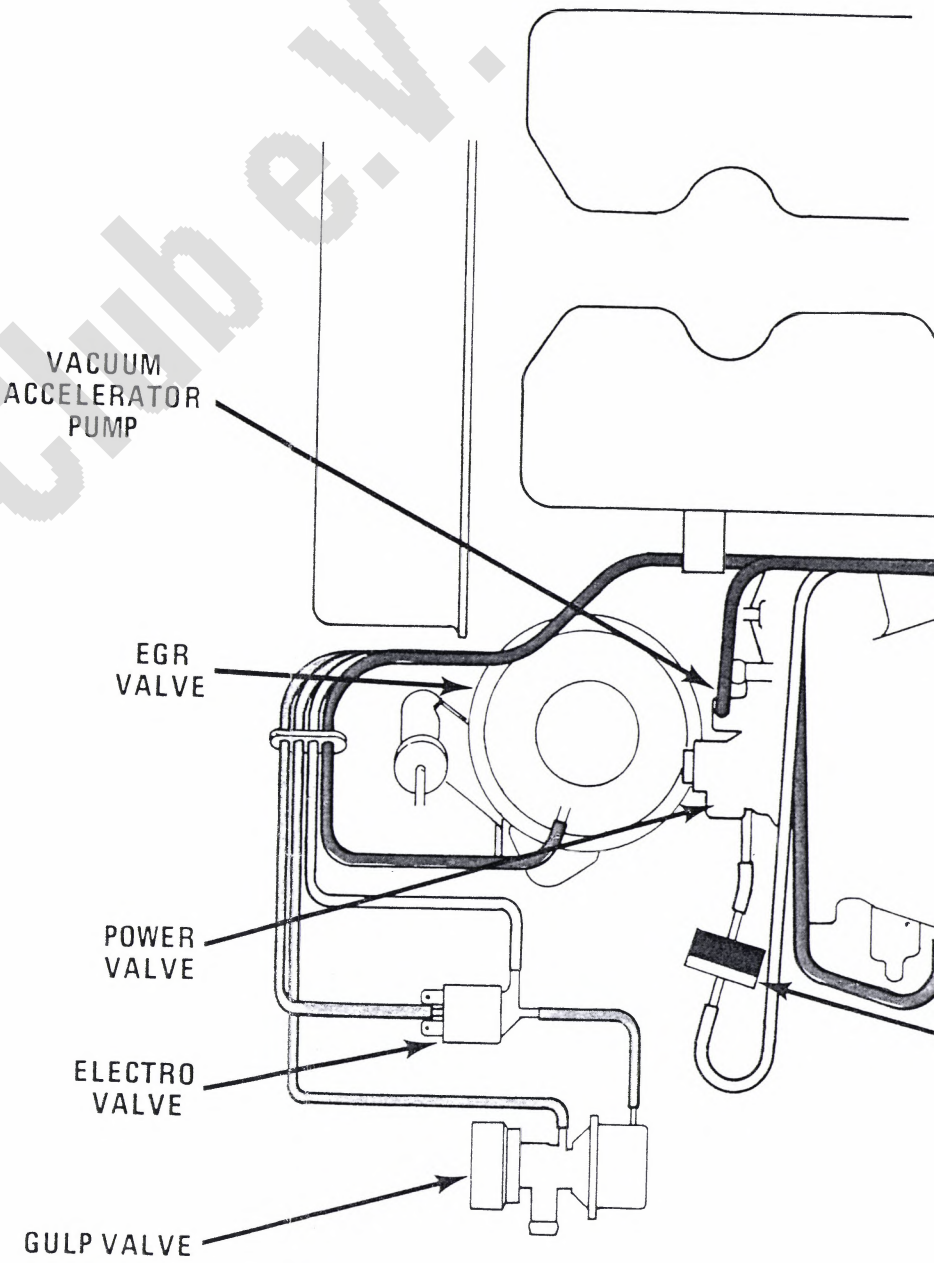
Gulp System –

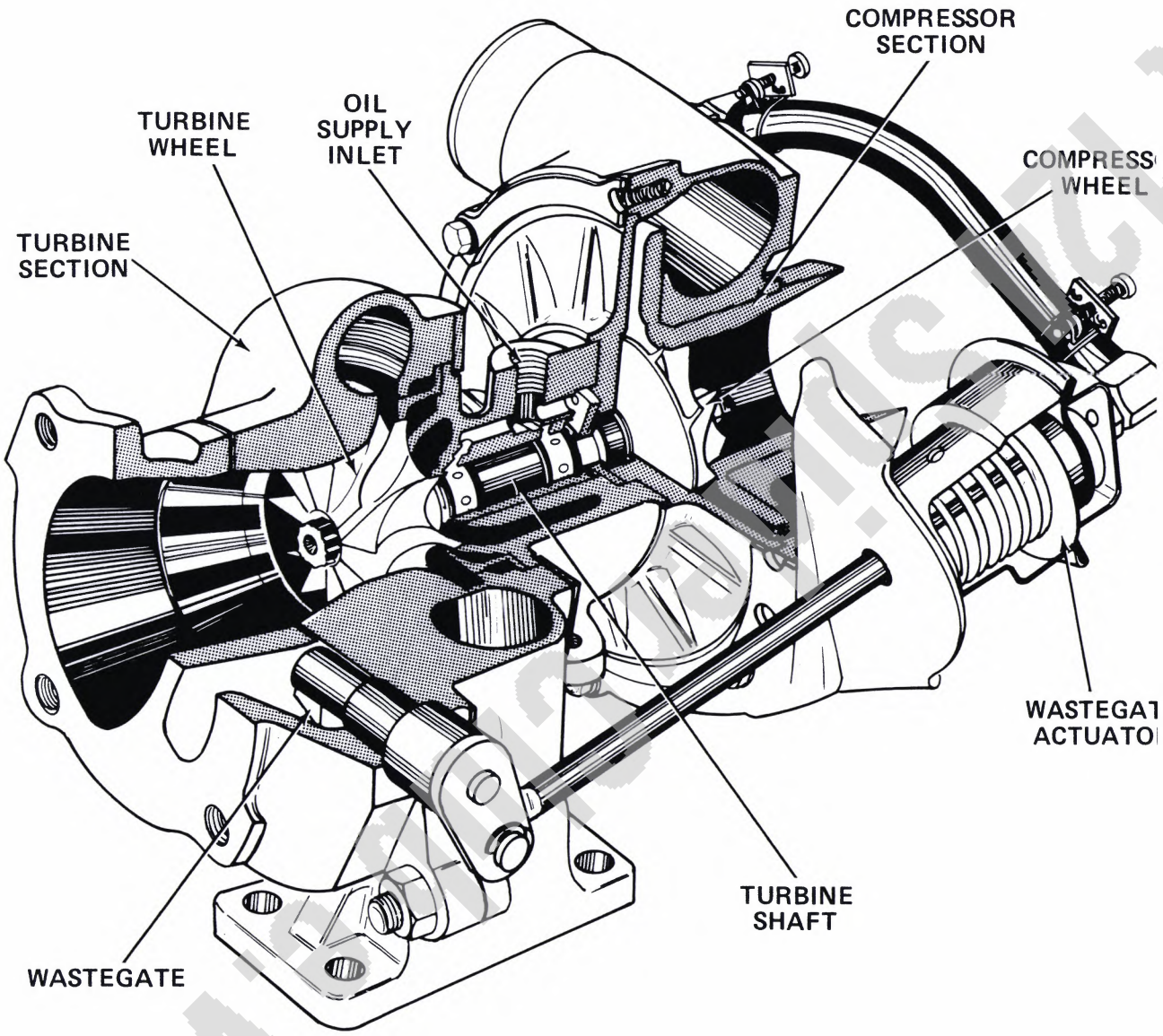
White – source to electrovalve

Blue – electrovalve to thermovalve

Black – thermovalve to gulp valve lower chamber (gulp valve open)

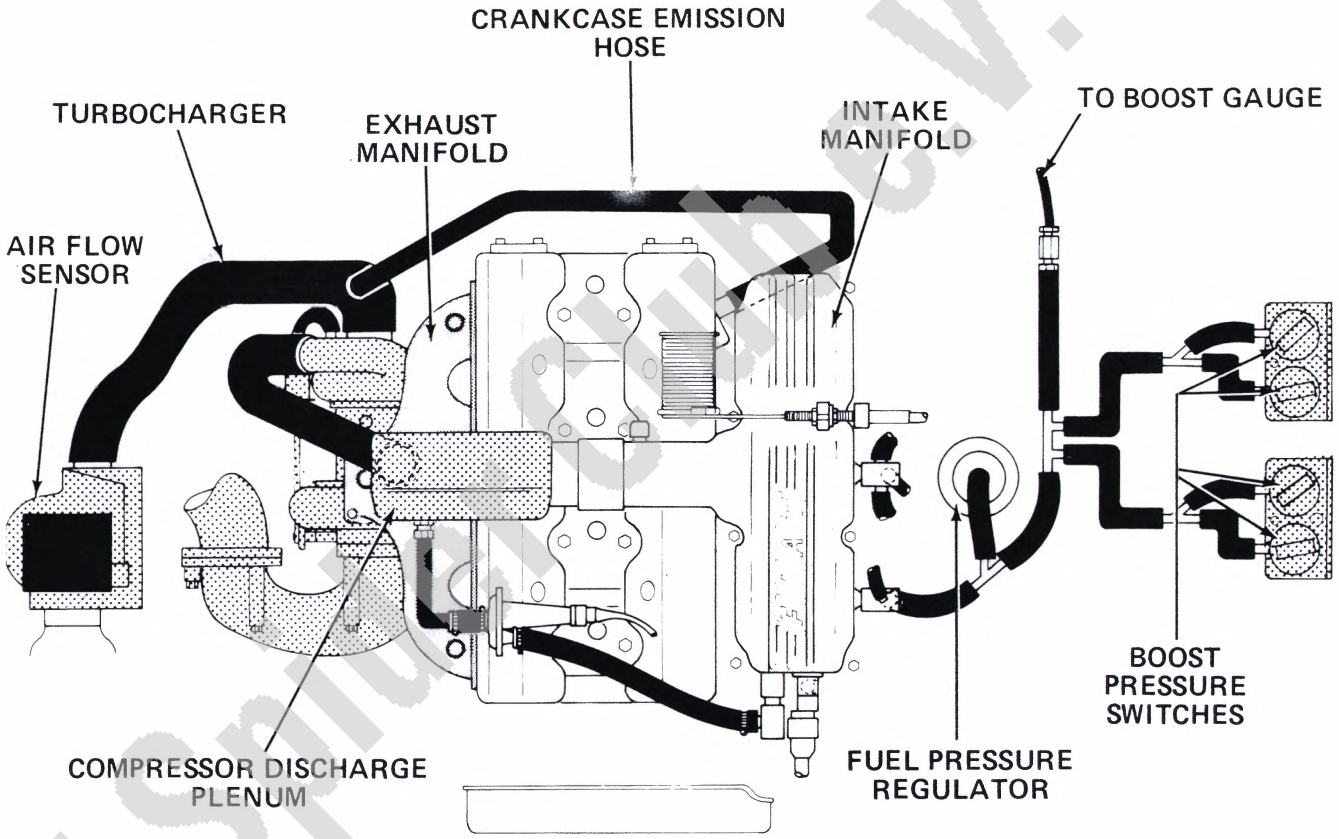
Black – electrovalve to gulp valve upper chamber (gulp valve closed)





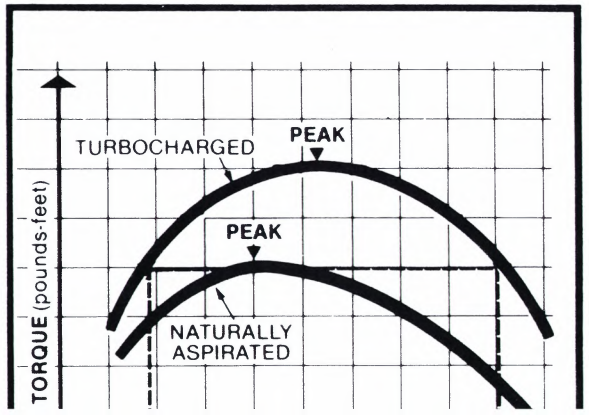
TURBOCHARGER WARNER-ISHI (RHB6)

The turbocharger installed as an option on 1981 and up Spiders is a light weight unit with a low inertia turbine wheel. This provides quick response and minimal turbo lag. It is bolted to the exhaust manifold so that all exhaust gases flow thru the unit. Inlet air is routed from the air flow sensor to the turbocharger where it is compressed. The compressed air is then routed to the discharge plenum and intake manifold. The compressed air increases the charge of air/fuel mixture which results in a significant increase in power output and engine torque.



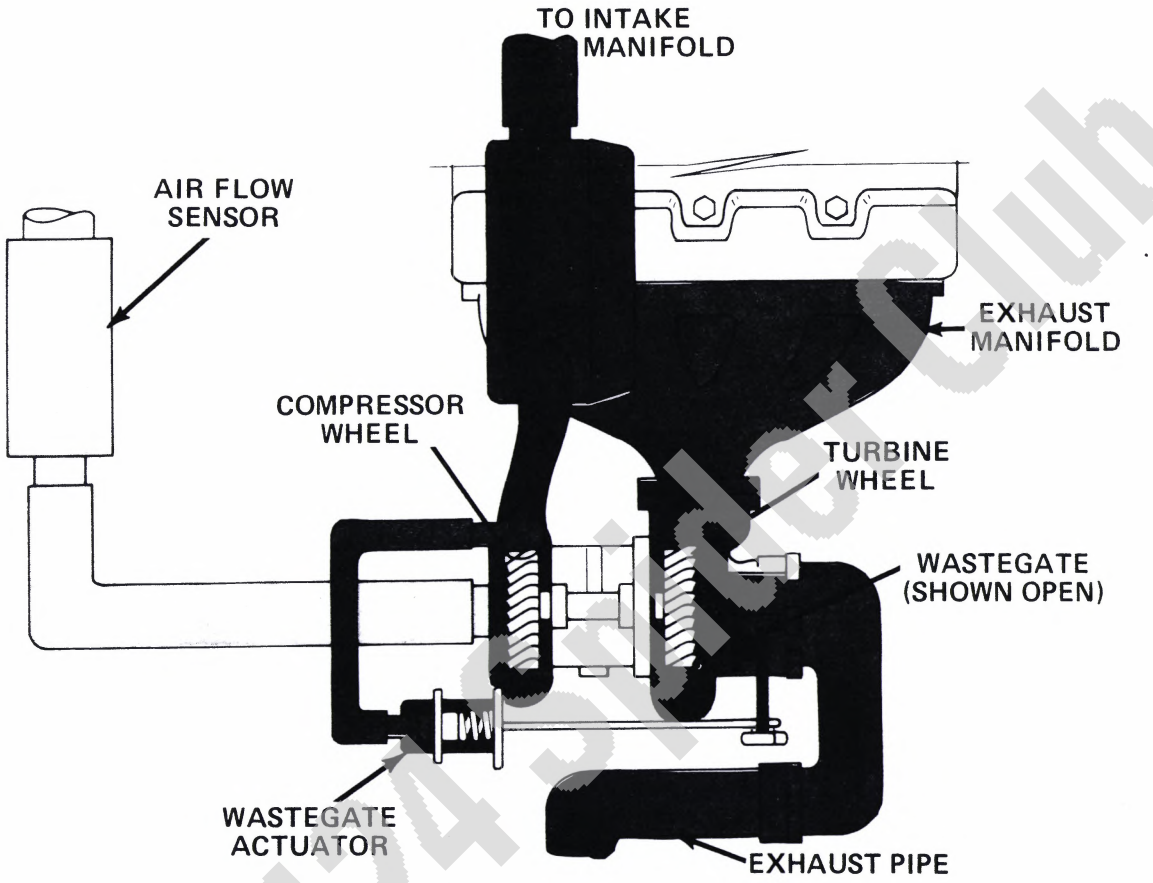
TOP VIEW OF TURBOCHARGER

The low inertia turbine wheel is designed to provide boost at relatively low engine speed which produces a broad torque curve. This results in more torque in the normal driving range of the engine without undue sacrifice of fuel economy, emissions, or durability.



TURBOCHARGER

Since the turbine wheel is driven by exhaust gases, the speed of the turbine wheel as well as the boost pressure will increas proportion to the speed and load of the engine. Depending on the amount of exhaust gas flow, the turbine wheel will spin at to 100,000 rpm. In order to prevent overboost which would damage the engine, a wastegate (charge boost pressure regulato incorporated in the turbocharger. The wastegate actuator contains a diaphragm and return spring. The upper chamber of actuator is connected to the compressor outlet. The boost pressure in the compressor outlet is applied to the diaphragm. A p.s.i., the boost pressure starts to overcome the spring pressure. This opens the wastegate which allows some exhaust gas to pass the turbine wheel. Any increase in exhaust gas flow will result in an increase in the bypass flow which will maintain maximum boost pressure at 6 p.s.i.



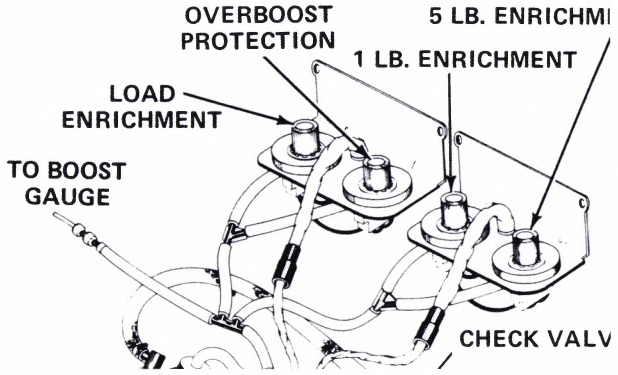
CONTROL SWITCHES

The turbocharger system is equipped with four boost pressure switches. The switches are mounted on the left fender well and are connected to the intake manifold. The switches are color coded as follows:

Load Enrichment – Blue
Overboost Protection – Black
1 lb. Enrichment – Yellow
5 lb. Enrichment – Green

A boost gauge in the instrument cluster is also connected to the intake manifold. This gauge indicates:

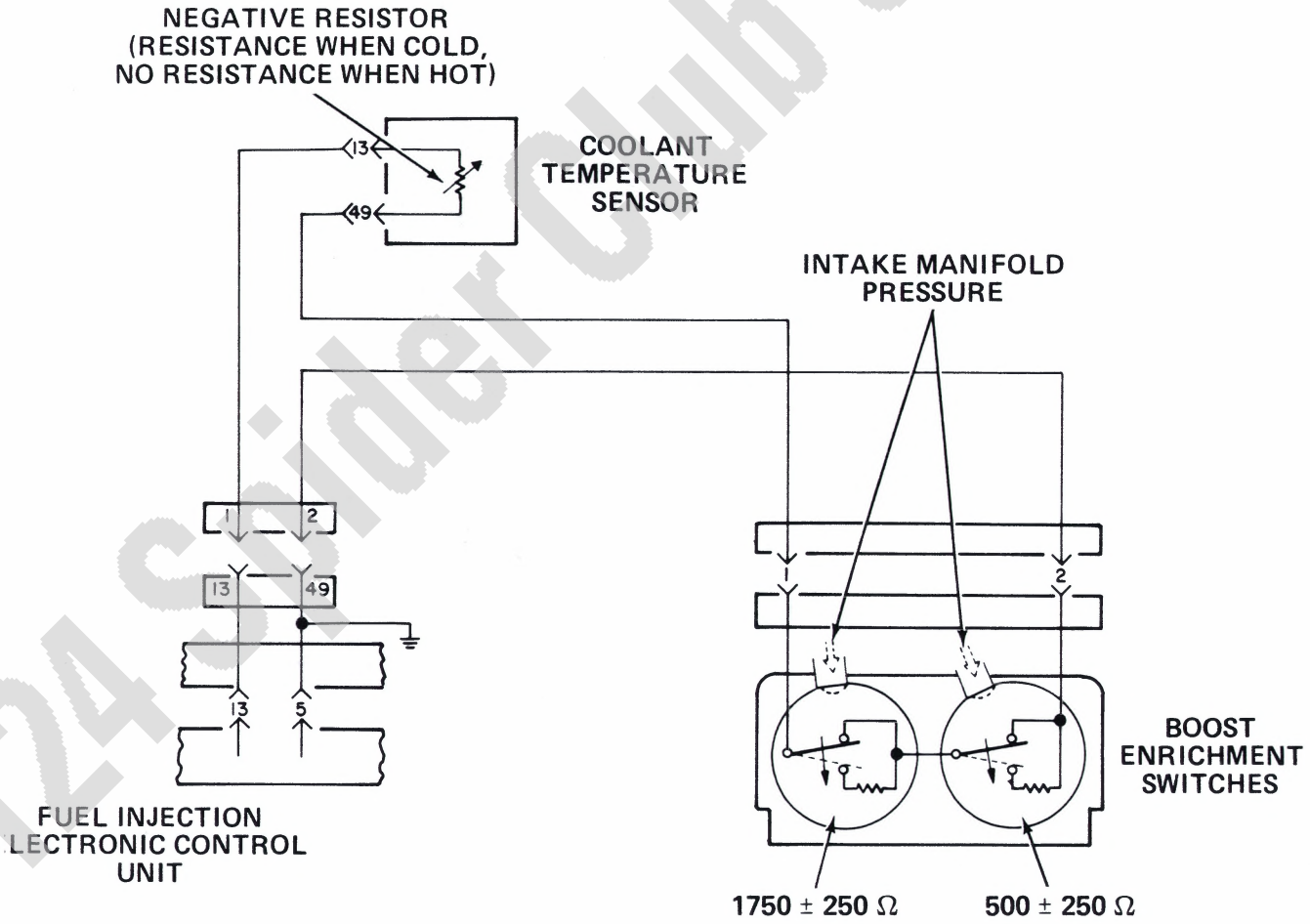
White Zone – Manifold vacuum, no boost



nsures that the proper fuel/air mixture is supplied by the fuel injection system whenever the turbocharger is providing boost positive intake manifold pressure).

:ach switch is a single pole, two position switch. The circuit through the normally closed contacts contain no resistance. The ircuit through the normally open contacts contain resistors. When the switch is deactivated, the signal through it is unchanged. Vhen the switch is activated the signal passes through the resistors.

Vhen operating without boost the coolant temperature sensor provides a signal to the electronic control unit (ECU) for extra uel during the warmup. When boost pressure increases to 1 ± 0.5 psi the first switch is activated. This opens the switch contact nd causes the signal to pass through a resistor of 1750 ± 250 ohms. This increase in resistance signals the ECU for additional uel. When boost pressure increases to 5 ± 0.5 psi the second switch is activated and an additional 500 ± 250 ohms is added. 'his signals for an additional increase in fuel flow.



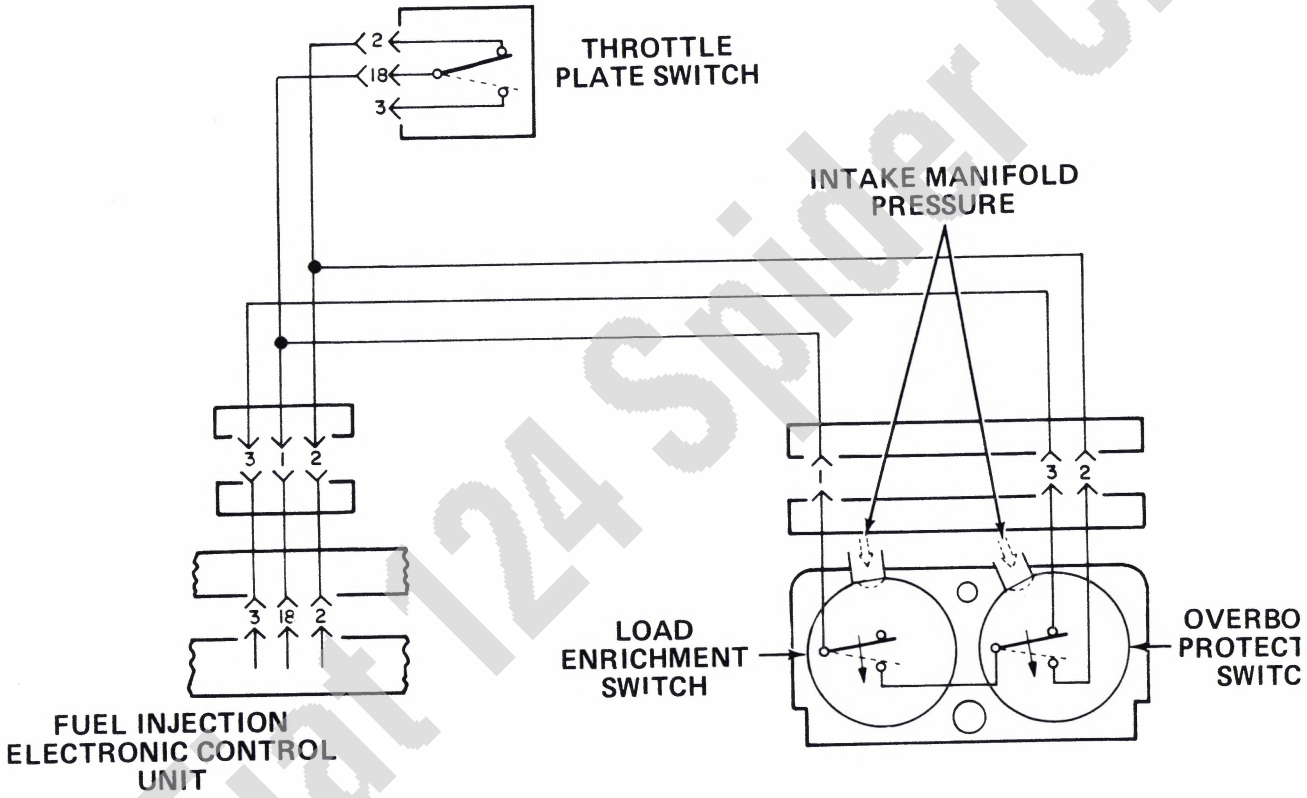
The load enrichment and overboost protection pressure switches are wired into the throttle plate switch circuits of the jection electrical system. The load enrichment switch is a single pole, single position switch. The overboost protection swi is a single pole, two position switch.

Load Enrichment

When the throttle plate is in idle position, the throttle plate switch provides the normal signal to the ECU. When boost press increases to about 1 psi, the throttle plate switch is open and not providing any signal to the ECU. The load enrichment switc closed. This connects the "full throttle" signal circuit from terminal 3 of the ECU through the normally closed contacts of overboost switch, the closed contacts of the load enrichment switch to terminal 18 of the ECU. This signal provides additic fuel for operation with boost.

Overboost Protection

If boost pressure should exceed 9 psi (wastegate failure), the overboost protection switch would be activated. This switches signal for the ECU from "full throttle" to "idle" signal. When the ECU receives an "idle" signal and a high rpm signal, it clc the fuel injectors. This causes the engine to slow down thereby reducing boost pressure.

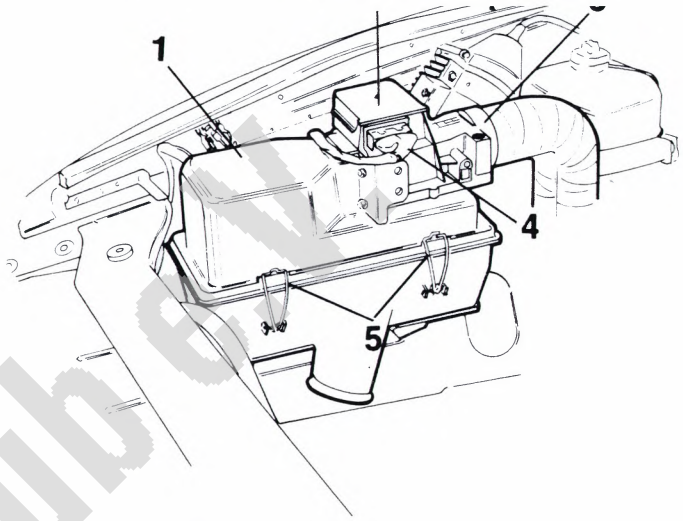


CAUTION: The exhaust manifold and turbocharger must be removed as a unit. Do not attempt to remove turbocharger from exhaust manifold on vehicle. The turbocharger bolts must be properly torqued and this can only be accomplished off the vehicle.

Remove front splash pan and drain cooling system by opening engine drain.

Loosen hose clamp (3). Disconnect electrical connector (4) from air flow sensor (2).

Release four clips (5) holding air cleaner cover (1). Remove cover with air flow sensor and remove air filter. Remove 3 nuts n air cleaner and lift air cleaner out.



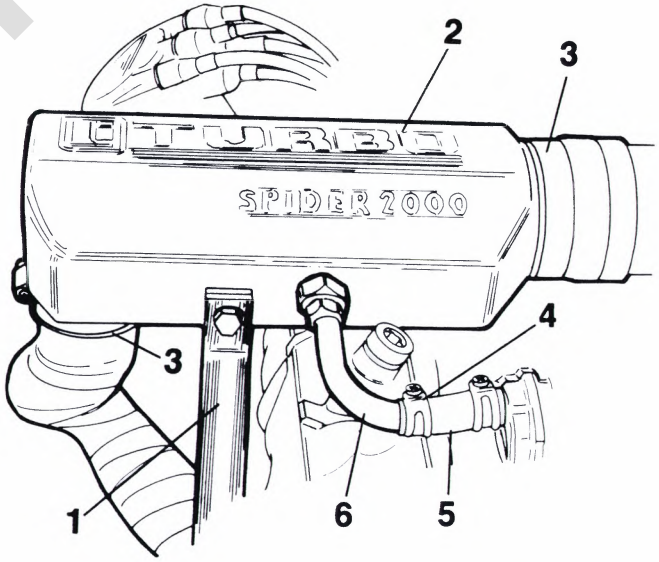
l. Air cleaner cover. 2. Air flow sensor 3. Clamp 4. Electrical connector 5. Clip

Remove bolt and nut securing support bracket (1) for air plenum (2) to exhaust manifold heat shield.

Loosen clamp (4) and disconnect auxiliary regulator air hose 5) from tube (6).

Loosen air hose clamps (3) and lift plenum off air hoses.

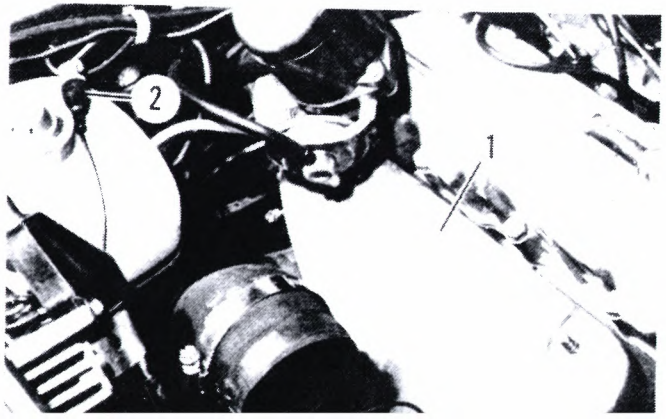
CAUTION: Cap off all turbocharger ports and oil supply and return orifices which may be exposed during removal.



Support bracket 2. Air plenum 3. Clamp 4. Clamp Auxiliary air regulator hose 6. Tube

emove two remaining nuts and washers holding heat shield) to exhaust manifold. Remove shield.

isconnect Lambda sensor electrical connector (2).



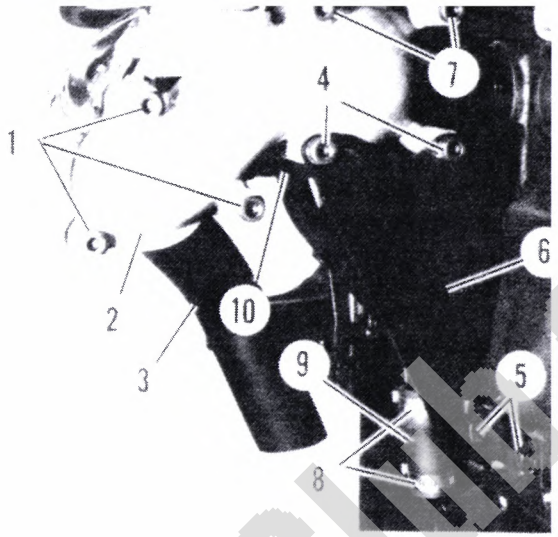
Heat shield 2. Lambda sensor electrical connector

Remove two Allen head bolts (4) and two self-locking nuts (5) or two bolts (A.C. vehicles) to remove exhaust elbow bracket (6).

Remove two remaining Allen head bolts (7) on exhaust elbow and remove elbow. Remove gasket and discard.

Loosen two clamps (8) on turbo oil drain line hose (9) at oil sump connection. Push hose down to clear drain line.

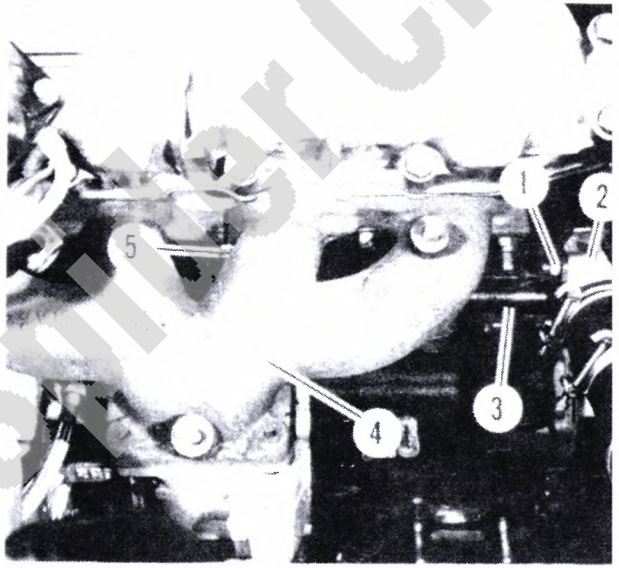
From under vehicle remove turbo support bracket nut at oil drain line flange (10).



1. Allen head bolt 2. Turbine outlet elbow 3. Exhaust pipe
4. Allen head bolt 5. Self-locking nut 6. Exhaust elbow bracket
7. Allen head bolt 8. Clamp 9. Oil drain hose 10. Oil drain line flange

Remove two nuts (1) holding heater return line (3) to water pump (2).

Remove nut (5) holding bracket on heater return line to exhaust manifold (4). Move return line away from manifold.



1. Nut 2. Water pump 3. Heater return line 4. Exhaust manifold
5. Nut

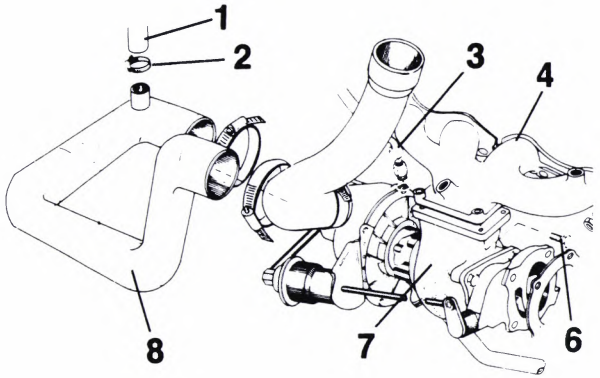
Loosen clamp (2) holding crankcase hose (1) to inlet hose (8). Disconnect hose (1). Leave inlet hose in place.

Disconnect oil hose (3) from turbocharger (7). Move hose to one side.

Remove five nuts (5) and washers securing exhaust manifold (4) to engine. Carefully remove exhaust manifold/turbocharger assembly.

Remove four bolts (6) holding turbocharger to exhaust manifold.

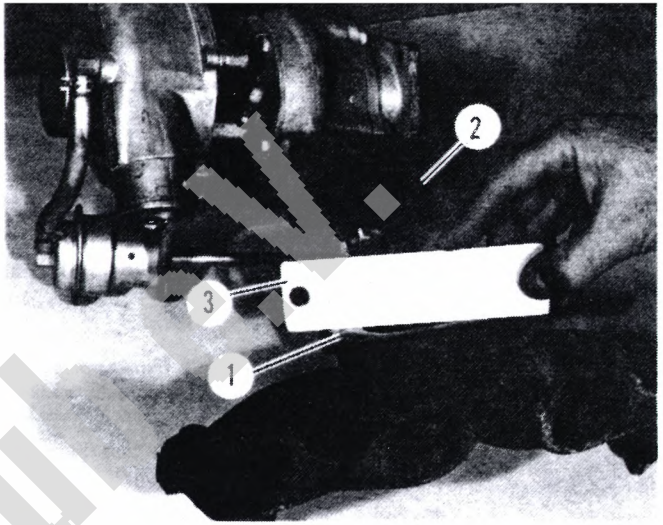
NOTE: Early production turbochargers had a gasket between manifold and turbocharger. If installed, remove and discard gasket. Do not install a gasket.



Installation is reverse of removal with particular attention to the following steps and precautions.

NOTE: High quality hardware is used throughout the turbo system. Whenever replacement is required, be sure to use hardware of same quality. Torque all hardware, refer to torque chart on following page. Apply a light application of anti-seize compound to all threads and both sides of each stainless steel gasket.

Using straightedge (3), check flatness of exhaust manifold flange (1) and turbocharger flange (2) as shown. Surfaces must be perfectly flat. If not, they must be machined. Remove only enough metal to return level finish to surface.



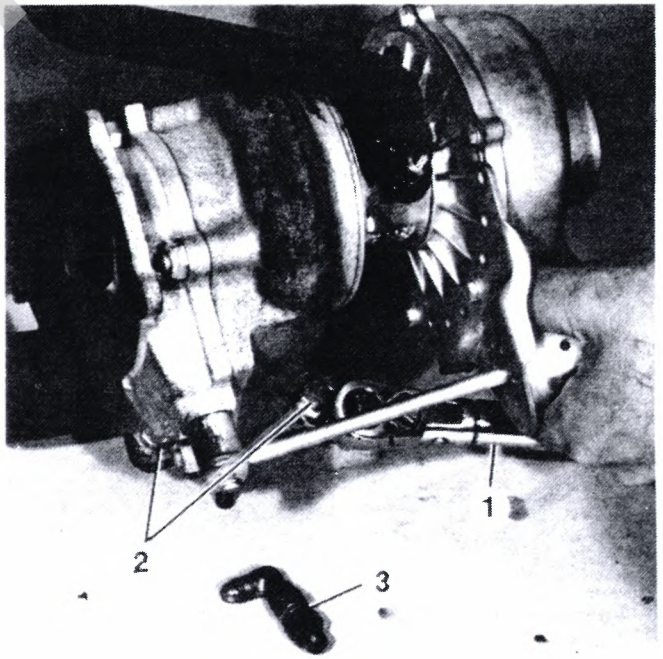
1. Exhaust manifold flange 2. Turbocharger flange 3. Straightedge

Using new bolts (2), (must be same type of high strength bolts as was removed), torque turbocharger and exhaust manifold flanges together (20 ft. lbs.).

Due to limited clearance, this can be accomplished with "crows foot" wrench extension on torque wrench (1) as shown.

NOTE: Crows foot extension will not add a significant amount of torque above 20 ft. lbs.

Reinstall oil supply line fitting (3).



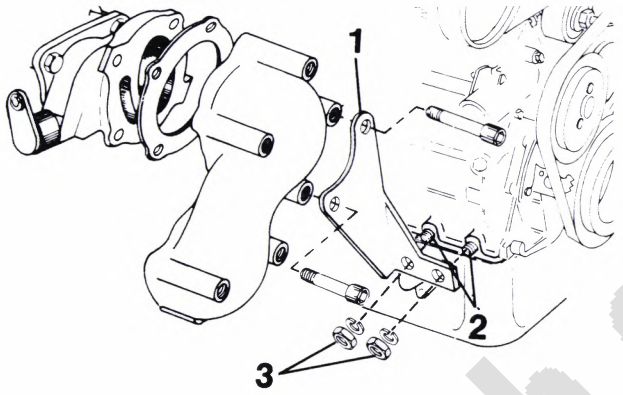
1. Torque wrench 2. Bolt 3. Oil supply line fitting

CAUTION: All intake hoses, wires, etc, must be kept clear of turbocharger, exhaust manifold and heat shield. Be certain to secure all hose clamps to prevent them from coming off during positive boost pressure.

vehicles) in engine block before securing bracket to elbow.

The leg of elbow support bracket should be parallel and flush to engine block. If it is not, take up slack with washer shims rather than drawing leg flush with mounting nuts (4).

1. Elbow support bracket 2. Mounting studs 3. Self-locking nuts



The orange compressor outlet hose (1) must be adjusted for a clearance of at least 5 mm from exhaust manifold heat shield (2). This can be accomplished by sliding hose up or down on compressor outlet port of turbocharger.

1. Compressor outlet hose 2. Heat shield

CAUTION: The stainless steel braided oil supply line can be extremely abrasive to anything it comes into contact with. Make sure the protective sheathing around this line is in good condition and positioned correctly to avoid contact with any components.

Refill and bleed cooling system. Refer to bleeding procedures in Radiator section.

Preparation

Disconnect vacuum hoses from "Y" fittings. Connect pressure tester J33076 to "Y" fitting.

CAUTION: When operating tester with line pressure connected, make sure air pressure to switches does not exceed 12 psi.

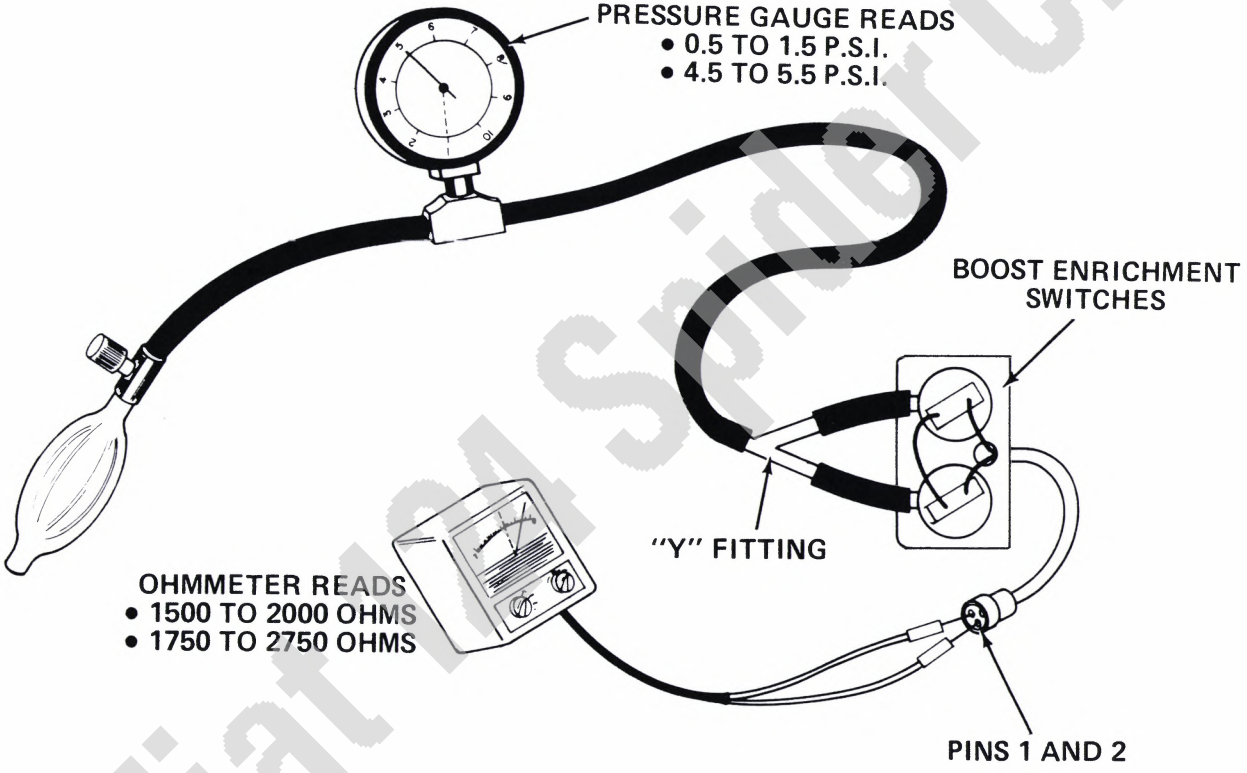
Disconnect connectors for switches from fuel injection wire harness.

Boost Enrichment Switches

Connect an ohmmeter to pins 1 and 2 of connector for boost enrichment switches.

Slowly apply pressure to switches. Check that switch operates (a slightly audible click may be heard) at 0.5 to 1.5 psi. Ch that ohmmeter reads between 1500 and 2000 ohms.

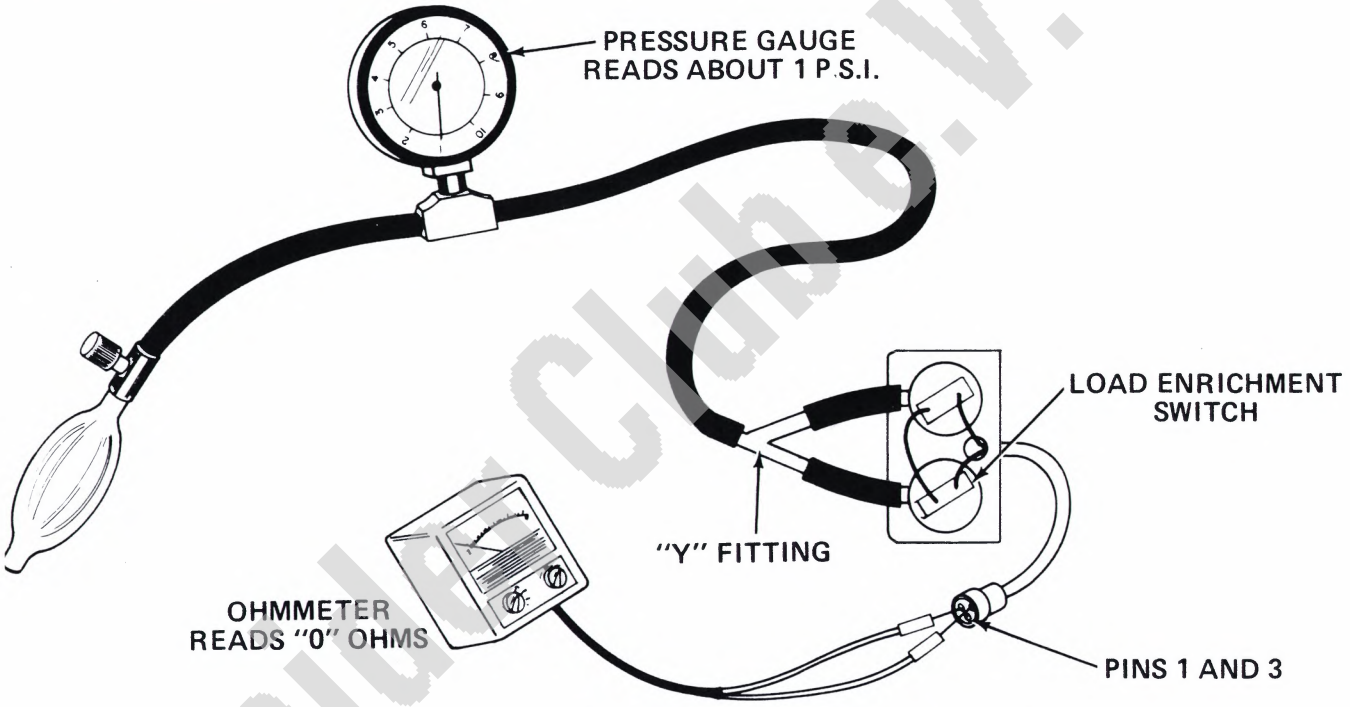
Slowly increase pressure. Check that other switch operates at 4.5 to 5.5 psi. Check that ohmmeter reads between 1750 and 2



Load Enrichment Switch

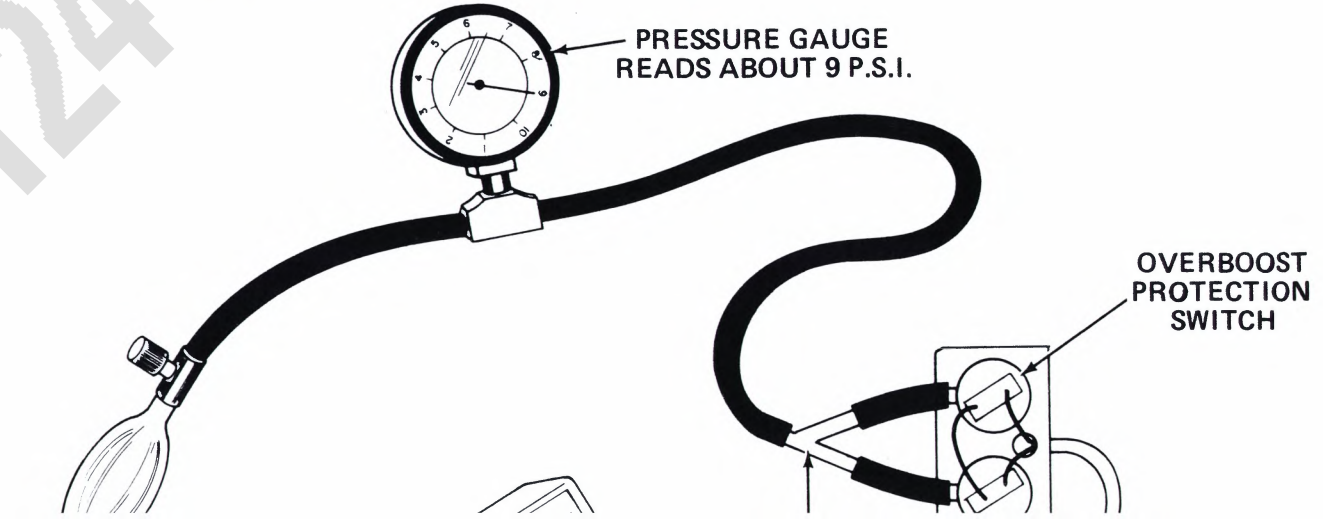
Connect pressure tester to "Y" fitting for load enrichment switch. Connect ohmmeter to pins 1 and 3 of connector for load enrichment/overboost switches. Zero ohmmeter.

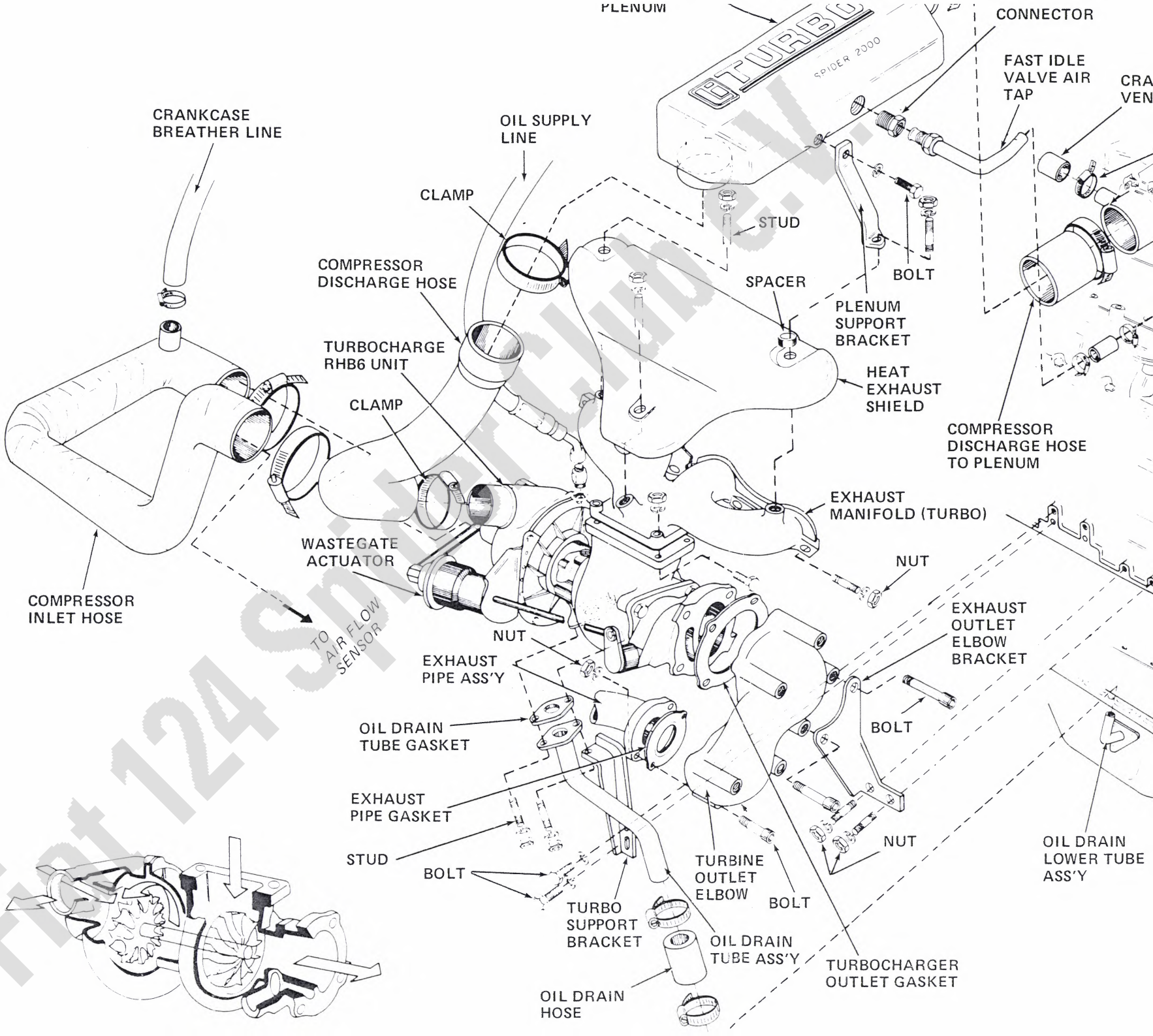
Check that ohmmeter reads infinity. Slowly apply pressure to switch. Check that load switch operates (a slightly audible click may be heard) at about 1 psi. Check that ohmmeter reads 0 ohms.



Overboost Protection Switch

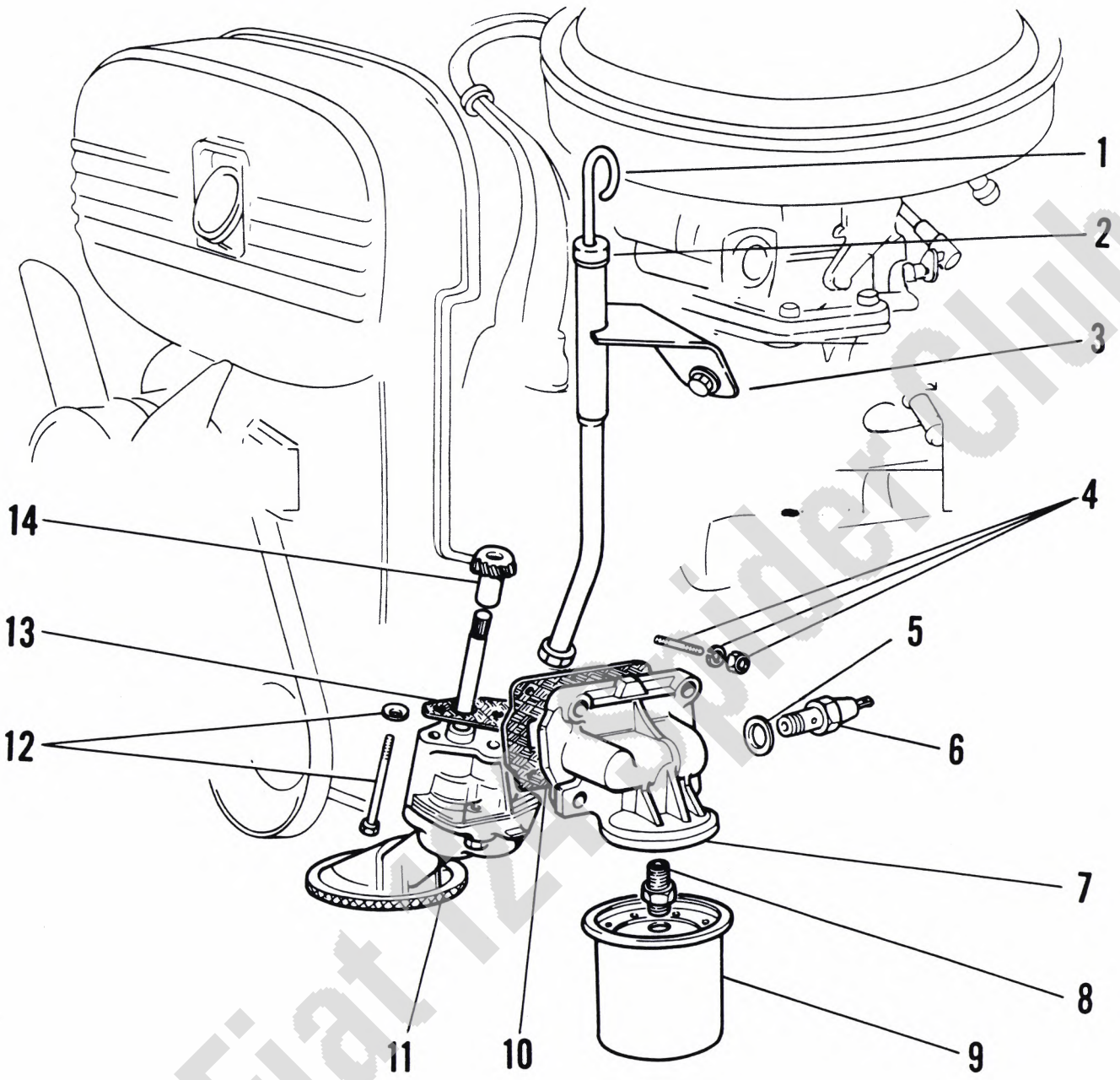
Connect ohmmeter to pins 1 and 2 of connector. Check that ohmmeter reads infinity. Slowly increase pressure. Check that overboost switch operates at about 9 psi. Check that ohmmeter reads 0 ohms.



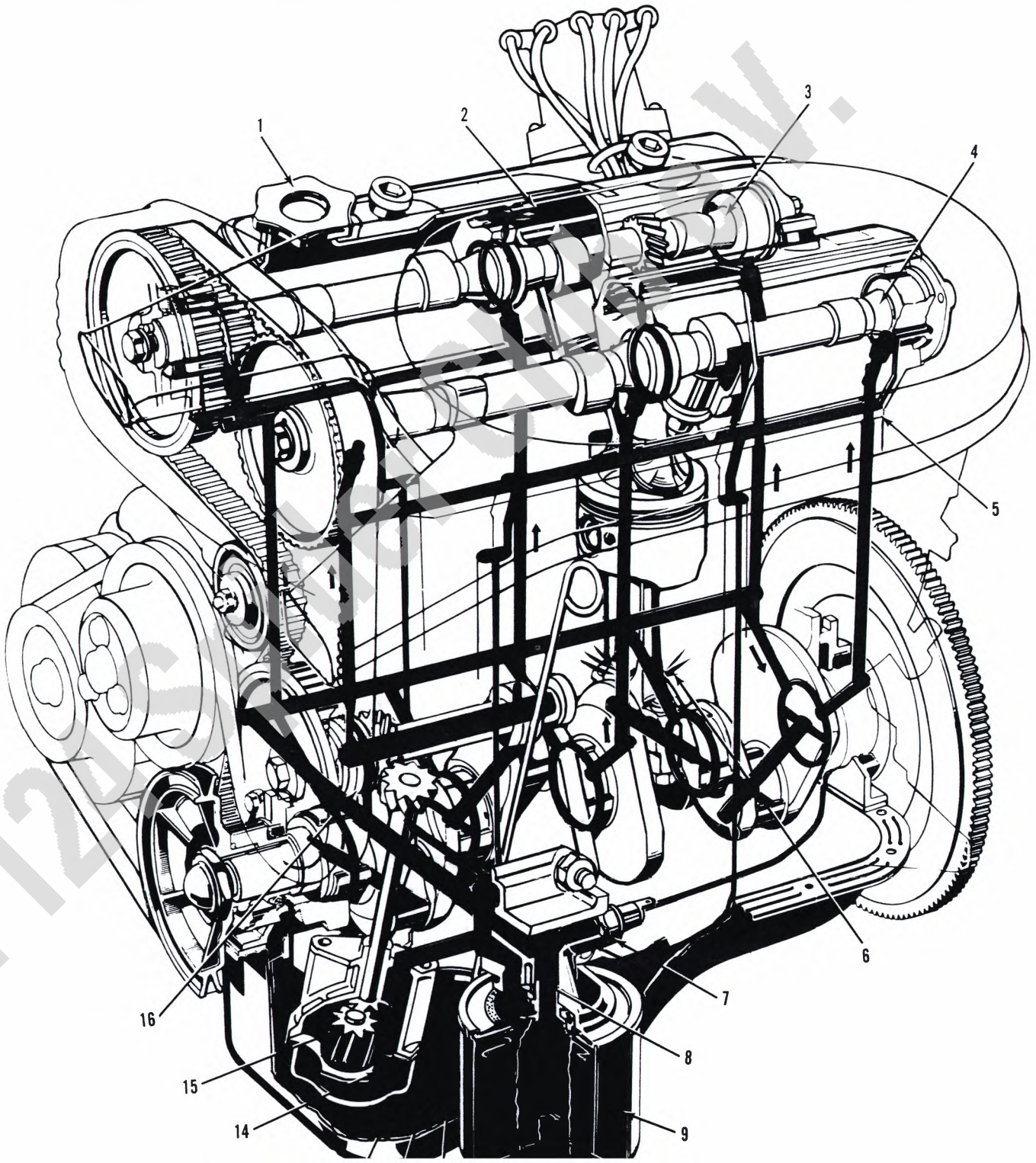


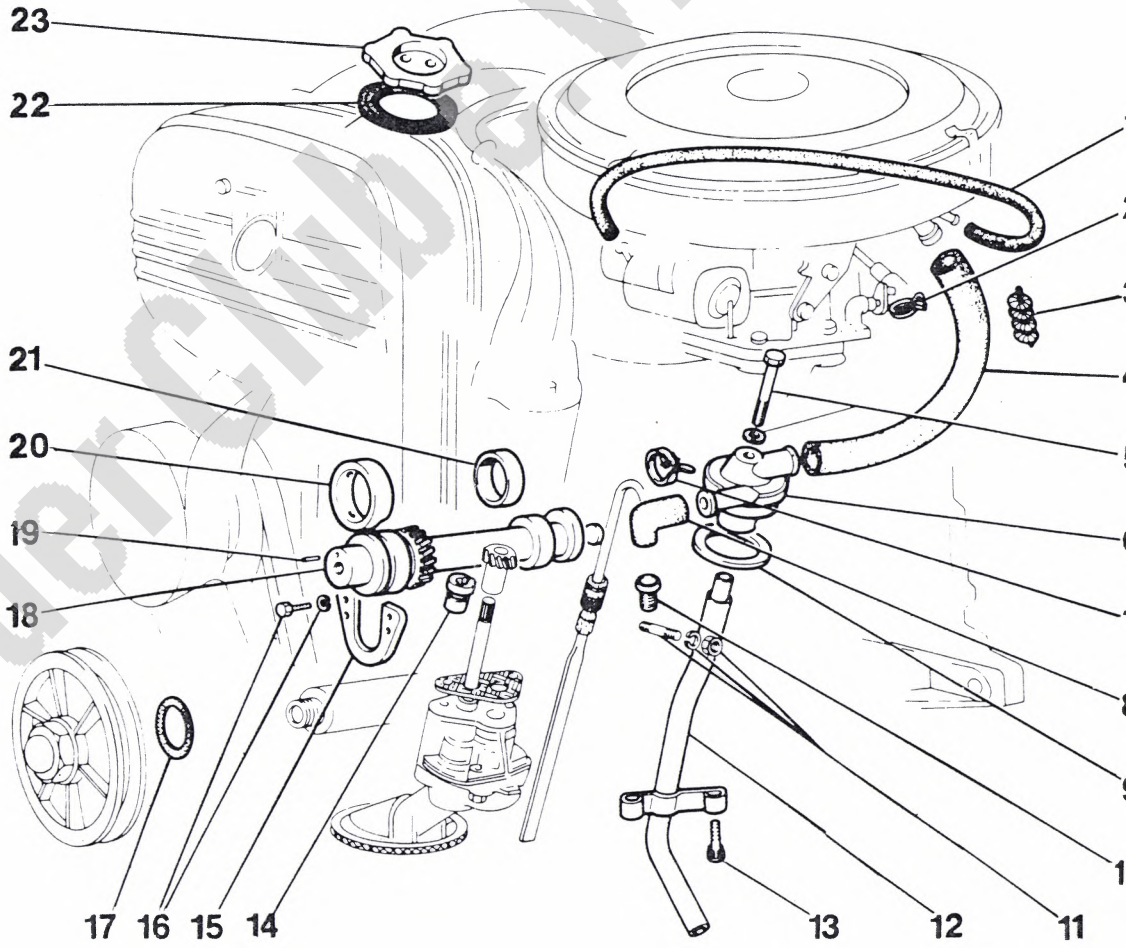
TROUBLESHOOTING

SYMPTOM OR COMPLAINT	POSSIBLE CAUSES
No Boost	Boost gauge inoperative Wastegate stuck open Turbo unit inoperative, seized Turbine impeller coked up
Lack of power	Engine low compression incorrect valve timing and clearance incorrect ignition timing Clogged air cleaner element Insufficient fuel supply restriction low fuel pressure fuel enrichment system not working
Detonation w/no boost	Low grade fuel Ignition timing advanced too far Rough edge or foreign object in cylinder
w/normal boost	Low grade fuel Ignition timing advanced too far Insufficient fuel supply restriction low fuel pressure fuel enrichment system not working
w/excessive boost	Wastegate actuator signal line leaking Actuator tampered with Wastegate or actuator damaged
Excessive fuel consumption (black exhaust smoke)	Engine out of tune Intake air flow restricted filter clogged air delivery hoses kinked or collapsed Cold start valve or injectors leaking Fuel enrichment system working all the time
Excessive oil consumption (blue, gray, or white exhaust smoke)	Incorrect type or grade of oil Extended oil change intervals Clogged air cleaner element Engine wear (piston rings, valve guides) Crankcase emission check valve stuck open or installed backwards Internal leakage at seals in turbo unit
Noise or vibration at turbo unit	Loose mount or brackets Internal wear – excessive shaft play Internal damage – out of balance



1. Dipstick
2. Dipstick seal
8. Connector, oil filter to support
9. Full-flow, cartridge type oil filter





1. Blow-by gas and oil vapor hose
2. Collar
3. Flam trap
4. Breather hose
5. Bolt and washer
6. Breather
7. Collar
8. Hose
9. Seal
10. Vapor return connection
11. S
12. B
13. B
14. G
15. R

OIL PUMP

REMOVAL AND INSTALLATION (Engine in Vehicle)

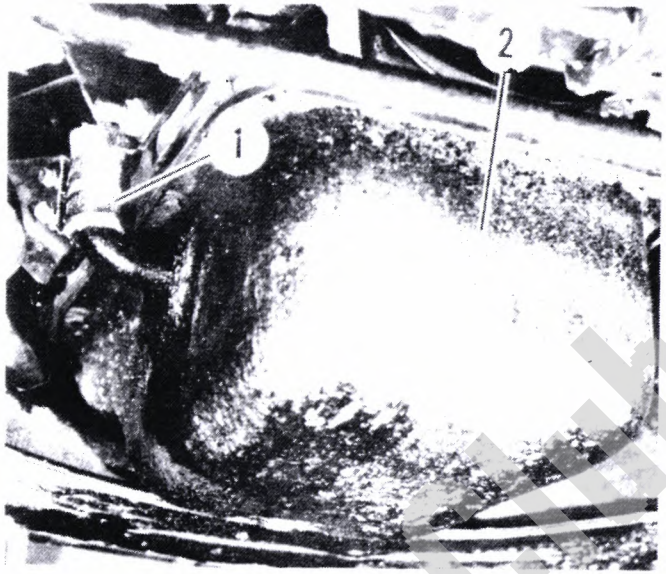
Drain engine oil.

Remove front protection shield.

Remove flywheel protection cover.

On turbocharged engines, loosen clamps on return hose (1) and push hose up to clear drain fitting.

1. Turbocharger oil return hose 2. Oil sump



NOTE: Engine must be raised and crossmember under engine must be lowered for clearance when removing oil sump.

Remove engine mount nut (1) thru hole in crossmember (3).

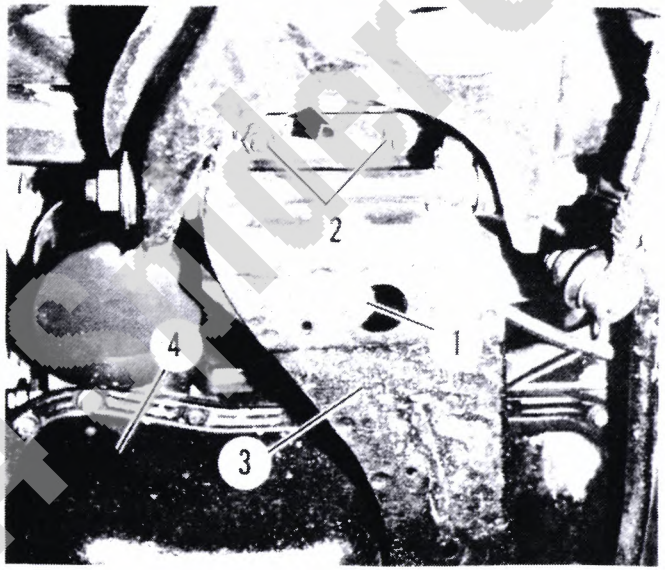
Remove upper crossmember bolt (arrow). Back-off on two crossmember nuts (2) until about two threads are left showing at bottom of stud. Repeat for other side.

Move crossmember down.

Place jack under transmission and raise engine until clearance is obtained for sump removal.

Remove bolts securing sump to engine. Remove sump (4) and gasket.

1. Bolt 2. Nut 3. Crossmember 4. Oil sump

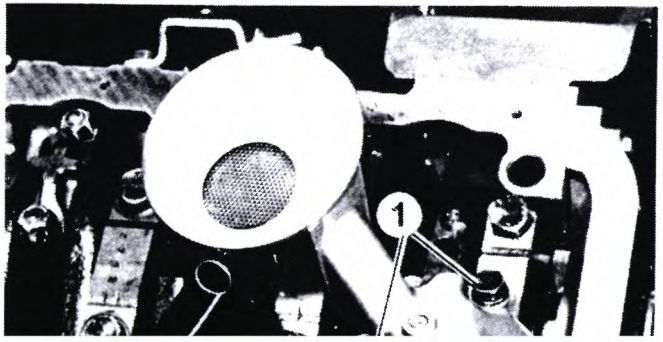


Remove two bolts (1) and washers holding oil pump (2). Remove pump and gasket.

Installation is reverse of removal.

Make sure pump is seated before tightening bolts. Torque bolts to 14 ft. lbs. (2 kgm).

1. Bolt 2. Oil pump

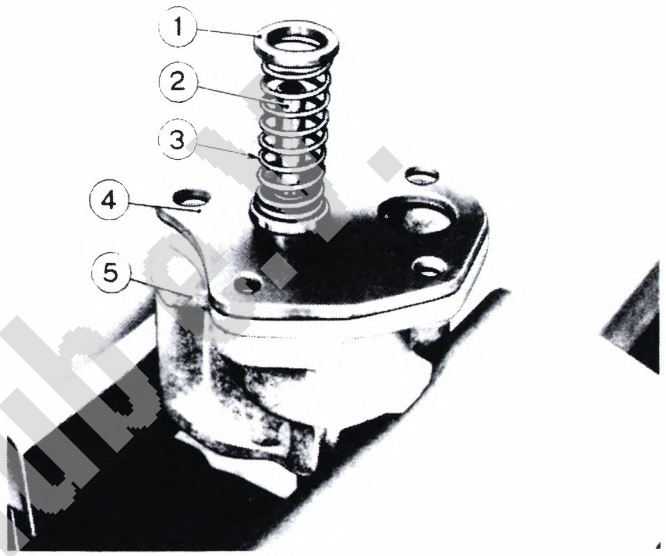


INSPECTION

Clean all parts. Blow parts dry with compressed air.

Check housing (5) and cover (4) for cracks. Check suction pipe and oil duct for clogging. Blow clear with compressed air. Make sure dirt and residues are removed between relief valve (2) and housing (3).

Check relief valve spring for cracks and loss of elasticity. Check spring load.

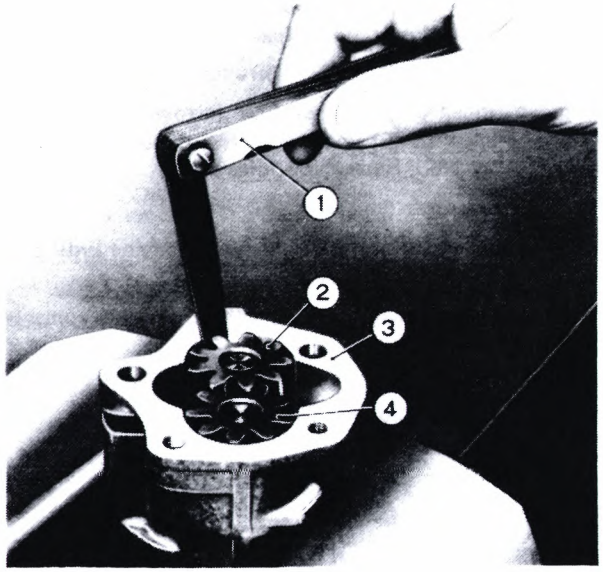


1. Washer 2. Relief valve 3. Spring 4. Cover 5. Housing

Check gears for wear.

Check gears for tooth to housing clearance. Clearance should be 0.0043 to 0.0070 inch (0.110 to 0.180 mm).

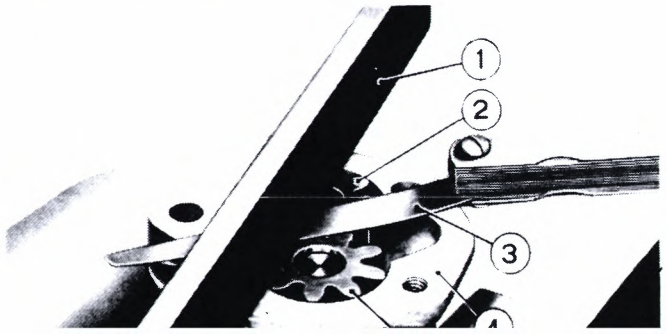
If clearance fails to meet specifications, replace gears and housing, if necessary.



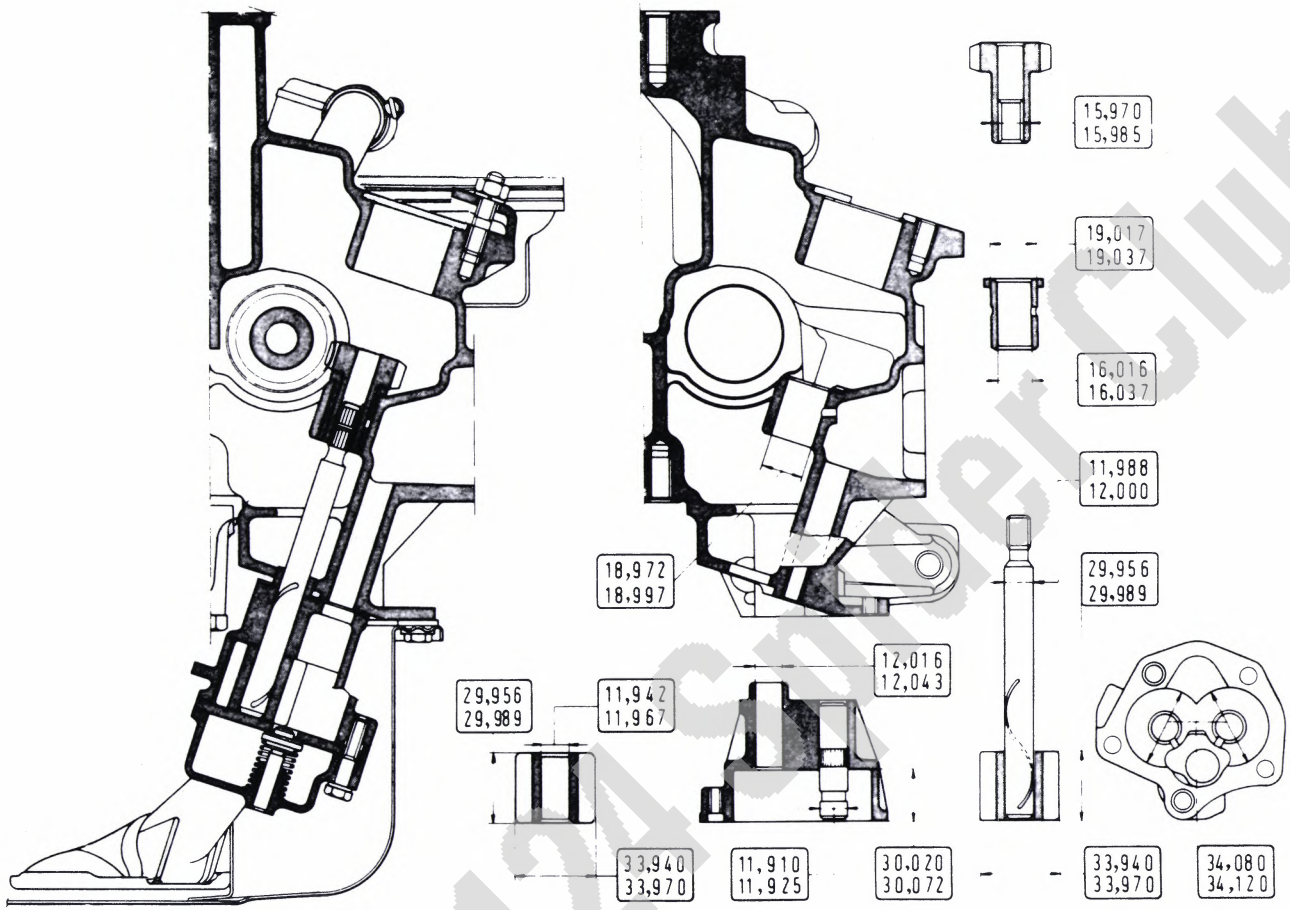
1. Feeler gauge 2. Drive gear 3. Housing 4. Driven gear

Check clearance between gears and cover mating face. Clearance should be 0.0010 to 0.0051 in. (0.026 to 0.131 mm). Use a straight edge and a feeler gauge.

If clearance fails to meet specifications, replace gears or housing.

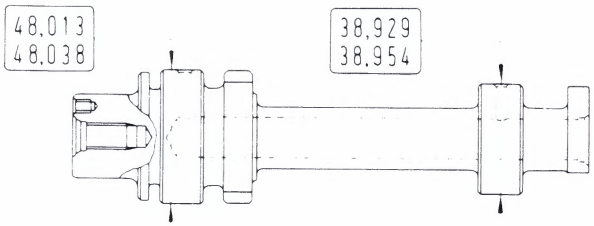


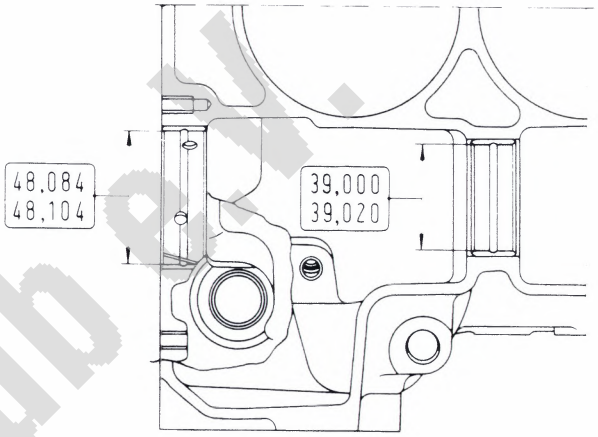
1. Straight edge 2. Drive gear 3. Feeler gauge 4. Housing
5. Driven gear



29.956 mm = 1.1793 in	33.940 mm = 1.3362 in	30.020 mm = 1.1819 in	16.016 mm = .6305 in
29.989 mm = 1.1806 in	33.970 mm = 1.3374 in	30.072 mm = 1.1839 in	16.037 mm = .6314 in
18.972 mm = .7469 in	11.918 mm = .4692 in	15.970 mm = .6287 in	11.988 mm = .4719 in
18.997 mm = .7479 in	11.925 mm = .4695 in	15.985 mm = .6293 in	12.000 mm = .4724 in
11.942 mm = .4701 in	12.016 mm = .4730 in	19.017 mm = .7487 in	34.080 mm = 1.3418 in
11.967 mm = .4711 in	12.043 mm = .4741 in	19.037 mm = .7495 in	34.120 mm = 1.3433 in

AUXILIARY SHAFT





MAIN DATA OF AUXILIARY SHAFT AND BUSHINGS

REMOVAL AND INSTALLATION

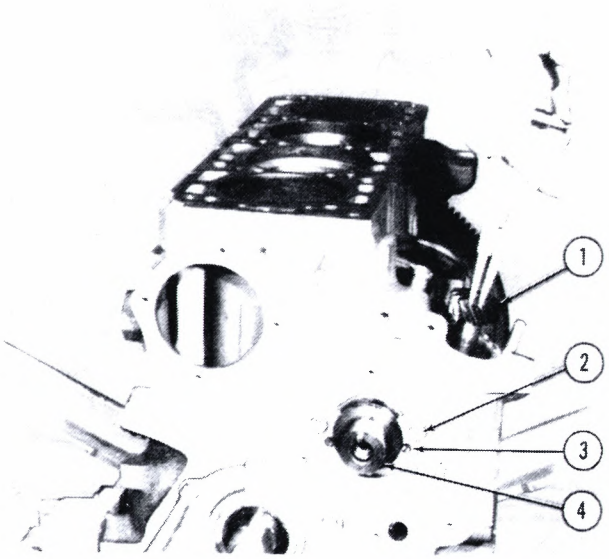
Remove nut, washer, and clamp holding spacer for oil pump in crankcase. Turn auxiliary shaft to raise oil pump gear. Using thin pliers, remove gear. Remove two bolts and washers holding retainer for auxiliary shaft.

Pull shaft out of crankcase.

Inspect shaft journals for scuffing or scoring. If shaft cannot be dressed, replace it.

Fit clearance between journals and bushings should be 0.0018 to 0.0036 in. (0.046 to 0.091 mm).

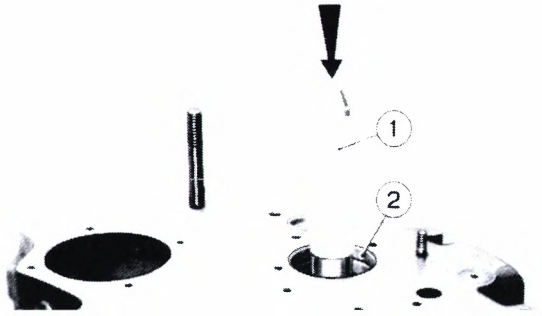
1. Gear 2. Bolts 3. Retainer 4. Auxiliary shaft



REPLACING AND REAMING AUXILIARY SHAFT BUSHINGS

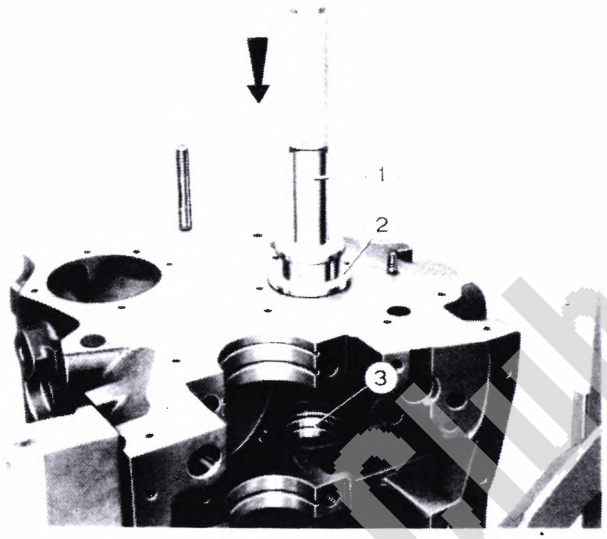
Press out front and rear bushings. Use tool A.60321/1 for rear bushing and tool A.60321/1/2 for front bushing.

1. Remover and installer 2. Front bushing



When installing new bushings, make sure oil holes in bushing are in line with oil holes in crankcase.

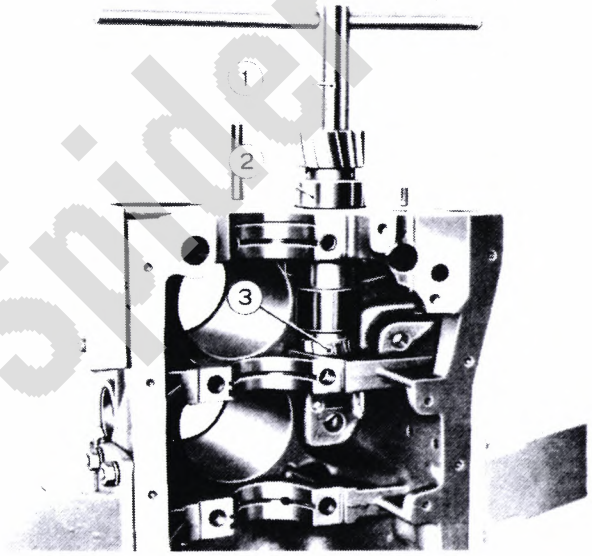
1. Remover and installer 2. Adapter 3. Rear bushing



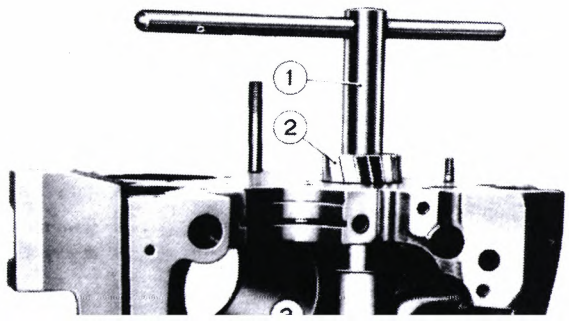
After press fitting bushings, ream bushings to finish size. Refer to Specifications.

Use care to make sure bushings are reamed with correct alignment and squareness of shaft axes.

1. Tool 2. Pilot on front bushing 3. Reamer on rear bushing



1. Tool 2. Reamer on front bushing 3. Pilot on rear bushing



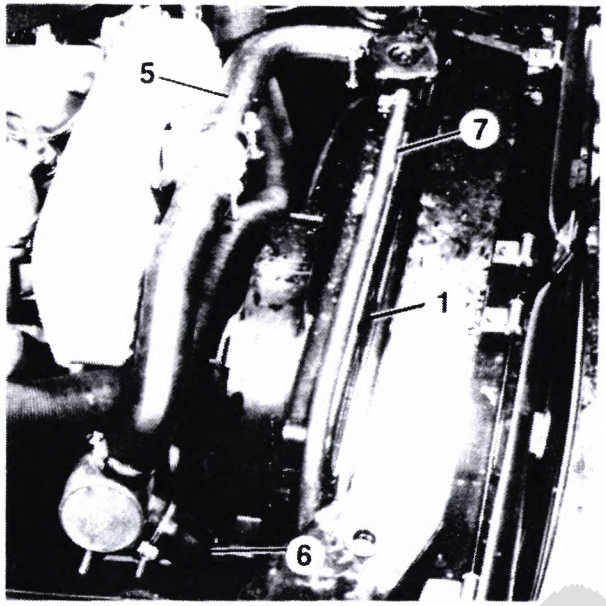
RADIATOR

REMOVAL AND INSTALLATION

From underneath vehicle, remove splash shield. Drain radiator (1) thru plug (2) on lower left side. Disconnect radiator fan connector (3). Disconnect fan thermo switch connector (4). Loosen clamps and disconnect upper (5) and lower (6) radiator hoses. Loosen clamp and disconnect radiator overflow hose (7). On vehicles with automatic transmission disconnect two oil cooling lines at radiator. Remove two nuts, one on each side (arrows), securing radiator to body. Carefully lift radiator/fan assembly out.

NOTE: On vehicles with turbocharger and A.C. the fan assembly has been repositioned on the radiator by using spacers. Also the fan shroud has been trimmed to clear radiator. When installing a new radiator be sure to use the spacers to position the fan properly.

1. Radiator 2. Drain plug 3. Connector 4. Connector 5. Upper hose 6. Lower hose 7. Overflow hose



TESTING

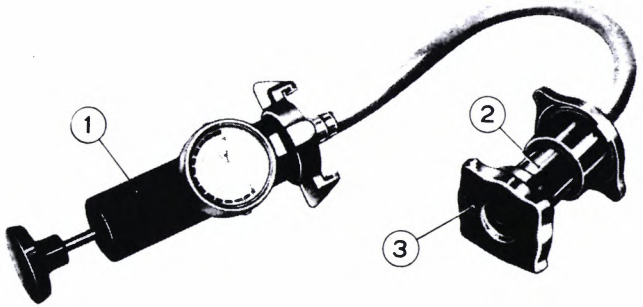
Fill radiator with water.

Attach tester to radiator filler.

Pump in air until pressure of 14 psi is built up. If pressure decreases check for leaks.

Test radiator cap (3) by applying pressure with tester (1) as shown. Check that vent valve opens at 11 psi.

1. Tester 2. Union 3. Radiator cap



BLEEDING COOLING SYSTEM

NOTE: Whenever cooling system has been drained and refilled, the system must be bled. Since the radiator height is lower than the engine, an air pocket will form in the engine cooling jacket.

Open heater valve. Fill radiator and install radiator cap.

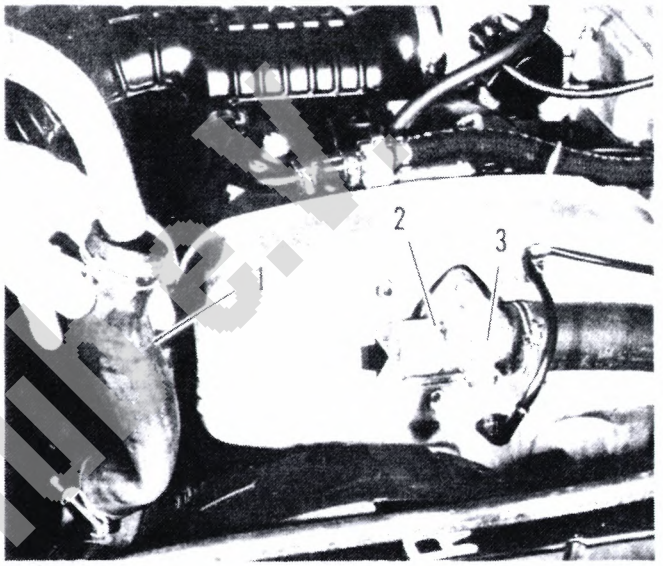
Disconnect water hose (1) from engine "T" housing (2).

Slowly pour coolant into hose (1) until it starts to flow out of housing (arrow). Reconnect hose to housing.

Remove bleed plug (3). Pour coolant into housing (2) until it overflows. Install bleed plug.

Fill expansion tank to "MAX" level and install cap.

1. Water hose 2. Engine "T" housing 3. Bleed plug

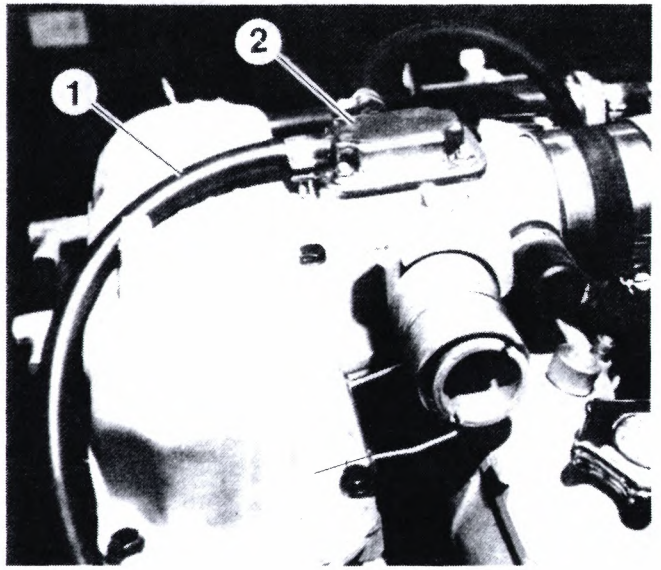


Disconnect hose (1) from throttle plate heater (2). Pour coolant into hose until heater overflows. Reconnect hose.

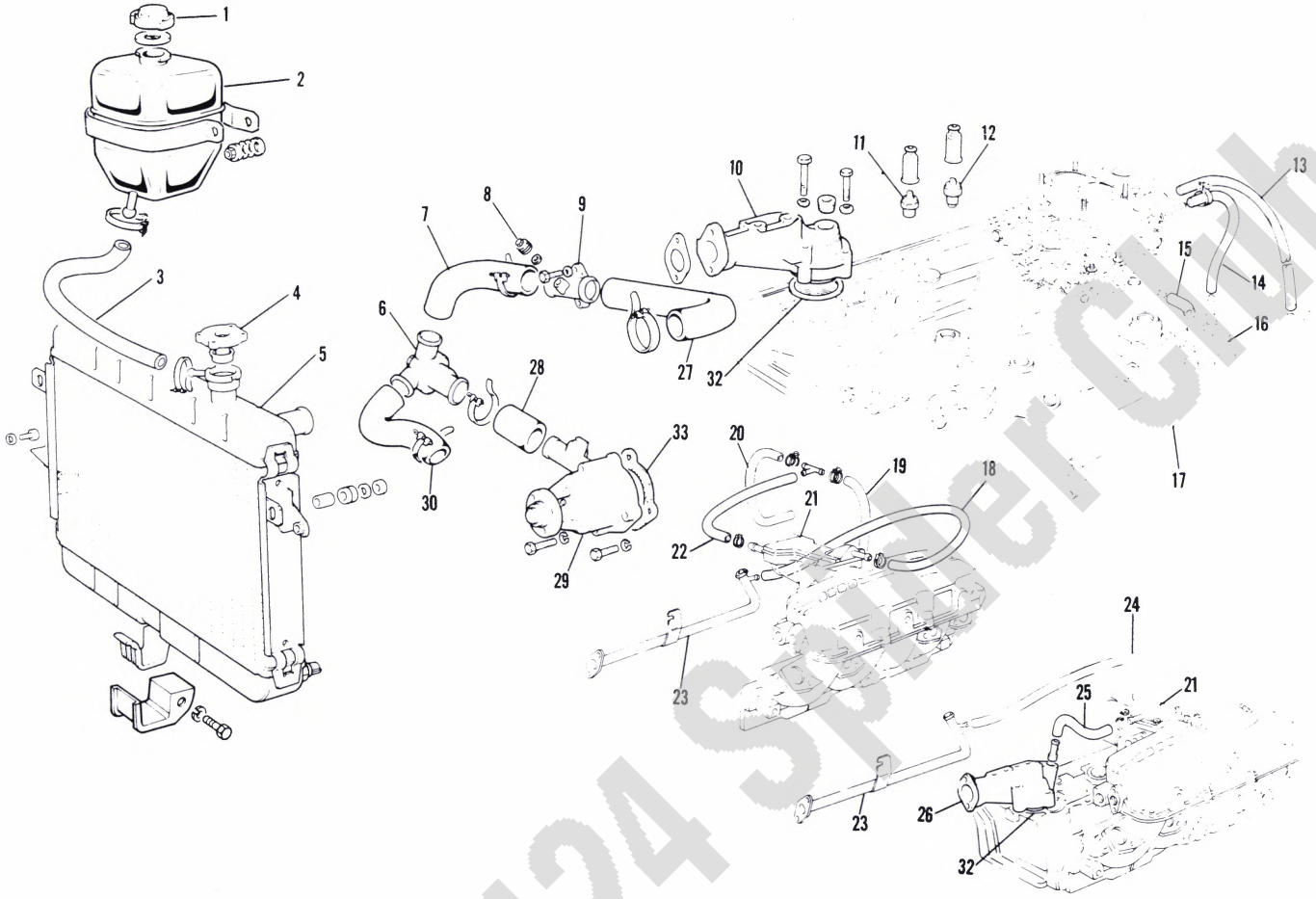
Start and run engine in neutral. If system is completely bled, temperature gauge will rise slowly to operating temperature and radiator will heat up. After passing operating temperature fan will operate. Allow this to occur for at least two fan operating cycles.

NOTE: If system is not completely bled, gauge will rise rapidly, radiator will be cool, and fan will not operate even though temperature is above normal. If this occurs, shut engine off and bleed system again.

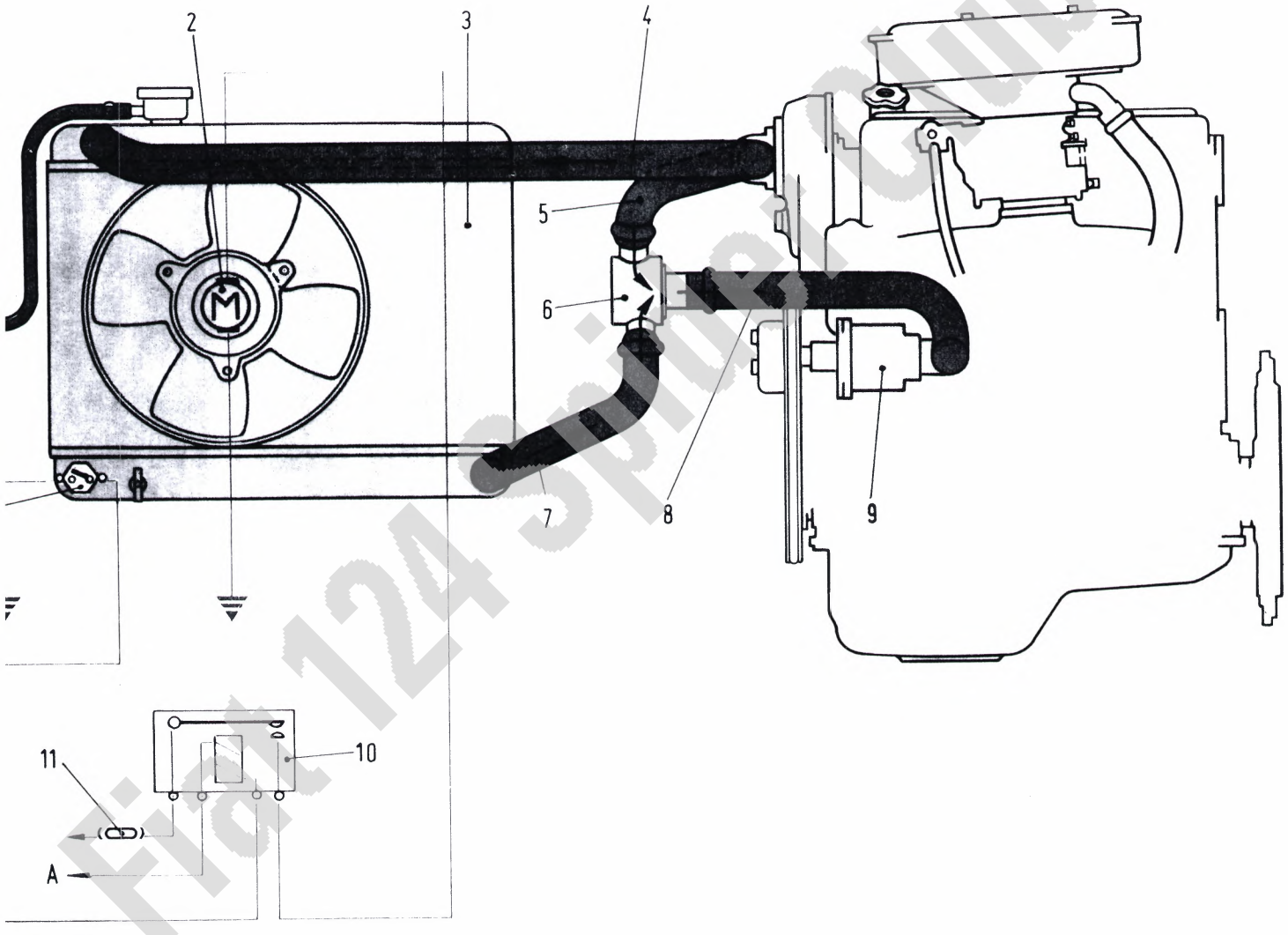
1. Hose 2. Throttle plate heater



WATER PUMP AND DUCTS



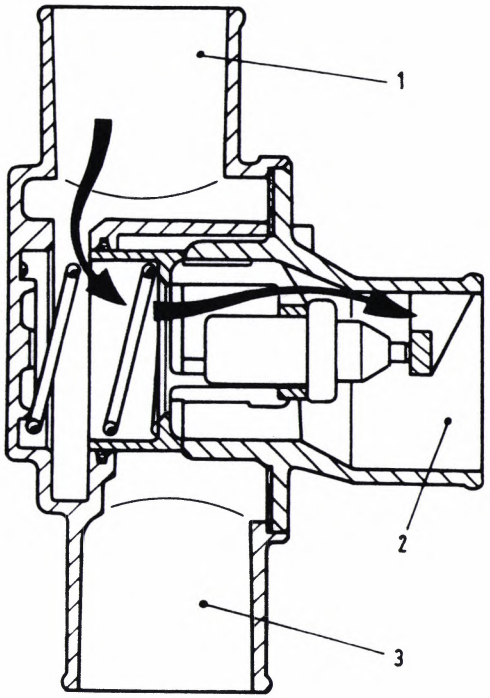
1. Expansion tank cap
2. Expansion tank
3. Overflow hose
4. Radiator cap
5. Radiator
6. Controlled by-pass thermostat
7. Water hose, cylinder head outlet to thermostat
8. Bleed plug
9. Union
10. Water outlet from cylinder head (carburetor version)
11. Temperature sending unit
18. Water hose, throttle plate heater to heater return line
19. Water hose, heater supply line
20. Water hose, heater supply line
21. Throttle plate heater
22. Water hose, throttle plate heater to heater supply line
23. Heater return line
24. Water hose, throttle plate heater to heater return line
25. Water hose, engine to throttle plate heater
26. Water outlet from cylinder head (fuel injection version)
27. Water hose, union to radiator



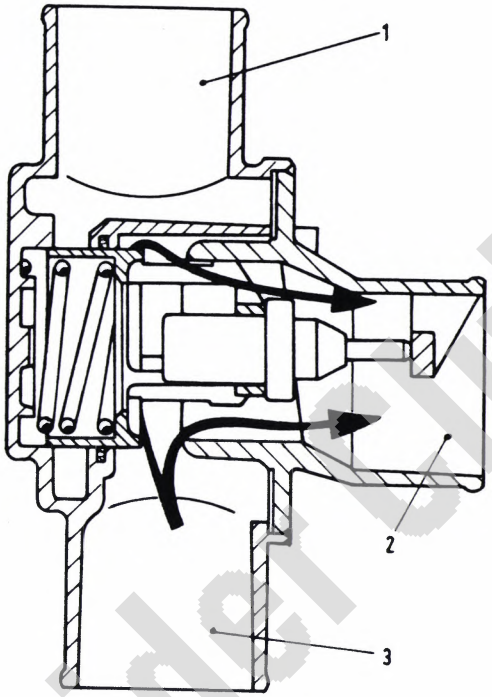
ısion tank
ofan motor
tor
hose from engine to radiator

5. Water hose from engine to thermostat
6. Controlled-by-pass thermostat
7. Water hose from radiator to thermostat
8. Water hose from thermostat to water pump
9. Water pump
10. Electrofan motor relay
11. Fuse
12. Electrofan motor thermal switch
13. Radiator to expansion tank hose

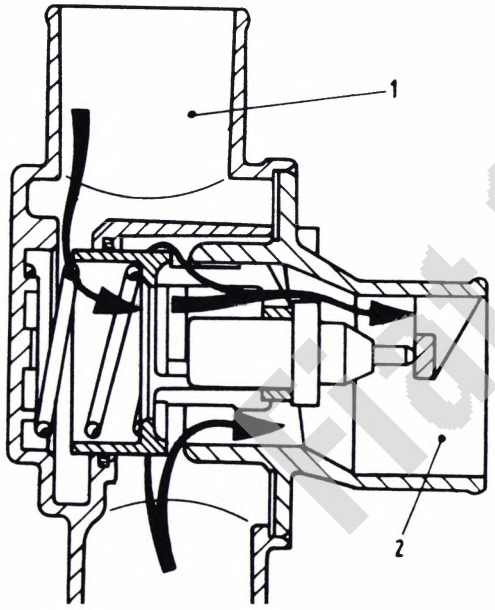
COOLING SYSTEM OPERATIONAL DIAGRAM



CLOSED



FULLY OPEN



Operational diagrams of controlled-by-pass thermostat for mixing coolant.

1. Thermostat water inlet from engine.
2. Thermostat water outlet to pump.
3. Thermostat water inlet from radiator.

The thermostat must be working properly for good engine performance.

Thermostat should begin opening at 172° to 180°F (78° to 82°C).

Thermostat should be fully open at 198°F (92°C).

Thermostat valve stroke at 198°F (92°C) is 0.29 in. (7.5 mm).

WATER PUMP

REMOVAL AND INSTALLATION

Drain cooling system thru radiator and engine block plug. Plug is located on right side of engine.

Loosen two bolts securing alternator (1). Remove drive belt (2).

Remove three water pump pulley bolts (3) to remove pulley.

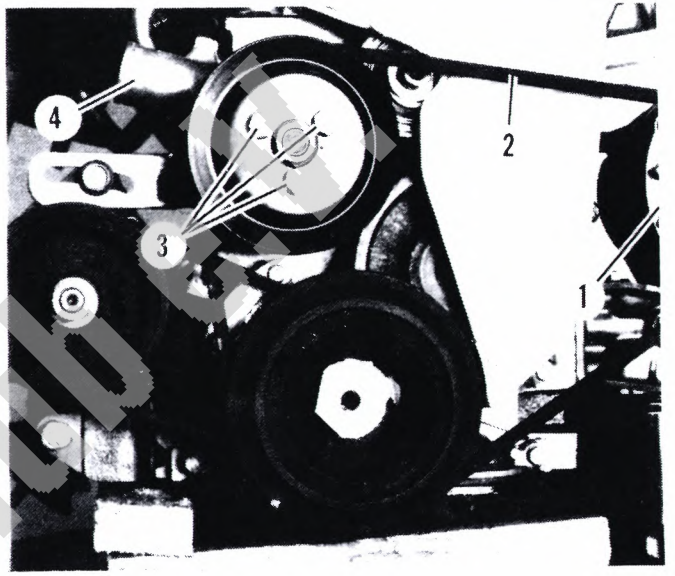
Loosen clamp and remove hose from water pump inlet (4). Remove four bolts to remove pump and gasket.

Remove two nuts and washers securing heater return tube to rear of water pump.

Install in reverse order. Torque water pump bolts to 14 ft. lbs. (2 kgm).

Adjust belt tension.

Refill and bleed cooling system (refer to Radiator section for bleeding procedure).

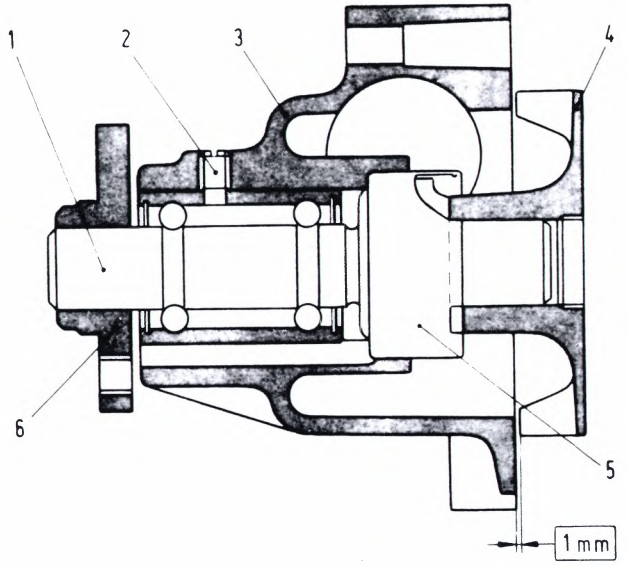


1. Alternator 2. Drive belt 3. Pulley 4. Pump inlet

Longitudinal Section of Water Pump

1. Drive shaft and bearing
2. Bearing lock screw on pump housing
3. Pump housing
4. Impeller
5. Packing
6. Pump drive shaft hub

1 mm = 0.04 in. – fit clearance between impeller and pump housing.



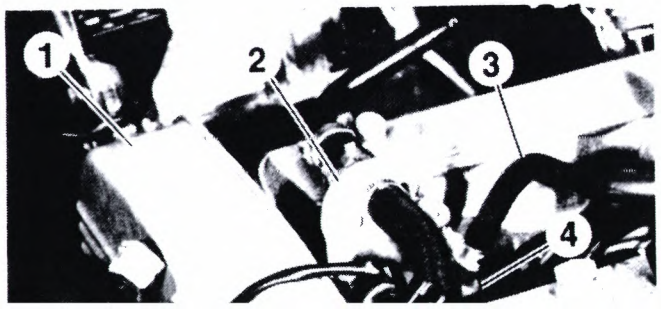
CYLINDER HEAD WATER OUTLET HOUSING

REMOVAL AND INSTALLATION

Drain cooling system through engine block plug until level is below top of radiator.

On fuel injected vehicles, remove auxiliary air regulator (2) from housing (4).

Remove clamp holding throttle plate heater hose (3) (if installed), and disconnect hose from housing.



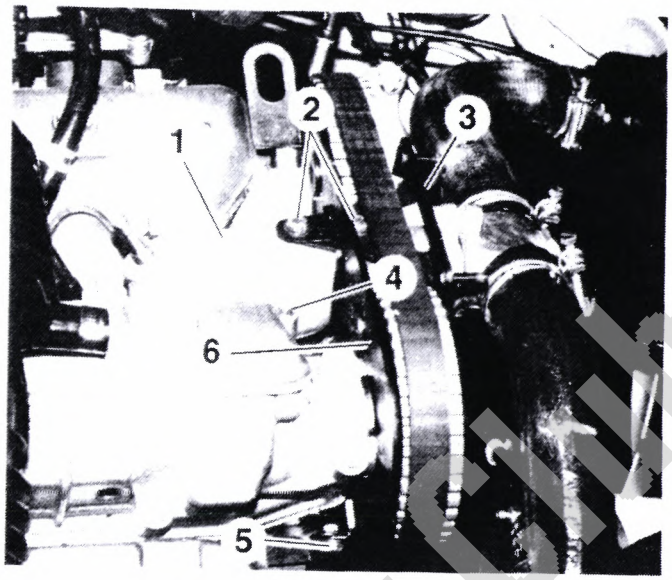
Remove bolt ( ) and washer holding timing belt rear shield ( ) on right side of engine.

Remove two bolts ( ) and washers holding cam timing bracket ( ) and rear shield ( ) to housing ( ).

Remove four bolts ( ) and washers holding housing ( ) to cylinder head. Remove housing and gasket.

Install in reverse order. Use new gaskets.

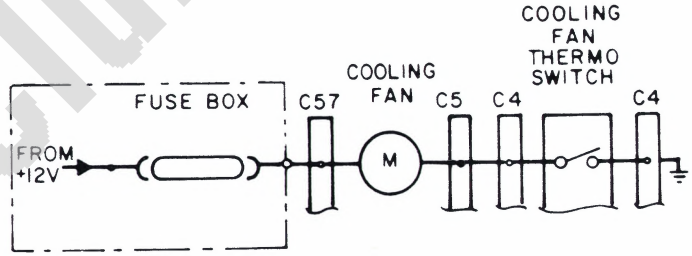
Refill and bleed cooling system. Refer to RADIATOR section.

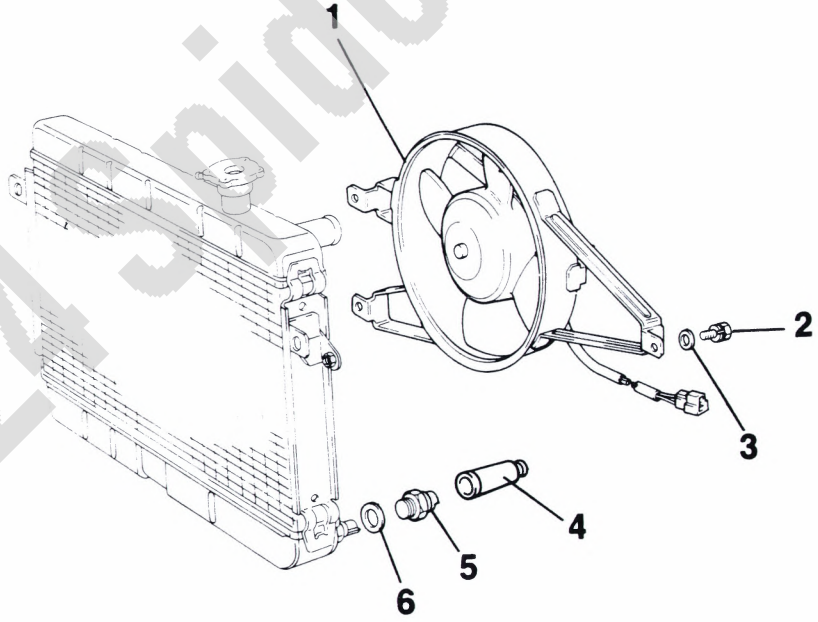


ELECTRIC FAN OPERATION

When water temperature is 194°F (90°C) or above, the thermostatic switch closes and electric fan operates. The fan continues to run until the temperature drops below 185°F (85°C).

CAUTION: Cooling fan can operate with ignition switch in "OFF".



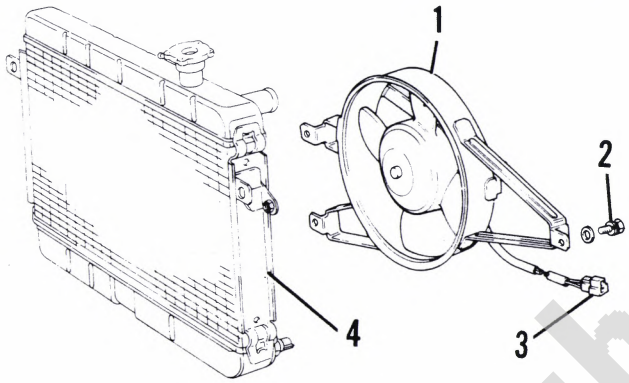


FAN ASSEMBLY

REMOVAL AND INSTALLATION

Disconnect electrical connector (3) located near lower left side of radiator ( ).

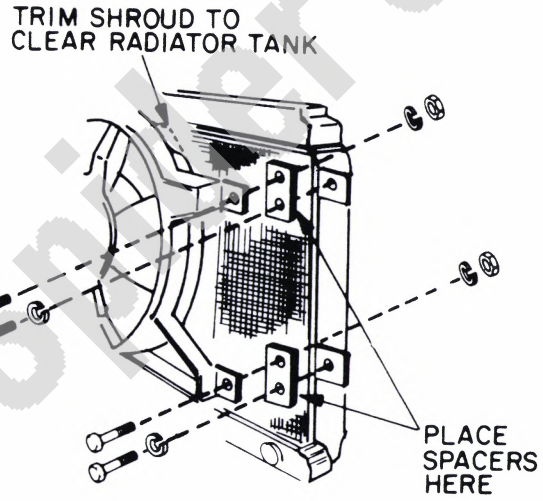
Remove three bolts (2) and washers securing fan assembly (1) to radiator (4).



1. Fan assembly 2. Bolt and lockwasher 3. Electrical connector
4. Radiator

NOTE: On vehicles with turbocharger and A.C., fan assembly is attached to two spacers on right side of radiator.

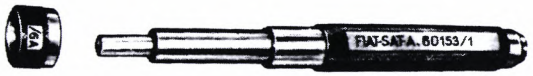
When installing a new fan assembly on a vehicle with turbocharger and A.C., trim shroud to clear top of radiator as shown.



NOTE: Number given in parentheses is Kent-Moore catalogue number.

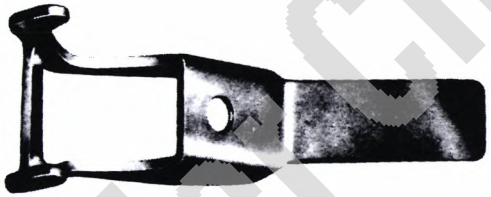
A.50113 (J28152) Wrench, oil sump drain plug

A.60395 (J28078) Remover and installer, valve guide



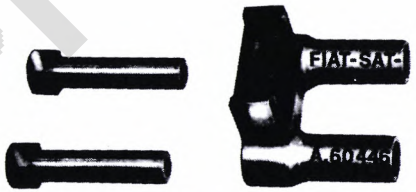
A.60313/1/2 (J28069) Installer, valve guide oil seal

A.60594 (J28229) Tool, holding tappets while removing plates and timing levers



A.60443 (J28080) Lever, pressing down tappets while timing valves

A.60446 (J28081) Tool, holding camshaft sprocket while tightening bolt



A.87001 (J28151) Remove tappet plates

A.96218 (J28203) Gauge, valve stem height check after seat reconditioning

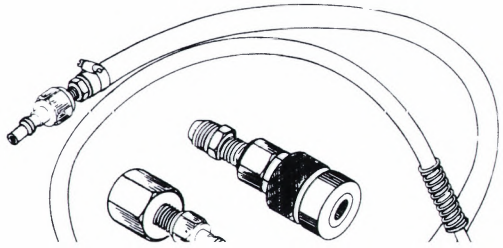
A.50149 (J28036) Wrench, cylinder head bolt (17mm)

A.95874 (J29821) Fuel pressure gauge (fuel injected engines)

A.33076 (J33076) Turbocharger pressure switches test pump

A.60645 (J28291) Intake cam sprocket holder (1978 and 1980 carburetored engines)

A.4467 (J29820) Exhaust gas analyzer adapter (fuel injected engines)



CLUTCH - 18

CLUTCH - 18

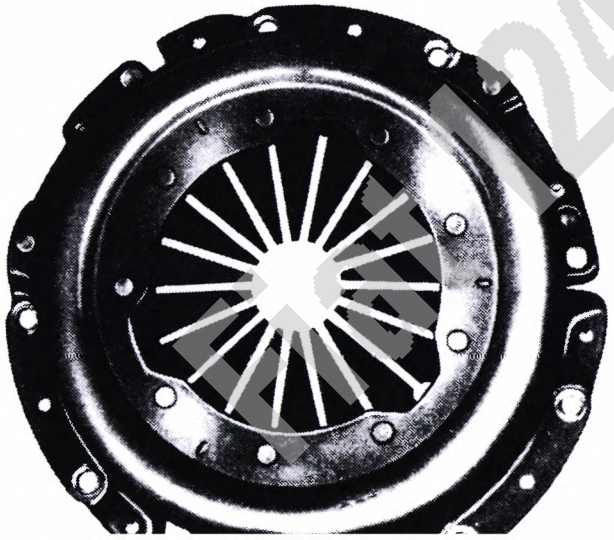
PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
18	Specifications	18-1
	Torque Specifications	18-1
181.01	Clutch Release Control	18-3
181.05	Clutch	18-5
18A	Service Tools	18-7

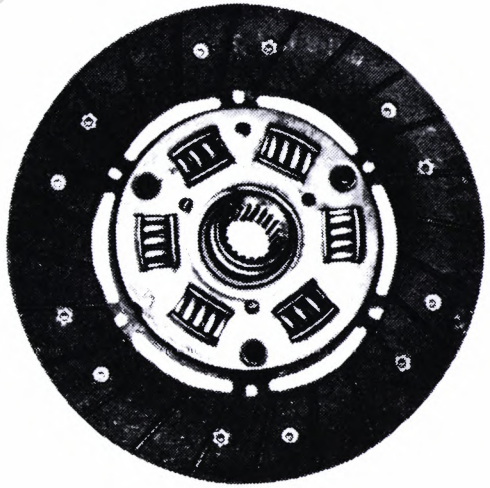
SPECIFICATIONS

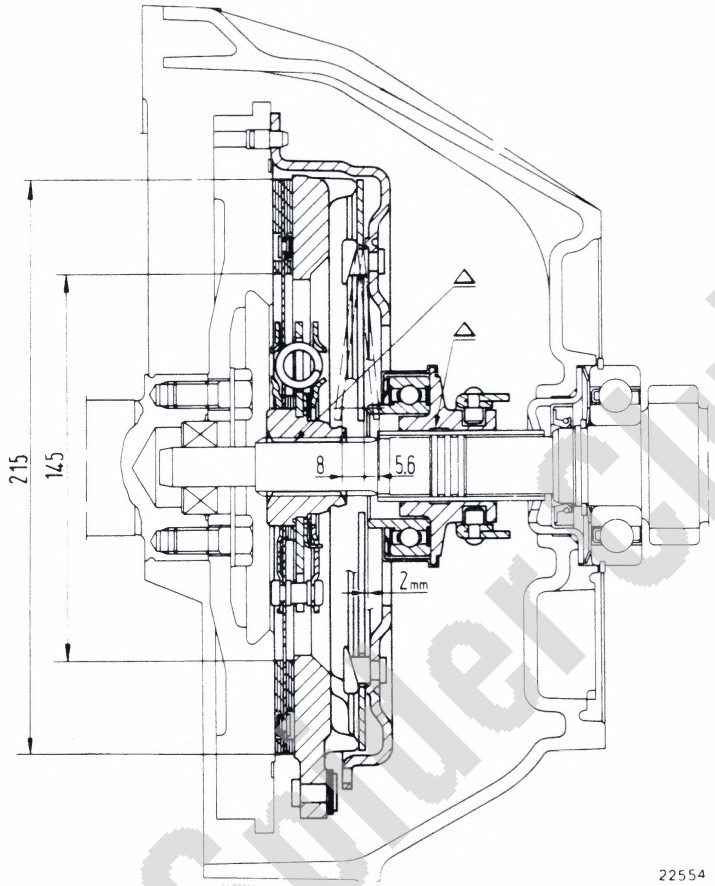
Type	single plate, dry	
Release mechanism	diaphragm spring	
Control	mechanical	
Clutch disc	with friction linings	
Lining O. D.	8.307	(215 mm)
Lining I. D.	5.708	(145 mm)
Max. runout of clutch disc linings	.006	(.15 mm)
Clutch pedal free travel, corresponding to a clearance of .079" (2 mm) between diaphragm spring and release sleeve, about	.984	(25 mm)
Travel of diaphragm spring, corresponding to a pressure plate displacement not less than .067" (1.7 mm)	.315	(8 mm)

TORQUE SPECIFICATIONS

DESCRIPTION	THREAD (METRIC)	TORQUE N·m	TORQUE FT. LB.	TORQUE Kgm
Bolt, clutch to flywheel	M8	29.4	22	3







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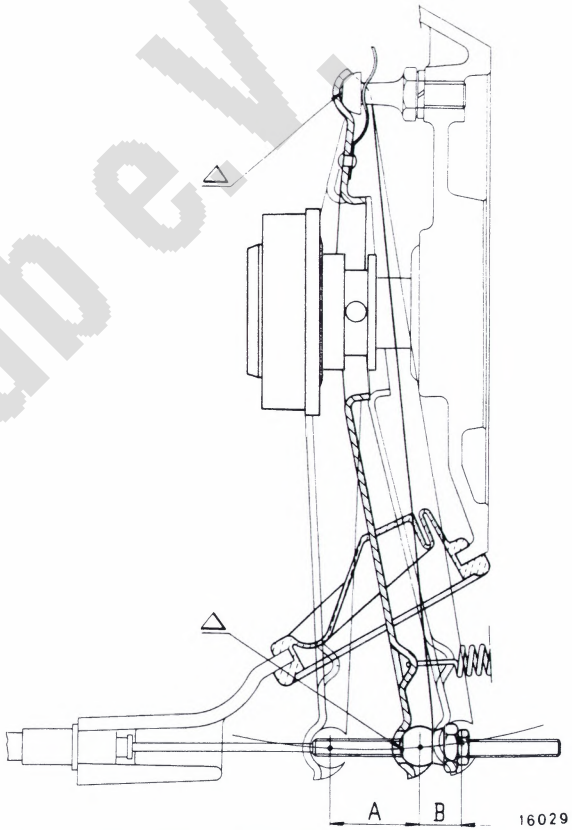


16029

.079" (2 mm) = Gap to be obtained by adjusting release control cable.

.220" (5.6 mm) = Maximum permissible displacement from wear of driven plate linings.

.315" (8 mm) = Release travel.

A = 1.181" (30 mm) approx. Release travel corresponding to a minimum driven plate movement of .067" (1.7 mm).

B = .669" (17 mm) approx. Displacement of release lever after wear of driven plate linings.

Δ = Lubrication points: FIAT KG 15 grease.

SPECIFICATIONS AND FEATURES

CLUTCH CABLE

REMOVAL AND INSTALLATION

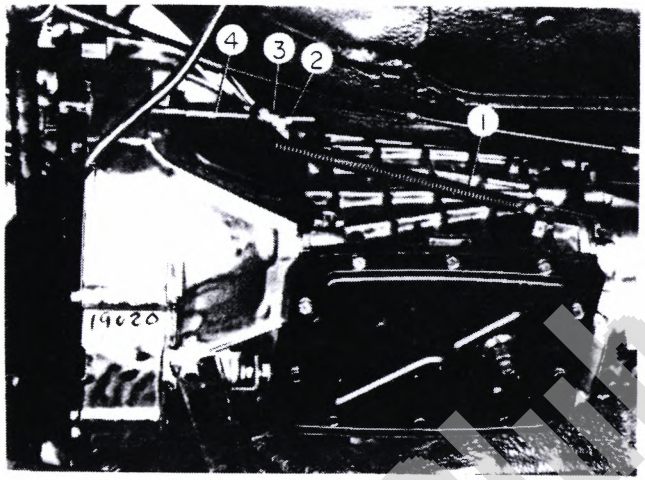
Raise vehicle on lift.

Remove clutch lever return spring (1).

Remove locknut (2) and adjusting nut (3) from clutch cable (4).

Withdraw cable through clutch housing.

Lower vehicle.

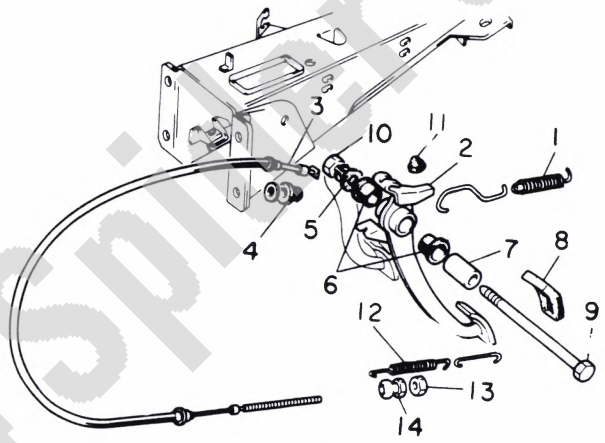


1. Return spring 2. Locknut 3. Adjusting nut 4. Clutch cable

From driver's compartment, remove clutch pedal return spring (1).

Remove clutch cable (3) from clutch pedal (2).

From engine compartment pull clutch cable through firewall and out of vehicle. Installation is reverse of removal.



1. Return spring 2. Clutch pedal 3. Clutch cable 4. Bushing
5. Spacer 6. Bushing 7. Spacer 8. Rubber pedal cover 9. Bolt
10. Nut 11. Pedal stop 12. Return spring 13. Locknut
14. Adjusting nut

INSPECTION

Check that cable moves freely inside casing, that threaded end is not damaged and that half-moon block end is not worn. Replace if damaged.

Replace return springs if weak.

Replace firewall rubber bushing if damaged.

CLUTCH ASSEMBLY

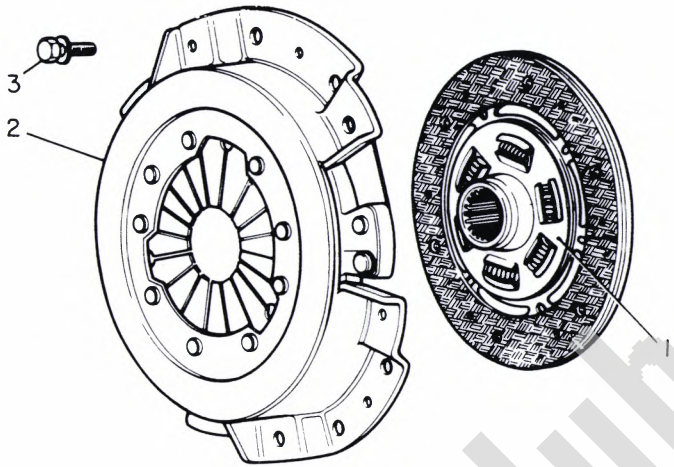
REMOVAL

Remove transmission (refer to Transmission Section 21).

If same clutch assembly is to be installed, mark position on flywheel so that correct balance will be maintained upon reassembly.

Remove clutch assembly (1 and 2) by gradually (a few turns each bolt) removing six bolts (3).

1. Disc 2. Pressure plate 3. Bolt



INSPECTION

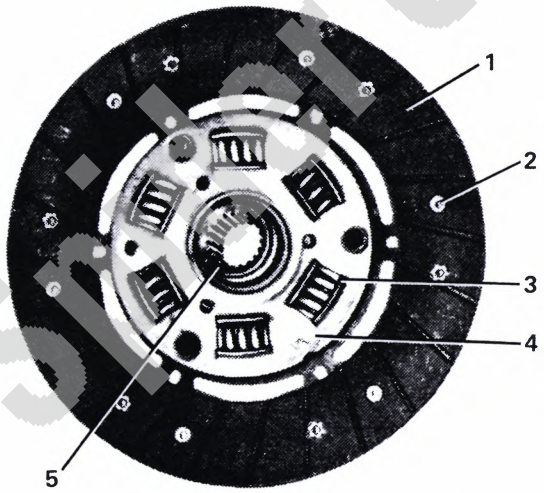
Clutch Disc

Check that surface of friction material (1) is not less than 1/16 in. from rivet heads (2), not cracked nor glazed.

Check that disc is not warped.

Check that springs (3), plate (4), or splines (5) are not damaged. Replace disc if damaged.

1. Friction material 2. Rivet head 3. Spring 4. Plate 5. Splines



Pressure Plate

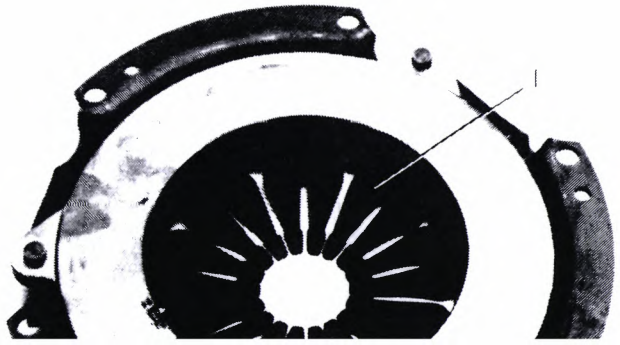
Check that fingers (1) of diaphragm spring are not broken, cracked, or misaligned.

Check facing (2) for heat cracks, scoring or burns.

For minor imperfections, dress with medium grit emery cloth. Replace if damaged.

Check mounting hardware for damage. Replace if damaged.

1. Fingers 2. Facing



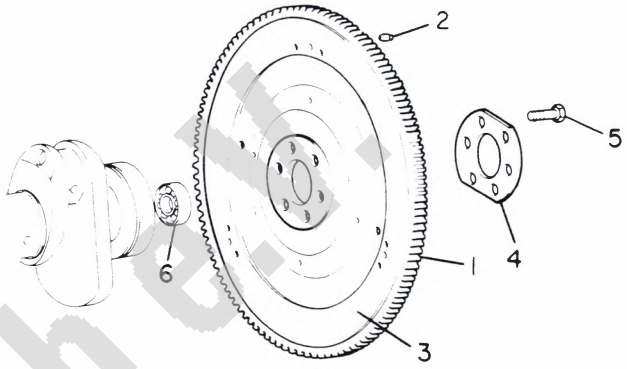
Flywheel

Inspect flywheel (3) for grooves, gauling, burns or heat cracks. For minor imperfections, lightly dress with medium emery cloth. For severe damage, replace flywheel.

Check mounting bolt holes for stripped threads. Repair with helical insert. Do not use oversize bolts as balance will be affected.

Check pilot bearing (6) for damage. Replace if damaged.

Check ring gear (1) for damaged teeth. Replace if considered not serviceable.



1. Ring gear 2. Pin 3. Flywheel 4. Plate 5. Bolt 6. Pilot bearing

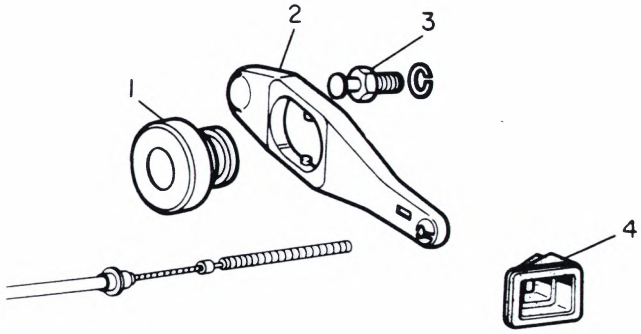
Throwout Bearing and Clutch Lever

Check throwout bearing (1) for serviceability. Replace if worn.

Check clutch lever (2) pivot points for excessive wear or damage. Replace if necessary.

Check end of pivot bolt (3) for excessive wear. Replace if worn.

Check dust boot (4) for deterioration. Replace if damaged.



1. Throwout bearing 2. Clutch lever 3. Pivot bolt 4. Dust boot

INSTALLATION

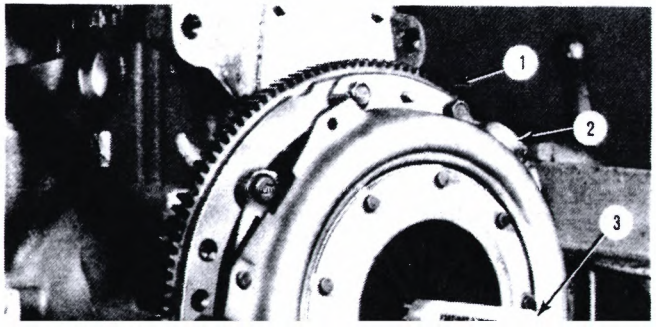
If flywheel was removed, torque mounting bolts to 105 ft lb (14.5 kgm).

Make sure clutch and flywheel surfaces are clean. If old clutch assembly is reinstalled, align marks noted in removal.

With protruding part of disc hub facing away from flywheel (1), loosely assemble clutch assembly (2) to flywheel.

Using pilot tool A.70081 (3), center disc in pressure plate.

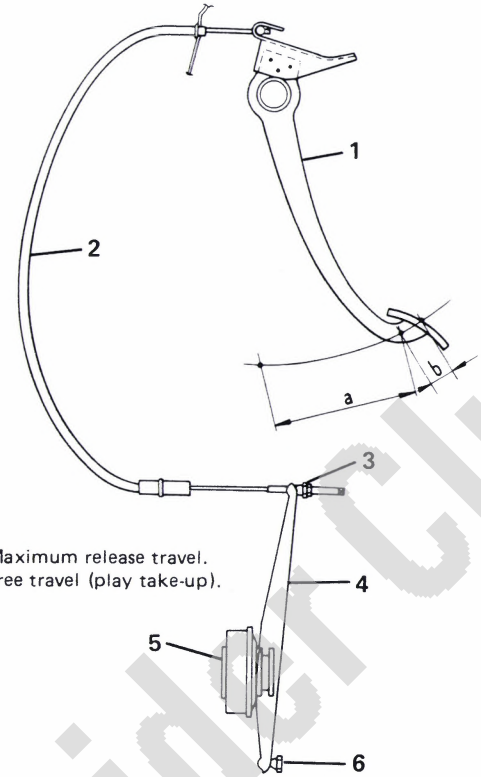
Gradually torque mounting bolts (4) to 22 ft lb (3 kgm).



ADJUSTMENT

Loosen locknut and tighten or loosen adjusting nut (3) to obtain free travel of approximately 1 in (25 mm) as shown (dimension "b").

1. Clutch pedal 2. Clutch cable 3. Adjusting nut 4. Clutch lever
5. Throwout bearing 6. Pivot bolt



a = 4.72" (120 mm approx. Maximum release travel.
b = .984" (25 mm) approx. Free travel (play take-up).

Service Tools

NOTE: Number given in parentheses is Kent Moore catalogue number.

A.70081 (J28091) Clutch centering pilot

TRANSMISSION - 21

TRANSMISSION - 21

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
21	Specifications	21-1
	Torque Specifications	21-5
212.03	Manual Transmission	21-7
212.05	Automatic Transmission	21-31
212.22	Gearshift Linkage	21-85
21A	Service Tools	21-93

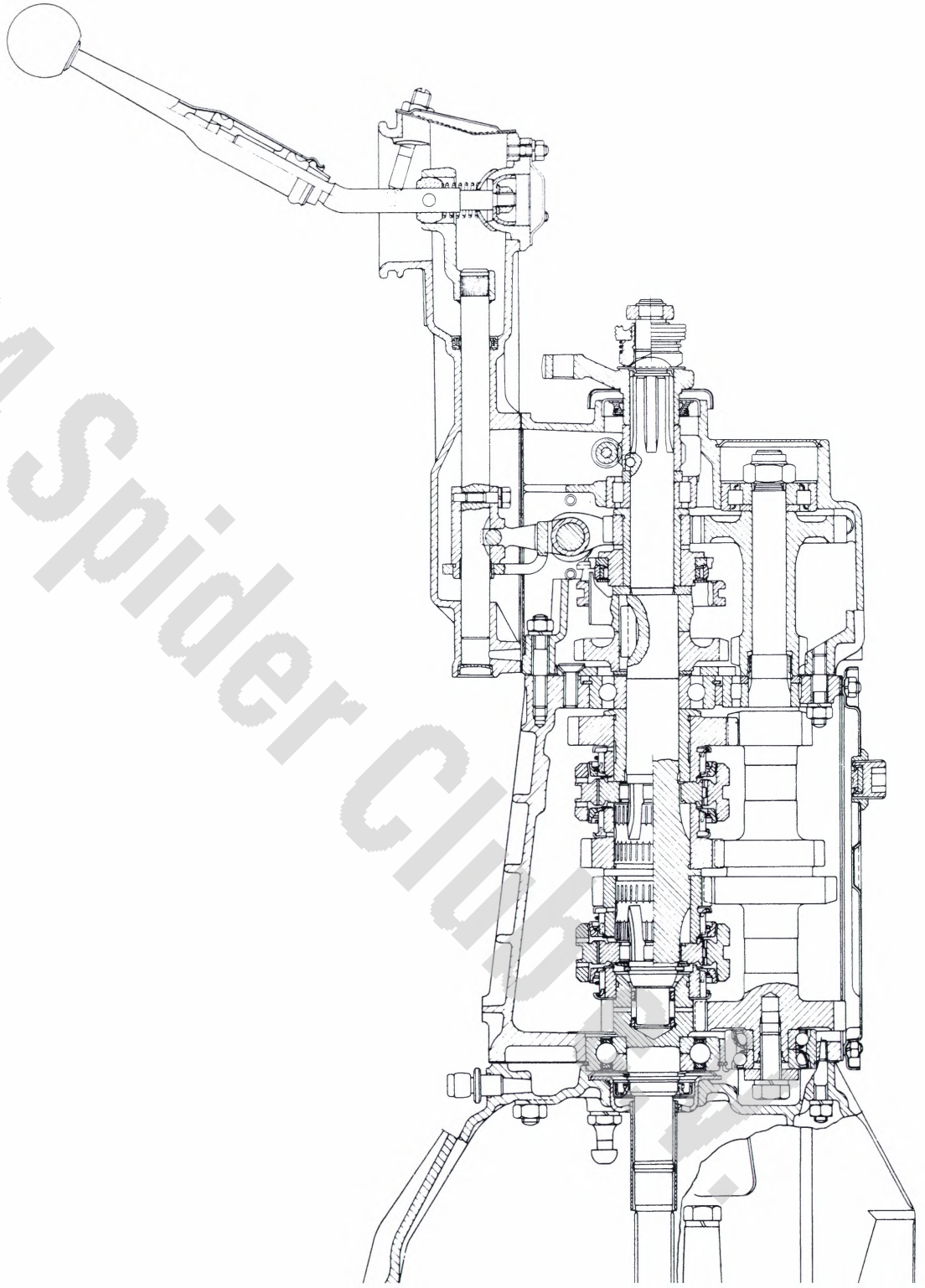
MANUAL TRANSMISSION

Speeds	five forward and reverse		
Synchronizers: slip ring, cone type	1st, 2nd, 3rd and 4th gear		
snap ring	5th gear		
Gear type: forward	constant mesh, helical toothed		
reverse	straight toothed		
	Up to 1978	1979 & 1980	1981
Gear ratios: first	3.667	3.612	3.667
second	2.100	2.045	2.100
third	1.361	1.357	1.361
fourth	1	1	1
fifth	0.881	0.830	0.881
reverse	3.244	3.244	3.244
	in	mm	
Gear lash	.004	0.10	
Ball bearing radial play, max. limit	.002	0.05	
Ball bearing end play, max. limit	.020	0.50	
Max. allowable shaft misalignment	.002	0.05	
Clearance between 1st gear and bushing and between 2nd-3rd gears and seats on mainshaft	.002 to .004	0.05 to 0.10	
Clearance between reverse shaft and reverse gear bushing	.002 to .004	0.05 to 0.10	

AUTOMATIC TRANSMISSION

Type G.M.S.

Speeds	three forward and reverse
Gear ratios: first	2.4 to 1
second	1.48 to 1
third	1 to 1
reverse	1.92 to 1
Location of selector lever	on tunnel
Selector lever positions:	
P = Park	transmission locked – engine starting possible
R = Reverse	back-up lights switched on
N = Neutral	engine starting possible
D = Drive	automatic engagement – 1-2-3-2-1
2 = Drive with exclusion of 3rd gear	automatic engagement of 1st and 2nd gear only

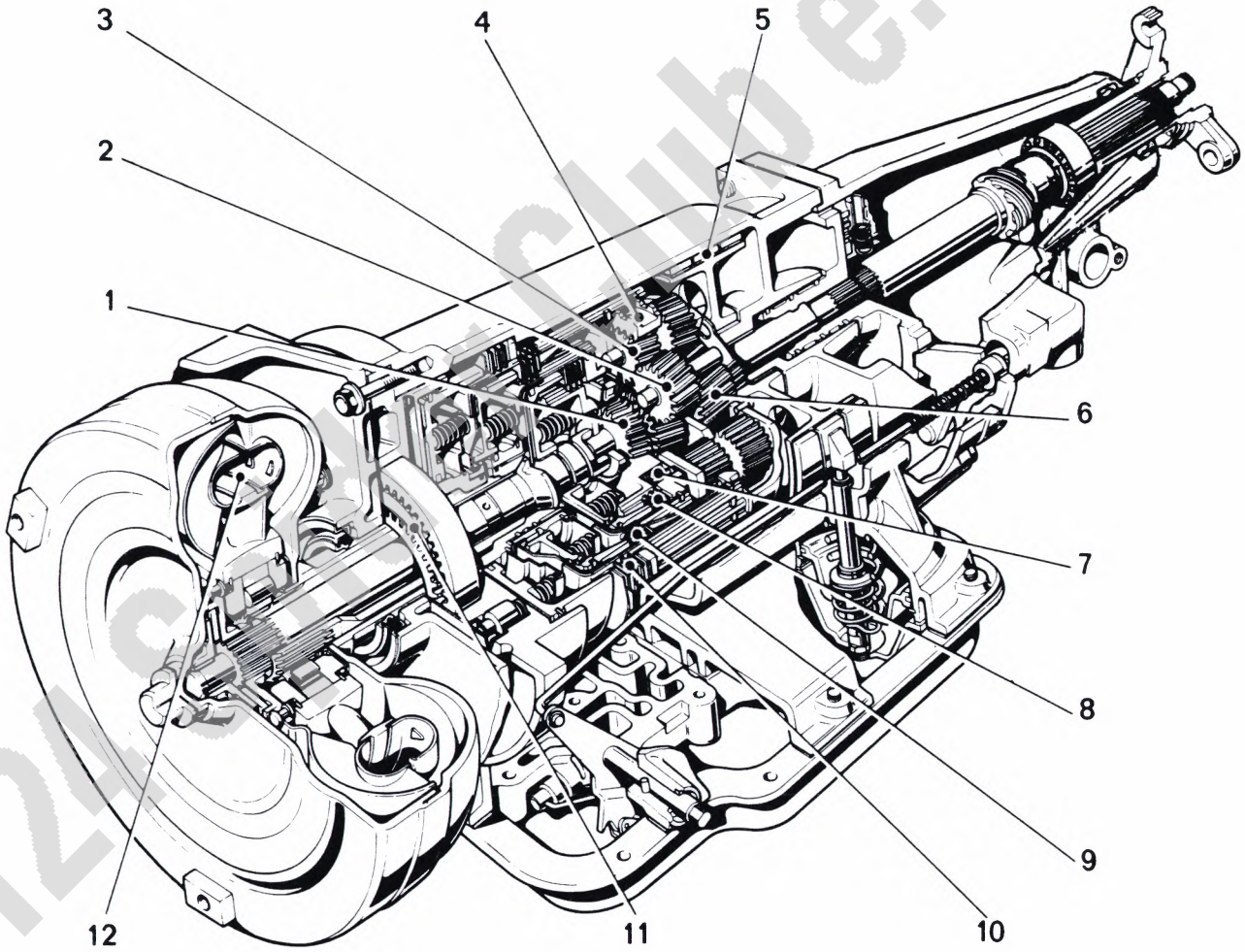


Gear changing	Automatic, actuated by the vacuum of the engine (valve and butterfly) and the speed of the vehicle (governor body)		
KICK DOWN operation	mechanical by means of a cable		
Sprag clutch	Installed on hub of 3rd clutch – raised lip faces input sun gear		
Clutch composition	Reverse	2nd gear	3rd gear
Discs with linings	3	3	3
Steel discs	4	4	4
Cushion plate (wave washer)	1	1	1
Reaction plate	1	–	–
Torque converter			
Diameter	9.01 in (229 mm)		
Variable torque multiplication ratio	between 2.4 to 1 and 1 to 1		
Oil type	Oliofiat G I/A (dexron type)		
Oil change quantities:			
Total with transmission and converter empty	11.8 pints (5.6 litres)		
Change only	5.28 pints (2.8 litres)		

Vehicle towing

The vehicle may be towed a maximum distance of 31 miles at a maximum speed of 31 mph with the transmission in running order and the drive shaft connected.

For distances greater than 31 miles, speeds higher than 31 mph or if transmission is damaged, disconnect drive shaft or lift rear wheels.



1. Input sun gear
2. Planet short pinion
3. Planet long pinion
4. Annulus
5. Brake band
6. Output sun gear
7. Sprag wheel

TIGHTENING REFERENCE

DESCRIPTION	THREAD (METRIC)	TORQUE N·m	TORQUE FT. LB.	TORQUE Kgm
Manual Transmission				
Selector rod detent spring cover bolt	M8	25	2.5	18
Bell housing-to-engine upper mounting bolt	M12 x 1.25	80.5	8.3	61
Bell housing-to-engine lower mounting bolt	M12 x 1.25	80.5	8.3	61
Transmission case-to-bell housing bolt	M10 x 1.25	49	4.9	36
Transmission case-to-bell housing nut	M8	25	2.5	18
Rear cover nut	M8	25	2.5	18
Rear cover lower bolt	M8	19.6	2.0	14
Starter motor bolt	M8	19.6	2.0	14
Countershaft rear bearing nut	M18 x 1.5	116	11.8	87
Propeller shaft yoke-to-mainshaft nut	M20 x 1	145	14.7	108
Countershaft front bearing bolt	M12 x 1.25	92	9.3	69
Forked lever bolt	M6	18	1.8	14
Gear shifter and selector shaft retainer cover nut	M6	6.4	.64	3
Prong-to-selector shaft bolt	M6	18	1.8	14
Gear lever support bolt	M8	19.6	2.0	14
Inner cup-to-gear lever lower self-locking nut, type S	M8	15	1.5	11
Rear mounting pad-to-transmission extension cover nut	M8	25	2.5	18
Automatic Transmission				
Bolt, bell housing attachment to engine	M12 x 1.25	85	61.5	8.5
Bolt, converter to flywheel	3/8-16 UNC	63	47	6.5
Self-locking nut, type S, gear selection rod lever	3/8-16 UNC-2 B	20	14.5	2
Bolt, gearshift support lever	M8	15	11	1.5
Bolt, starter motor attachment	M8	20	14.5	2
Bolt, support plate to rear housing	M10	51	36	5

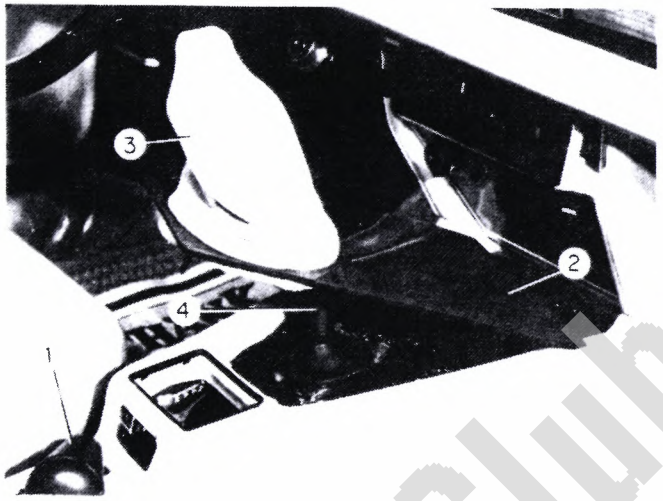
MANUAL TRANSMISSION

REMOVAL AND INSTALLATION

Disconnect battery ground cable.

Unscrew gearshift knob (1).

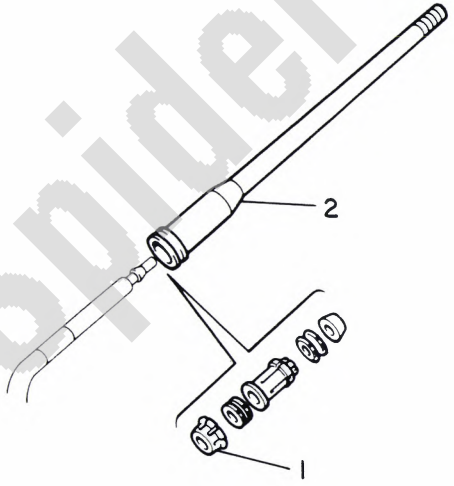
Unsnap rear of console cover (2) and lift up, along with boot (3), over gearshift lever (4) as shown.



1. Gearshift knob 2. Console cover 3. Gearshift boot 4. Gearshift lever

Unclip plastic retainer (1) at bottom of gearshift lever assembly and separate top half (2) of lever from bottom half as shown.

NOTE: To reassemble, install all retainers and bushings, including bottom retainer (1), into top half of lever in order shown. Place top half onto bottom half and tap into position with plastic mallet.



1. Plastic retainer 2. Shift lever top half

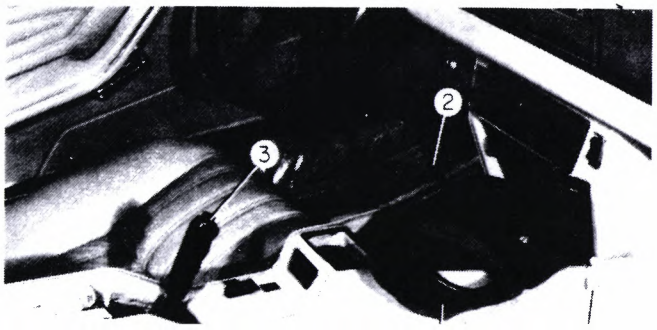
Disconnect electrical connector (4) to reverse switch.

Lift insulation to gain access to screws holding top cover (5) and remove cover.

Remove screws at front of console (1). Remove coin holder at rear of console to remove rear screw.

Lift console up slightly, and carefully pull back about 3 inches in order to obtain clearance for gearshift lever (2) when transmission is lowered.

NOTE: It may be necessary to slacken off emergency brake cable adjustment in order to raise brake handle (3)



Raise vehicle on lift. Drain transmission by removing bottom plug (5).

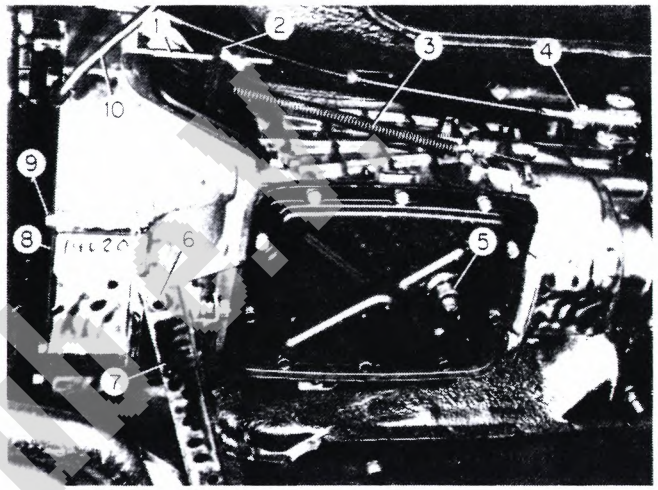
Remove clutch lever return spring (3). Disconnect clutch cable (1) from clutch lever (2). Withdraw cable through clutch housing.

Unscrew speedometer connector (4) from transmission.

Remove three bolts holding starter to clutch housing. Secure starter out of way.

Remove four bolts (8) to remove flywheel cover (9).

NOTE: Left bolt of flywheel cover also secures engine ground lead (10).

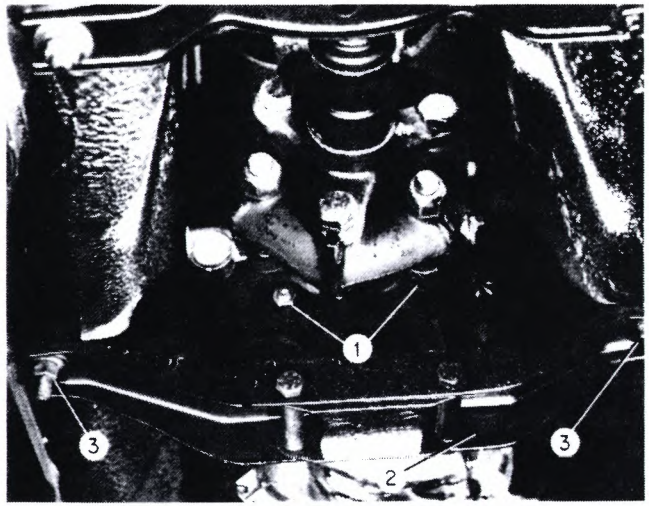


1. Clutch cable 2. Clutch lever 3. Clutch return spring
4. Speedometer connector 5. Drain plug 6. Bolt 7. Bracket
8. Bolt 9. Flywheel cover 10. Engine ground lead

Remove drive shaft assembly (refer to Drive Shaft section).

Place transmission jack under transmission.

Remove two nuts (3) holding transmission mount (2) to body. Remove two nuts (1) holding mount to transmission.



1. Nut 2. Transmission mount 3. Nut

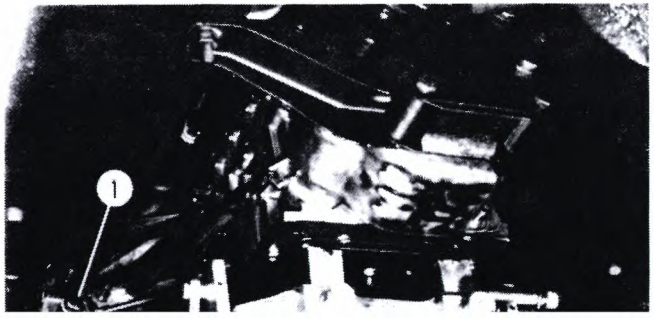
Remove four bolts (1) securing transmission to engine.

Separate transmission from engine and move it rearward. Tilt transmission to slip input shaft out of clutch. Lower transmission.

CAUTION: Be careful that transmission input shaft does not damage clutch diaphragm spring laminae.

Install in reverse order of removal.

Torque all bolts (refer to Torque Specification chart).



DISASSEMBLY

Mount transmission on support (2) A.71001/19, part of rotating stand (1).

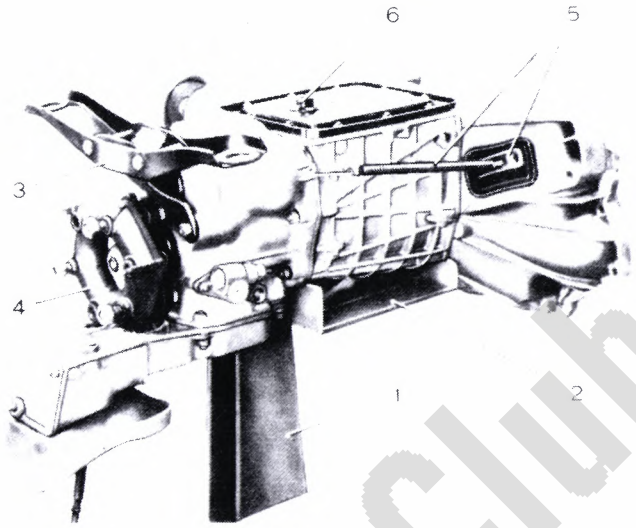
Using tools A.50113, A.55087, and A.57051, remove oil drain plug (6), oil level plug, and rear housing oil drain plug.

Remove three self-locking nuts and bolts attaching flexible joint (4).

Remove two nuts and washers attaching rear supporting cross strut (3) to rear housing.

Remove return spring and rubber boot (5).

1. Rotating stand 2. Support 3. Rear supporting cross strut
4. Flexible joint 5. Spring and rubber boot 6. Oil drain plug

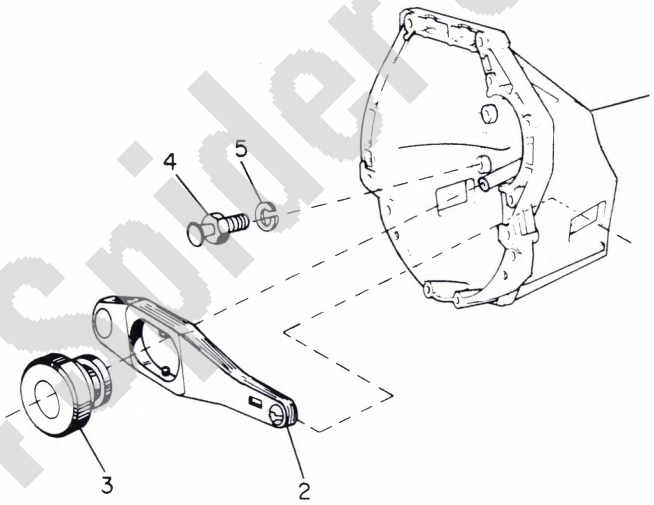


Unhook yoke (2) from pivot (4) by sliding yoke toward return spring end.

When unhooked, guide yoke and throwout bearing (3) off input shaft.

Remove pivot (4) and lockwasher (5) from bellhousing (1) only if damaged.

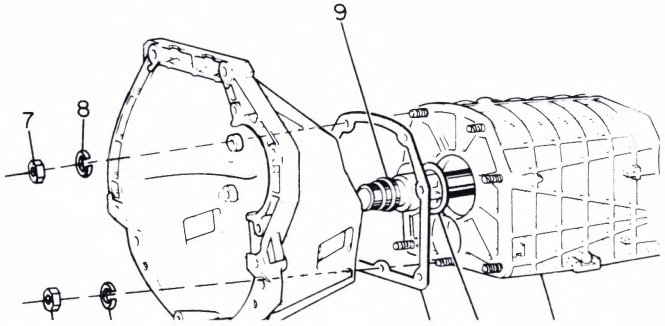
1. Bellhousing 2. Yoke 3. Throwout bearing 4. Pivot
5. Lockwasher



Remove six nuts (7), lockwashers (8), and one nut (6) and lockwasher (5) attaching bellhousing (4) to case (1).

Remove gasket (3) and spring washer (2). Remove seal (9) from the bellhousing (4) only if seal will be replaced.

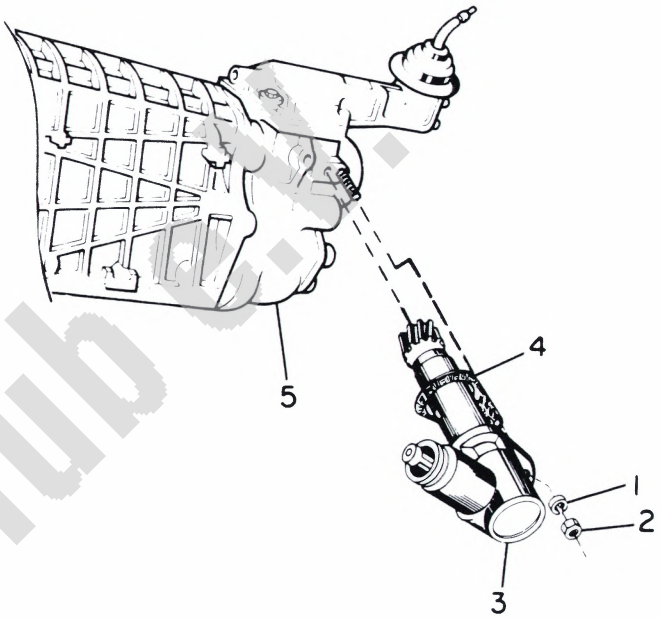
1. Case 2. Spring washer 3. Gasket 4. Bellhousing 5. Lockwasher
6. Nut 7. Nut 8. Lockwasher 9. Seal



Remove nut (2) and lockwasher (1) attaching speedometer drive (3) to rear housing (5).

Remove speedometer drive (3) and gasket (4).

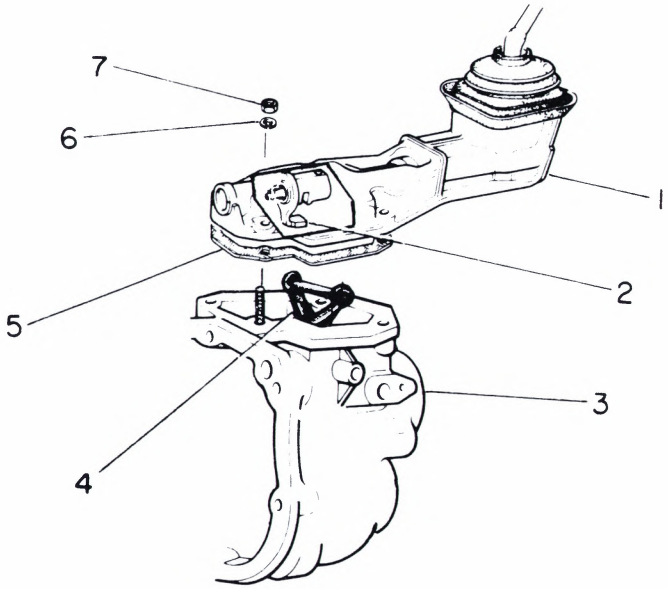
1. Lockwasher 2. Nut 3. Speedometer drive 4. Gasket
5. Rear housing



Remove four nuts (7) and lockwashers (6).

Remove entire shift tower assembly (1) by lifting, then pushing shift lever forward until tab on dog (2) clears engaging lever (4) in rear housing (3). Remove gasket (5).

1. Shift tower assembly 2. Dog 3. Rear housing 4. Engaging lever
5. Gasket 6. Lockwasher 7. Nut



NOTE: Disassemble shift tower assembly only to the extent to replace defective components.

Remove boot (15).

Remove four nuts and lockwashers (14), cover (17), and gasket (16). Do not remove reverse lockout screw (18) and locknut (19) unless damaged.

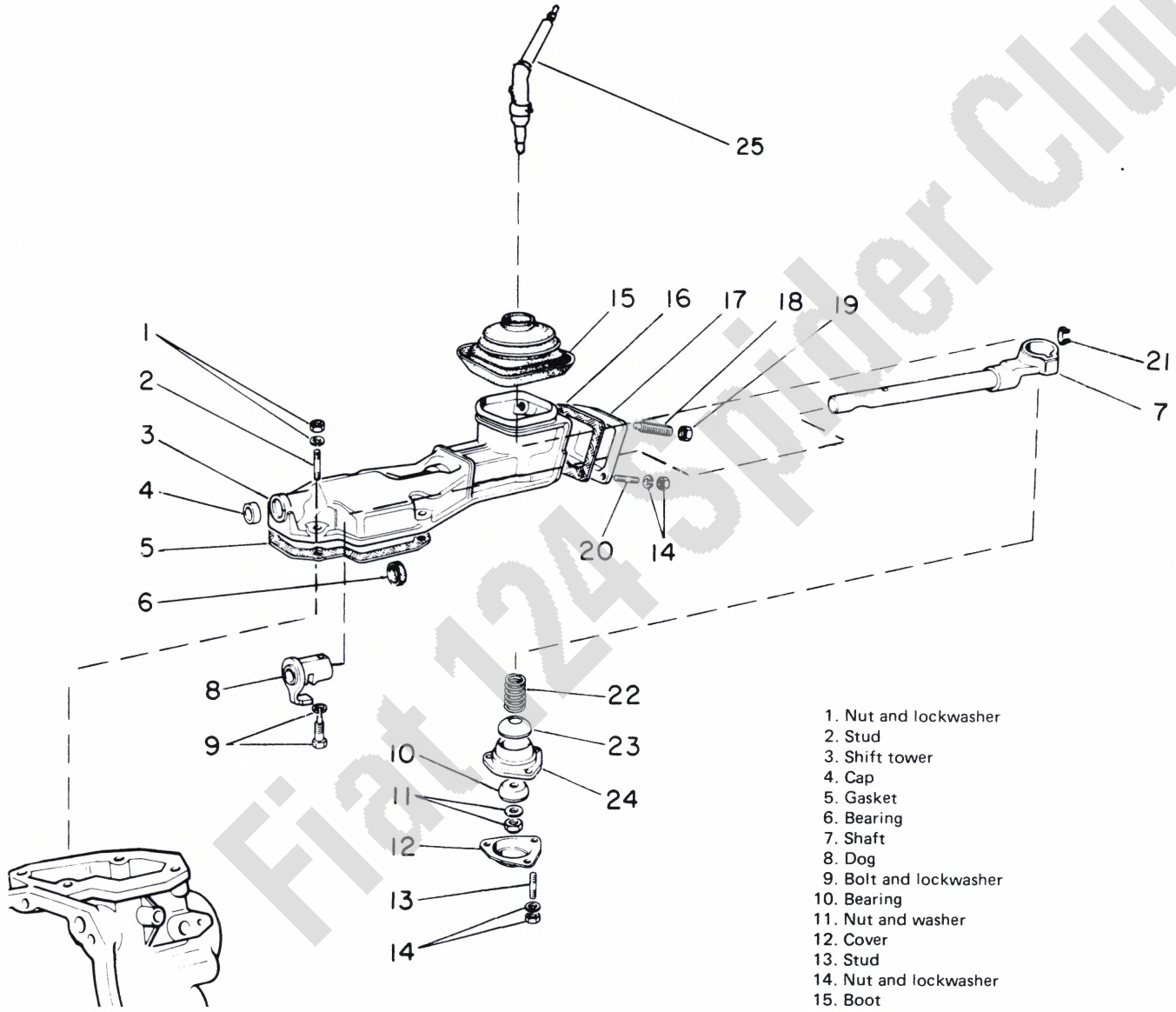
Remove three nuts and lockwashers (14), and cover (12).

Remove nut and washer (11), bearings (10), socket (24), cover (23), and spring (22).

Lift shift lever (25) from shift tower. Remove spring clip (21).

Remove bolt and lockwasher (9). Slide shaft out shift tower rear, then remove dog (8).

Remove cap (4), bearing (6), and studs (2, 13, and 20) only if damaged



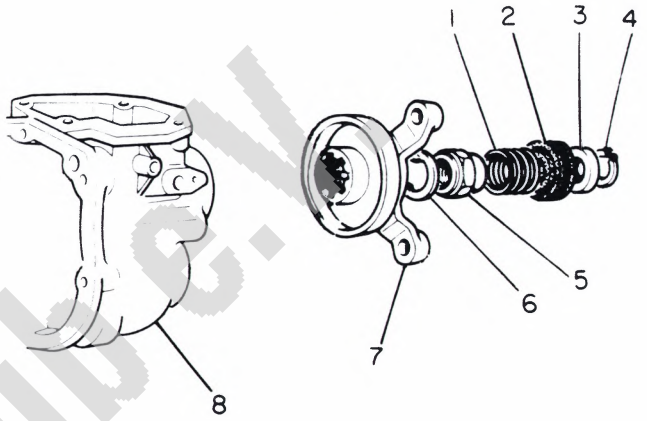
1. Nut and lockwasher
2. Stud
3. Shift tower
4. Cap
5. Gasket
6. Bearing
7. Shaft
8. Dog
9. Bolt and lockwasher
10. Bearing
11. Nut and washer
12. Cover
13. Stud
14. Nut and lockwasher
15. Boot

Remove snap ring (4), spacer (3), seal (2), and spring (1) from output shaft.

Using adapter A.55130 on yoke (7), remove nut (5) and washer (6).

Using a puller, remove yoke (7).

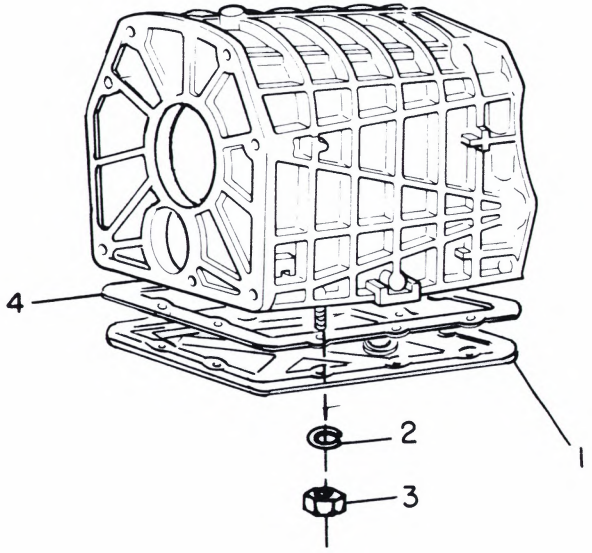
1. Spring 2. Seal 3. Spacer 4. Snap ring 5. Nut 6. Washer
7. Yoke 8. Rear housing



Remove ten nuts (3) and lockwashers (2).

Remove cover (1) and gasket (4).

1. Cover 2. Lockwasher 3. Nut 4. Gasket

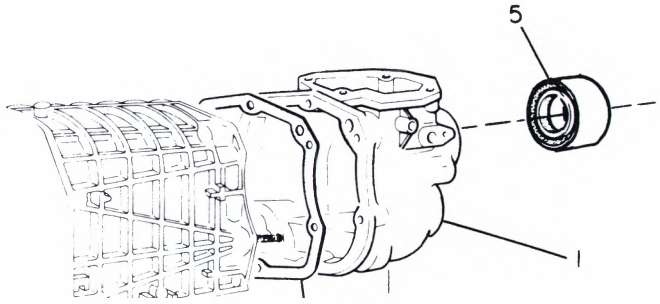


Remove six nuts (2) and lockwashers (3) attaching rear housing (1) to case. (One nut is located inside the case.)

Carefully remove rear housing (1) from case. As housing is removed, guide gear selection and engaging lever out of fork shafts.

Remove gasket (4).

Remove seal (5) from rear housing (1) only if the seal will be replaced.



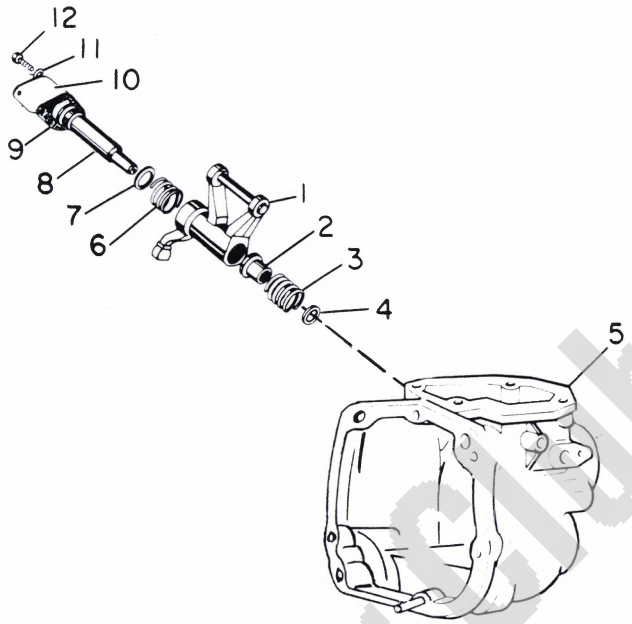
NOTE: Disassemble gear selection and engaging lever only if damaged.

Remove two bolts (12) and two lockwashers (11) attaching cover (10) to rear housing (5).

Remove cover (10) and gasket (9).

Slowly slide gear selection and engaging lever rod (8) out side of rear housing (5). As rod is withdrawn, remove spring (3), spring retainer (2), gear selection and engaging lever (1), spring (6), and thrust washer (7).

Remove thrust washer (4) from rear housing (5).



1. Engaging lever 2. Spring retainer 3. Spring 4. Thrust washer
5. Rear housing 6. Spring 7. Thrust washer 8. Engaging lever rod
9. Gasket 10. Cover 11. Lockwasher 12. Bolt

Remove bolt (3) and lockwasher (2) attaching fifth and reverse shift fork to fifth and reverse fork shaft (1).

Slowly remove fork shaft. As fork shaft is removed, detent ball (8) will release.

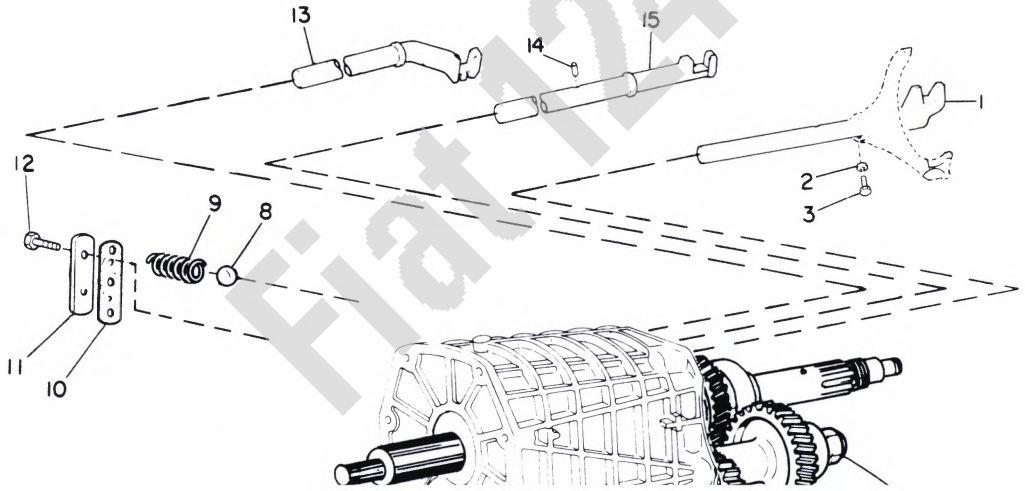
Engage two gears to lock the transmission. Loosen, but do not remove, 27-mm nut (4) and 19-mm bolt (7) on ends of countershaft. Disengage the two gears.

Remove two bolts (12) attaching cover (11) to case. Remove gasket (10), three springs (9), three detent balls (8), and short detent dowel (6).

Remove second bolt (3) and lockwasher (2) attaching third and fourth shift fork to third and fourth fork shaft (15).

Slowly remove third and fourth fork shaft. While removing fork shaft, remove detent pin (14) from fork shaft. Using a magnet, remove long detent dowel (5).

Remove third bolt (3) and lockwasher (2) attaching first and second shift fork to first and second fork shaft (13). Remove fork shaft.

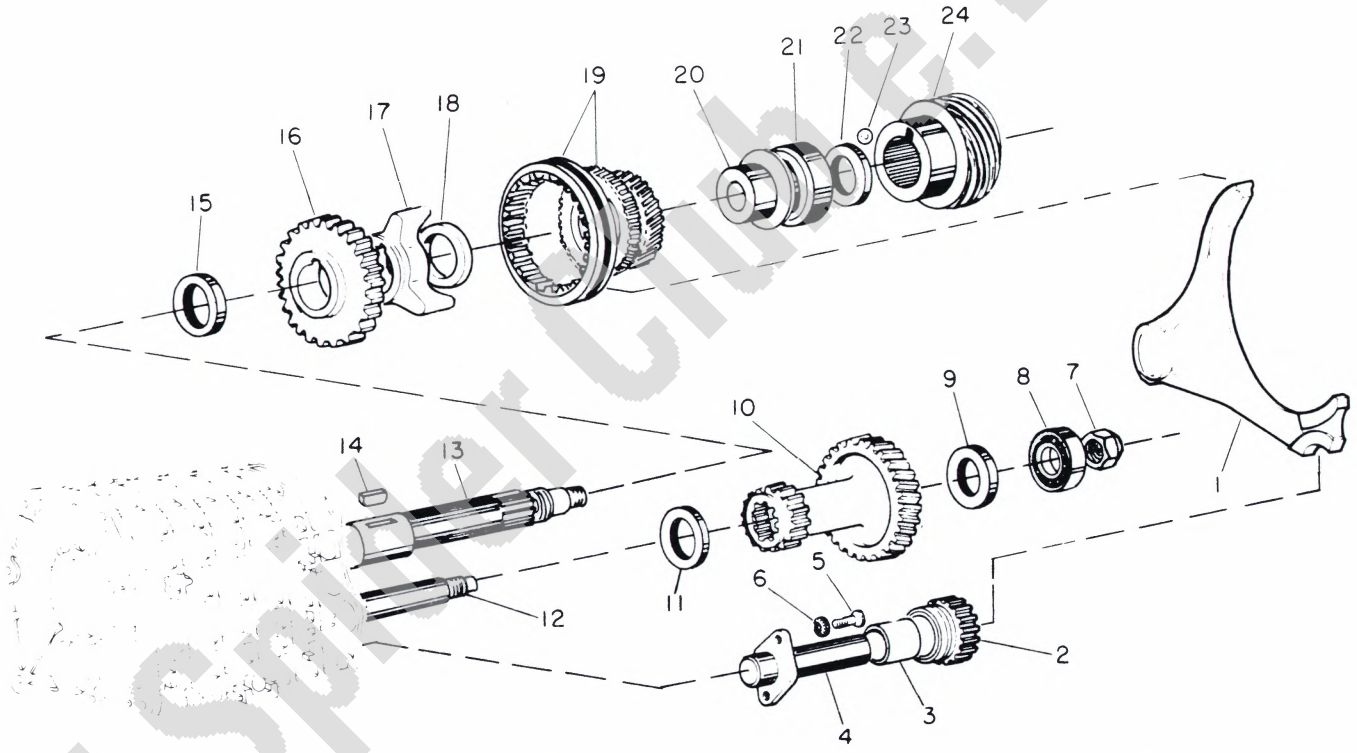


1. Fifth and reverse fork shaft
2. Lockwasher
3. Bolt
4. 27-mm nut
5. Long detent dowel
6. Short detent dowel

Remove speedometer drive gear (24), ball (23), spacer (22), and bearing (21). Remove 27-mm nut (7), bearing (8), and spacer (9).

Carefully tap fifth and reverse gear (10) off until its internal splines are disengaged. As fifth and reverse gear is removed from countershaft (12), remove reverse sliding gear (2), fifth and reverse gear (10), spacer (11), bushing (20), fifth and reverse gear shift fork (1), and fifth gear assembly (19). Disassemble fifth gear assembly as specified in Fifth Gear Assembly.

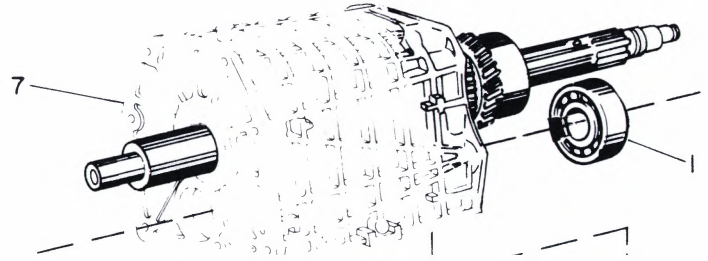
Remove spacer (18), hub (17), and reverse gear (16). Remove bushing (3) and shaft (4) attached with screws (5) and lockwasher (6) only if damaged.



1. Fifth and reverse shift fork
2. Reverse sliding gear
3. Bushing
4. Shaft
5. Screw
6. Lockwasher
7. 17-mm nut
8. Bearing
9. Spacer
10. Fifth and reverse gear
11. Spacer
12. Countershaft
13. Main shaft
14. Key
15. Spacer
16. Reverse gear
17. Hub
18. Spacer
19. Fifth gear assembly
20. Bushing
21. Bearing
22. Spacer
23. Ball
24. Speedometer drive gear

Remove bolt (6), lockwasher (5), and washer (4). Using a soft mallet, tap on output end of countershaft (2) until bearing (3) can be removed from case (7).

Carefully tap on bearing (1) outer race to remove from case (7). Remove countershaft (2) from case.



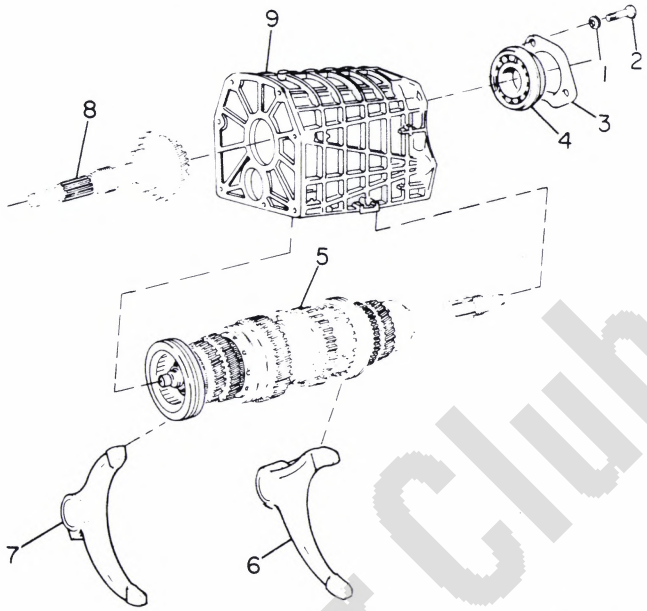
1. Bearing
2. Countershaft
3. Bearing
4. Washer
5. Lockwasher

Remove third and fourth shift fork (7), first and second shift fork (6). Although both forks are the same, do not mix to maintain wear.

Using an impact driver, remove three screws (2) and lockwashers (1). Remove bearing retainer (3) and bearing (4).

Carefully work to slip input shaft assembly (8) out of case (9). Disassemble as specified in Input Shaft Disassembly.

Carefully move main shaft assembly (5) rearward, then remove from case (9). Disassemble as specified in Main Shaft Assembly.



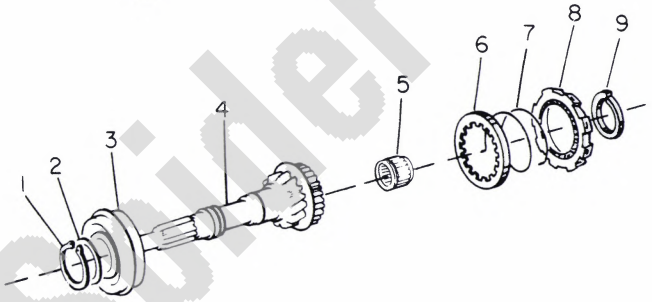
1. Lockwasher 2. Screw 3. Bearing retainer 4. Bearing 5. Main shaft assembly 6. First and second shift fork 7. Third and fourth shift fork 8. Input shaft assembly 9. Case

Input Shaft Disassembly

Use a press and tool A.70350 to compress spring washer (2). Unsnap snap ring (1) from its groove, then remove from press.

Remove snap ring (1), spring washer (2), and bearing (3) from input shaft (4). Remove bearing (5) from inside input shaft.

Remove snap ring (9) holding synchro (8) to input shaft. Remove synchro (8), spring (7), and spring retainer (6).



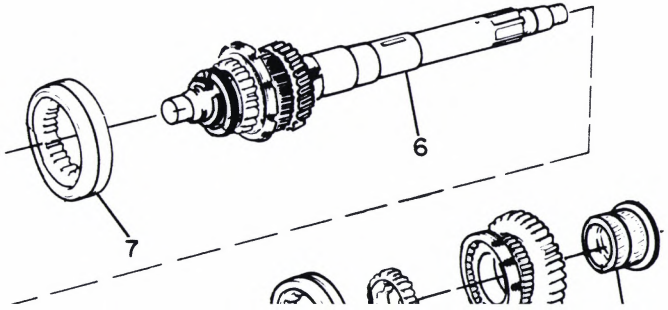
1. Snap ring 2. Spring washer 3. Bearing 4. Input shaft 5. Bearing 6. Spring retainer 7. Spring 8. Syncro 9. Snap ring

9. SNAP RING?

Main Shaft Disassembly

Remove sleeve (7). Remove bushing (1), first gear assembly (2), hub (3), sleeve (4) and second gear assembly (5) from main shaft and third gear subassembly (6).

Disassemble main shaft and third gear subassembly (6) as specified in Main Shaft and Third Gear Subassembly. Disassemble first and second gear assemblies (2 and 5) as specified in First, Second, and Third Gear Assemblies.

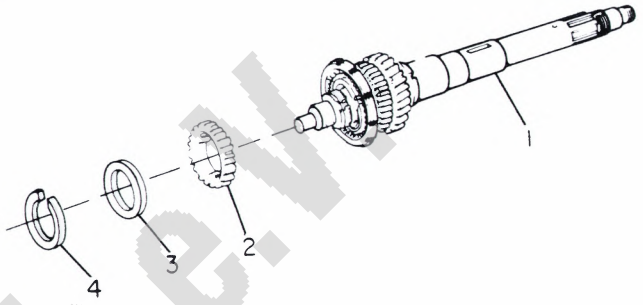


1. Bushing 2. First gear assembly 3. Hub 4. Sleeve 5. Second

Main Shaft and Third Gear Subassembly Disassembly

Place subassembly in press. Do not support subassembly on gear, but on shoulder of main shaft. Use press and tool A.70159 to compress spring washer (3). Unsnap snap ring (4) from its groove, then remove from press.

Remove snap ring (4), spring washer (3) and hub (2) from main shaft and third gear (1). Disassemble main shaft and third gear (1) as specified in First, Second, and Third Gear Assemblies.



1. Main shaft and third gear 2. Hub 3. Spring washer 4. Snap ring

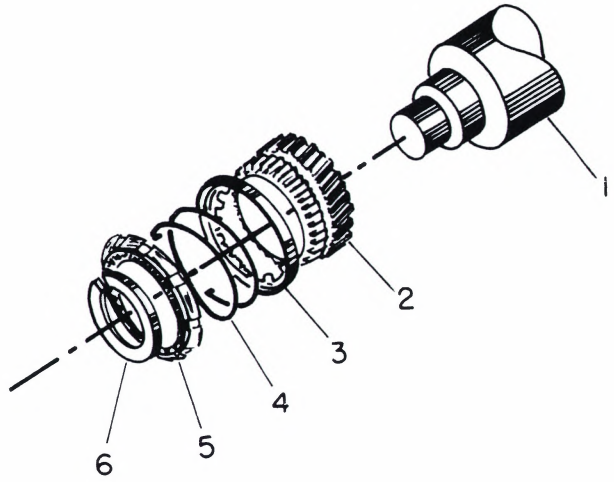
First, Second, and Third Gear Disassembly

NOTE: Although different in size, first, second, and third gear assemblies are similar in assembly. Also, third gear assembly is assembled on the main shaft.

Using tool A.70159, remove snap ring (6).

Remove synchro (5), spring (4) and spring retainer (3) from gear (2).

Remove third gear assembly from main shaft (1).



1. Main shaft (third gear only) 2. First, second, or third gear
3. Spring retainer 4. Spring 5. Synchro 6. Snap ring

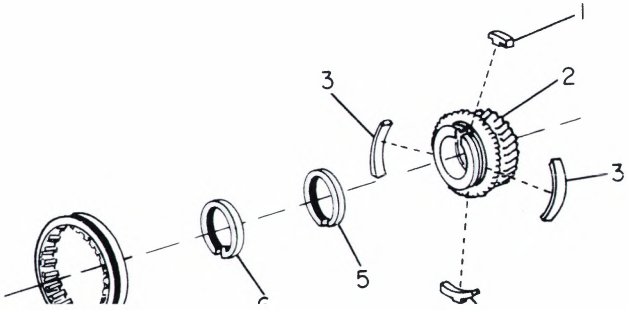
Fifth Gear Disassembly

Remove sleeve (7).

Remove synchromesh parts snap ring (6). Discard snap ring.

Using tool A.70166, remove synchromesh ring (5).

Remove spring (3), lock (1), and stop (4) from fifth gear (2).



1. Lock 2. Gear 3. Spring 4. Stop 5. Synchromesh ring
6. Synchromesh parts snap ring 7. Sleeve

INSPECTION AND REPAIR

Cleaning

Clean all parts with a suitable cleaning solvent to remove oil traces.

Carefully scrape or brush away deposits from holes and grooves.

Carefully remove gaskets from mating surfaces.

Dry with compressed air.

CAUTION: Do not spin dry bearings as damage may result.

Inspect and repair each part as described. If there is doubt as to a part's serviceability, replace the part.

Bearings

a. Roller or ball
   1. Check that bearing rollers and balls are free to turn in their cages, or that there is no galling, scratches, or cracks. Replace bearing if damaged.
   2. Check that surfaces of inner and outer races are free from galling, scratches, or cracks. Replace bearing if damaged.
   3. Check that radial play is not greater than 0.002 inch and end play is not greater than 0.020 inch. Replace worn bearings.

b. Throwout bearing. Check throwout bearing for wear. Replace if worn.

c. Nonroller bearings. Check for wear. For minor scratches, clean with fine emery or stone. Replace if worn, cracked, or broken.

Hubs and Sleeves

Check that bearing surfaces are free from burrs, nicks, or galling. For nicks or burrs, use a fine stone or emery. Replace if galled.

Check that there is no excessive play between a hub or sleeve and its mating surface.

Check that teeth are not chipped, broken, galled, or worn. Replace if damaged.

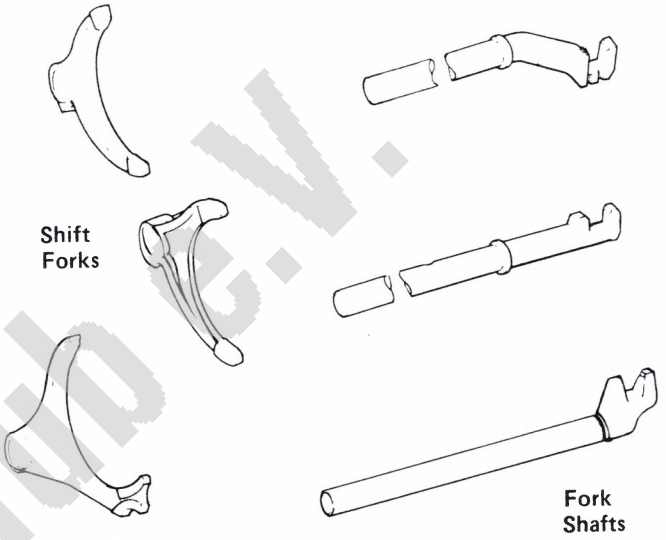
Shift Forks and Fork Shafts

NOTE: Although the first and second shift fork is the same as the third and fourth shift fork, do not interchange.

Check that threads in bolt holes are clean and free from damaged threads. Use a tap to clean holes. Replace shaft if threads are stripped.

Check sliding surfaces for excessive wear. Replace if worn.

Check that fork shafts are not bent, and that grooves for detent balls are not scored. Replace if bent or worn.



Detent Balls, Dowels, and Pin

Check for free travel of detent pin in third and fourth fork shaft. Replace pin if worn. Use fine emery for minor scratches.

Check detent ball and dowels for galling. Replace if damaged.

Check detent springs for tension. Replace if weak.

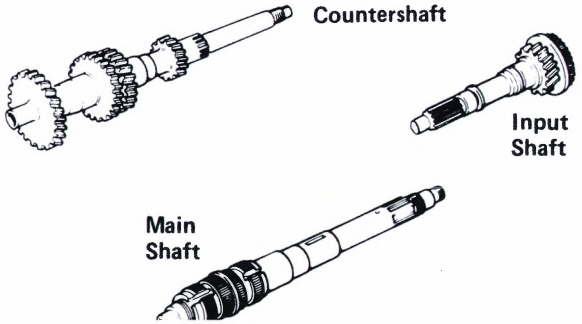
Input Shaft, Main Shaft, Countershaft, Reverse Sliding Gear Shaft, and Engaging Lever Rod

Check all shafts for straightness by placing between points. Maximum runout shall be not greater than 0.002 inch. Some shafts can be straightened with a press. If not, replace.

Check splines for damage. Use a fine file, emery, or stone to remove burrs or nicks.

Check that threads on main shaft and countershaft are not damaged. Replace shaft if threads are stripped.

Check that bearing surfaces are free from burrs, nicks or



Gears

Check that teeth on all gears are not chipped, broken, or galled. Replace if damaged.

Check that synchro crown teeth are flat and not rounded. Rounded teeth indicates worn gear. Replace. Also replace mating gear.

Check that wear pattern is even. Replace if worn.

Check that bearing surfaces are free from burrs, nicks or galling. Use fine emery to clean.

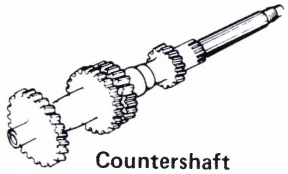
Check that clearance between reverse sliding gear bushing and reverse shaft is 0.002 to 0.004 inch. Replace bushing if worn.

Check that clearance between first gear and its bushing is 0.002 to 0.004 inch. Replace if worn.

Check that clearance between second and third gears and seats on main shaft is 0.002 to 0.004 inch. Replace if worn.

First, Second, and Third Gears

Fifth and Reverse Gear



Countershaft

Input Shaft

Synchros

Check that synchro is not cracked. Replace if cracked.

Check that teeth are not broken. Replace if broken.

Check bearing surfaces for excessive wear. Replace if worn.

Synchros

Springs

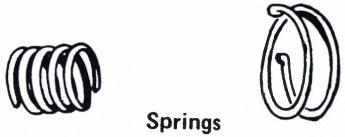
Check all springs for tension. Replace weak springs.

Check detent springs for wear on axial surface. Replace if worn.

Snap Rings

Check that snap rings are not deformed and maintain a good grip in their grooves. Replace if worn. Discard the synchromesh parts snap ring used on fifth gear assembly.

Spacers, Thrust and Spring Washers



Springs

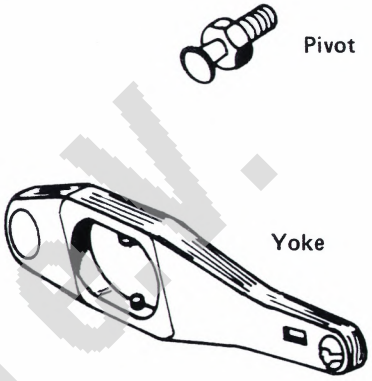
Snap Ring

Pivot and Yoke

Check that pivot and yoke for throwout bearing are not worn. Replace if worn.

Check that hole for return spring on yoke is not worn. A steel washer can be welded to restore hole.

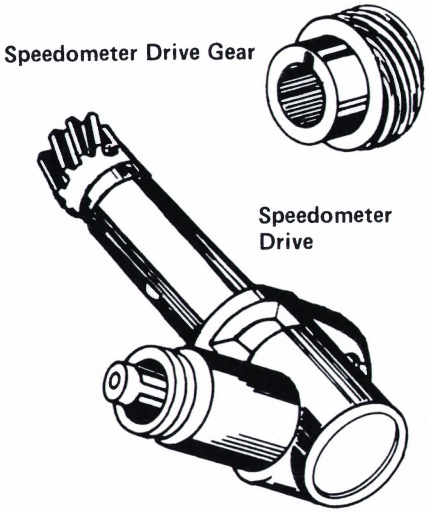
Check that yoke is not bent. Replace if bent.



Speedometer Drive

Check that teeth on speedometer drive are not chipped, broken or galled. Replace if damaged. Also replace speedometer drive gear.

Check that shafts turn easily without excessive play. Replace if worn.



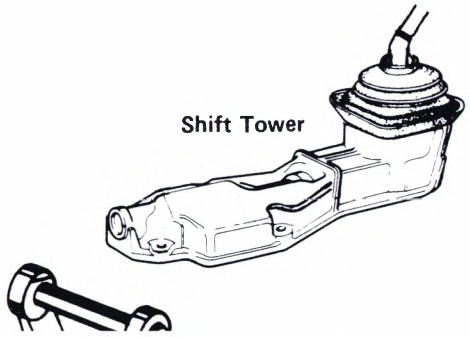
Shift Tower and Gear Selection and Engaging Lever

If not disassembled, check for free movement without binding or excessive play. Disassemble for binding.

If disassembled, check that all bearing surfaces are free from excessive wear. Replace worn parts.

Check that shafts are not bent. Replace bent parts.

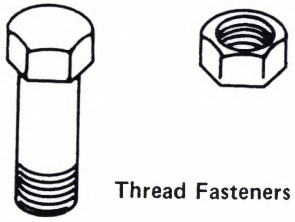
Check that dog is not damaged. Replace if damaged.



Thread Fasteners

Check that threads on all threaded fasteners are not stripped or cross-threaded. Replace if damaged.

Replace all self-locking nuts.



Thread Fasteners

Case, Rearhousing, Bell Housing, Covers

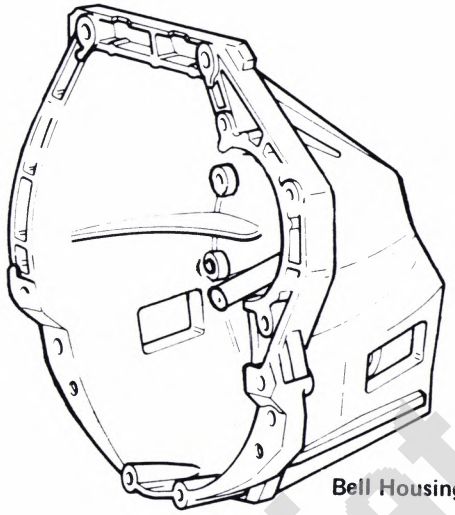
Check that all structured parts are not cracked, broken, or damaged. Replace if damage is in a bearing or structural area. Cracks or holes in any nondimensional or structural area may be repaired by welding.

Check that all threaded holes are not stripped or cross-threaded. Repair by retreading oversize or using helical inserts.

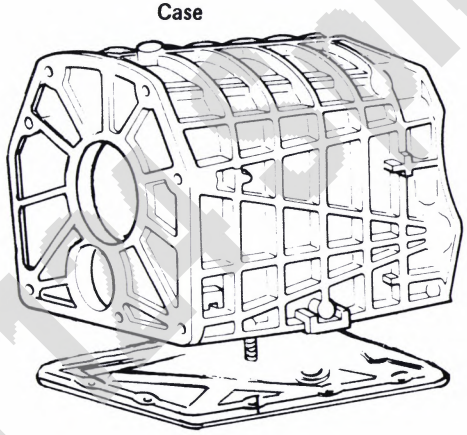
Check that covers are not bent or cracked. Repair by straightening or welding.

Check that bores for detent balls and dowels are not worn. Replace steel sleeve if worn.

Check gasket surfaces for nicks, scratches, or breaks that may cause leaks. Clean with fine emery. Gasket surface can be repaired by welding and machining. Otherwise replace part.

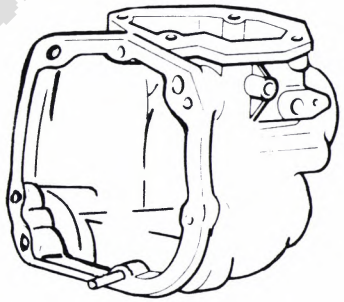


Bell Housing



Case

Cover



Rear Housing

Oil Seals

Check that oil seals are not worn, chipped, torn, brittle, or cracked. Replace if damaged.

Check that seal springs are not deformed and in place. Restore spring to its position if seal is not otherwise damaged.

Oil Seal

REASSEMBLY

Reassembly is reverse of disassembly and observing the following instructions.

Fifth Gear Reassembly

Lightly coat parts with oil.

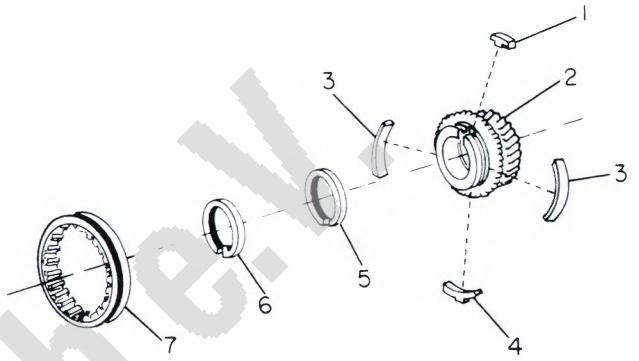
With gear (2) laying flat (gear side down), assemble lock (1) into slot of gear (2).

Assemble stop (4) and two springs (3).

Carefully spread synchro ring (5) and place around assembled parts (1, 3, and 4) so open end is over stop (4).

Using tool A.70166, assemble new synchromesh parts snap ring (6) with dog end in slot on gear (2).

Assemble sleeve (7).



1. Lock 2. Gear 3. Spring 4. Stop 5. Synchromesh ring
6. Synchromesh parts snap ring 7. Sleeve

First, Second, and Third Gear Reassembly

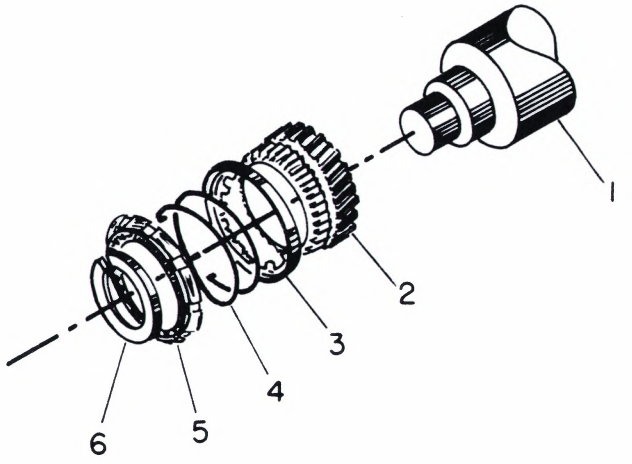
Lightly coat parts with oil.

For third gear only, assemble third gear (2) on main shaft (1).

With cup side away from gear (2), assemble spring retainer (3) on gear (2). Assemble spring (4).

With small end of synchro (5) away from gear (2), assemble synchro (5) and snap ring (6) on gear (2). Use tool A.70159 to assemble snap ring (6).

When assembled, check that synchro (5) can be moved along gear (2), and springs back when released.



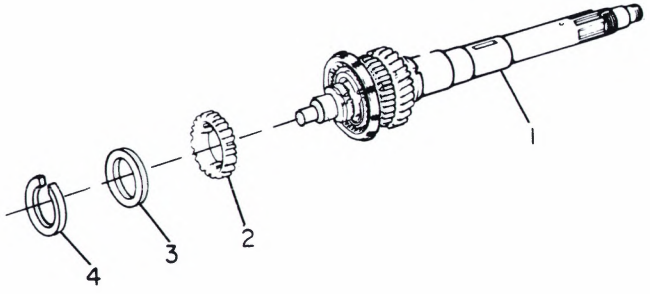
1. Main shaft (third gear only) 2. First, second, or third gear
3. Spring retainer 4. Spring 5. Synchro 6. Snap ring

Main Shaft and Third Gear Reassembly

Lightly coat parts with oil, then place main shaft and third gear (1) in a press. Do not support on third gear, but on shoulder of main shaft.

Onto main shaft and third gear (1) input end, assemble hub (2), spring washer (3), snap ring (4), and tool A.70159.

Use press to compress spring washer (3), then seat snap ring (4) in its groove. Remove subassembly from press.



1. Main shaft and third gear 2. Hub 3. Spring washer 4. Snap ring

Main Shaft Reassembly

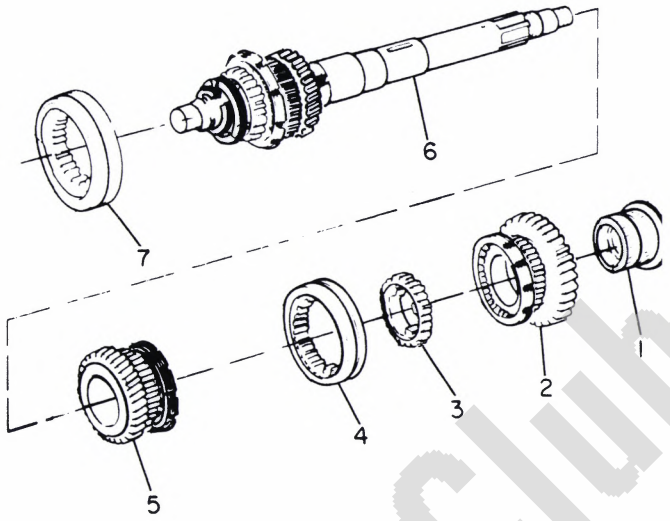
Lightly coat parts with oil.

Onto output end of main shaft and third gear assembly (6), assemble second gear assembly (5), sleeve (4), hub (3), first gear assembly (2), and bushing (1).

Carefully mate all parts. When assembled, sleeve (4) should straddle the synchros on second and first gear assemblies, and the gears should go from small to large, input end to output end.

Assemble sleeve (7) on input end.

1. Bushing 2. First gear assembly 3. Hub 4. Sleeve 5. Second gear assembly 6. Main shaft and third gear subassembly 7. Sleeve



Input Shaft Reassembly

Lightly coat parts with oil. Place input shaft (4) in press. Support on gear end.

Onto input shaft (4) input end, assemble bearing (3) with retaining ring away from gear, spring washer (2), snap ring (1), and tool A.70350.

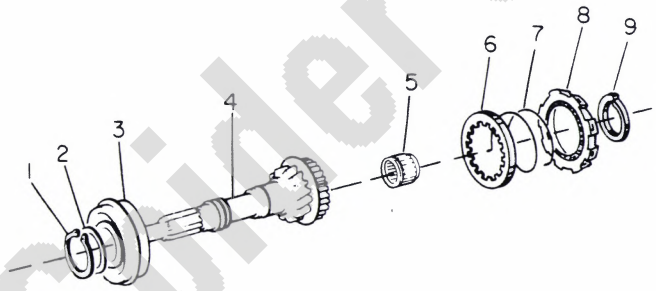
Use press to compress spring washer (2), then seat snap ring (1) in its groove. Remove from press.

Coat bearing (7) with heavy grease. Install bearing (5) inside input shaft.

Assemble spring retainer (6), spring (7), and synchro (8) on input shaft. Assemble snap ring (9) in its groove on input shaft.

Lay input shaft on its side so bearing (5) does not come out.

1. Snap ring 2. Spring washer 3. Bearing 4. Input shaft 5. Bearing 6. Spring retainer 7. Spring 8. Synchro 9. Snap ring



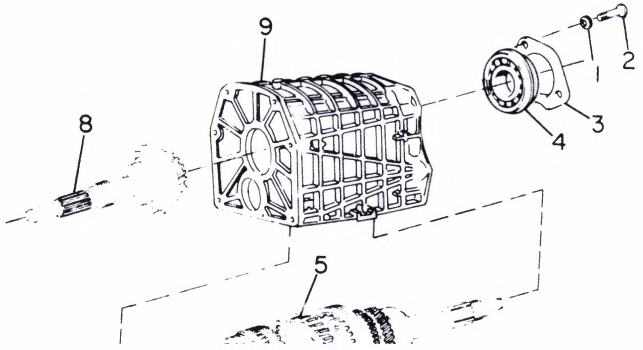
Input and Main Shaft Assemblies Installation

Lightly coat all bearing bores, bores for fork shafts, and bores for detent balls and dowels. Also coat each part as it is installed.

While keeping main shaft assembly (5) fully compressed, carefully insert output end into its bore in case (9), then insert input end. Check for bearing in input shaft assembly (8), then carefully work input shaft assembly into its bore in case (9).

Assemble bearing (4), bearing retainer (3), washers (1) and screws (2). Tighten screws with an impact driver.

Check that input and main shaft assemblies (8 and 5) are easily



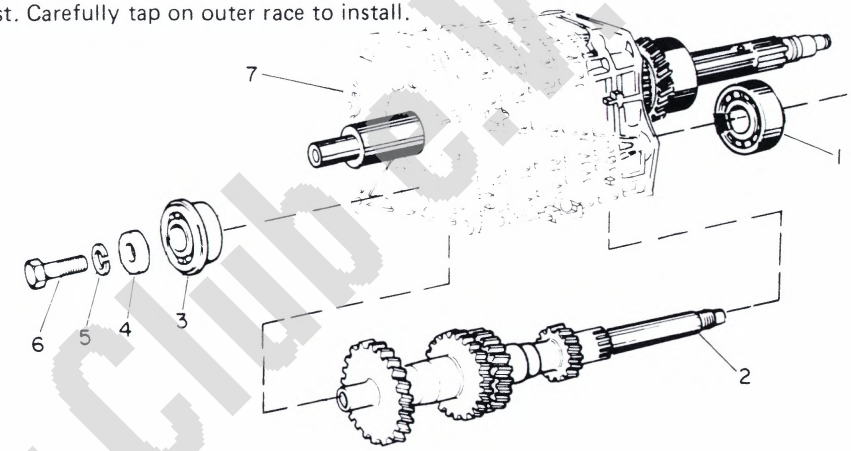
Countershaft Installation

Insert output end of countershaft (2) into its bore in case (7), then insert input end.

Assemble bearing (3) with retaining ring away from case (7), washer (4), lockwasher (5), and bolt (6). Finger tighten bolt.

Install bearing (1) with inner race going on first. Carefully tap on outer race to install.

1. Bearing
2. Countershaft
3. Bearing
4. Washer
5. Lockwasher
6. Bolt
7. Case



Fifth and Reverse Gears Installation

If removed, install bushing (3) in reverse sliding gear (2). Attach shaft (4), lockwasher (6), and screws (5). Tighten screws with impact driver.

Assemble spacer (15) and key (14) on main shaft (13). Assemble reverse gear (16), hub (17), and spacer (18). Assemble spacer (11) on countershaft (12).

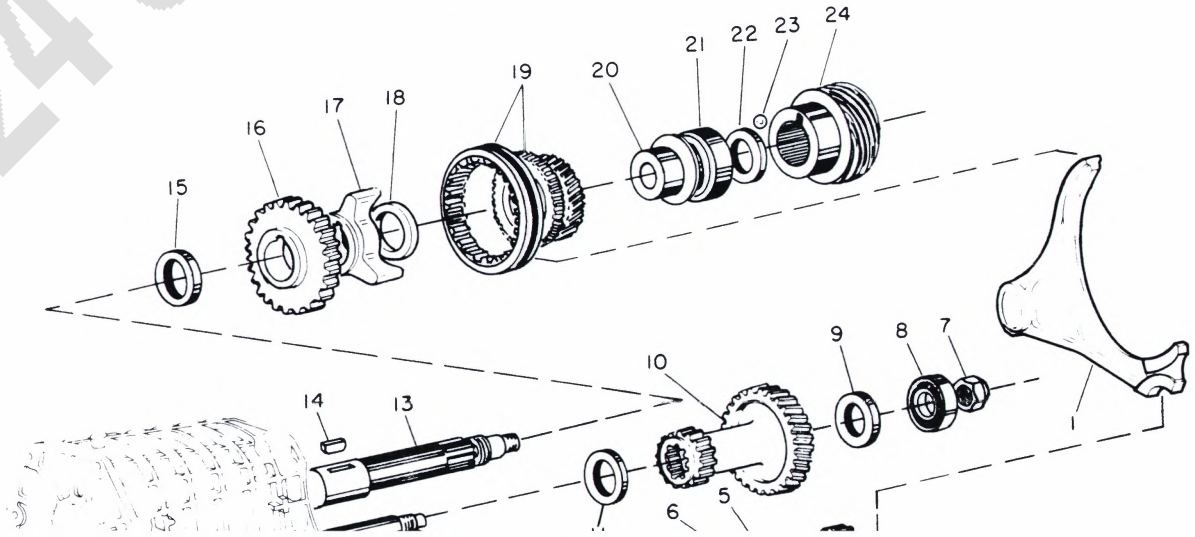
Partially assemble fifth and reverse gear (10) on countershaft (12), and fifth gear assembly (19) on main shaft (13).

Assemble fifth and reverse shift fork (1) on reverse sliding gear (2) and fifth gear assembly (19). Carefully slide partially assembled parts on their respective shafts until they can be released.

Carefully tap on fifth and reverse gear (10) until it is fully seated on countershaft (12).

Assemble spacer (9), bearing (8), and nut (7). Finger tighten nut.

Assemble bushing (20), bearing (21), spacer (22), ball (23), and speedometer drive gear (24).



Fork Shafts Installation

Install first and second fork shaft (13) in fork shaft hole furthest away from case cover. As fork shaft is installed, insert into firs and second shift fork.

Assemble washer (2) and bolt (3). Tighten to 14 ft lb torque.

Install long detent dowel (5).

Install third and fourth fork shaft (15) in center fork shaft holes. As fork shaft is installed, insert into third and fourth shift fork Also install detent pin (14) into fork shaft (15).

Assemble washer (2) and bolt (3). Tighten to 14 ft lb torque.

Temporarily install two detent balls (8) and two springs (9) for installed fork shafts. Assemble cover (11) and two bolts (12).

Engage two gears to lock the transmission.

Tighten 27-mm nut (4) to 87 ft lb and 19-mm bolt to 69 ft lb torque. Disengage two gears.

Check that both countershaft and main shaft can be easily turned. If countershaft cannot be turned, its rear bearing may be in stalled backwards. Also engage each gear and check for free turning.

Using staking pliers A.74140/1 and staking heads A.74140/4, stake nut (4).

Install short detent dowel (6).

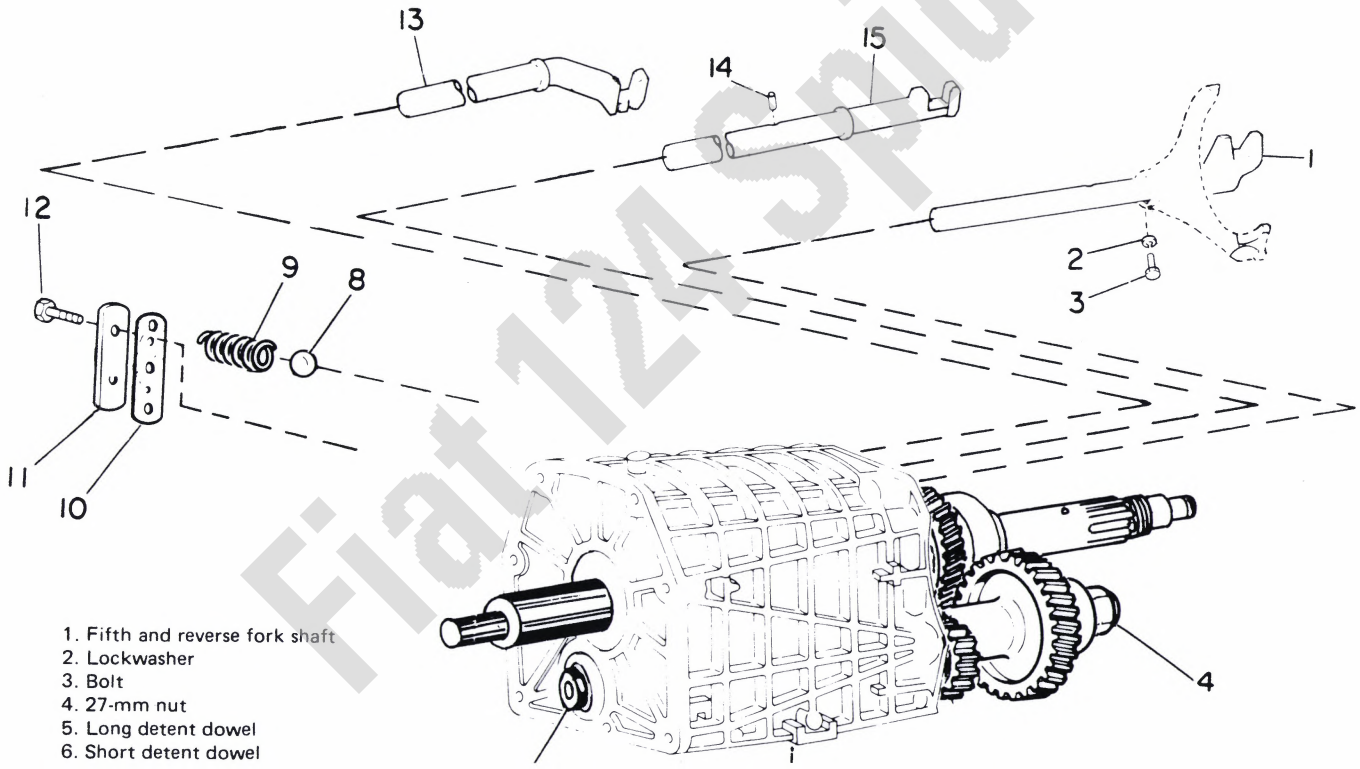
Install fifth and reverse fork shaft (1) into fifth and reverse shift fork, and into remaining fork shaft hole.

Assemble washer (2) and bolt (3). Tighten to 14 ft lb torque.

Remove bolt (12) and cover (11). Install third detent ball (8) and spring (9).

Install new gasket (10) (sealant is not recommended), cover (11), and two bolts (12). Tighten bolts to 18 ft lb torque.

Engage a gear. Check that a second gear cannot be engaged at the same time.



1. Fifth and reverse fork shaft
2. Lockwasher
3. Bolt
4. 27-mm nut
5. Long detent dowel
6. Short detent dowel

Engaging Lever Installation

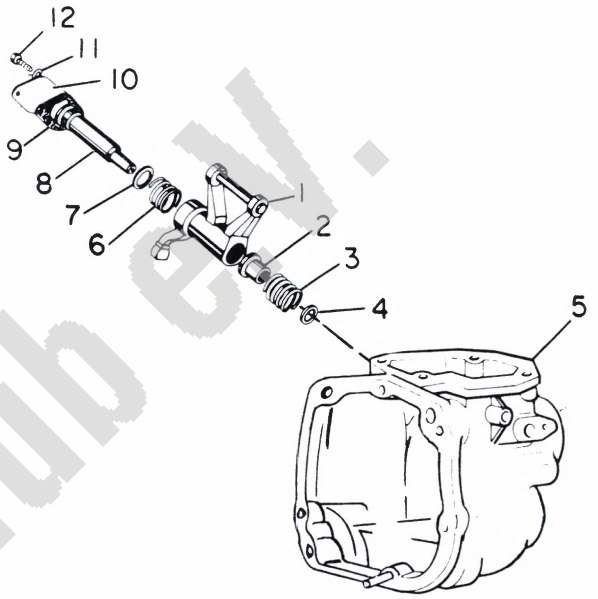
If disassembled, install thrust washer (4) in rear housing (5).

Slowly install engaging lever rod (8) into rear housing (5). As rod is installed, assemble thrust washer (7), spring (6), gear selection and engaging lever (1), spring retainer (2), and spring (3).

Install new gasket (9) (sealant is not recommended), cover (10), lockwasher (11), and bolt (12). Tighten bolt to 14 ft lb torque.

Check for free side-to-side travel of gear selection and engaging lever (1), and that it returns to center position when released.

1. Engaging lever 2. Spring retainer 3. Spring 4. Thrust washer
5. Rear housing 6. Spring 7. Thrust washer 8. Engaging lever rod
9. Gasket 10. Cover 11. Lockwasher 12. Bolt



Rear Housing Installation

If removed, install new seal (5).

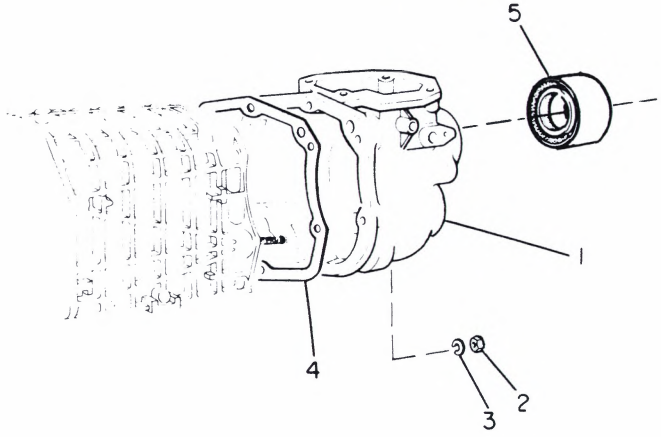
Assemble new gasket (4) on case (sealant is not recommended).

Move gear selection and engaging lever rearward. Slowly assemble rear housing (1) onto case. As rear housing is assembled, guide gear selection and engaging lever into fork shafts.

Assemble six nuts (2) and lockwashers (3). Tighten to 18 ft lb torque.

Check that gear selection and engaging lever can be operated through all gears.

1. Rear housing 2. Nut 3. Lockwasher 4. Gasket 5. Seal

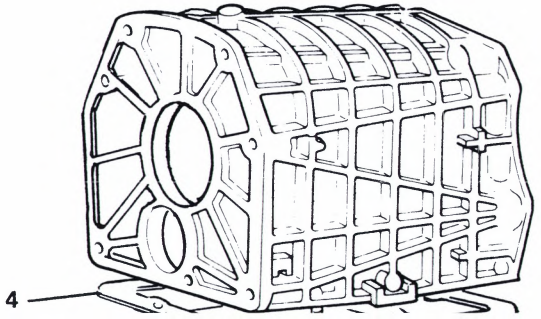


Case Cover Installation

Assemble new gasket (4) to case.

Assemble cover (1), ten lockwashers (2), and nuts (3).

1. Cover 2. Lockwasher 3. Nut 4. Gasket



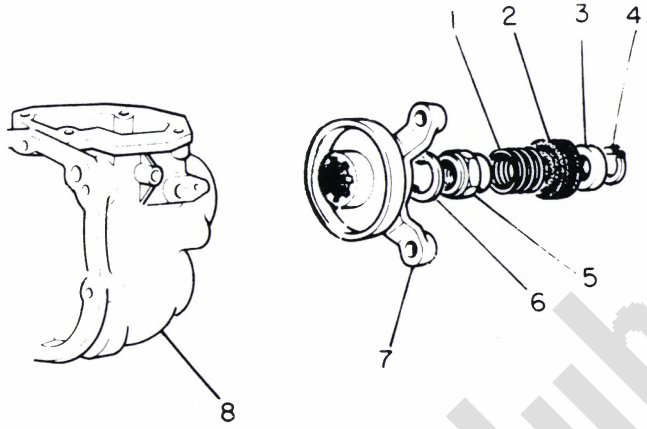
Yoke Installation

Coat splines of yoke (7) with antiseize compound, then assemble to main shaft.

Assemble washer (6) and nut (5). Using adapter A.55130 on yoke (7), tighten nut to 108 ft lb torque.

Assemble spring (1), seal (2), spacer (3), and snap ring (4).

Coat seal (2) with heavy grease.



1. Spring 2. Seal 3. Spacer 4. Snap ring 5. Nut 6. Washer
7. Yoke 8. Rear housing

Shift Tower Reassembly

If disassembled, install shaft (7) in shift tower (3) and into dog (8). Assemble bolt and washer (9). Tighten screw to 14 ft lb torque.

Assemble new gasket (16), cover (17), and washer and nut (14).

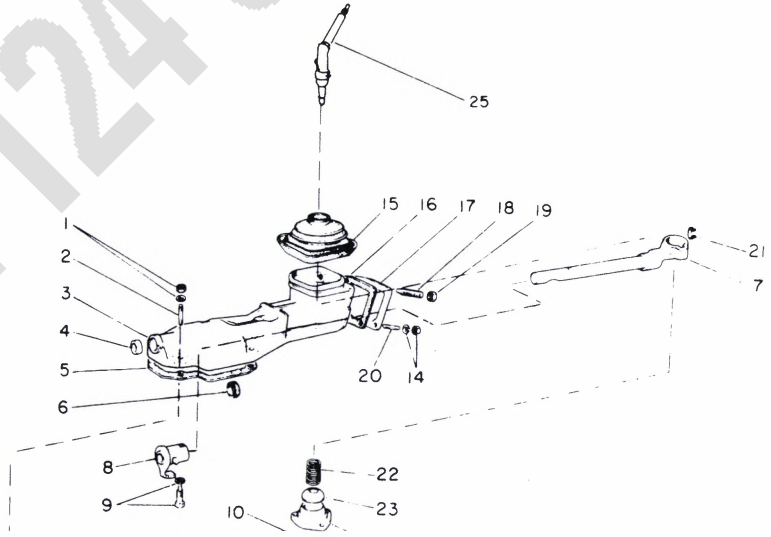
Place spring (21) in groove in shaft (7). Install shift lever (25).

To bottom of shift lever, assemble spring (22), cover (23), socket (24), bearing (10), and washer and nut (11). Tighten nut to 11 ft lb torque.

Assemble cover (12) and three washers and nuts (14).

To adjust reverse lockout screw (18), place shift lever (25) in fifth/reverse gate. Screw reverse lockout screw (18) in until it contacts shift lever, then back out three turns. Tighten locknut (19).

1. Nut and lockwasher
2. Stud
3. Shift tower
4. Cap
5. Gasket
6. Bearing
7. Shaft
8. Dog
9. Bolt and lockwasher
10. Bearing
11. Nut and washer
12. Cover
13. Stud
14. Nut and lockwasher
15. Boot
16. Gasket
17. Cover
18. Reverse lockout screw
19. Locknut



Shift Tower Installation

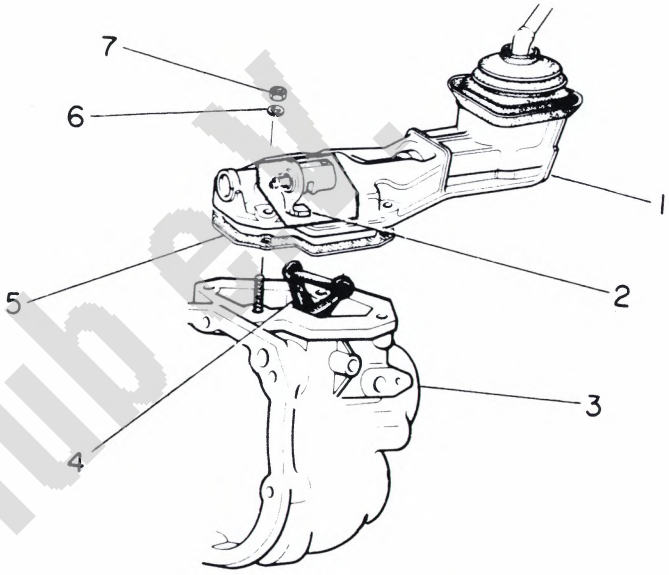
Assemble new gasket (5) on rear housing (3).

Move shift lever forward, then place shift tower (1) on rear housing (3).

Carefully slide shift tower down, then move shift lever rearward to engage dog (2) on engaging lever (4).

Assemble four washers (6) and nuts (7).

1. Shift tower assembly 2. Dog 3. Rear housing 4. Engaging lever 5. Gasket 6. Lockwasher 7. Nut

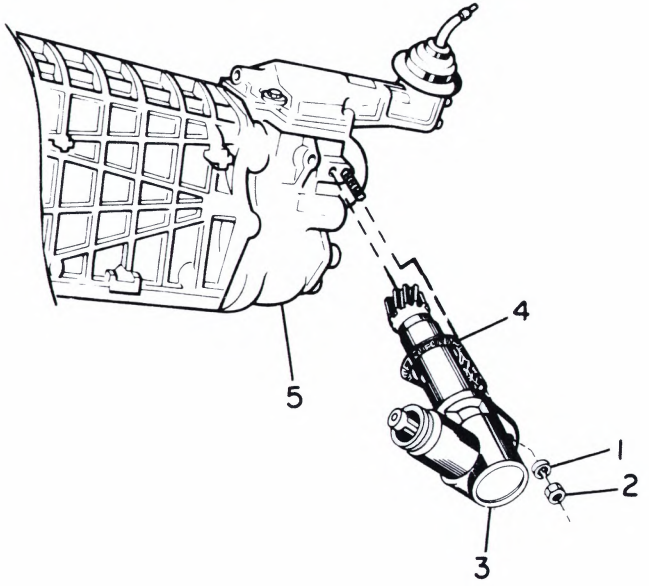


Speedometer Drive Installation

Assemble new gasket (4) and speedometer drive (3) on rear housing (5).

Assemble washer (1) and nut (2).

1. Lockwasher 2. Nut 3. Speedometer drive 4. Gasket 5. Rear housing



Bellhousing Installation

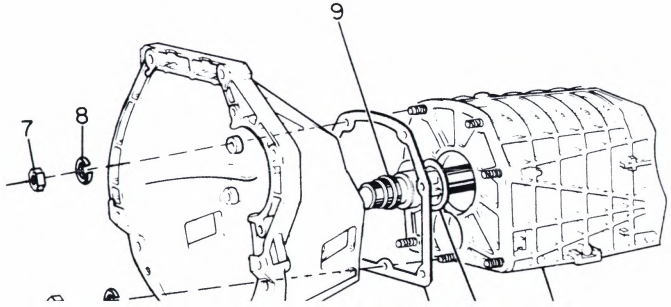
If removed, install new seal (9) in bell housing (4).

Assemble new gasket (3) on case (1).

Coat spring washer (2) with heavy grease. With cup end forward, place on seal in bellhousing.

Assemble bellhousing (4), six lockwashers (8), nuts (7), and one lockwasher (5) and nut (6).

Tighten nuts (7) to 36 ft lb torque and nut (6) to 18 ft lb torque.



Yoke and Throwout Bearing Installation

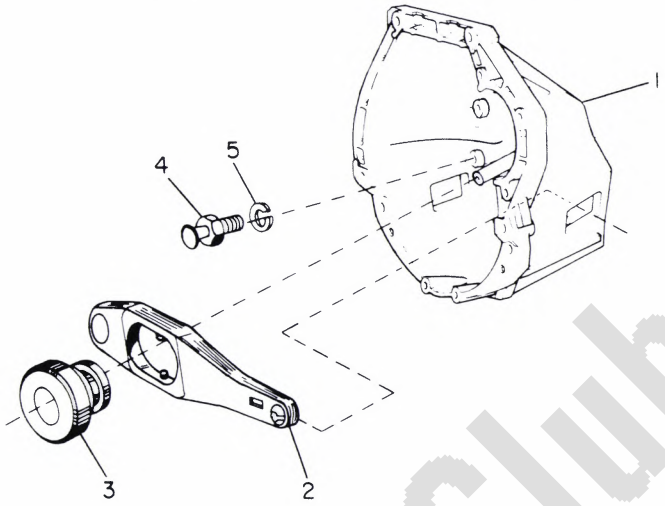
If removed, assemble lockwasher (5) and pivot (4) to bellhousing (1).

Insert throwout bearing (3) into yoke (2).

Insert return spring end of yoke (2) into opening in bellhousing (1) and throwout bearing (3) over input shaft.

Slide yoke (2) over pivot (4) until locked in place.

1. Bellhousing 2. Yoke 3. Throwout bearing 4. Pivot
5. Lockwasher



Oil Plugs Installation

Assemble return spring and rubber boot (5).

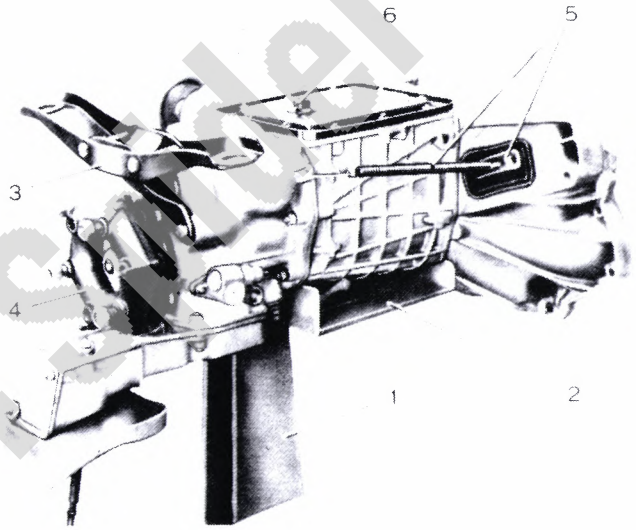
Using two nuts and washers, attach rear supporting cross strut (3) to rear housing.

Using three self-locking nuts and bolts, attach flexible joint (4) to yoke.

Using tools A.50113 and A.55087, install oil drain plug (6) and rear housing oil drain plug. Loosely install oil level plugs until transmission is filled with oil.

After transmission is installed in car, add 1¾ quarts of SAE 90 oil containing antiwear additives. Do not use EP oil.

1. Rotating stand 2. Support 3. Rear supporting cross strut
4. Flexible joint 5. Spring and rubber boot 6. Oil drain plug



AUTOMATIC TRANSMISSION

REMOVAL AND INSTALLATION

Disconnect battery ground cable.

In engine compartment remove dipstick (1) from filler tube (2). Remove bolt (3) and washers securing filler tube to engine bracket.

NOTE: Do not remove filler tube until transmission has been drained.

1. Dipstick 2. Filler tube 3. Bolt 4. Ignition distributor

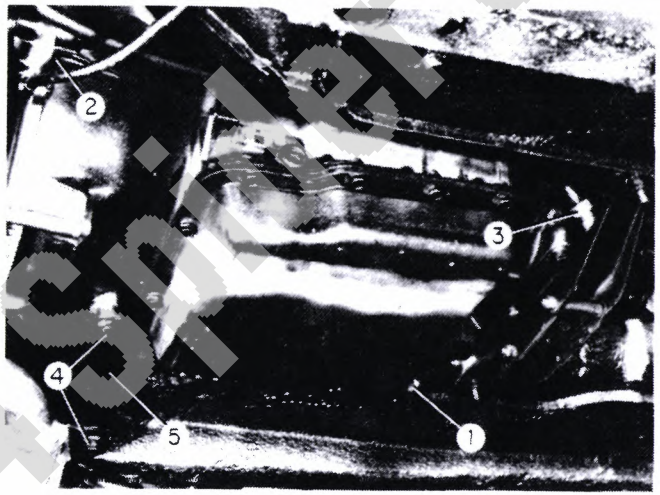
Raise vehicle on lift.

Remove drain plug (1) to drain transmission.

Remove three bolts (2) holding starter to transmission housing. Secure starter out of way.

Unscrew speedometer connector (3) from transmission.

Remove two bolts (4) to remove exhaust pipe bracket (5).

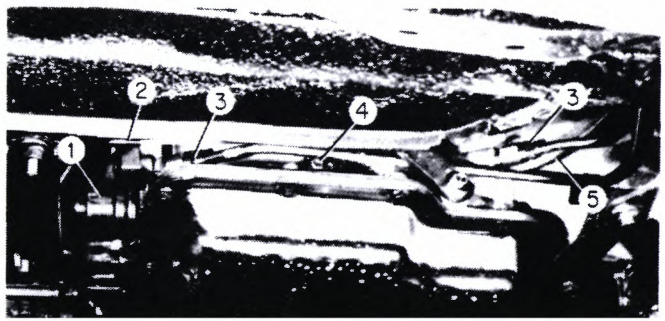


1. Drain plug 2. Starter bolt 3. Speedometer cable connector 4. Bolt 5. Bracket

Disconnect vacuum hose from modulator (1). Disconnect vacuum line from clip (2) on transmission.

Disconnect and cap cooling lines (3) from transmission. Remove bolt and clamp holding cooling line.

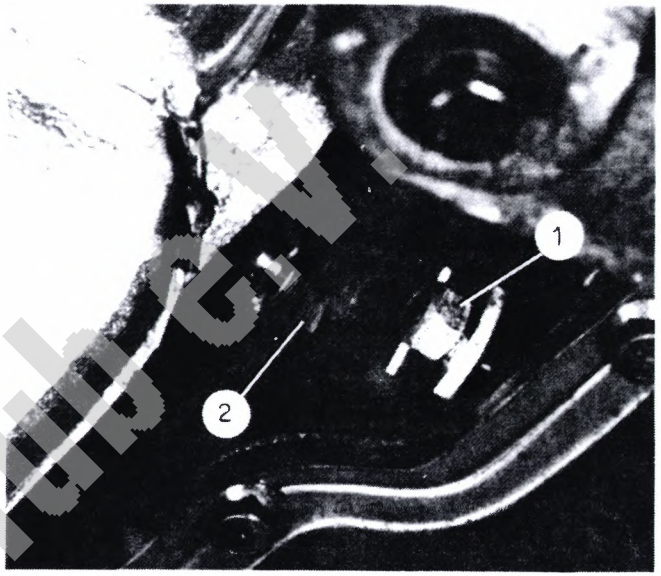
Disconnect kick-down cable (5) by removing bolt and clamp (4).



1. Modulator 2. Clip 3. Transmission cooling lines 4. Bolt and clamp 5. Kick-down cable

Remove nut (1) holding shift lever (2) to transmission control rod. Disconnect lever.

1. Nut 2. Shift lever

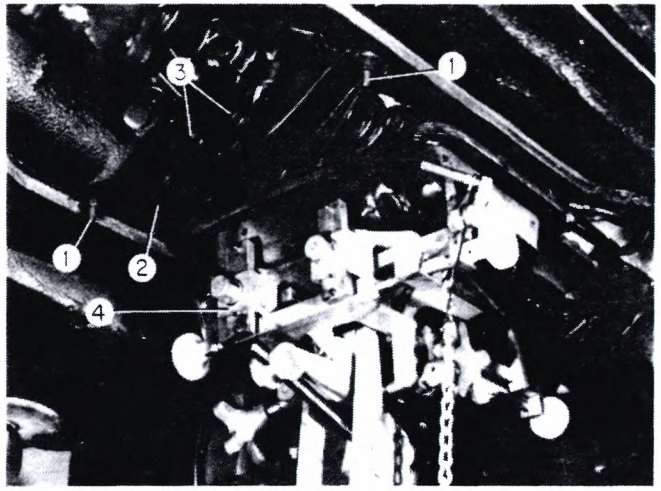


Remove drive shaft assembly (refer to Drive Shaft section).

Place transmission jack (4) under transmission.

Remove two nuts (1) holding transmission mount (2) to body. Remove two bolts (3) holding mount to transmission.

1. Nut 2. Transmission mount 3. Bolt 4. Transmission jack

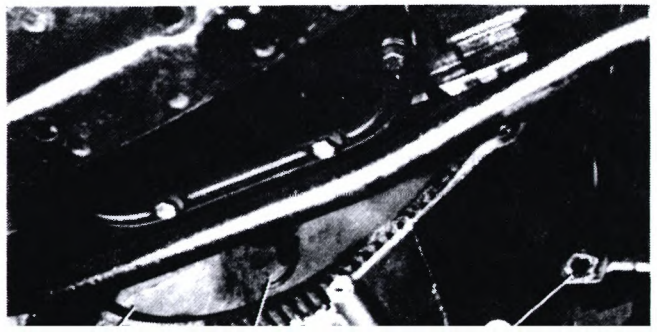


Remove four bolts to remove flywheel cover.

NOTE: Left bolt of flywheel cover also secures engine ground lead (1).

Remove three bolts (2) holding flywheel (3) to torque coverter. Turn flywheel to gain access to bolts.

1. Ground lead 2. Bolt 3. Flywheel

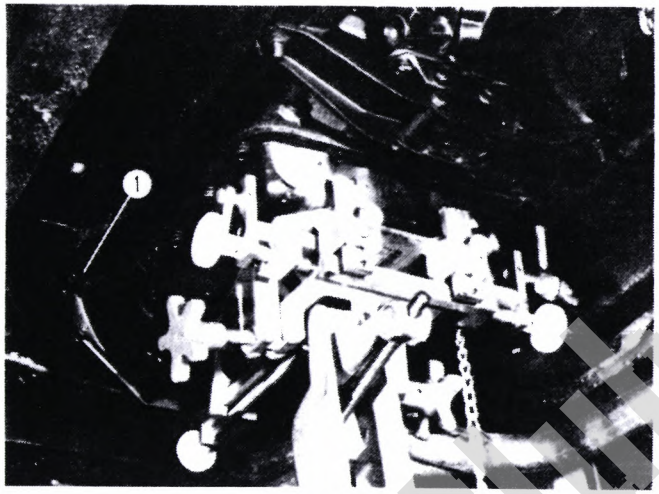


Remove four bolts (1) holding transmission to engine.

Tilt rear of transmission down and slide it back. Lower transmission to ground.

CAUTION: Support torque converter while removing and installing transmission.

1. Bolt



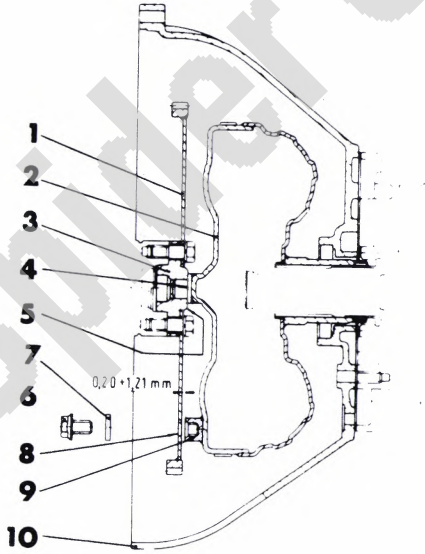
Installation is reverse of removal.

Torque all bolts (refer to Torque Specifications chart).

After attaching transmission to engine, push torque converter (2) against flywheel flange (3). Check that gap between boss (9) and attachment point (8) is .008 to .048 in (0.2 to 1.21 mm). Check at each point with a feeler gage. If clearance is not correct, replace flywheel.

Attach flywheel to converter with three bolts (6) and washers. Torque bolts to 47 ft lb (6.5 kgm).

1. Flywheel 2. Torque converter 3. Flywheel flange 4. Converter contact point 5. Flywheel contact point 6. Bolts 7. Washers 8. Attach point 9. Attachment boss 10. Converter housing



CHECKING AND FILLING TRANSMISSION

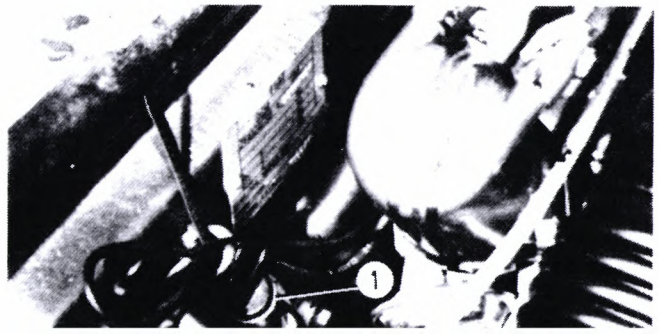
CAUTION: Use Dexron type transmission fluid only.

Complete transmission installation in vehicle and install drain plug in fluid sump pan.

Add about 5.28 pints (2.8 liters) of transmission fluid, through filler tube (1).

Apply brakes and block wheels. Start engine and run at normal idle. Place gearshift in "D" (Drive).

Move selector lever slowly through each range and allow transmission to warm up.



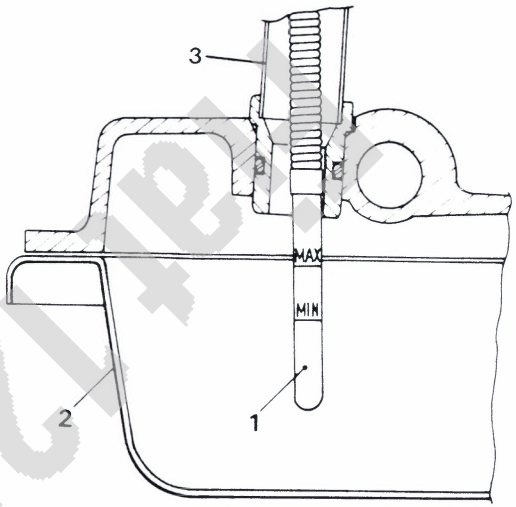
NOTE: Make sure vehicle is on level ground, engine idling, and gearshift in "P" (Park) or "N" (Neutral).

When transmission reaches operating temperature of about 156°F (80°C), move lever to "N" (Neutral) or "P" (Park). Check fluid level. Fill to MAX mark on dipstick (1). Use lint-free cloth when wiping dipstick.

CAUTION: Do not overfill as foaming and fluid loss will occur when fluid heats up.

FILLING CAPACITIES:

Fluid change	3 quarts (2.8 liter)
New Torque Converter	2 quarts (1.9 liter)
Dry Transmission	6 quarts (5.6 liter)



1. Dipstick 2. Oil pan 3. Filler tube

DISASSEMBLY

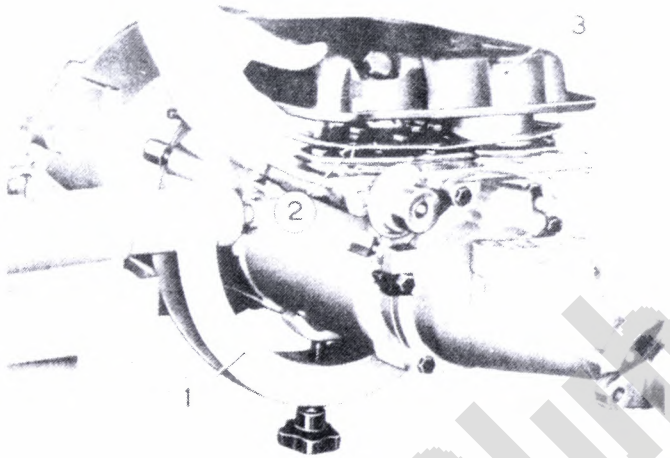
Remove torque converter from within housing by sliding it off splined shaft by hand.

Place transmission in holding fixture 3289-20 and 8763-02.

Remove bolt and lockwasher holding speedometer driven gear. Remove driven gear and gasket.

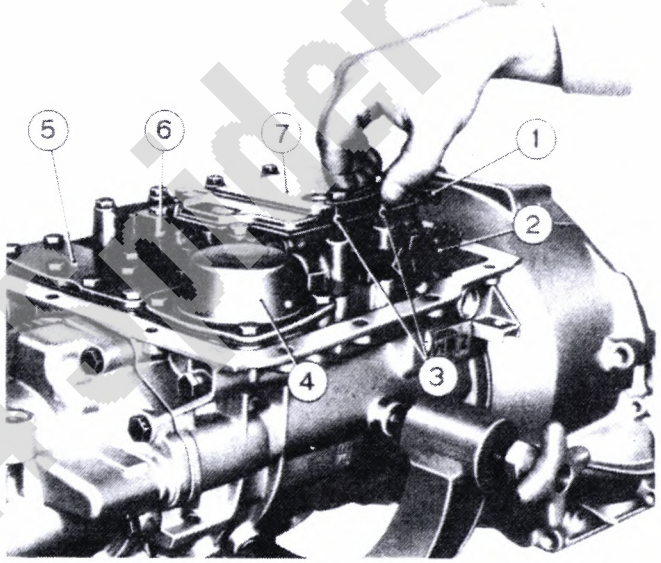
Turn transmission over.

Remove 12 bolts holding oil pan (3). Use a ½ inch socket. Remove pan and gasket (2). Discard gasket.



1. Transmission stand 2. Gasket 3. Oil pan

Remove 2 bolts (3) holding manual detent spring (1). Remove spring. Remove 3 bolts holding oil filter (7). Remove oil filter (7) and gasket. Discard gasket and filter.

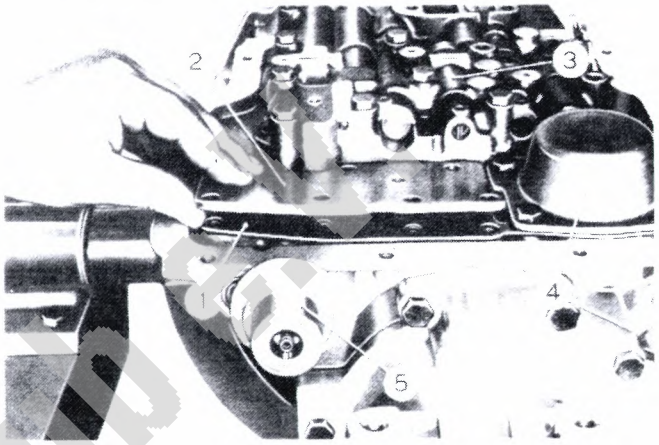


1. Manual detent spring 2. Selector lever 3. Bolts 4. Servo piston
5. Transfer plate reinforcement 6. Valve body 7. Oil filter

Loosen 20 bolts holding valve body (3), reinforcement plate (2) and servo cover (4). Use a ½ inch socket.

Remove the 12 bolts holding the reinforcement plate and servo cover. Remove gasket for servo cover. Discard gasket.

1. Transfer plate 2. Reinforcement plate 3. Valve body 4. Servo cover 5. Vacuum modulator

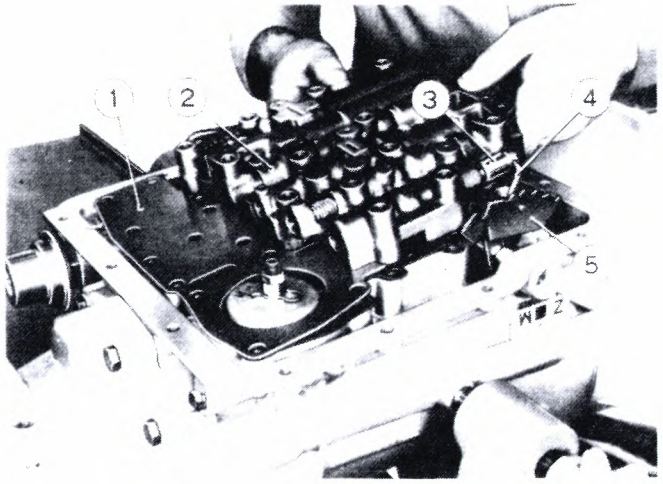


Remove 8 bolts holding valve body (2). Lift valve body and transfer plate (1). Hold manual valve link (4) and disconnect it from selector lever (5).

Make sure manual valve (3) and link (4) are not dropped or damaged. Remove valve body (2) and transfer plate (1). Remove gasket. Discard gasket.

Remove check ball from oil passages in transmission case.

1. Reinforcement 2. Valve body 3. Manual valve 4. Link 5. Selector lever

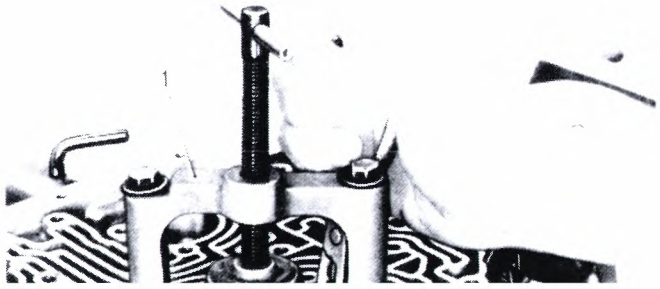


Install tool 23075 on case. Make sure legs of tool are seated. Make sure middle of tool is centered over servo. Carefully thread 2 bolts of tool into case.

Turn tool down just enough to allow removal of snap ring (2). Using pliers, remove snap ring.

Loosen tool slowly to relieve spring pressure on servo piston (3). Remove tool and servo piston. Remove return spring and piston apply rod.

1. Compressor tool 2. Snap ring 3. Servo piston



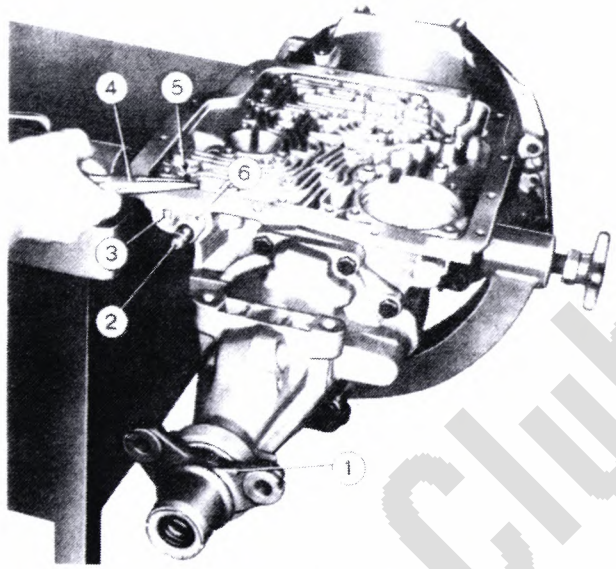
Using wrench 23100, remove vacuum modulator and gasket. Discard gasket. Remove modulator plunger.

Remove valve (2) and sleeve (6) for modulator assembly from case.

Very carefully remove retaining roll pin (5) holding kick-down valve assembly (3).

Remove kick-down sleeve, valve, spring seat, and spring from case.

1. Output shaft flange 2. Modulator valve 3. Kick-down valve assembly 4. Pliers 5. Retaining roll pin 6. Modulator sleeve



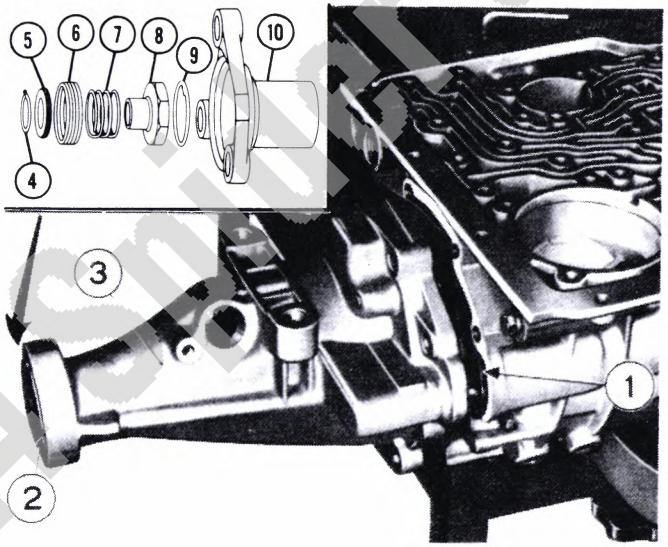
Remove snap ring (4), ring (5), seal (6), spring (7), nut (8) and washer (9) from end of output shaft.

Remove output yoke (10) by pulling it off of output shaft.

Remove seven bolts holding rear housing (3) to case. Use a 9/16 inch socket.

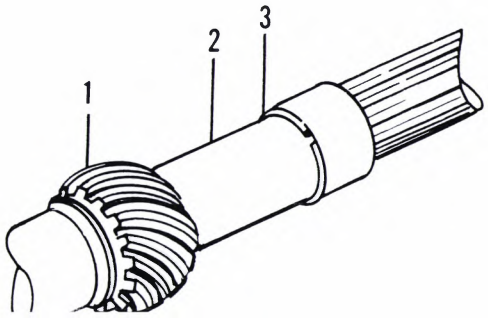
Slide rear housing (3) off output shaft. Remove gasket (1). Discard gasket.

1. Gasket 2. Output shaft seal 3. Rear housing 4. Snap ring 5. Ring 6. Seal 7. Spring 8. Nut 9. Washer 10. Output yoke



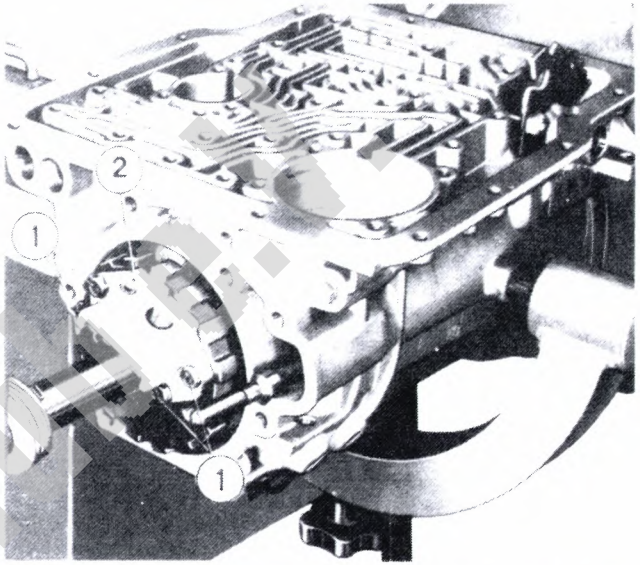
Remove snap ring (3). Slide collar (2) from output shaft and pull off speedometer gear (1).

1. Speedometer gear 2. Collar 3. Snap ring



Remove four bolts (1) holding governor (2) to hub. Use a 7/16 inch socket. Remove governor. Remove and discard gasket.

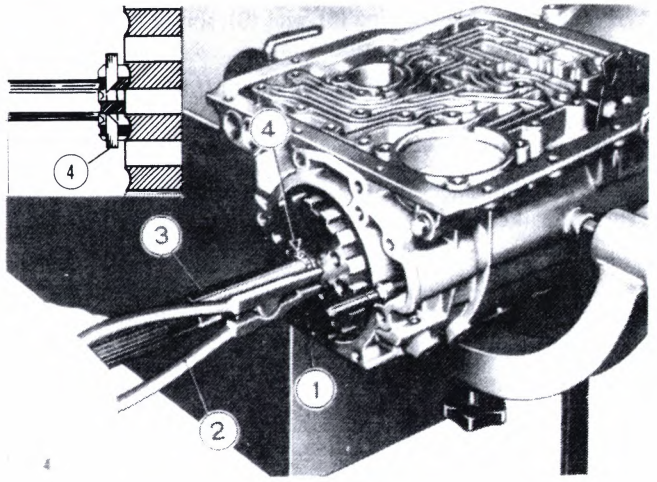
1. Bolts 2. Governor



Remove snap ring (4) holding governor hub (1) to output shaft (3). Use snap ring pliers (2).

Slide hub off shaft.

1. Governor hub 2. Pliers 3. Output shaft 4. Snap ring



Position transmission with converter housing up.

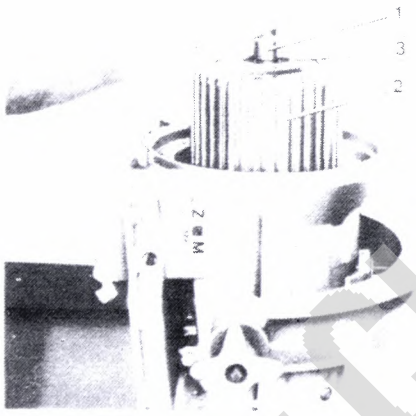
Just "crack" 5 inner bolts holding converter to pump.

Remove 7 outer bolts and sealing washers holding housing to case. Discard sealing washers. Use a ½ inch socket. Lift housing and oil pump out of case. If necessary, slap sharply on side of housing with rubber mallet to loosen pump assembly.

Lift third clutch assembly (1) and second clutch drum (2) out of case by the input shaft.

Remove selective thrust washer from input shaft.

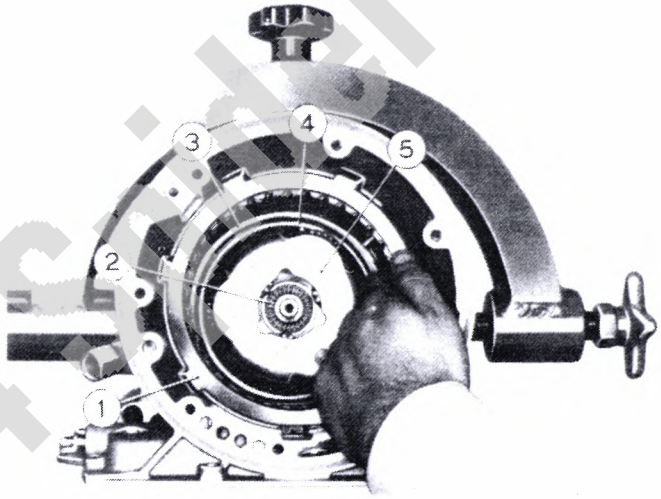
1. Third clutch assembly 2. Second clutch drum 3. Selective thrust washer



Remove reverse clutch plates (1) and reaction plate from case.

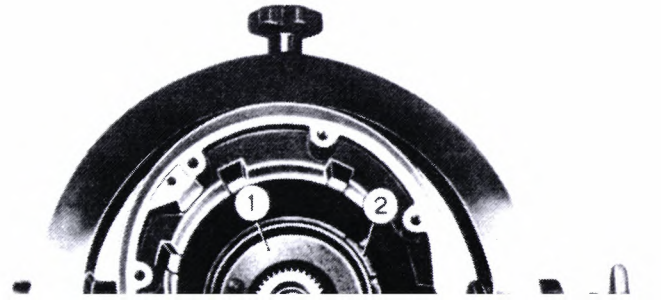
Lift planetary carrier (5) with output shaft out of case. Be careful of needle bearings (2) and races so as not to drop or lose them.

1. Reverse clutch plates 2. Needle bearing 3. Band 4. Drum 5. Planetary carrier



Remove reaction sun gear and drum (1) from case by pulling straight out.

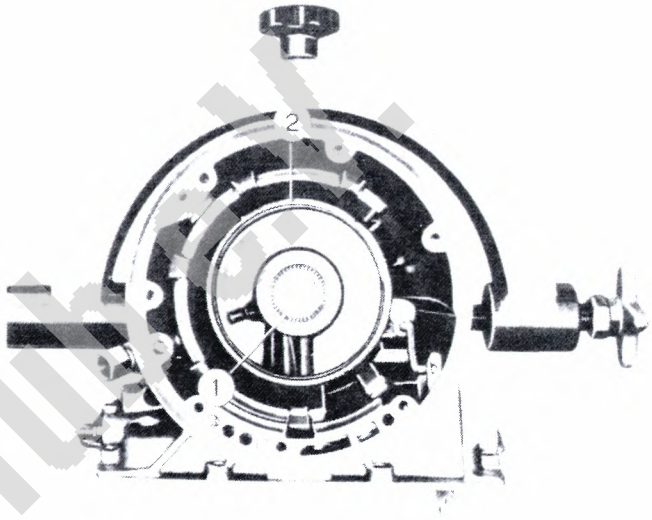
1. Reaction sun gear and drum 2. Band



Remove needle bearing (1) and race from rear of case. Bearing and race may come out with reaction sun gear and drum. Be careful not to lose them.

Slightly compress band (2). Remove band by pulling it straight out.

1. Needle bearing 2. Band

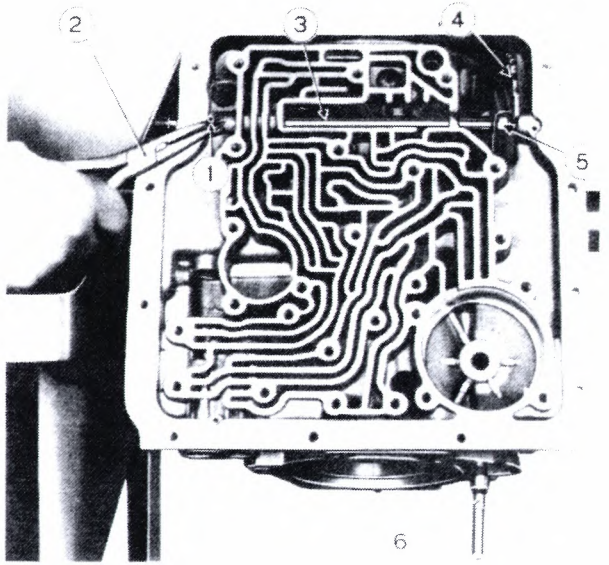


Turn case so that oil passages are up.

Remove nut (5) holding lever (4) to shaft (3). Remove retaining pin (1) holding selector lever shaft (3). Slide lever out of case.

Remove parking lock actuator (6) with selector lever (4). Remove lever from actuator by aligning slot in lever with tab on actuator.

1. Retaining pin 2. Pliers 3. Shaft 4. Selector lever 5. Nut 6. Parking lock actuator

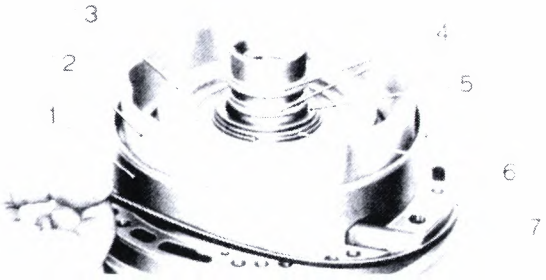


Disassembly, Inspection and Reassembly of Converter Housing

Remove 5 bolts and sealing washers holding oil pump (1) to housing. Discard sealing washers. Remove outer oil seal (7) from housing. Discard oil seal.

Lift housing off of oil pump.

1. Oil pump 2. Reverse clutch piston 3. Spring retainer 4. Seal rings 5. Adjustment washer 6. Snap ring 7. Outer oil seal.

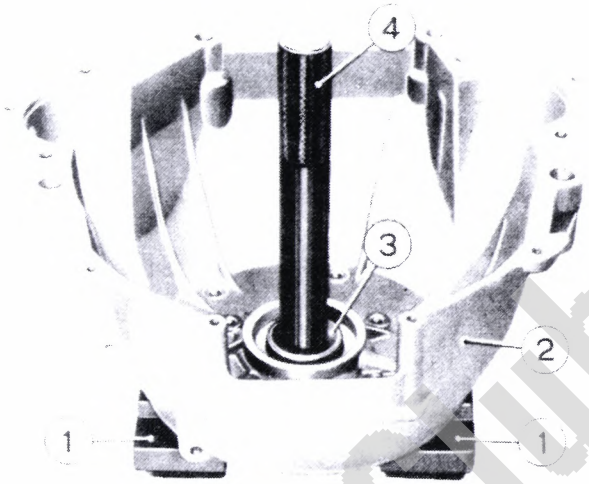


Remove oil seal.

Thoroughly clean converter housing.

Inspect bushing in housing. If worn, remove bushing from converter side of housing as shown. Use bushing remover 21465-17 and drive handle 8093.

1. Converter housing 2. Front oil seal 3. Slide hammer 7004-1
4. Hook 23129



Turn housing over and install bushing in converter housing from oil pump side. Use bushing installer 21465-17 and handle 8093.

Make sure bushing is flush with front face of housing (seal side).

1. Handle 8093 2. Bushing installer 21465-17 3. Converter housing

Install new oil seal in housing. Use seal installer 21359.

1. Converter housing 2. Seal installer 21359 3. Oil seal

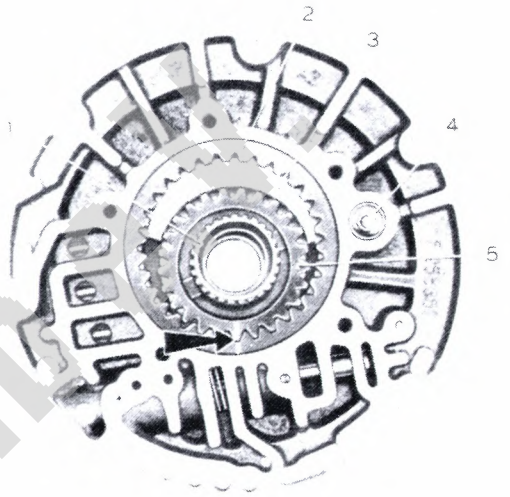
Disassembly, Inspection and Reassembly of Oil Pump and Reverse Clutch

Remove wearplate from oil pump. Mark topside of oil pump gears (2 and 5) as shown.

Inspect wear plate for signs of scoring and wear.

CAUTION: Do not use center punch.

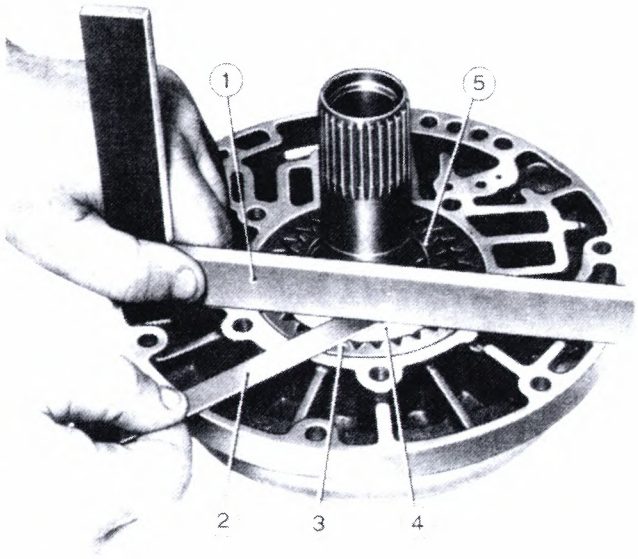
NOTE: Priming valve (4) not installed in later models.



1. Converter stator support 2. Pump gear 3. Sump segment 4. Priming valve 5. Pump gear

Check end clearances of both gears to pump face. Use a straight edge and feeler gauge. Clearance should be 0.013 to 0.038 mm (0.0005 to 0.0015 inch).

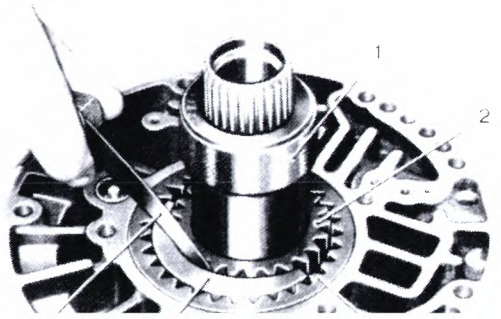
If clearance is not within limits, replace pump.



1. Straight edge 2. Feeler gauge 3. Driven pump gear 4. Pump segment 5. Driving pump gear

Install aligning tool 23082 (1) on oil pump drive gear (2) to center gear. Measure clearance between drive gear (2) and pump segment (4) whild rotating gears thru 360°. Use feeler gauge (5).

If clearance is not between 0.135 and 0.235 mm (0.0053 to 0.0093 inch) replace pump assembly.

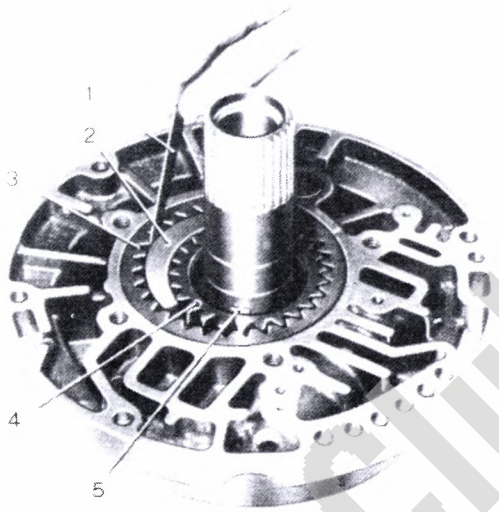


1. Aligning tool 70266 2. Drive gear 3. Driven gear 4. Pump segment 5. Feeler gauge

Measure clearance between outside of driven gear (3) and pump housing. Rotate gear thru 360° while measuring clearance. If clearance is not within 0.069 to 0.165 mm (0.0027 to 0.0065 inch), replace pump assembly.

Measure clearance between inside of driven gear (3) and pump segment (2). Rotate gear thru 360°. If clearance is less than 0.125 mm (0.005 inch), replace pump assembly.

If clearances are good, remove gears (3 and 4).



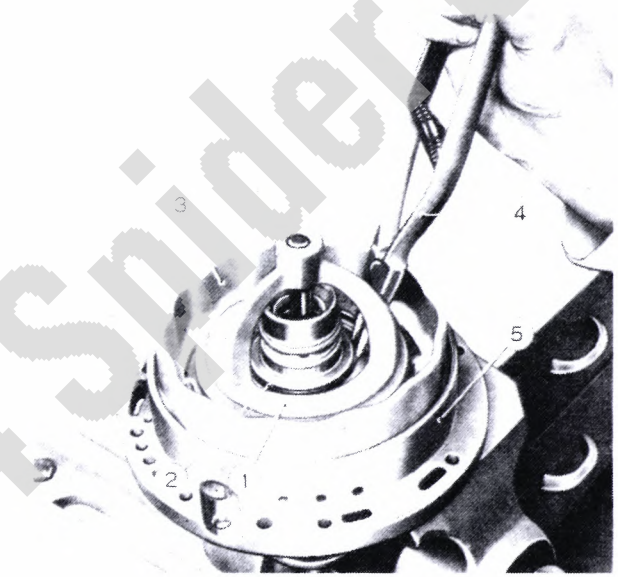
1. Feeler gauge 2. Pump segment 3. Driven gear 4. Drive gear
5. Gear tab

Place compressor tool (1) 23078 on spring retainer for reverse clutch (3). Place adapter on tool shaft and turn nut to compress clutch. Remove snap ring (2).

CAUTION: Release compressor tool slowly. Make sure spring retainer does not catch in snap ring groove.

When springs are released, remove compressor tool and retaining ring.

Remove 24 springs for reverse clutch.



1. Compressor tool 2. Snap ring 3. Reverse clutch piston 4. Pliers
5. Oil pump

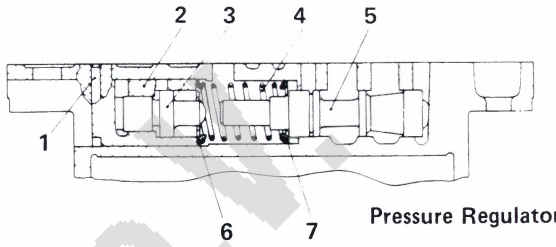
WARNING: When using compressed air, always wear eye protection.

Cover priming valve (if installed) by hand.

Remove reverse clutch piston (3) by blowing compressed air through hole (H) on front face of oil pump assembly.

Depress boost valve sleeve (2). Remove retaining pin (1). Use small wire cutters. If necessary, remove burr caused by pin from bore. Remove boost valve sleeve (2), valve (3), spring (4) and seats (6 and 7), and pressure regulator valve (5).

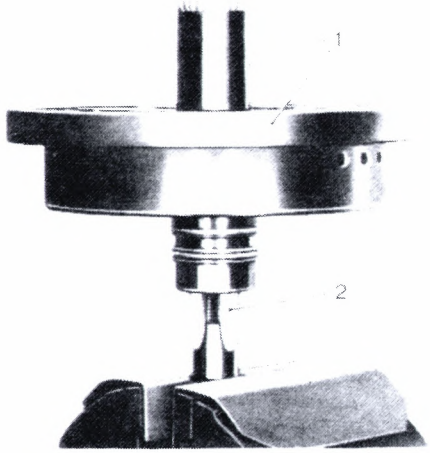
1. Retaining pin 2. Sleeve 3. Boost valve 4. Spring 5. Pressure regulator 6. Spring seat 7. Spring seat



Pressure Regulator

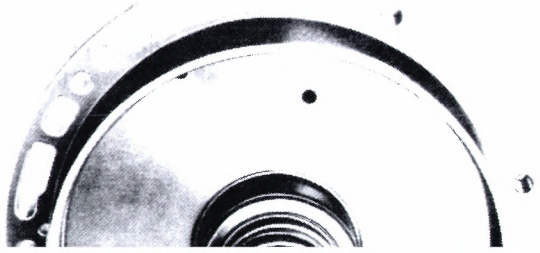
Inspect bushing in oil pump hub for damage. If necessary, remove bushing by threading tool 23130-5 into bushing. Using a press and a drift, press bushing out. Use a rag or cloth to protect oil pump face.

1. Oil pump 2. Tool 23130-5



Thoroughly clean pump body. Make sure all passages are clean.

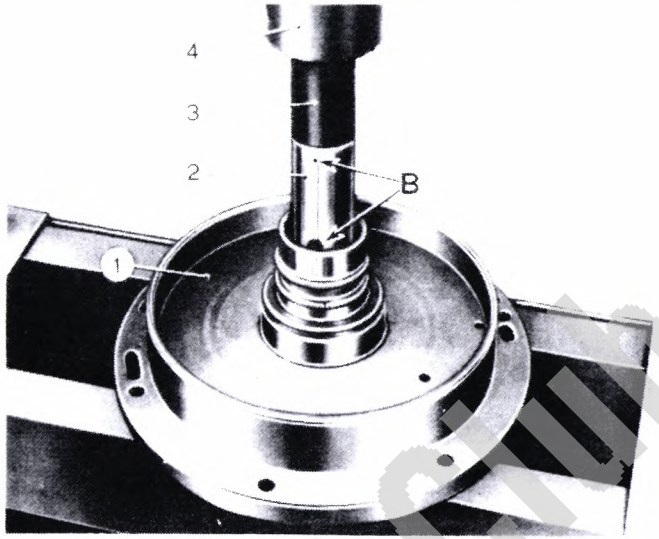
Position oil pump with hole "A" facing downwards. Locate oil groove to right of hole "A" (see arrow). Scribe an aligning mark on inner diameter of shaft at center of oil groove.



Scribe a mark on outer edge of new bushing (2) thru centers of small and large holes "B". Place bushing into pump shaft with small hole up. Align scribe marks.

Press bushing into shaft until bushing is seated in bore. Use an arbor press. Make sure bushing is pressed in straight. Make sure marks are aligned.

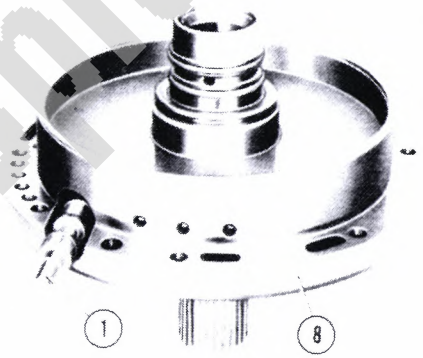
1. Oil pump 2. Bushing 3. Tool 23130-1 4. Press



Inspect and thoroughly clean pressure regulator assembly. Immerse valve in transmission fluid before installing.

Install pressure regulator valve (1), spring seat (2), spring (3), seat (4), boost valve (5), and sleeve (6) in pump. Depress sleeve until back end aligns with pin hole. Install retaining pin (7).

1. Pressure regulator valve 2. Seat 3. Spring 4. Seat 5. Boost valve 6. Sleeve 7. Retaining pin 8. Oil pump



Inspect oil seal rings (1) on oil pump hub (2). Replace rings if damaged or show side wear.

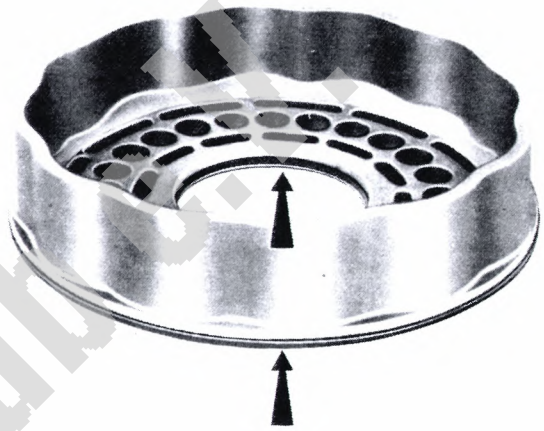
NOTE: Rings should have flat sides and no bright spots.

Install rings on hub (2). Make sure split in rings are 90° apart.

1. Oil seal rings 2. Hub 3. Oil pump

Coat each seal, piston, and oil pump with transmission fluid.

Install new inner and outer oil seals on reverse clutch piston as shown by arrows.



Install seal protector 28241 on pump hub.

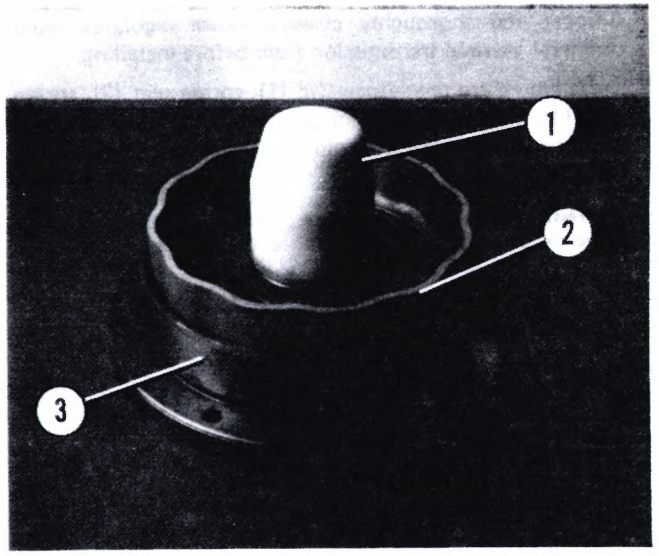
CAUTION: Do not damage seal when installing piston.

Install piston on pump. Remove seal protector 28241.

Inspect return springs for reverse clutch. Look for bent or broken springs or heat discoloration. Replace entire set if any are damaged.

Install 24 return springs on piston.

1. Seal protector 28241 2. Reverse clutch piston 3. Oil pump

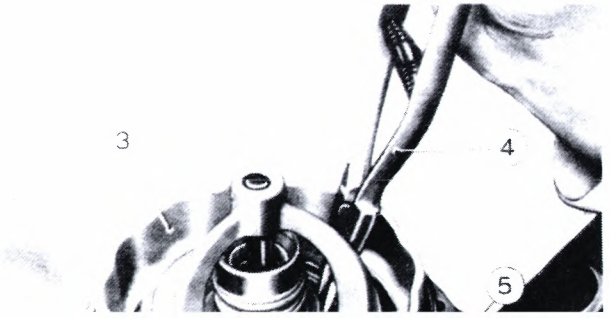


Place spring retainer on springs. Install compressor tool 23078. Compress springs.

CAUTION: Retainer may catch in snap ring groove. Be careful not to damage spring retainer. In next step make sure snap ring is seated in its groove.

Install snap ring. Use pliers. Loosen and remove compressor tool slowly.

CAUTION: Do not air check reverse clutch. Clutch assembly is not complete. Air checking may damage spring retainer and seat.

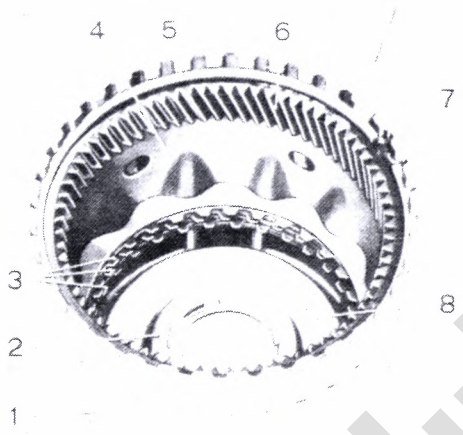


Disassembly, Inspection and Assembly of Second Clutch

Remove retaining ring (5) for ring gear (6).

Remove ring gear.

1. Second clutch drum 2. Thrust washer 3. Clutch plates 4. Spacer 5. Retaining ring 6. Ring gear 7. Screwdriver 8. Spring retaining plate

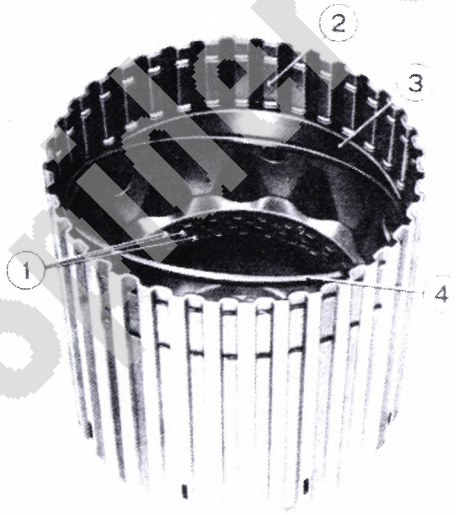


Remove retaining ring (4) for spacer plate (3). Remove spacer plate (3).

NOTE: After removing clutch plates (1), keep them in same sequence.

Remove clutch plates (1).

1. Clutch plates 2. Clutch drum 3. Spacer 4. Retaining ring



Remove thrust washer from center of drum.

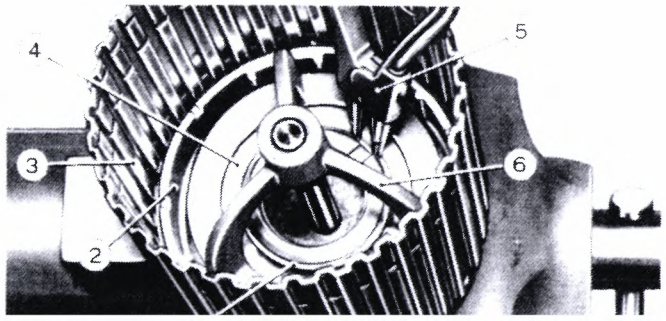
Install compressor tool assembly 23078 or J2590-02, 03, 04, 05 and adapter on spring retainer (4).

Compress springs and remove snap ring (1). Use snap ring pliers (5).

Loosen compressor tool slowly. Remove tool. Remove retainer (4).

CAUTION: Retainer may catch in snap ring groove.

Remove 22 return springs from piston (2). Remove piston



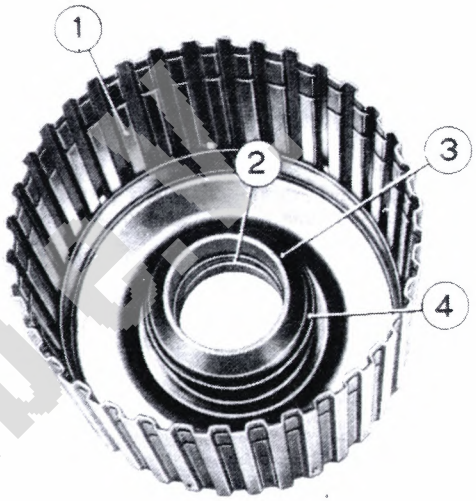
Remove oil seal (4) from hub (3). Discard oil seal.

Inspect bushing (2) in clutch hub (3) for scoring or wear. If necessary, remove bushing. Use tool 23130-6 and handle 8092.

Thoroughly clean hub in solvent. If removed, install new bushing. Use tools 23130-6 and handle 8092. Drive bushing in until tool bottoms on bench.

Install new oil seal (4) on hub (3).

1. Clutch drum 2. Bushing 3. Clutch hub 4. Oil seal

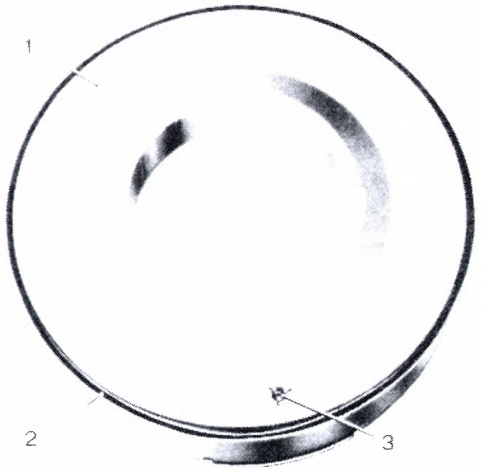


Remove oil seal (2) from piston (1). Discard oil seal.

Inspect piston for damage. Shake the piston and make sure check ball moves freely. If piston is damaged or check ball is stuck, replace piston.

Inspect piston return springs. If any spring is damaged, replace complete set.

1. Piston 2. Oil seal 3. Check ball



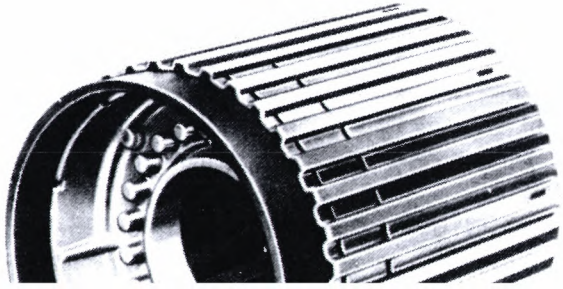
Install new oil seal on piston (2).

Coat oil seal, piston, and drum with transmission fluid. Place tool 23080 on piston to protect oil seal.

Install piston and tool in drum.

Push piston and tool down until tool seats. Then push piston down further until it bottoms. Remove tool.

1. Tool 23080 2. Piston 3. Drum

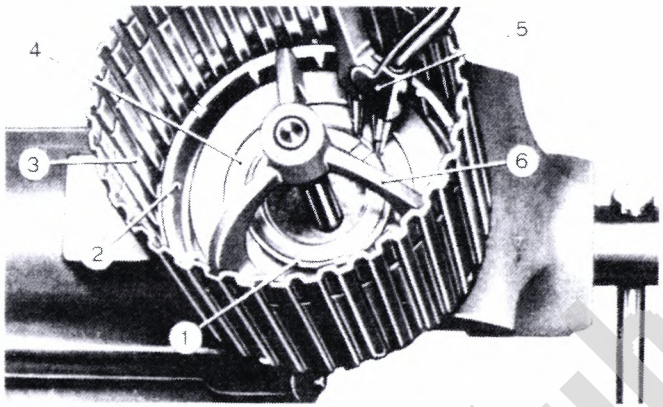


Place 22 springs on piston. Place spring retainer (4) on springs.

Install tool (6) on piston (2). Compress spring retainer.

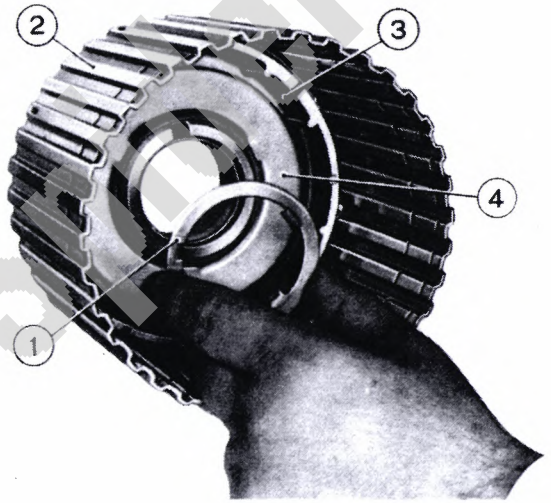
CAUTION: Retainer may catch in snap ring groove. Be careful not to damage spring retainer. In next step make sure snap ring is seated in its groove.

Install snap ring (1). Use pliers (5). Loosen compressor and remove it.



1. Snap ring 2. Piston 3. Drum 4. Spring retainer 5. Pliers
6. Compressor tool

Inspect thrust washer (1) for damage. Install thrust washer on hub. Make sure tang on washer seats in slot of hub. Secure washer with petroleum jelly.



1. Thrust washer 2. Drum 3. Clutch piston 4. Spring retainer

Inspect clutch plates (1) for wear, scores, or excessive heat marks. Replace clutch pack if damaged.

Coat plates with clean transmission fluid.

Install wave washer in drum (4) first. Install clutch plates in drum, first steel plate, composition plate, steel plate, etc.

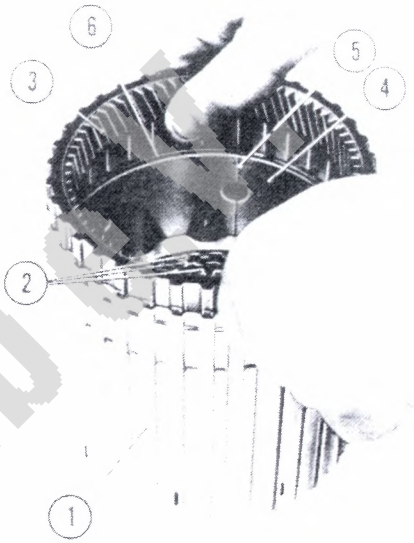
1. Clutch plates 2. Piston 3. Thrust washer 4. Drum

Install spacer plate (4) in drum (1). If plate slides in without pressure, expand plate. Use a screwdriver in slot (5) to expand plate. Make sure spacer seats tightly in drum (1), wave part down.

Install spacer plate retaining ring (6).

Install ring gear (3) in drum. Secure gear with second retaining ring.

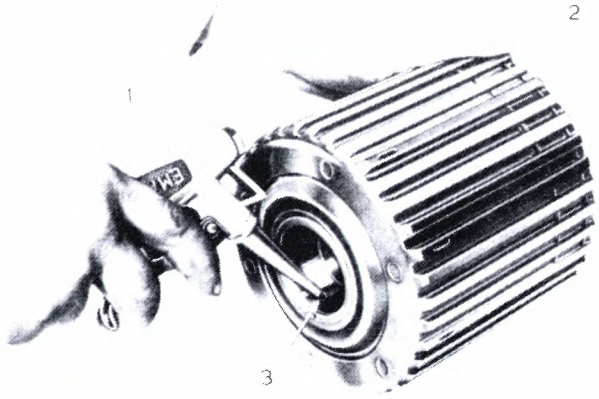
1. Drum 2. Clutch plates 3. Ring gear 4. Spacer plate 5. Slot 6. Retaining ring



Apply air to hole (3) in drum. Check that clutch piston moves. If piston does not move, disassemble clutch. Check seal rings.

WARNING: When using compressed air, always use eye protection.

1. Air gun 2. Drum 3. Hole



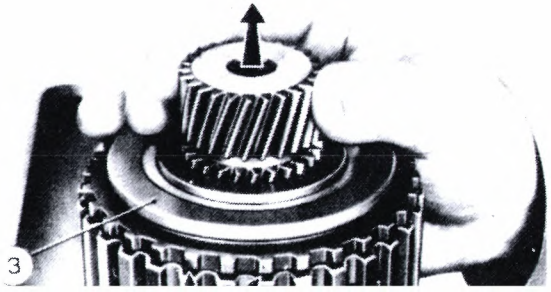
Disassembly, Inspection, and Assembly of Third Clutch

Compress retaining ring (2) at several places around drum (1) while lifting input sun gear (3) in direction of arrow.

Remove input sun gear with clutch hub in direction of arrow.

Remove gear, sprag, and outer race from drum.

1. Drum 2. Retaining ring 3. Sprag



Remove sprag (2) and outer race (3) from clutch hub (1).

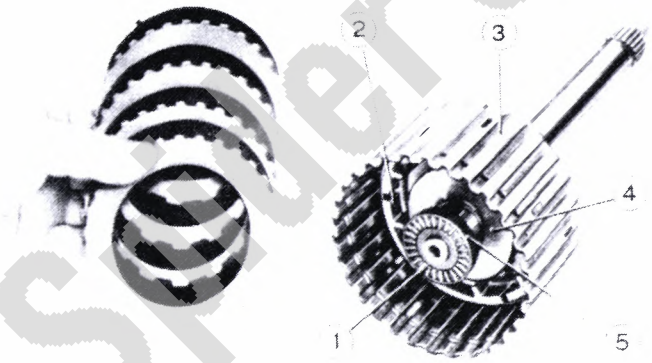
Push sprag (2) out of outer race (3).

1. Third clutch hub 2. Sprag race 3. Outer race

Remove third clutch plates from drum (3). Keep plates in same order that they were removed.

Remove thrust bearing (1) and washer (5) from input shaft.

1. Thrust bearing 2. Piston 3. Drum 4. Spring retainer
5. Thrust washer

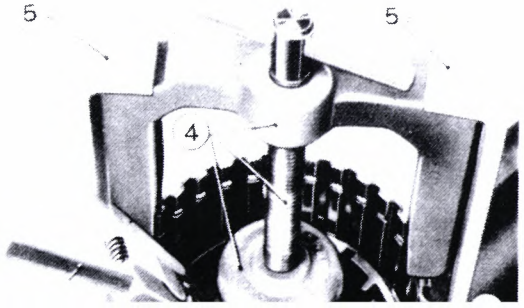


Install spring compressor 23075 (4) on spring retainer. Use puller jaws (5) 23075-10 to hold tool on drum or use a press. Compress springs. Remove snap ring (1).

Loosen and remove tools (4 and 5). Remove spring retainer and 12 springs from piston (6).

CAUTION: Release compressor tool slowly. Make sure spring retainer does not catch in snap ring groove.

1. Snap ring 2. Drum 3. Pliers 4. Compressor tool 5. Puller jaws
6. Piston



Remove third clutch piston (1) from drum.

Inspect piston for damage. Inspect check ball (3). If ball is stuck, missing, or falls out, replace piston. If piston is damaged, replace it.

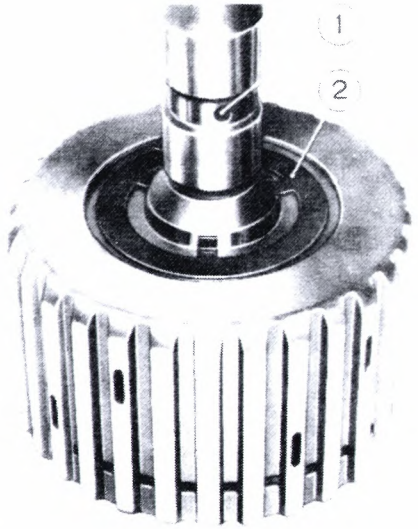
Remove oil seal (2). Install new oil seal.

Inspect return springs. If any spring is damaged, replace entire set.

1. Piston 2. Oil seal 3. Check ball

Thoroughly clean third clutch drum. Inspect drum and input shaft for damage. Inspect thrust washer (2) for scoring or damage. Replace if necessary.

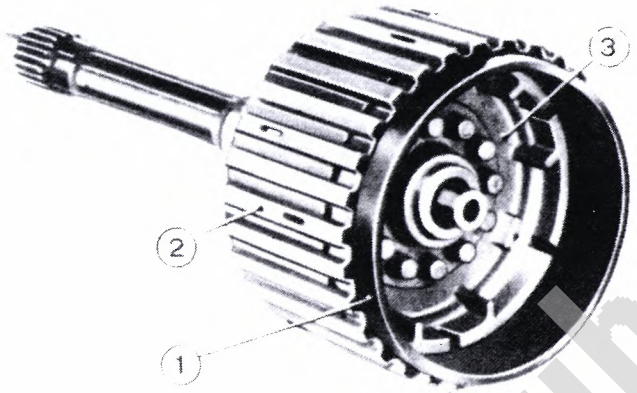
1. Oil pressure hole 2. Thrust washer



Remove oil seal from input shaft inside drum. Install new oil seal. Be careful not to damage seal on edge of shaft.

Coat oil seal on piston (3) and inside of drum with transmission fluid. Install tool 23084 on piston. Install piston in drum (2). Remove tool.

1. Tool 23084 2. Drum 3. Piston

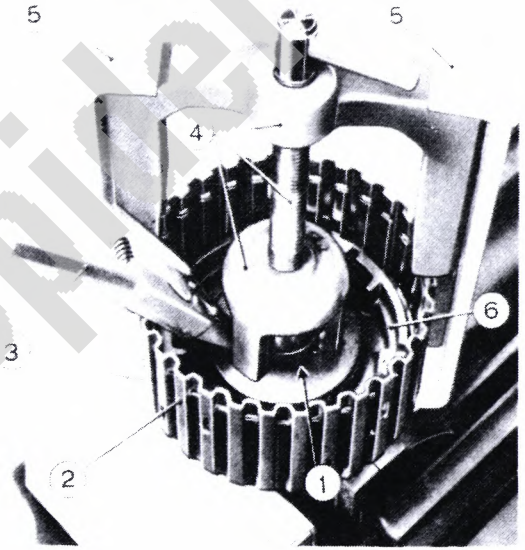


Install 12 return springs on piston. Place spring retainer on piston.

Install compressor 23075 (4) on spring retainer. Install puller jaws 23075-10. Compress spring retainer and install snap ring (1).

CAUTION: Make sure retainer does not catch on snap ring groove. Release compressor tool slowly.

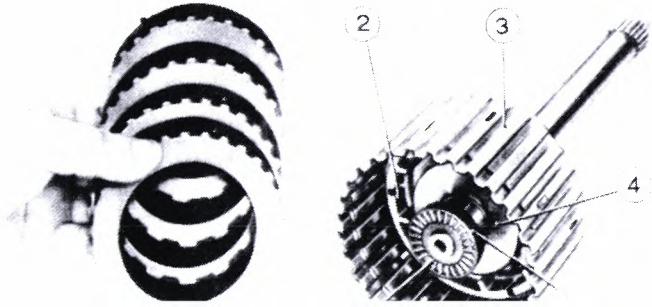
1. Snap ring 2. Drum 3. Pliers 4. Compressor tool 5. Puller jaws 6. Piston



Inspect third clutch plates. If plates are worn, scored, or show excessive heat, replace entire clutch pack.

Inspect thrust washer (5) and bearing (1) for damage. Replace if necessary. Install washer and bearing on input shaft. Secure them with petroleum jelly.

1. Thrust bearing 2. Piston 3. Drum 4. Spring retainer 5. Thrust washer

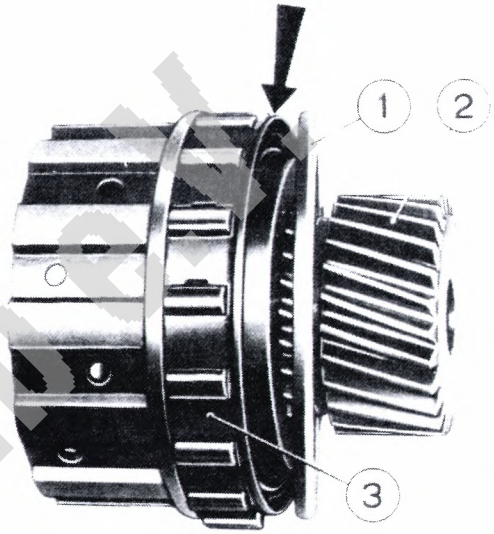


Inspect sprag assembly (3) for wear, damage, or sprags that fall out of cage. Inspect sun gear (2) for chipped or nicked teeth and wear. Replace part if necessary.

Install sprag on third clutch hub with groove (arrow) toward sun gear.

Install sprag race and retainer over sprag assembly.

1. Sprag retainer 2. Sun gear 3. Sprag

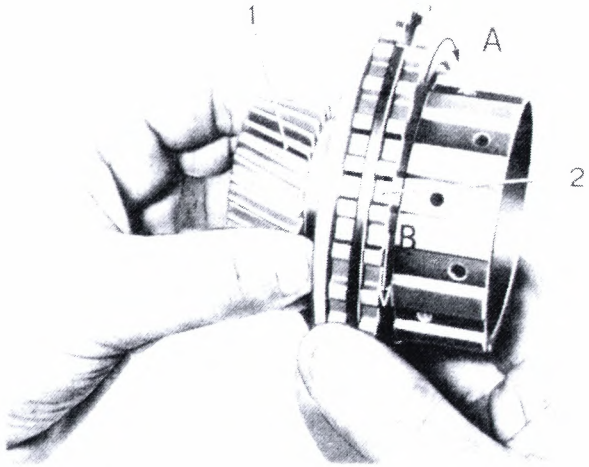


Check sprag for operation as follows:

Hold sun gear (1) with left hand. Turn sprag race (2) in direction of arrow "A". Check that sprag locks up.

Turn sprag race (2) in direction of arrow "B". Check that sprag rotates freely.

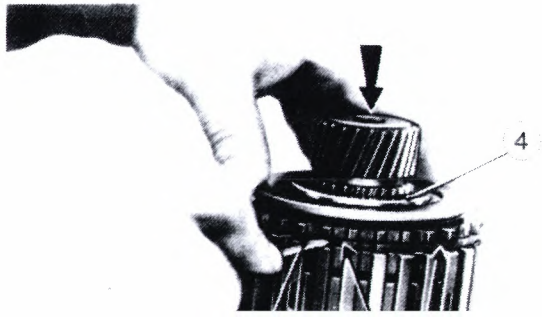
1. Sun gear 2. Sprag race



Place retaining ring (2) on outer race. Install clutch plates in third clutch drum (1). Install wave washer first, then steel plate, composition plate, steel plate, etc.

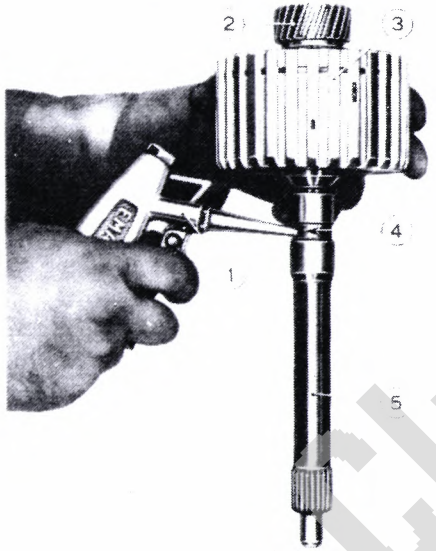
Align inner teeth of composition plates. Align grooves of clutch hub with these teeth and slide hub into clutch plates. Align outer race with grooves in hub. Using screwdriver (3), compress retaining ring (2). Push outer race in until retaining ring snaps into groove in drum (1).

1. Drum 2. Retaining ring 3. Screwdriver 4. Sprag



Apply air from air gun (1) to hole (4) in input shaft (5). Check that clutch moves in drum (3).

WARNING: When using compressed air, always wear eye protection.



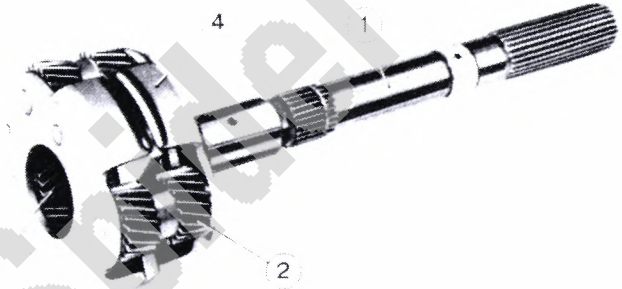
1. Air gun 2. Sun gear 3. Drum 4. Oil pressure hole 5. Input shaft

Planetary Carrier Inspection

Inspect planetary carrier and output shaft for distortion or damage.

Inspect planetary pinions for excessive wear or damage. Inspect for chipped teeth.

NOTE: Do not lose needle bearings on either side of carrier.

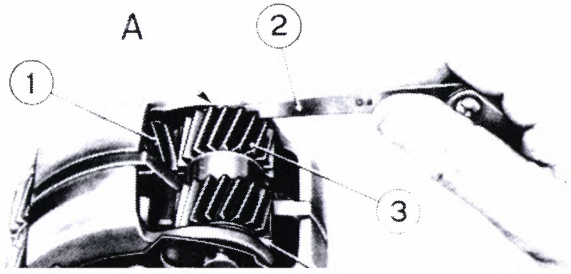


1. Output shaft 2. Planetary pinions 3. Planetary pinions 4. Carrier

Check end clearance of all planetary pinions (1 and 3) at points A and B. Use a feeler gauge (2).

Clearance should be between 0.13 and 0.89 mm (0.005 and 0.035 inch).

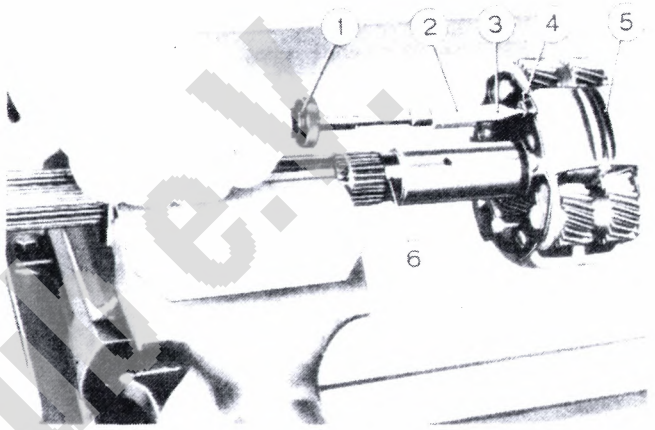
Replace entire assembly if damage or excessive wear is noted.



1. Planetary pinion 2. Feeler gauge 3. Planetary pinion

Check retaining screws (4) for lock plate on planetary carrier (5). Torque to 40 to 52 kgcm (29 to 38 in. lbs).

1. Torque wrench 2. Adapter 3. Screwdriver 4. Retaining screw
5. Planetary carrier 6. Output shaft

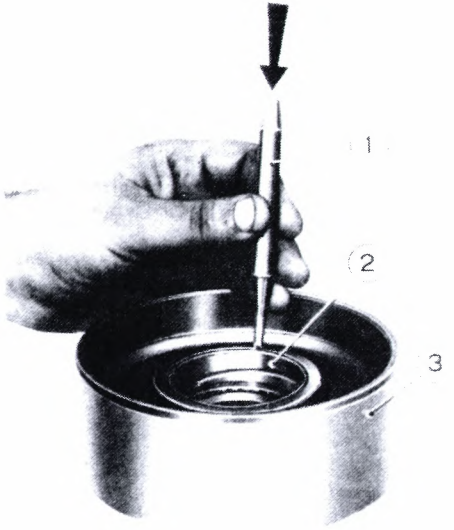


Reaction Sun Gear and Drum
Disassembly, Inspection and Assembly

Inspect reaction sun gear for chipped or nicked teeth. Inspect sun gear for scoring. If necessary, replace entire assembly.

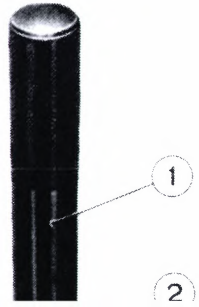
Inspect sun gear drum (3) and bushing (2). If necessary to replace bushing (2), use a chisel. Remove bushing from drum at bushing joint.

1. Chisel 2. Bushing 3. Drum



Thoroughly clean drum (3). Install new bushing. Use installer tool 23130-2 and handle 8093. Install bushing flush with rear face of drum hub.

1. Handle 8093 2. Installer 23130-2 3. Drum

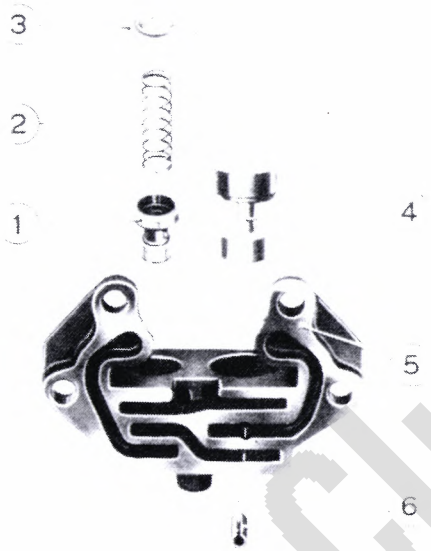


Governor Body Disassembly, Inspection and Assembly

Depress secondary valve (1). Remove spring retainer (3). Remove valve spring (2). Remove valve (1). Remove spring pin (6) from body (5). Remove primary valve (4).

Inspect primary and secondary valves for nicks, burrs, etc. Use crocus cloth to remove small burrs. Inspect valve spring for distortion.

Clean all parts in solvent. Blow parts dry. Inspect all oil passages and valve bores for dirt, nicks, burrs and varnish in body. Replace if necessary.

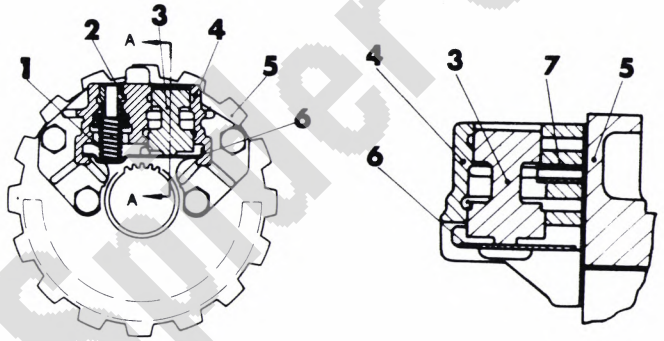


1. Secondary valve 2. Spring 3. Spring retainer 4. Primary valve
5. Body 6. Spring pin

Coat valves with transmission fluid.

Install primary valve (3) in body (4) with smaller section first. Install spring pin (7) in front face of body. Pin should be flush to 0.01 inch below face.

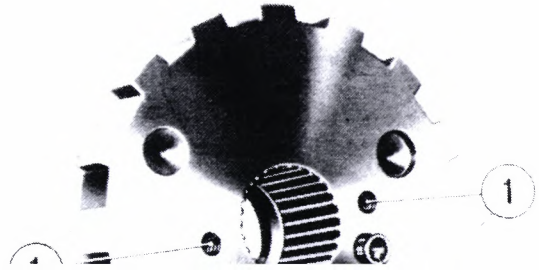
Install secondary valve (2) (small end first) and spring (1) in body. Depress spring and install retainer (6) in body.



1. Spring 2. Secondary valve 3. Primary valve 4. Body
6. Governor hub 6. Spring retainer 7. Spring pin

Governor Hub Disassembly, Inspection and Assembly

Remove oil screen (2) from hub (3). Clean and inspect screen. Replace if necessary. Install oil screen flush to governor hub.

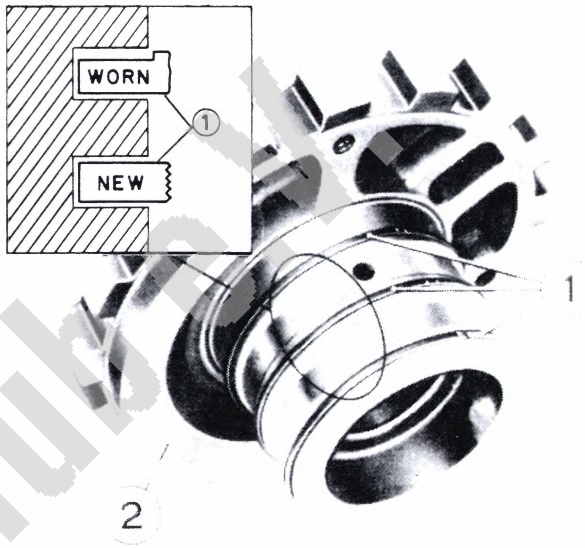


1. Bolt holes 2. Oil screen 3. Hub

Inspect 3 oil rings (1). If broken or side wear is noted, replace rings.

Inspect splines of hub (2) for cracks or chipped teeth. Replace governor hub if damaged.

1. Oil rings 2. Governor hub



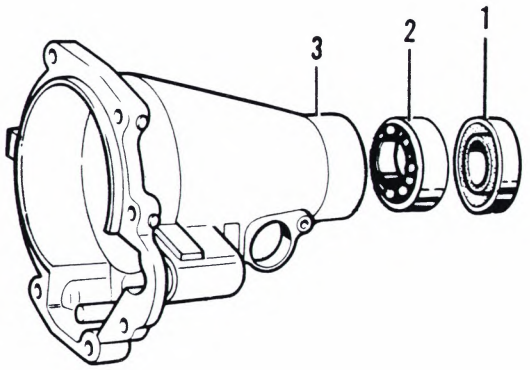
Rear Housing Disassembly, Inspection and Assembly

Thoroughly clean extension housing (3). Inspect housing for damage. Replace housing if necessary.

Remove oil seal (1).

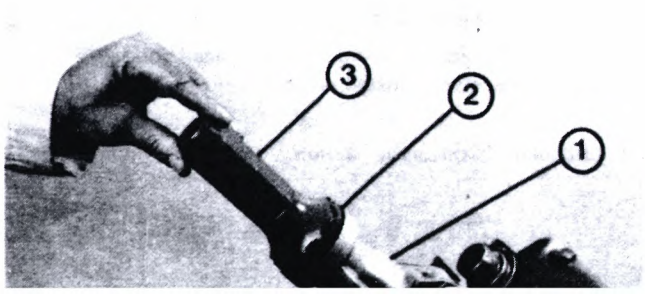
Inspect housing bearing (2). If bearing is worn, scored or damaged, replace it.

1. Rear oil seal 2. Bearing 3. Rear housing

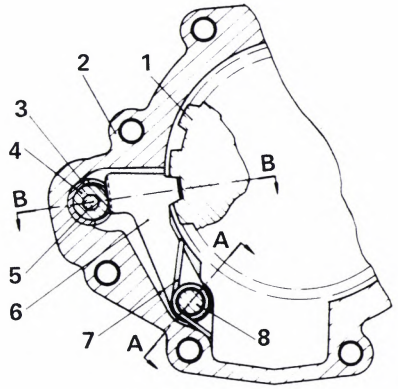


Install new oil seal in extension housing. Use seal installer 21426.

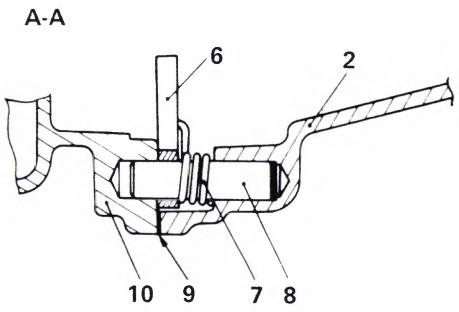
1. Extension housing 2. Rear oil seal 3. Seal installer 21426



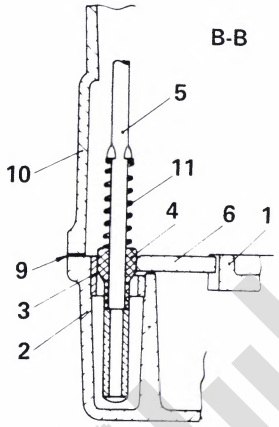
Inspect parking pawl (6) and spring (7) for damage. If damaged, replace.



1. Governor hub
2. Extension housing
3. Guide bushing
4. Actuating rod bushing



5. Actuating rod
6. Parking pawl
7. Spring
8. Pin

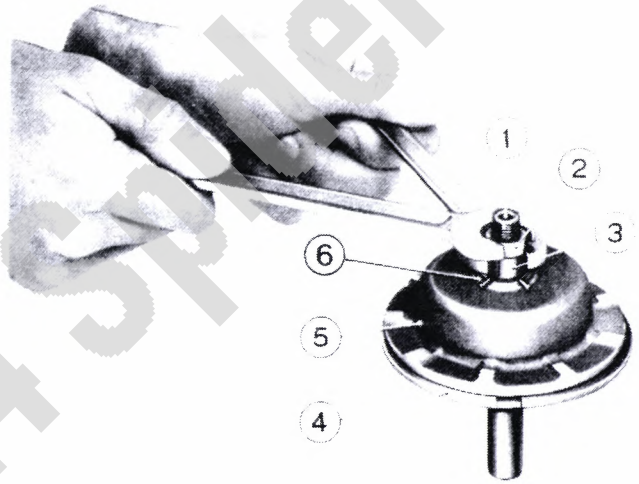


9. Gasket
10. Transmission case
11. Actuating rod spring

Servo Piston
Inspection and Assembly

Remove rod from servo piston (4). Hold sleeve (3) with a wrench on flats on sleeve. Remove locknut (2). Depress piston sleeve and remove retaining clip (6). Remove piston ring (4).

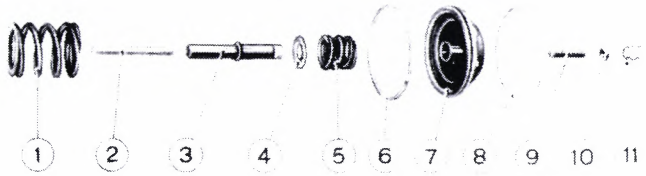
1. Adjusting bolt 2. Locknut 3. Sleeve 4. Piston ring 5. Servo piston 6. Clip



Push sleeve (3) thru piston (7). Remove spring (5) and retainer (4).

Inspect spring, adjusting bolt (9), and sleeve for damage. Inspect piston for damage. Inspect piston ring for side wear. Replace parts as necessary.

Place retainer (4) and spring (5) on sleeve (3). Thread adjusting bolt (9) into sleeve. Push sleeve thru piston (7). Secure sleeve with clip (11). Thread locknut (10) on bolt (9). Install piston ring (6) on piston.

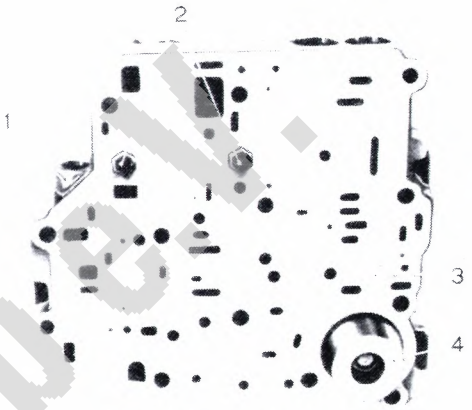


Valve Body Disassembly, Inspection and Assembly

Remove manual valve and link from valve body.

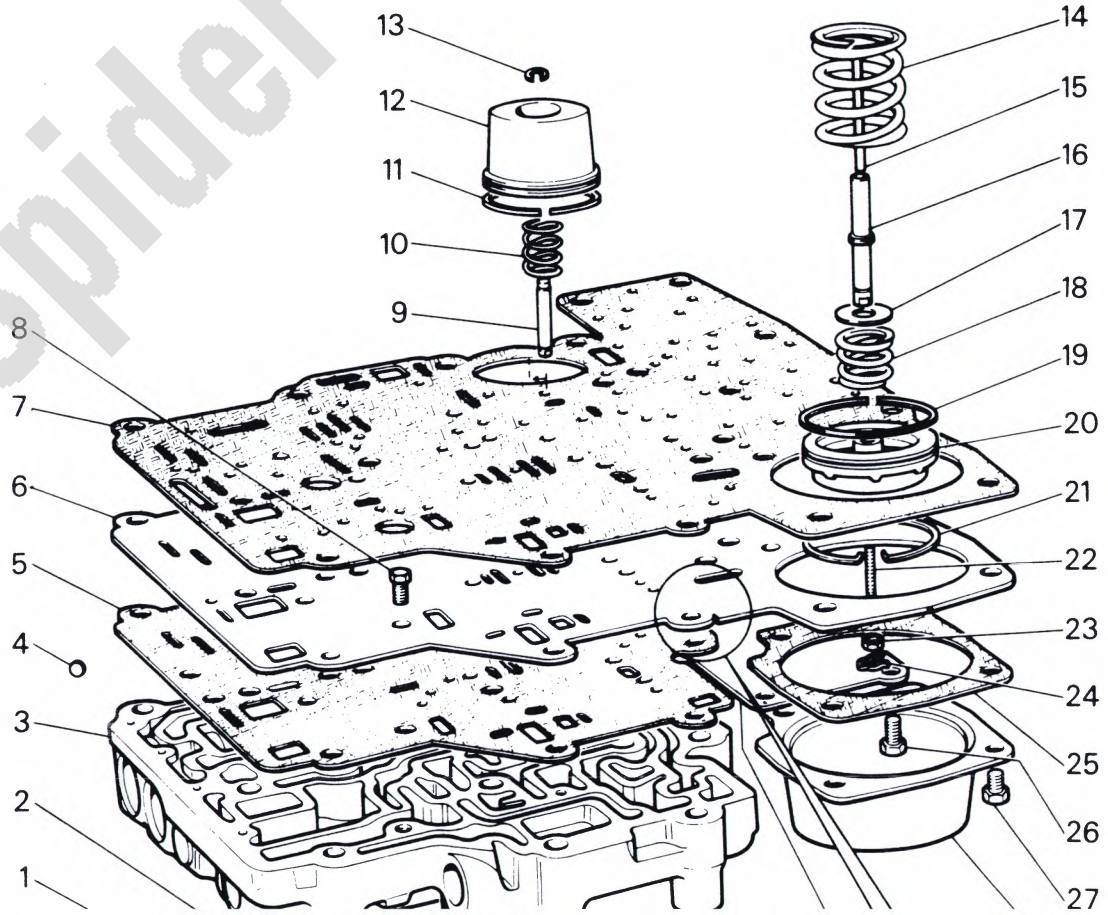
Position valve body with transfer plate (3) up. Remove 2 bolts (2). Remove plate and gasket. Discard gasket.

1. Valve body 2. Bolts 3. Transfer plate 4. Accumulator piston



Valve Body Assembly

1. Oil strainer
2. Gasket
3. Valve body
4. Check ball
5. Gasket
6. Transfer plate
7. Gasket
8. Bolt
9. Accumulator piston
10. Spring
11. Oil ring
12. Accumulator
13. Retaining ring
14. Spring
15. Servo apply rod
16. Servo adjusting sleeve
17. Spring retainer
18. Spring
19. Oil ring
20. Servo piston
21. Retaining ring
22. Adjusting bolt
23. Locknut
24. Retaining ring
25. Gasket
26. Bolt
27. Bolt
28. Servo cover
29. Reinforcement plate
30. Bolt

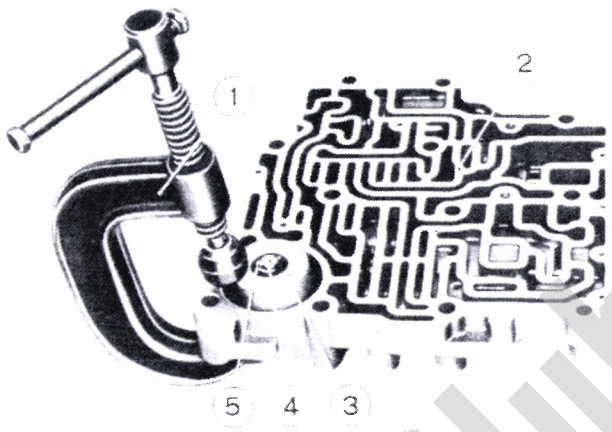


Compress accumulator piston (3). Use a small C clamp (1). Remove retaining ring (5). Carefully loosen clamp. Accumulator piston is under spring tension.

Remove piston (3) and spring from valve body (2). Remove oil ring from piston.

Inspect piston and spring for damage. Inspect oil ring for damage or side wear. Replace parts as necessary.

1. C clamp 2. Valve body 3. Piston 4. Shaft 5. Retaining ring



Disassembly, Inspection, and Assembly of Control Valves

NOTE: Be careful when removing retaining pins. Do not damage valve body. Drive all pins from outside of valve body. If necessary, remove burrs in bore of valve body. Use a fine crocus cloth.

All numbers in parenthesis refer to drawing on the facing page.

1-2 Shift Control Valve

Remove retaining pin (1). Remove sleeve (2). Remove control valve (3), spring (4) and shift valve (5).

2-3 Shift Control Valve

Remove retaining pin (9). Remove sleeve (10). Remove control valve (11), spring (12), seat (13) and shift valve (14).

3-2 Shift Control Valve

Remove retaining pin (15) and plug (16). Remove spring (17) and control valve (18).

Detent Pressure Regulator Valve

Remove retaining pin (20) and spring (21). Remove regulator valve (22).

High Speed Downshift Timing Valve

Remove retaining pin (33) and spring (32). Remove timing valve (31).

Low Speed Downshift Timing Valve

Remove retaining pin (34). Remove plug (30), timing valve (29), and spring (28).

Manual Low and Reverse Control Valves

Remove retaining pin (26) and spring (25). Remove manual low control valve (24) and reverse control valve (23).

1-2 Accumulator Valve

Remove retaining pin (19) and plug (18). Remove accumulator valves (6 and 7).

Cleaning and Inspection

Make sure work area is free of dirt or dust. Make sure hands and tools are clean. Clean valve body and valves in cleaning solvent. Use compressed air to blow out passages.

CAUTION: Do not use paraffin base cleaning solvent to clean parts. This could block passages. Do not use cloth to clean or dry valves. Material removed from cloth could block passages.

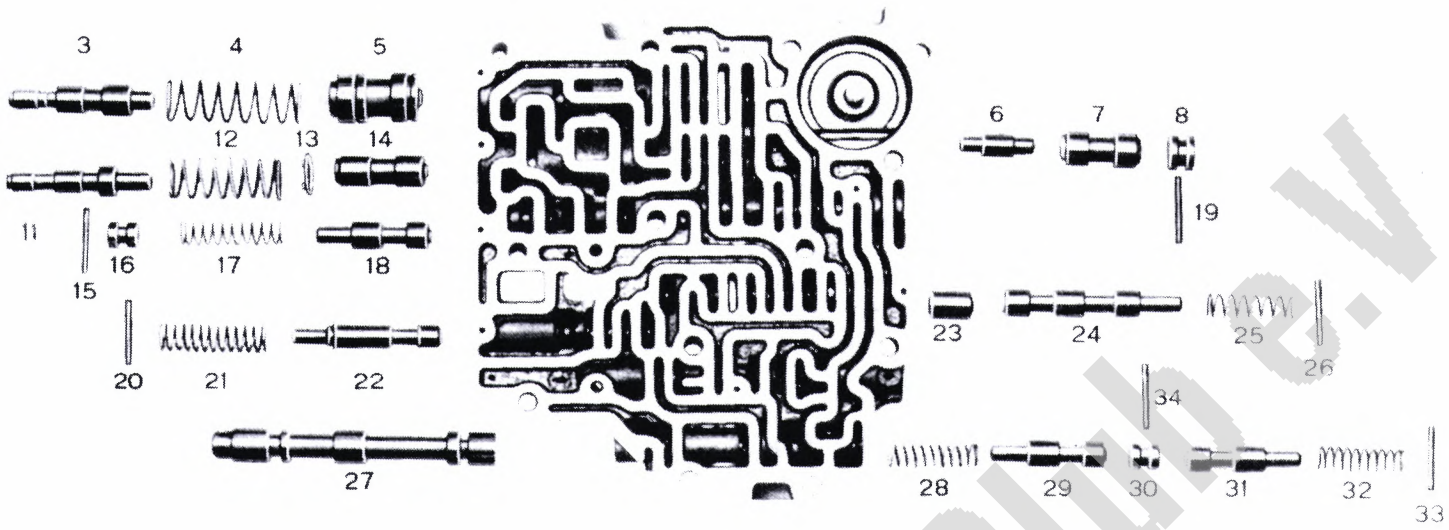
Inspect each valve for free movement in the bore. If necessary, remove small burrs on a valve. Use crocus cloth.

Do not remove sharp edges of the valves. These edges perform a cleaning action within the bore.

Inspect valve springs for distortion or collapsed coils. If necessary, replace springs.

If any damage is found to the valves or valve body, replace valve body assembly.

Reassemble valves, springs, plugs, and retaining pins in their proper location and order. Use a liberal amount of transmission fluid.

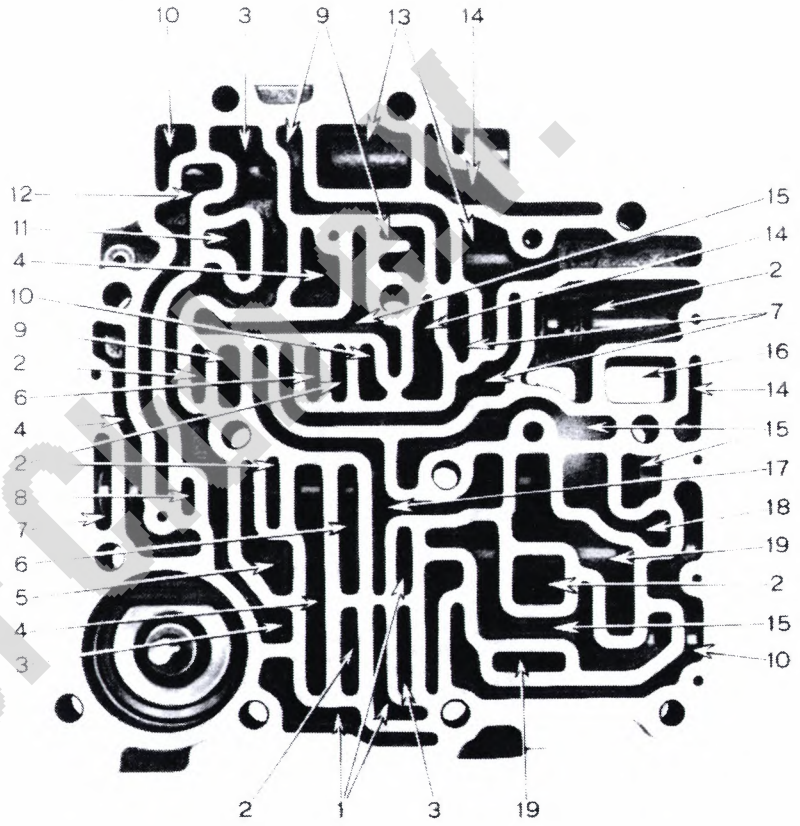


1. Retaining pin
2. 1-2 shift control valve sleeve
3. 1-2 shift control valve
4. Control valve spring
5. 1-2 shift valve
6. Accumulator control valve
7. Accumulator valve
8. Valve plug
9. Retaining pin
10. 2-3 shift control valve
11. 2-3 shift control valve
12. Control valve spring
13. Spring seat
14. 2-3 shift valve
15. Retaining pin
16. Valve plug
17. 3-2 control valve spring
18. 3-2 control valve
19. Retaining pin
20. Retaining pin
21. Regulator valve spring
22. Detent pressure regulator valve
23. Reverse control valve
24. Manual low control valve
25. Control valve spring
26. Retaining pin
27. Manual valve
28. Timing valve spring
29. Low speed downshift timing valve
30. Valve plug
31. High speed downshift timing valve
32. Timing valve spring
33. Retaining pin
34. Retaining pin

VALVE BODY COMPONENTS

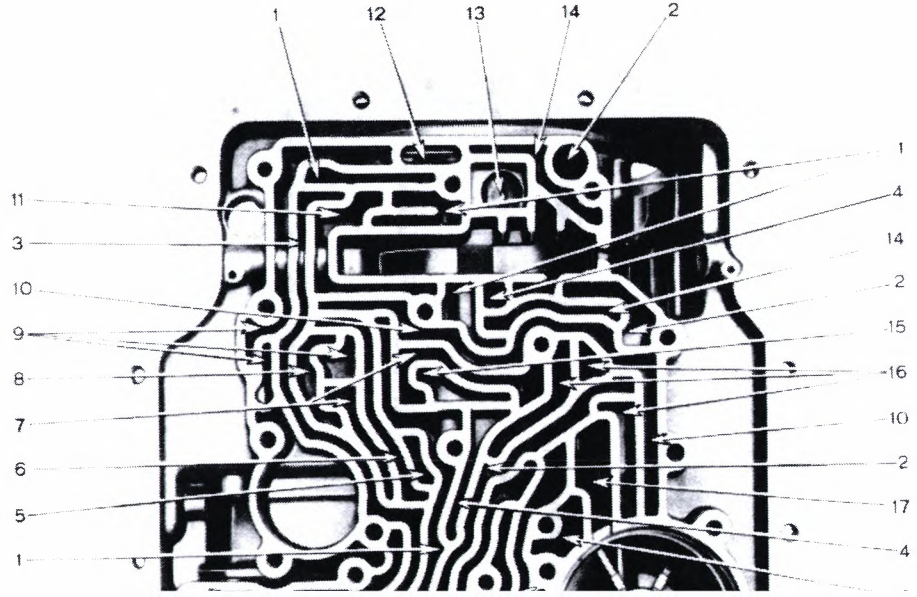
VALVE BODY PASSAGES (Top Side)

1. Second clutch
2. Exhaust
3. Drive
4. Governor
5. 1-2 accumulator
6. 2-3 exhaust
7. Regulator
8. 1-2 shift
9. Servo release
10. Low
11. Servo apply
12. Intermediate
13. Drive
14. Reverse
15. Modulator
16. Suction
17. Third clutch
18. Modulator or detent
19. Detent



TRANSMISSION CASE PASSAGES (Bottom Side)

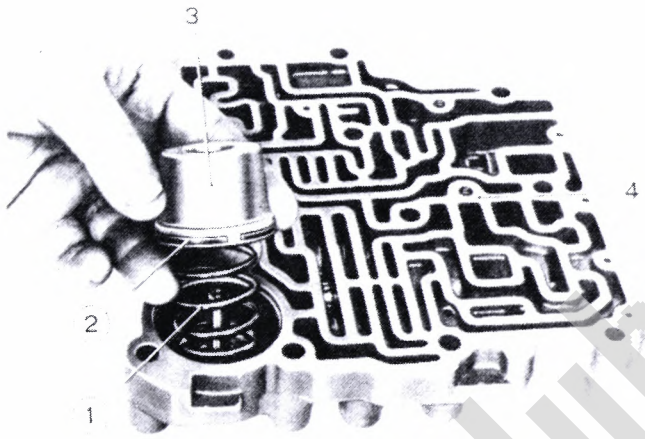
1. Modulator
2. Line
3. Detent
4. Regulator
5. 1-2 accumulator
6. Intermediate
7. Governor
8. Drive
9. Second clutch
10. Low
11. Third clutch
12. Boost
13. Suction
14. Reverse
15. 2-3 exhaust
16. Servo release



Install oil ring (2) on accumulator piston (3). Install spring (1) and piston in valve body (4).

Compress piston and install retaining ring. Use a small C clamp to compress piston.

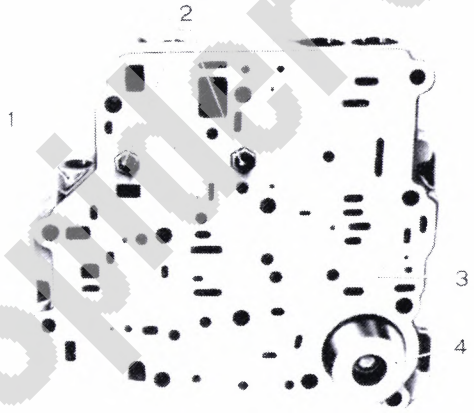
1. Spring 2. Oil ring 3. Accumulator piston 4. Valve body



Inspect transfer plate (3) for dents or distortion. Check particularly area that check balls in case contact transfer plate. Replace plate if necessary.

Install a new valve body gasket on body (1). Use six bolts to center up transfer plate with valve body. Bolt transfer plate (3) to body (1) with 2 bolts (2). Torque bolts (2) to 0.8 to 1.1 kgm (6 to 8 ft lbs).

1. Valve body 2. Bolts 3. Transfer plate 4. Accumulator piston



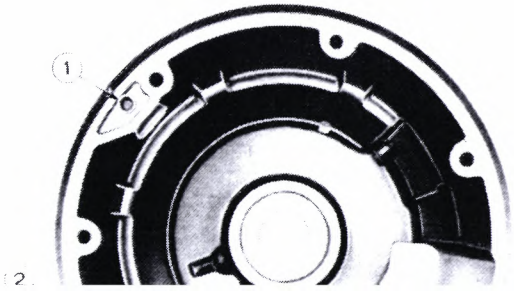
Case Disassembly, Inspection and Assembly

Inspect case for damage. Check that band anchor pins are retained properly and of equal height.

Inspect and clean oil passages in case. Use cleaning solvent and air.

Inspect bores for detent valve and modulator valves for scratches or scoring.

1. Case vent 2. Converter out 3. 2nd clutch 4. 3rd clutch

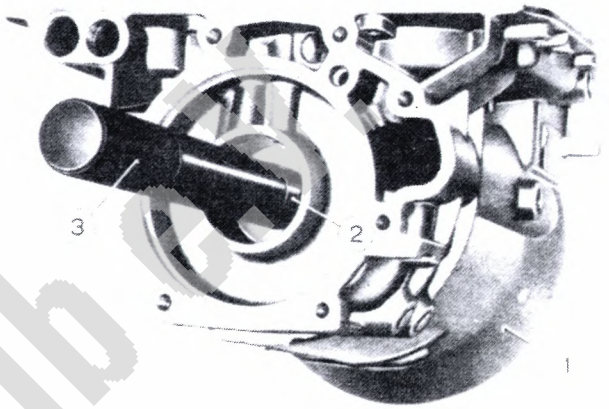


Inspect bushing inside rear of case. If damaged, remove bushing. Use tool 23130-3 and handle.

Inspect bushing sleeve for sun gear drum inside case for scoring. If damaged, remove sleeve by grinding. Be very careful when grinding to prevent damage to aluminum case.

Install new sleeve. Use installer 32130-7 and handle. Install new bushing. Use installer 23130-3 and handle. Make sure bushing is flush with case at rear.

1. Case 2. Tool 23130-3 3. Handle



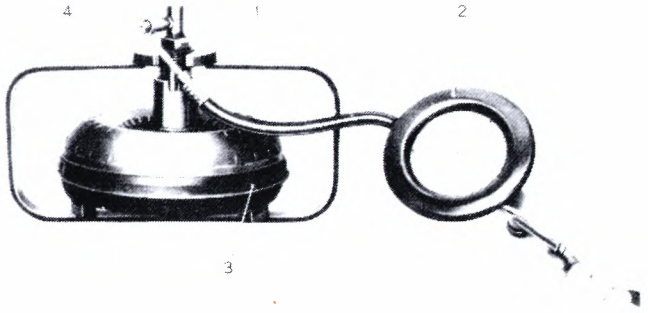
Torque Converter Inspection

Drain converter. Check fluid for clutch material or foreign matter. If foreign matter or clutch material is found, replace converter. Converter cannot be cleaned properly.

Check hub surfaces of converter for scoring or wear.

If available, use tool to check converter for leaks. Apply 71 to 85 psi air pressure to tool. Submerge converter in water. Check for leaks.

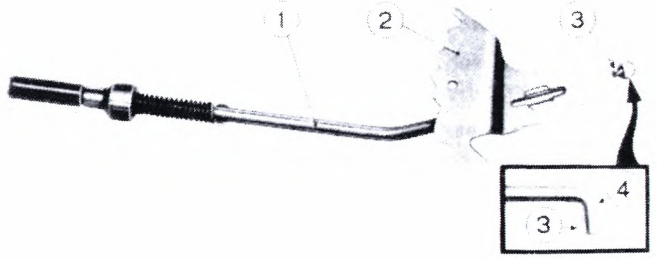
1. Tool for checking converter 2. Air gauge 3. Converter 4. Gauge fitting



Selector Lever and Shaft Installation

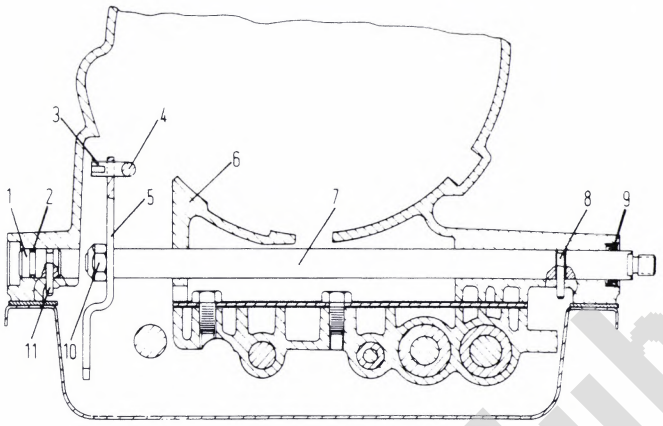
Install selector lever (2) on parking lock actuator (1) by aligning tab (3) on actuator with slot lever. Place actuator with lever in case.

1. Parking lock actuator 2. Selector lever 3 & 4. Tab



Install new oil seal (9) in case (6). Insert selector lever shaft (7) thru case from outside. Be careful not to damage oil seal (9). Install retaining pin (8) thru case and shaft.

Position selector lever (5) over shaft (7). Secure lever to shaft with nut (10). Torque nut (10) to 1.1 to 1.5 kgm (8 to 11 ft lbs).



1. Plug 2. Gasket 3. Tab 4. Parking lock actuator 5. Selector lever 6. Case 7. Shaft 8. Retaining pin 9. Oil seal 10. Nut 11. Retaining pin

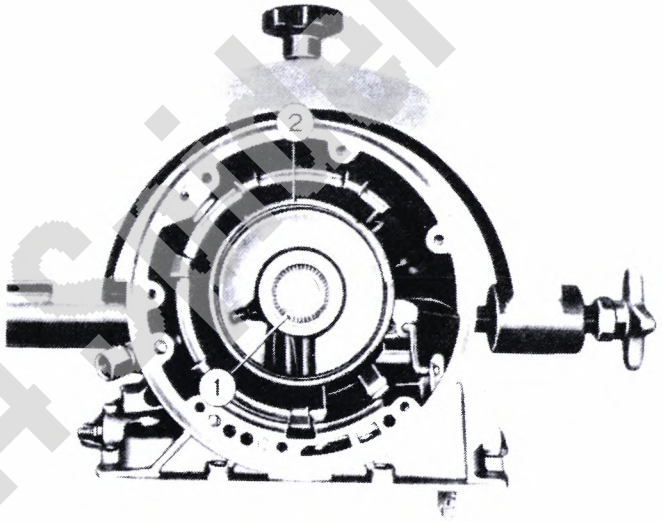
REASSEMBLY

Turn transmission so that front of case is up.

Inspect band for cracks, flaking, burring or looseness. Replace, if necessary.

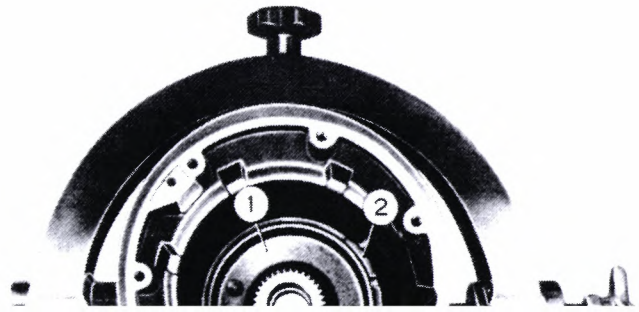
Place band in case. Locate band so that tabs on outer edges of band seat against anchor pins in case.

Place race for thrust bearing on rear of case. Secure with petroleum jelly. Place thrust bearing on race. Secure with petroleum jelly.



1. Needle bearing 2. Low band

Install reaction sun gear and drum (1) into band (2) with sun gear up. Place thrust bearing on sun gear. Place race on thrust bearing. Secure with petroleum jelly.

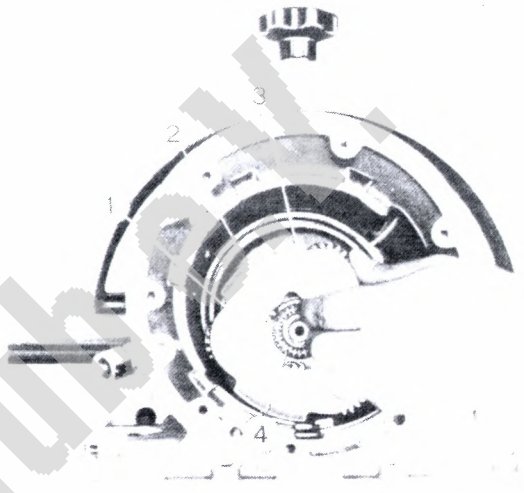


1. Reaction sun gear and drum 2. Low band

Place thrust washer in carrier (1). Place thrust bearing (4) on washer.

Install output shaft and planetary carrier (1) into case to spline with reaction sun gear.

1. Planetary carrier 2. Low band 3. Reaction sun gear and drum
4. Thrust bearing

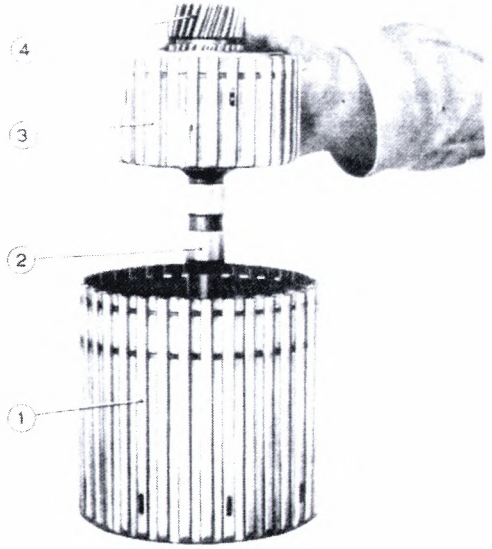


On the bench, align clutch plates in second clutch drum (1).

NOTE: Check that thrust washer is seated correctly on second clutch hub.

Insert third clutch drum (3) and input shaft (2) thru top of drum (1). Seat splines of drum (3) into splines of clutch plates inside drum (1).

1. Second clutch drum 2. Input shaft 3. Third clutch drum
4. Input sun gear



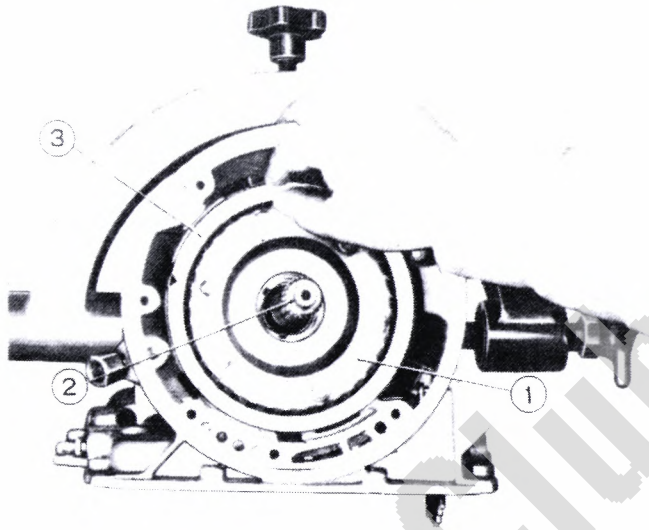
Hold clutch assemblies (2) by input shaft (1). Lower assembly into case. Turn drum and shaft to align ring gear and input sun gear with planetary pinions.

1. Input shaft 2. Clutch assemblies 3. Selective thrust washer

Inspect clutch plates for third clutch. If plates are worn, scored, or burned, replace the pack.

Place steel reaction plate (3) in case. Place reverse clutch steel plate, composition plate, steel plate, composition plate, etc. into case. Use a liberal amount of transmission fluid.

Place reverse clutch cushion plate (wave washer) in case.

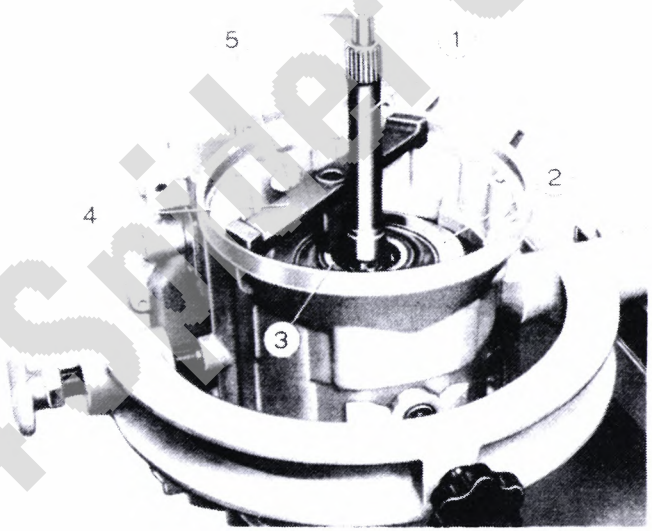


1. Third clutch drum 2. Input shaft 3. Reaction plate

Place gauging tool 23085 (4) on case flange against input shaft (1).

Loosen thumb screw (5) on tool. Allow inner shaft to drop on second clutch drum (3). Tighten thumb screw and remove tool.

Place selective washer against inner shaft of tool. Washer should be flush with top face of shaft. If not, select next larger or smaller washer until correct size is obtained.



1. Input shaft 2. Reverse clutch plate 3. Second clutch drum
4. Gauging tool 23085 5. Thumb screw

The washer selected should be exactly flush or slightly below inner shaft for correct end play in transmission.

NOTE: Selective washer removed from transmission may be oil soaked and discolored.

Selective Washer Chart

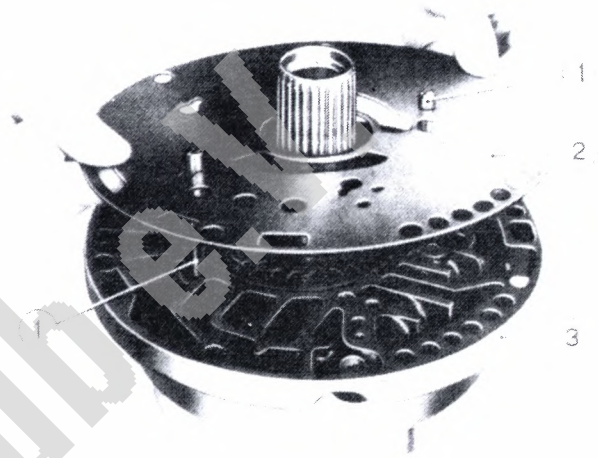
	Identification Code	Thickness
No.	Color	Inch
2	Yellow	0.070 to 0.074
3	Blue	0.076 to 0.080
4	Red	0.081 to 0.085
5	Brown	0.086 to 0.090
6	Green	0.091 to 0.095
7	Black	0.097 to 0.101

Install two gears into oil pump (3) noting topside marks made at disassembly.

Place wear plate (2) on oil pump (3).

Insert guide pins (1) in oil pump for alignment of converter housing.

1. Guide pins 2. Wear plate 3. Oil pump



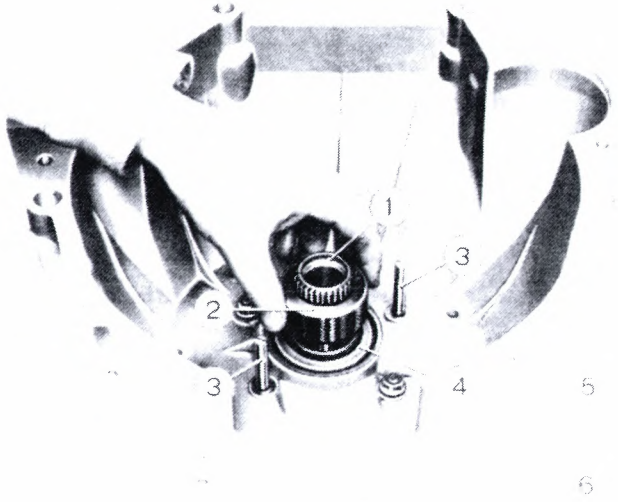
Lower converter housing (5) onto oil pump (6).

Install new sealing washers on 5 bolts for converter housing. Remove guide pins (3). Loosely install bolts thru housing (5) into oil pump.

Install aligning tool 23082 (2) on the shaft (1) to align housing to pump. Tool should bottom on oil pump gear.

Tighten bolts "finger tight" only.

1. Converter stator support shaft 2. Tool 23082 3. Guide pins
4. Oil seal 5. Converter housing 6. Oil pump

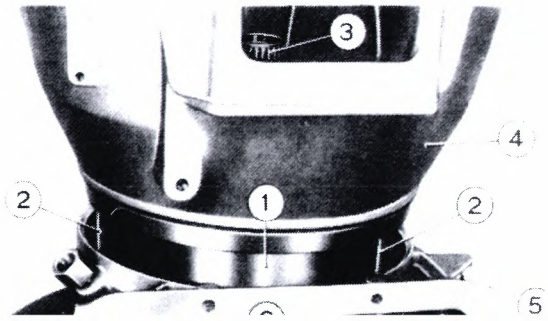


Install new rubber oil seal on converter housing (4). Install new gasket on pump flange.

Place selective washer, previously selected, on oil pump shaft. Use petroleum jelly to secure it.

Install 2 glide pins (2) in case. Lower converter housing (4) and oil pump onto case. Place new sealing washers on 7 bolts. Remove glide pins. Loosely install 7 case bolts.

Torque outer 7 bolts to 3 to 3.6 kgm (22 to 26 ft lbs) and torque 5 bolts to 1.8 to 2.3 kgm (13 to 17 ft lbs). Remove tool 23082.

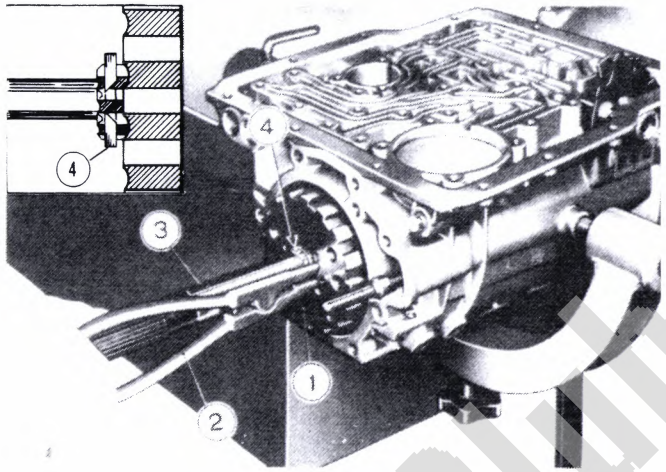


Turn case so that bottom of case is facing up.

Stagger seal ring gaps on hub.

Slide governor hub (1) along output shaft (3). Seat hub in case. Secure hub with snap ring (4), narrow side towards rear or outwards.

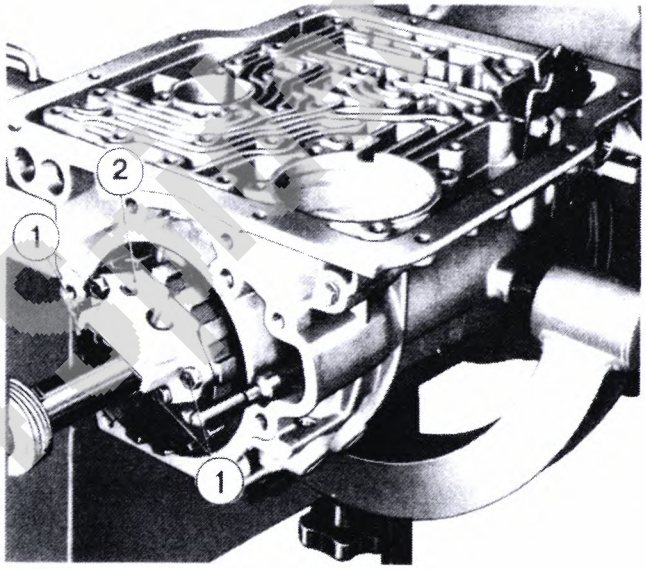
1. Governor hub 2. Pliers 3. Output shaft 4. Snap ring

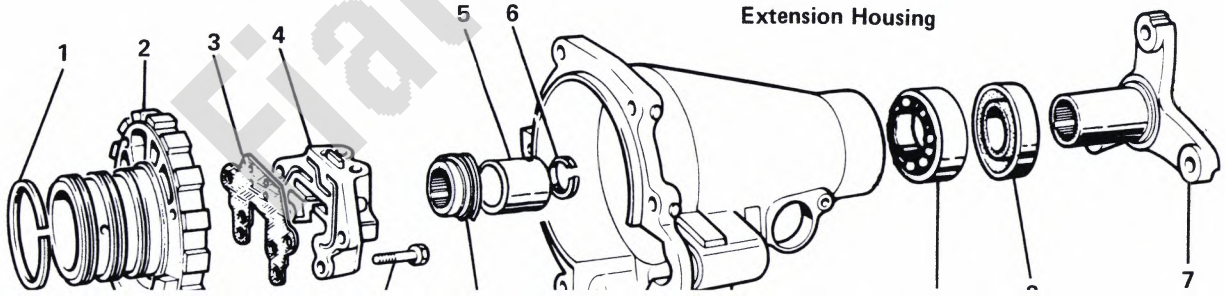


Place new gasket on governor body (2). Secure governor (2) to hub with four bolts (1). Torque bolts to 6 to 8 ft lbs (0.8 to 1 kgm). Check that valves in governor body move freely after bolts are torqued.

Slide speedometer drive gear and collar into position on shaft. Install snap ring.

1. Bolts 2. Governor





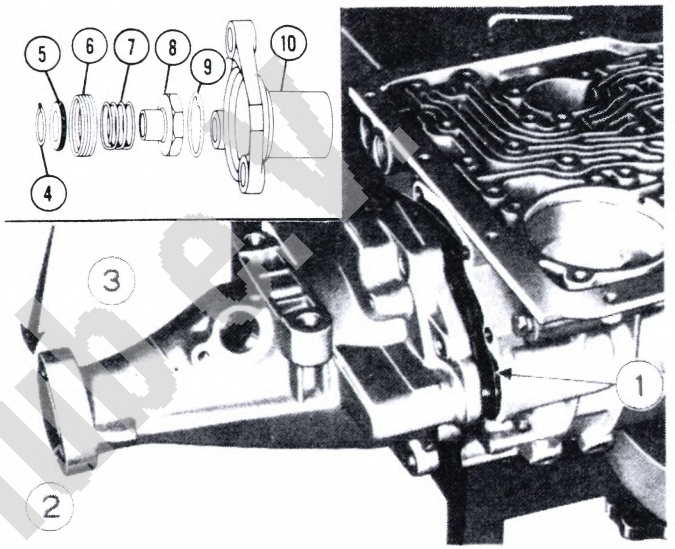
Install new gasket (1) on case. Slide extension housing (3) over output shaft. Align parking lock actuator with extension housing. Align bolt holes. Install 7 bolts. Torque bolts to 2.8 to 3.5 kgm. (20 to 25 ft lbs).

Slide output yoke (10) onto output shaft.

Install washer (9) and nut (8) on end of output shaft. Torque nut to 108 ft lbs (15 kgm).

Install spring (7), seal (6), ring (5) and snap ring (4) on end of output shaft.

1. Gasket 2. Output shaft seal 3. Rear housing 4. Snap ring
5. Ring 6. Seal 7. Spring 8. Nut 9. Washer 10. Output yoke



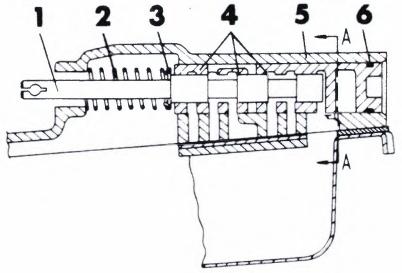
Replace "O" ring on detent valve sleeve (4). Coat parts with transmission fluid.

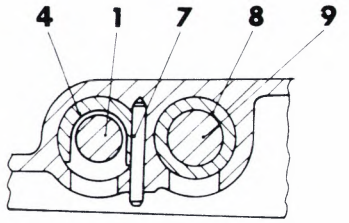
Place spring seat (3) and spring (2) on detent valve (1). Install valve in sleeve (4). Install sleeve (4) in case with slots in sleeve facing oil pan.

Align groove in sleeve (4) with retaining pin bore. Use a 3/8 inch drive tool inserted in end of sleeve.

Depress valve spring and sleeve (4). Install retaining pin (7) thru case and sleeve. Make sure pin is inserted into groove in sleeve and not into one of the oil passage slots.

1. Detent valve 2. Spring 3. Spring seat 4. Sleeve 5. Case
6. O ring 7. Retaining pin 8. Modulator valve sleeve 9. Modulator valve



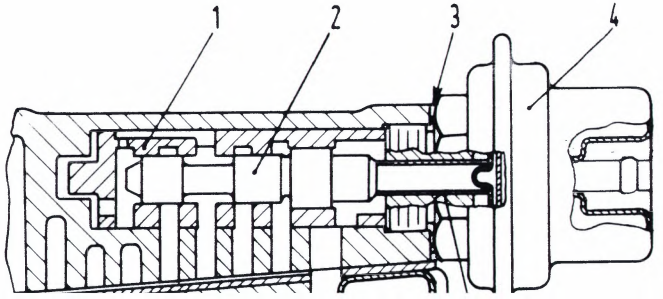


A-A

Install modulator valve (2), small end first into sleeve (1). Install sleeve in case.

Place new gasket (3) on modulator (4). Install plunger (5) in modulator. Thread modulator (4) into case. Tighten with wrench J23100.

1. Modulator valve sleeve 2. Modulator valve 3. Gasket
4. Modulator 5. Plunger

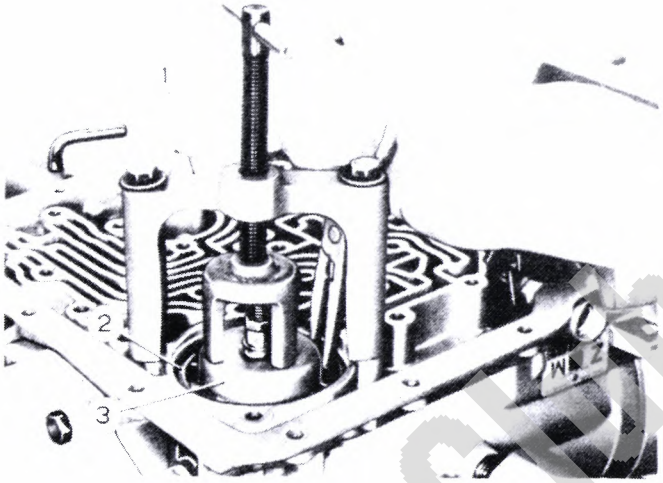


Coat servo parts with transmission fluid.

Install servo apply rod, spring, and piston into case.

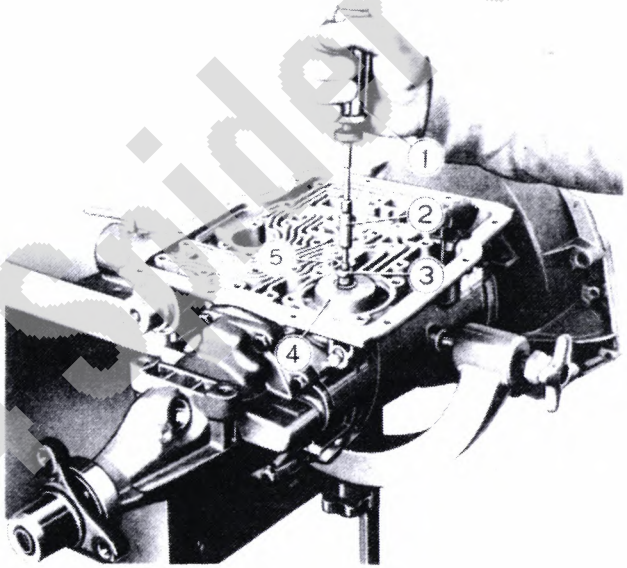
Install compressor tool 23075 (1) on case. Make sure legs of tool are straight. Turn tool down to compress piston (3). Lightly tap on piston while compressing until piston is seated to prevent damage to oil ring. Install retaining ring (2). Remove tool 23075 carefully, insuring retaining ring has seated.

1. Compressor tool 2. Retaining ring 3. Servo piston



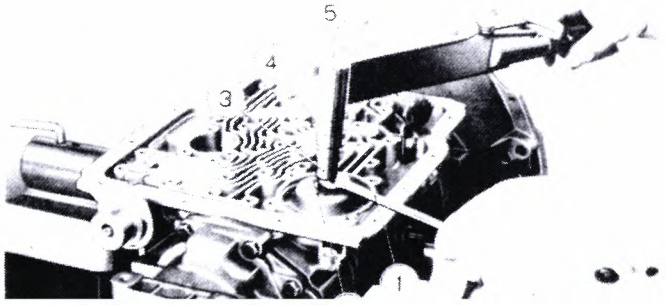
Using a 3/16" hex head wrench on servo adjusting bolt, adjust servo apply rod. Torque adjusting bolt to 46 kgcm (40 in lbs). Back off bolt exactly 4 turns.

1. Torque wrench 2. Adapter 3. Lock nut 4. Servo piston
5. Adjusting bolt



Hold sleeve of servo piston with a wrench on flats. Using 9/16 inch socket and torque wrench, torque lock nut to 1.7 to 2.1 kgm (12 to 15 ft lbs).

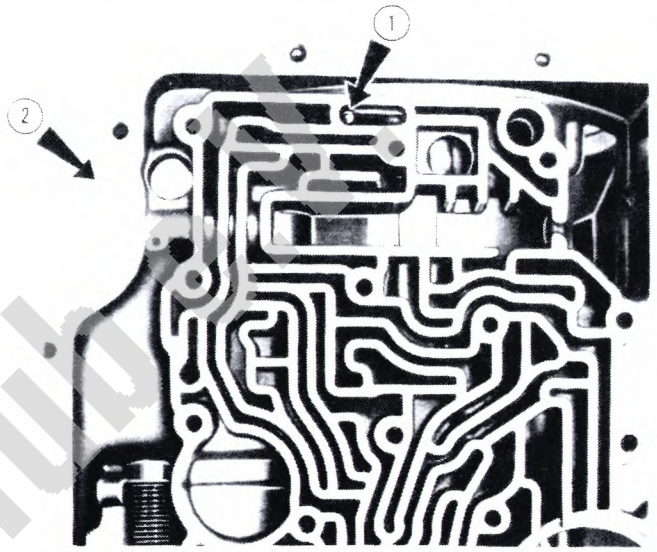
1. Wrench 2. Servo piston 3. Socket 4. Extension 5. Torque wrench



Clean check ball with lint-free rag.

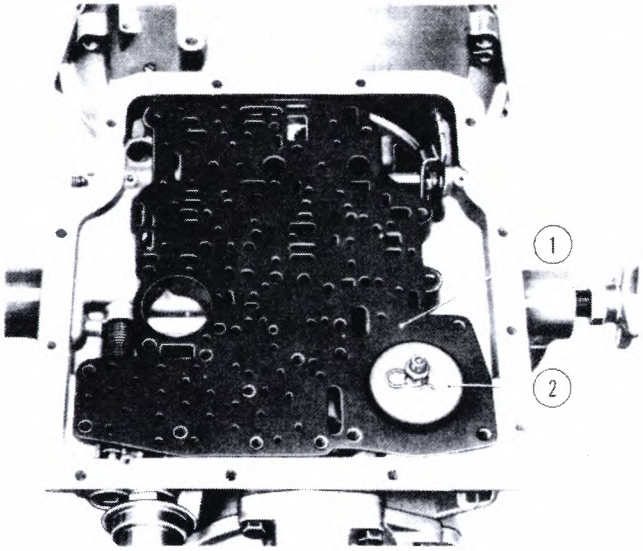
Insert ball in oil passage of transmission case as shown by arrows.

1. Check ball 2. Transmission case



Install new gasket (1) on case.

1. Gasket 2. Servo piston

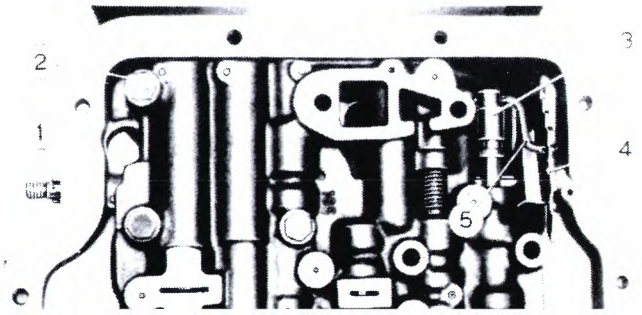


Coat manual valve with transmission fluid. Install manual valve (3) in valve body. Install long side of link (5) in manual valve.

Install small end of link (5) into selector lever (4) and position valve body and transfer plate onto large gasket and casing.

Loosely install 8 bolts (2) holding valve body to transmission case.

1. Selector lever shaft 2. Bolt 3. Manual valve 4. Selector lever 5. Link



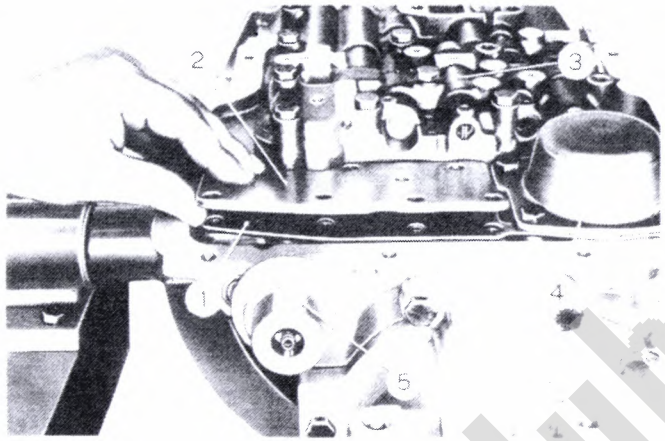
Install gasket for servo cover (4) on transfer plate (1). Install cover (4) with 4 bolts.

Install reinforcement plate (2) on transfer plate (1). Secure plate with 8 bolts. Torque bolts for valve body (3) to 1.8 to 2.1 kgm (13 to 15 ft lbs). Torque bolts from center working outward.

Torque bolts for reinforcement plate (2) to 1.8 to 2.1 kgm (13 to 15 ft lbs).

Torque bolts for servo cover (4) to 2.3 to 2.6 kgm (17 to 19 ft lbs).

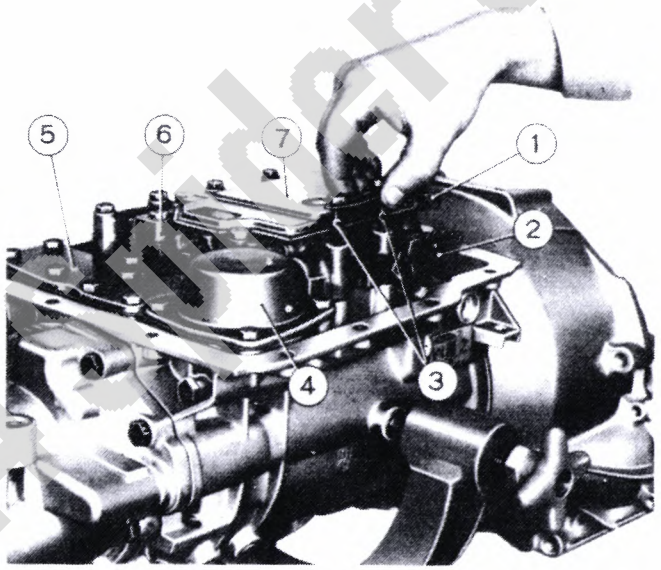
1. Transfer plate 2. Reinforcement plate 3. Valve body
4. Servo cover 5. Modulator



Place oil filter gasket on valve body. Install filter on valve body (6) with 3 bolts. Torque bolts to 1.8 to 2.1 kgm (13 to 15 ft lbs).

Install manual detent spring (1) with 2 bolts (3). Torque bolts to 1.8 to 2.1 kgm (13 to 15 ft lbs).

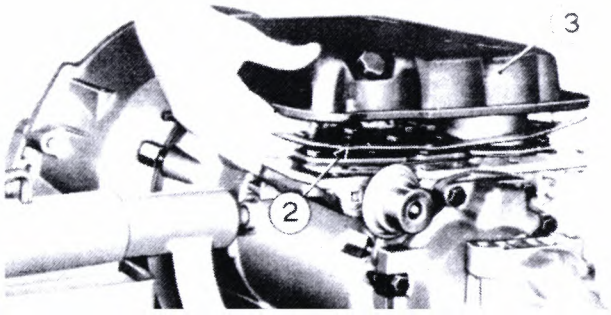
1. Detent spring 2. Selector lever 3. Bolts 4. Servo cover
5. Reinforcement plate 6. Valve body 7. Oil filter



Install new gasket (2) for oil pan (3). Secure pan to case with 12 bolts. Torque bolts to 1 to 1.3 kgm (7 to 10 ft lbs).

Install output shaft flange, sliding it on by hand.

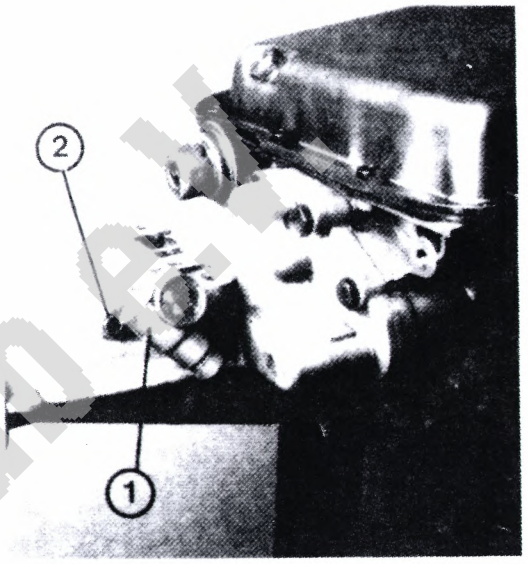
1. Tool 2. Gasket 3. Oil pan



Slide torque converter over stator shaft and input shaft. Make sure keyway on converter hub is seated into drive lugs on oil pump. Rotate converter to check that it is fully seated.

Install gasket, speedometer driven gear (1), bolt (2), and lockwasher.

1. Speedometer driven gear 2. Bolt

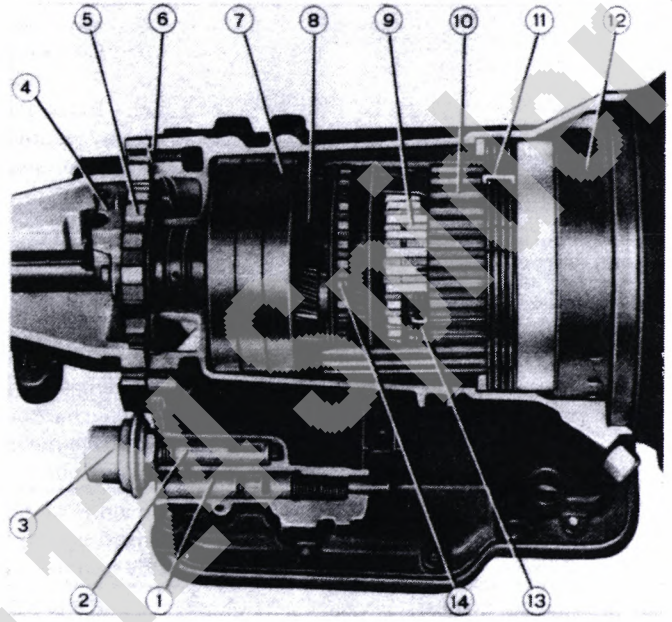


TRANSMISSION BOLT TORQUE CHART

DESCRIPTION	TORQUE	
	Kgm	Ft lb
Bolt, oil pan to case	1.0 to 1.3	7 to 9
Bolt, filter to case	1.8 to 2.1	13 to 15
Bolt, reinforcement plate to case	1.8 to 2.1	13 to 15
Bolt, valve body to case	1.8 to 2.1	13 to 15
Bolt, transfer plate to valve body	0.8 to 1.1	6 to 8
Bolt, servo cover to body	2.3 to 2.6	17 to 19
Bolt, converter housing to case	3.0 to 3.6	22 to 26
Bolt, converter housing to oil pump	1.8 to 2.3	13 to 17
Nut, selector lever to shaft	1.1 to 1.5	8 to 11
Bolt, governor body to governor	0.8 to 1.0	6 to 7
Bolt, extension housing to case	2.8 to 3.5	20 to 25
Bolt, servo adjusting	0.46	3.3 (40 in lb)
Nut, lock, servo adjusting bolt	1.7 to 2.1	12 to 15
Screw, lock plate to planetary carrier	0.4 to 0.5	2.5 to 3.2 (29 to 38 in lb)

COMPONENT OPERATION CHART

Selector Lever Position	Gear Engaged	Reverse Clutch	Second Clutch	Third Clutch	Band	Sprag Clutch Locked	Parking Pawl
P	Park						X
R	Reverse	X		X			
N	Neutral						
D	1st Gear				X	X	
	2nd Gear		X		X		
	3rd Gear		X	X			
2	1st Gear				X	X	
	2nd Gear		X		X		
1	1st Gear			X	X		



1. Kick Down valve
2. Modulator sleeve
3. Modulator
4. Governor
5. Governor hub
6. Gasket
7. Band
8. Planetary carrier
9. Third clutch drum
10. Second clutch drum
11. Reverse clutch discs
12. Pump body
13. Third clutch discs
14. Ring gear

OIL PRESSURE CHECKS

To check oil pressures of transmission, connect pressure gauge 5907 to transmission. Connect vacuum gauge in vacuum line to modulator. Position gauge inside car so it can be read during driving. Start engine and operate car until engine and transmission reach normal operating temperature. Check that engine is running properly.

Normal Oil Pressure Check:
With selector in D, and engine at idle (750 to 850 rpm), check that the oil pressure is 61 to 70 psi (4.3 to 4.9 Kg/cm2).

Modulator Oil Pressure Check:
Drive car with selector in D and accelerator pedal down past KICK-DOWN position. Check that transmission shifts up when oil pressure reads 108 to 119 psi (7.5 to 8.4 Kg/cm2). Vacuum gauge should read 0.86 in/Hg (25 mm/Hg).

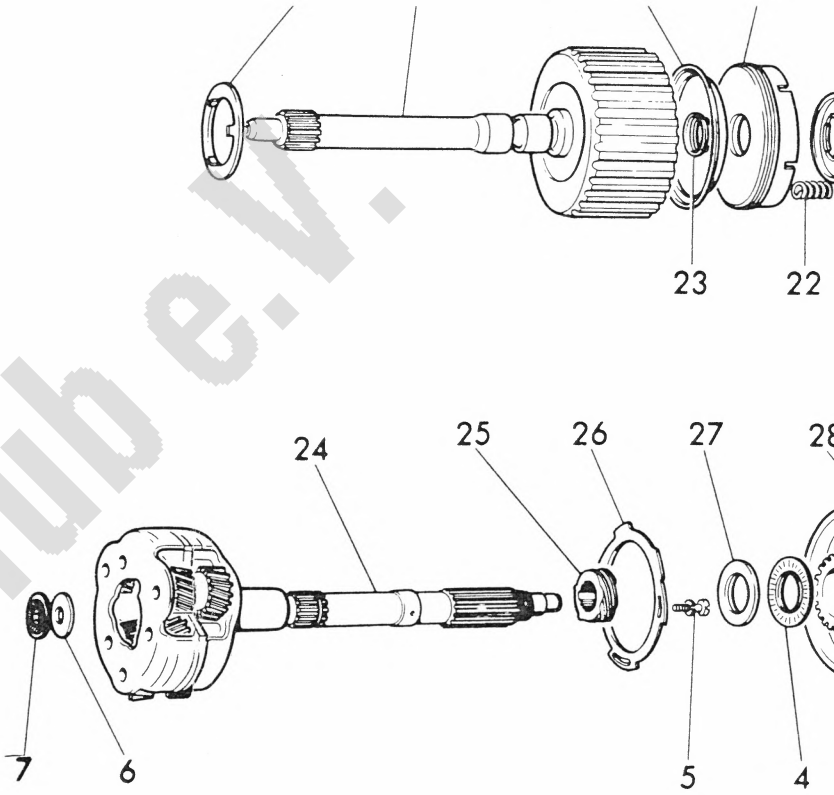
Regulator Boost Oil Pressure Check:
Place selector in 1 with car stopped. Check that oil pressure is 98 to 109 psi (6.9 to 7.7 Kg/cm2) with approximately 12 in/Hg (305 mm/Hg) of vacuum.

TROUBLE DIAGNOSIS

CONDITION	POSSIBLE CAUSE
Low oil level	1. Oil coming out of filler tube 2. External oil leak 3. Failed vacuum modulator diaphragm
Oil coming out of filler tube	1. Oil level too high 2. Water in oil 3. External vent clogged 4. Leak in pump suction circuit
External oil leaks	1. Converter housing area a. Leaking converter b. Converter housing seal (front seal) c. Sealing washers under converter housing to case bolts d. Sealing washers under converter housing to pump bolts e. Converter housing to case seal
	2. Case and extension area a. Shifter shaft seal b. Extension seal c. Oil pan gasket d. Filler tube O-ring (bottom of tube) e. Extension to case gasket f. Vacuum modulator gasket g. Drain plug gasket h. Cooler line fittings i. Speedo drive housing gasket
Excessive smoke coming from exhaust	1. Failed modulator diaphragm
No drive in any selector position	1. Low oil level 2. Clogged suction screen 3. Inner manual valve linkage disconnected 4. External linkage disconnected 5. Input shaft broken 6. Pressure regulator stuck in open position 7. Failed pump
No forward drive	1. Band worn or adjustment loose 2. Band servo piston stuck 3. Band servo seal ring cracked
No drive in D or 2 but drive in 1 and R	1. Input sprag installed backwards 2. Input sprag failure
No drive in R. Drive in all other ranges	1. Reverse clutch failure
Drive in neutral	1. Selector lever linkage improperly adjusted 2. Planetary carrier broken (lock-up) 3. Band improperly adjusted (too tight)
Low oil pressure	1. Low oil level 2. Clogged suction screen 3. Leak in pump suction circuit 4. Internal leak in pressure circuit 5. Priming valve stuck

TROUBLE DIAGNOSIS (cont'd)

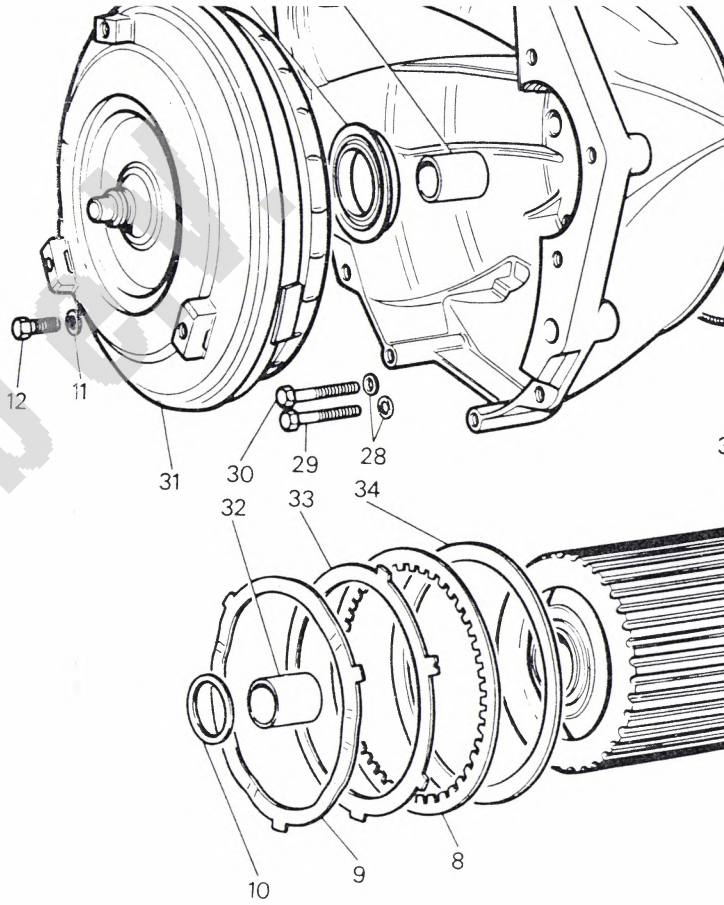
CONDITION	POSSIBLE CAUSE
Will not shift at any speed	1. Governor valves stuck 2. 1-2 shift valve stuck in downshifted position 3. Large leak in governor pressure passage
Upshifts only at part throttle	1. Detent pressure regulator valve stuck 2. Detent cable broken or misadjusted
Upshifts only at full throttle	1. Modulator valve stuck 2. Failed modulator diaphragm 3. Broken or disconnected vacuum line to modulator 4. Engine vacuum leak
Will not make part throttle 3-2 downshift at lower car speeds	1. 3-2 downshift control valve stuck
Only upshifts from 1 to 2	1. 2-3 shift valve stuck
Sudden engagement after an increase in rpm	1. Band servo piston binding
Slipping 1-2 upshifts	1. Low oil pressure 2. 1-2 accumulator valve stuck 3. Second clutch piston seals leaking 4. Second clutch piston centrifugal ball stuck open 5. Second clutch piston cracked or broken
Slipping 2-3 upshifts	1. Low oil pressure 2. Third clutch piston seals leaking 3. Third clutch piston centrifugal ball stuck open 4. Third clutch piston cracked or broken 5. Input shaft bushing worn
Abrupt 1-2 upshift	1. High oil pressure 2. 1-2 accumulator valve stuck 3. Governor valves stuck
Abrupt 2-3 upshift	1. High oil pressure 2. Governor valves stuck
Abrupt 3-2 forced downshift at high speed	1. High speed downshift timing valve stuck open
Abrupt 3-2 coast downshift	1. Low speed downshift timing valve stuck open



1. Bolt
2. Thrust bearing race
3. Bushing
4. Thrust bearing
5. Screw and washer
6. Thrust washer
7. Thrust bearing
8. Thrust washer
9. Input shaft
10. Oil seal
11. Third clutch piston

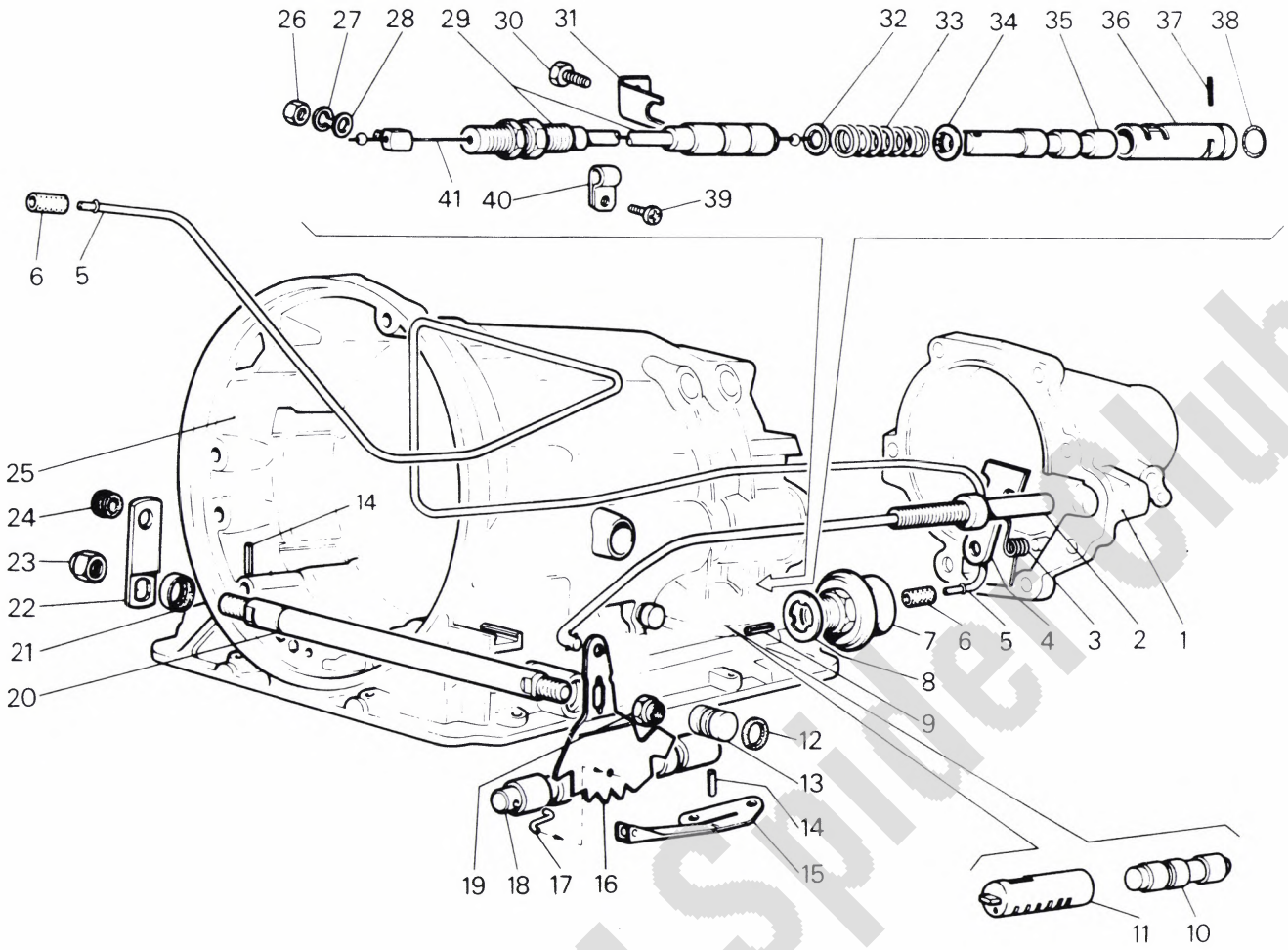
12. Spring
13. Thrust
14. Wave
15. Clutch
16. Sprag
17. Retain
18. Outer
19. Input
20. Clutch
21. Snap r
22. Clutch

THIRD CLUTCH, PLANETARY CARRIER, RE



1. Retaining ring
2. Clutch plate
3. Thrust washer
4. Snap ring
5. Clutch spring
6. Oil seal
7. Second clutch drum
8. Clutch plate
9. Wave washer
10. Selective washer
11. Washer
12. Bolt
13. Oil seal
14. Bushing

TORQUE CONVERTER, C



1. Extension housing
2. Parking lock actuator
3. Spring
4. Parking pawl
5. Vacuum tube
6. Hose
7. Modulator
8. Gasket
9. Plunger
10. Modulator valve
11. Sleeve
12. Gasket
13. Plug
14. Retaining pin
15. Detent spring
16. Selector lever
17. Link
18. Manual valve
19. Nut
20. Shaft
21. Seal
22. Control lever
23. Nut
24. Washers
25. Main case
26. Nut
27. Lockwasher
28. Washer
29. Kickdown cable
30. Bolt
31. Support
32. Washer
33. Spring
34. Spring seat
35. Detent valve
36. Sleeve
37. Retaining pin
38. Oil seal
39. Screw
40. Clamp
41. Cable

BRAKE BAND ADJUSTMENT

Adjust brake band in car as follows:

Drain transmission oil.

Remove sump and gasket.

Remove servobrake cover (15).

Loosen locknut (14) of adjusting screw (13).

Using torque wrench and socket tighten screw (13) to 40 in lb (46 kgm).

Then back off screw five turns.

Tighten locknut (14) to 12 to 15 ft lbs (1.7 to 2.1 kgm). Hold sleeve (5) and screw (13) to prevent rotation.

Install servobrake cover (15).

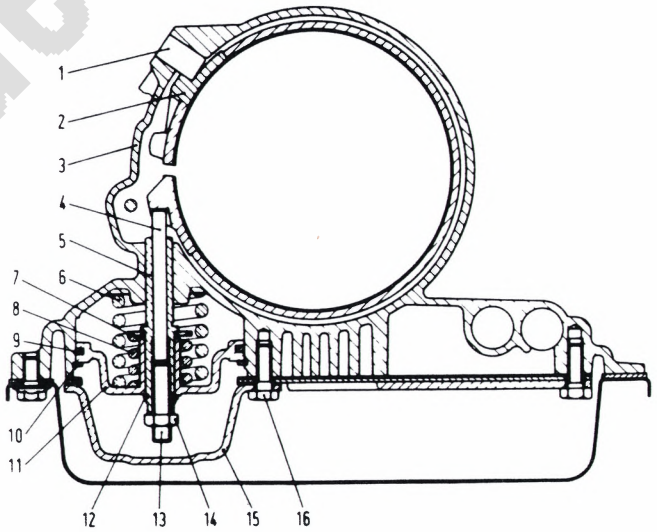
Use a new gasket. Tighten bolts (16) to 17 to 19 ft lbs (2.3 to 2.5 kgm).

Install oil sump with new gasket. Tighten attaching bolts to 7 to 9 ft lbs (1 to 3 kgm).

Fill transmission with oil.

NOTE: The correct adjustment of the brake band is not confined to clearance between band and drum but includes the correct preload setting of the servobrake release spring. The servobrake acts as an accumulator for oil directed to the reverse clutch when shifting from intermediate to high gear. Therefore the band adjustment directly affects the operation of the rear clutch.

1. Brake band anchoring pin
2. Brake band
3. Transmission main case
4. Brake actuating rod
5. Sleeve
6. Release spring
7. Damping spring seat
8. Damping spring
9. Piston ring
10. Retainer
11. Piston
12. Circlip
13. Adjusting screw
14. Nut
15. Servobrake cover
16. Cover bolt

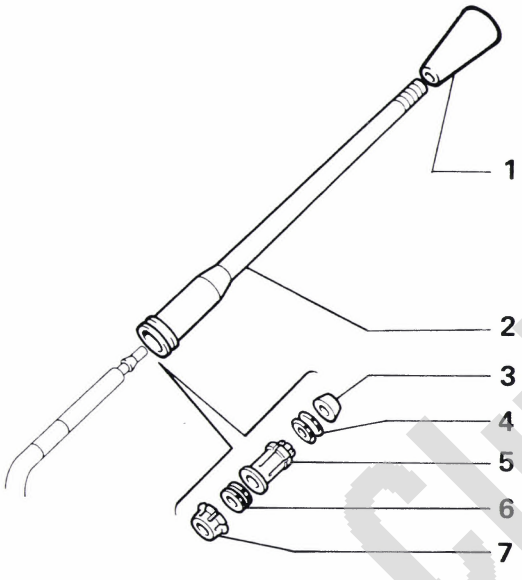


MANUAL TRANSMISSION LINKAGE

REMOVAL AND INSTALLATION

Refer to Manual Transmission portion in this section for removal and installation.

1. Knob 2. Upper half of gearshift lever 3. Shoulder block
4. Rubber bushing 5. Spacer 6. Rubber bushing 7. Plastic retainer



AUTOMATIC TRANSMISSION LINKAGE

ADJUSTMENT (Carburetor Vehicles Only)

Refer to illustration on facing page.

The travel of accelerator pedal between positions I and III is divided into two parts (Travel "A" and "B"). Travel "A" is from pedal released (position I) up to wide open throttle (position II). Travel "B" is from wide open throttle (position II) up to travel stop (position III). This additional travel is accomplished by overcoming the action of the spring in the telescoping link (3). Travels "A" and "B" must be adjusted together since they make up the total travel "D" and are interdependent. Pedal travel is limited by stops (15 and 16).

The correct setting for KICK-DOWN is when the telescoping link (3) has extended 0.276 to 0.354 in (7 to 9 mm) with the carburetor butterfly full open and the accelerator pedal against stop (15).

Checking and Adjusting Travel

Disconnect telescoping link (3) from control lever (1).

Push accelerator pedal (13) down until ball end (6) on cable (7) is just touching cable pin (5). Push pedal to stop (15). Check that cable (7) has extended 0.276 to 0.354 in (7 to 9 mm).

If cable travel is not correct, adjust nuts (10).

Push pedal (13) to stop (15).

Hold control lever (1) in full throttle (position II). Extend telescoping link (3) 0.315 to 0.393 in (8 to 10 mm). Check that link can be connected to control lever (1) when extended.

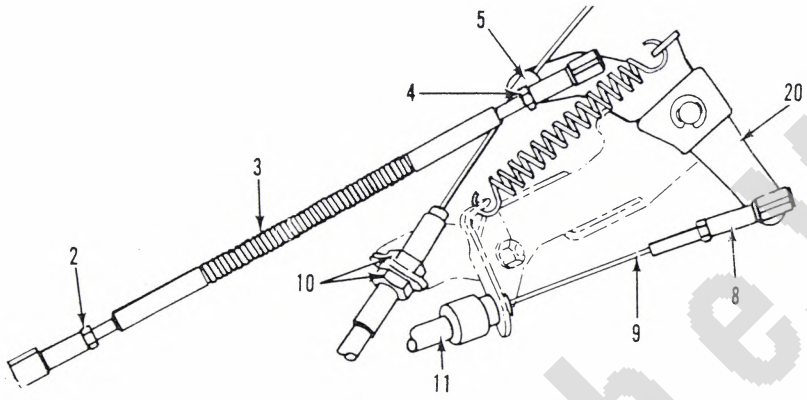
If link cannot be connected, loosen nuts (2 and 4) and adjust link (3).

Release accelerator pedal until ball end (6) is just touching cable pin (5). Move control lever (1) to full throttle (position II). Check that telescoping link (3) can be connected to control lever (1) without extending.

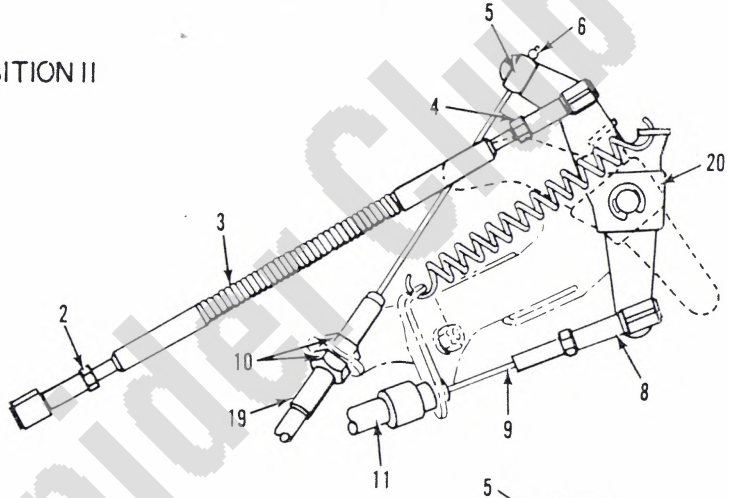
If link cannot be connected, loosen nuts (2 and 4) and adjust link (3).

When adjusting link (3) make equal adjustments at each end. Adjusting only one end could cause that end to run out of threads.

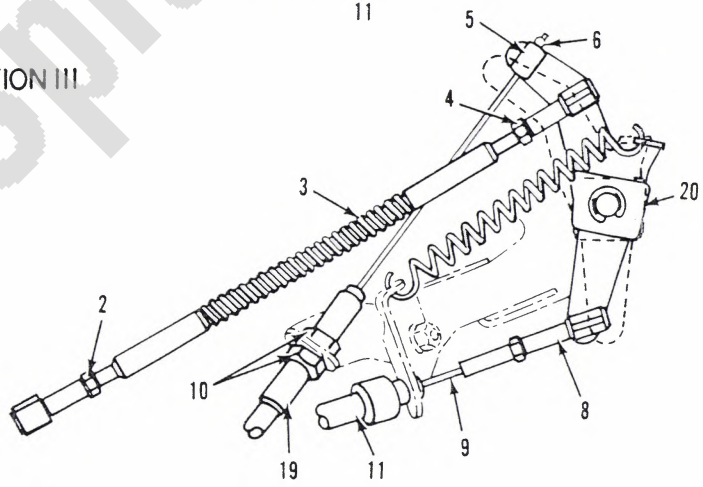
NOTE: For correct adjustment it is necessary for the kick-down valve to move its specified travel when accelerator pedal is fully depressed (position III).

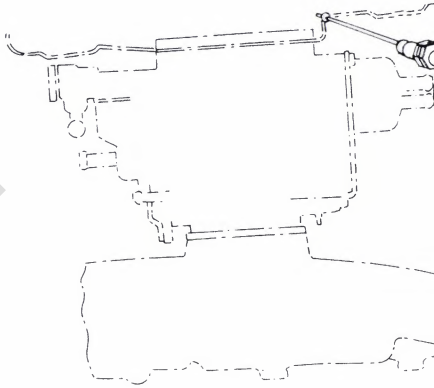


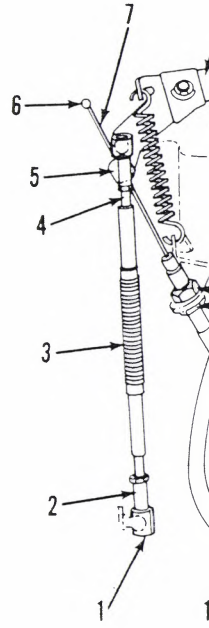
POSITION II



POSITION III







1. Control lever
2. Adjusting nut
3. Telescoping link
4. Adjusting nut
5. Cable pin
6. Ball end
7. Kick-down cable

THROTTLE AND KICK-DOWN CABLE

ADJUSTMENT (Fuel Injection Only)

Make sure engine idle speed is set correctly (Refer to Engine Section).

Throttle Cable

Check for cable slack at the cable housing support on the intake manifold.

Pull back lightly on the cable housing until just prior to moving throttle lever. Check for approximate clearance of 1 mm between adjustment nuts and support.

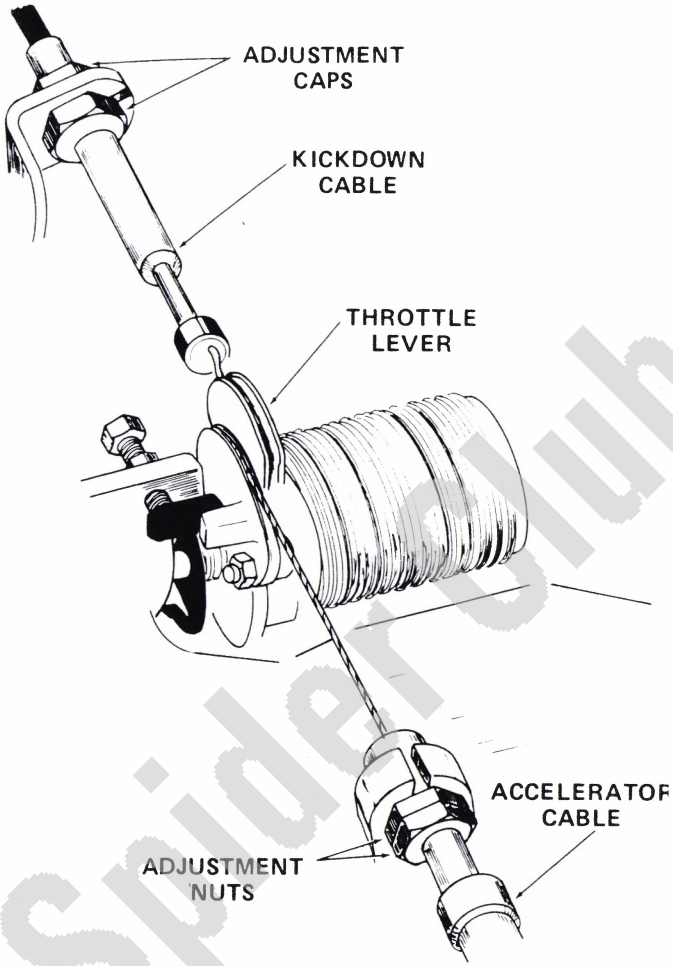
If necessary, adjust nuts to obtain clearance.

Kick-Down Cable

Depress throttle cable until lever contacts the maximum opening stop. Check that kick-down cable starts to pull at this point.

Fully depress throttle. Check that kick-down cable extends 9 to 11 mm.

If necessary, adjust nuts on housing to obtain correct extension of cable.



SELECTOR VALVE LINKAGE

ADJUSTMENT

Refer to illustration on facing page.

This adjustment may be required to correct a loose condition in linkage or as a result of power plant taking some set on rubber mounts.

A misadjustment of linkage will eventually affect selector lever (3), so that movement of lever will fail to affect a corresponding movement of selector valve.

To adjust linkage, proceed as follows:

- Disconnect tie rod (13) from relay lever (10) and set this in position [P].
- Set lever (14) in position [P] (all the way back): to check that this position is correct, make sure vehicle is blocked.
- Adjust length of rod (13), if necessary, by turning nut (12) as required, and reconnect rod to relay lever (10), after locking nut (12).

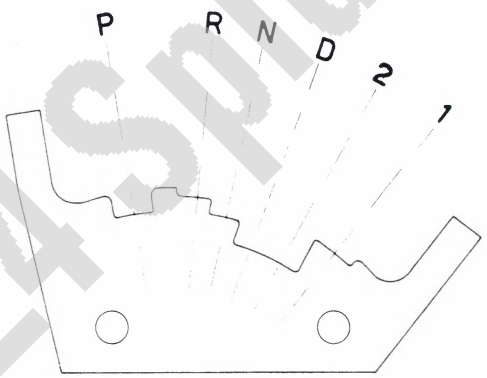
With lower handle (2) up, check all six positions: a definite click should be felt in each position.

Then check selector lever (3) for correct positioning in gear selector (5) gate, as follows:

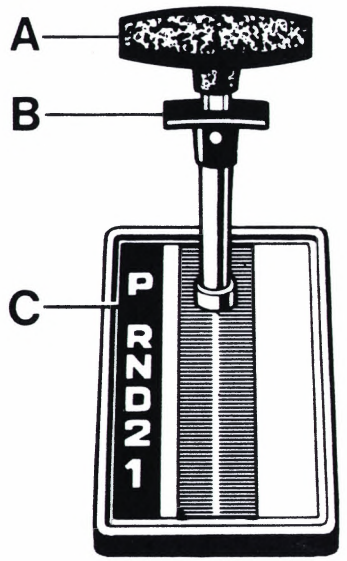
- With lower handle (2) fully up, select position [1] and release handle: stop tooth should engage selector gate without causing selector lever (3) to be shifted from its position.
- Repeat above check in all other positions and correct adjustment of rod (13), if required.

Make sure selector positions are in line with numbers and letters on selector plate; if not, adjust plate as required.

CAUTION: Misadjustment of linkage may cause manual valve to direct part of oil under pressure to discharge, when positions [D], [2], [1], and [R] are selected, without driver being able to notice trouble. This will result in a sudden drop of hydraulic pressure, with possible clutch slippage and attendant clutch lining burning.



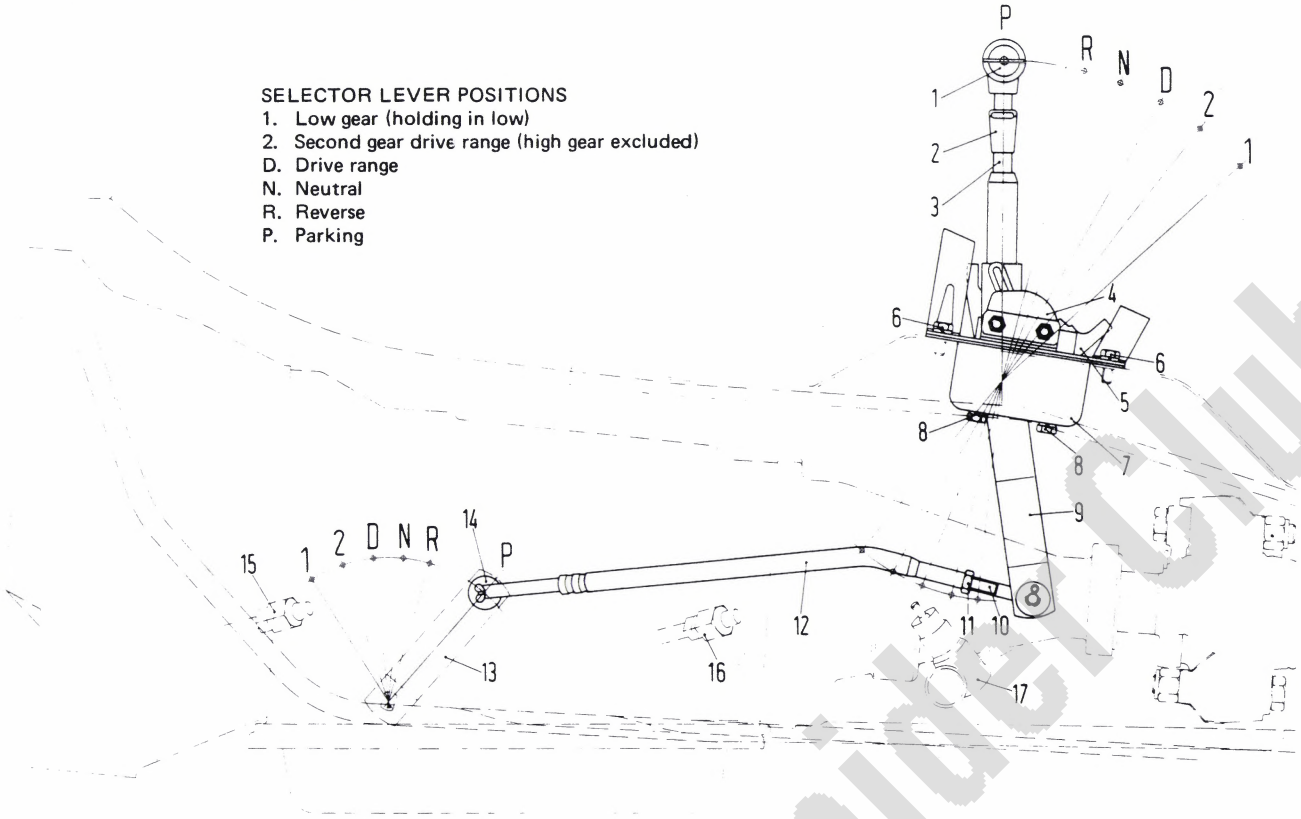
P. Parking
R. Reverse
N. Neutral
D. Drive range
1. Drive range (high gear excluded)
2. Low gear (holding in low)



A. Selector lever upper handle
B. Lower handle to be raised for shifting [P-R], [R-P], [N-R], [D-N], [2-1]
C. Gear indicator.

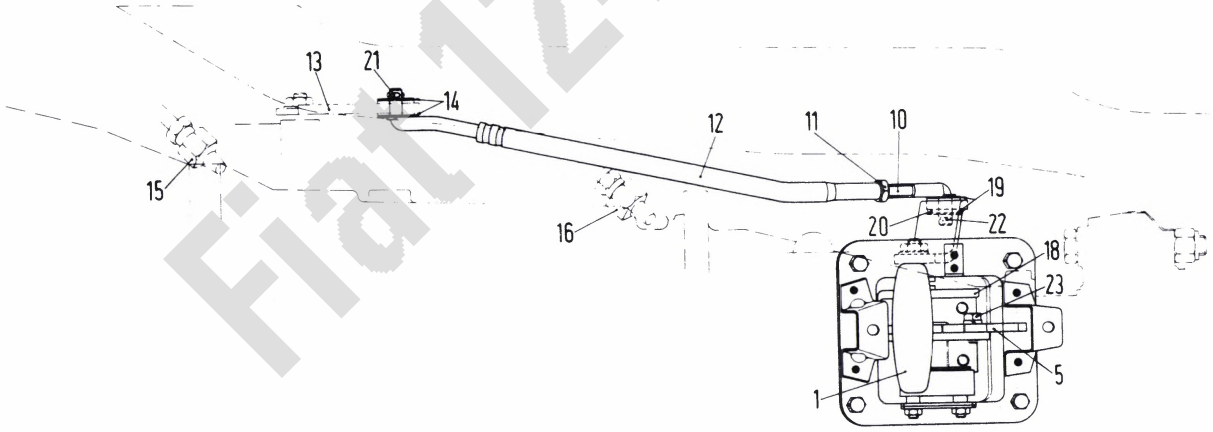
AUTOMATIC TRANSMISSION LINKAGE

SELECTOR LEVER POSITIONS
1. Low gear (holding in low)
2. Second gear drive range (high gear excluded)
D. Drive range
N. Neutral
R. Reverse
P. Parking



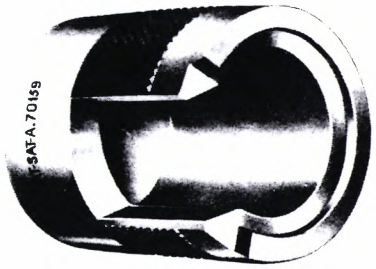
SELECTOR VALVE CONTROL AND PARKING LOCK LINKAGE

1. Upper handle
2. Lower handle
3. Selector lever
4. Starter inhibitor switch
5. Gear selector
6. Bolt
7. Support
8. Bracket bolt
9. Relay lever
10. Tie rod adjustable end
11. Adjusting nut
12. Tie rod
13. Cross shaft actuating lever
14. Flat washer
15. Oil union
16. Oil union
17. Speedometer drive support
18. Bracket
19. Flat washer
20. Bushing
21. Cotter pin
22. Cotter pin
23. Gear selector bolt



NOTE: Number given in parentheses is Kent-Moore catalogue number.

A.70159 (J28103) Remover and installer, snap ring and spring washer

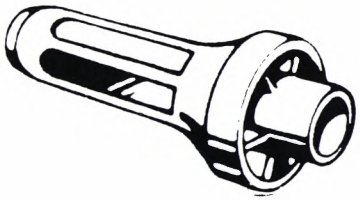


A.70256 (J23084) Ring for installing third clutch piston

A.70263/2 (J23075-10) Holding brackets for tool 23075

A.70350 (J28117) Remover and installer, snap ring and spring washer

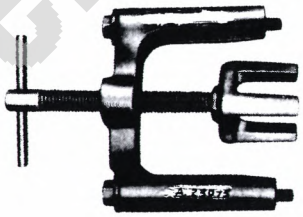
A.21359 (J23159) Converter housing seal installer



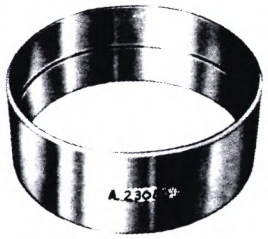
A.21424-9 (J21424-9) Extension housing bushing installer

21465-17 (J21465-17) Remover and installer, converter housing bushing

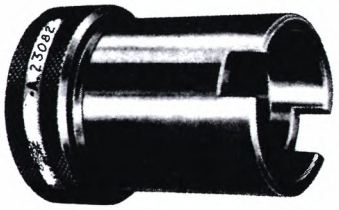
23075 (J23075) Spring compressor



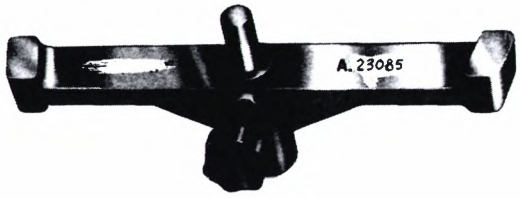
A.70255 (J23080-A) Second clutch piston seal installer



23082 (J23082-01) Converter housing to oil pump aligning tool

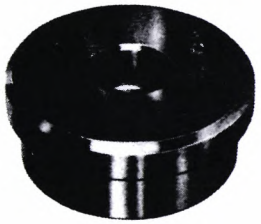


23085 (J23085) Oil pump hub to second clutch gauging tool

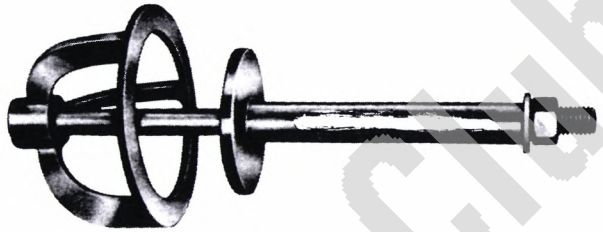


23100 (J23100) Vacuum modulator wrench

23130 (J23130) Bushing service tool set



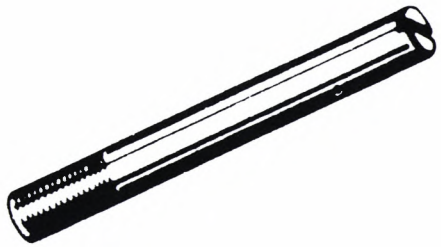
70250 (J23078) Clutch spring compressor
(J2590-02, 03, 04, 05 can be used)



328920 (J3289-20) Holding fixture base

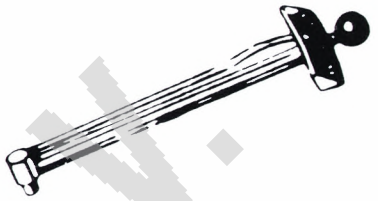
A.876302 (J8763-02) Transmission holding fixture

33872 (J3387-2) Aligning pins



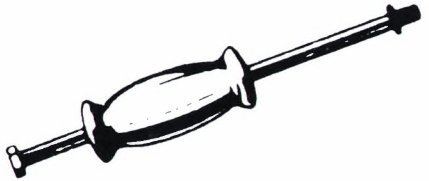
5907 (J5907) Pressure gauge set

6459 (J6459-01) Torque wrench (0-50 in.)



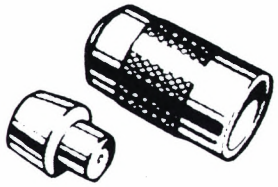
8093 (J8092) Driver handle

9003 (J7004-1) Slide handle



A.50113 (J28152) Oil plug wrench

A.70166 (J28104) Synchronizer snap ring installer



DRIVE SHAFT - 24

DRIVE SHAFT - 24

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
24	Specifications	24-1
	Torque Specifications	24-1
243.01	Drive Shaft	24-5
24A	Service Tools	24-11

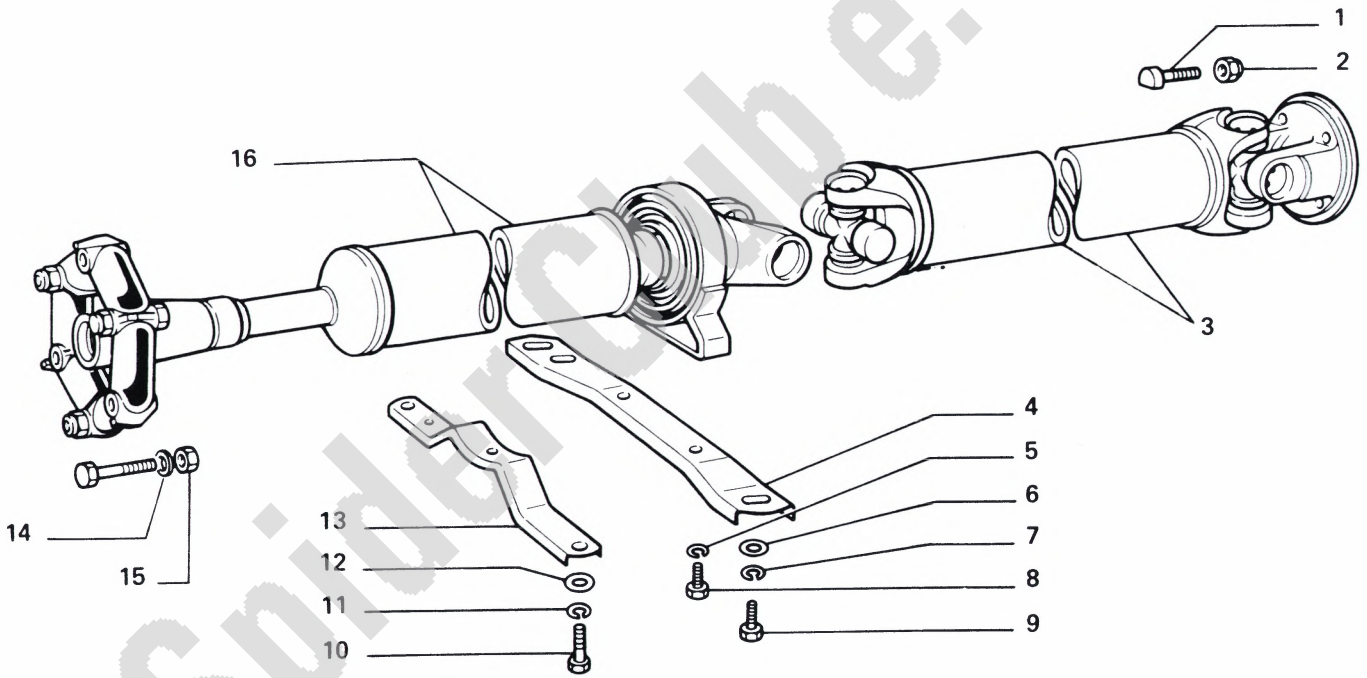
SPECIFICATIONS

Drive Shaft: dual with center pillow block with rubber-cushioned bearing. Universal joints on rear section. Flexible joint at transmission end.

Front Shaft	
— Type	tubular, with splined ends
— Diameter	2.756 in. (70 mm)
— Length, manual trans. (measured between stub ends)	14.5 in. (368.3 mm)
— Length, auto. trans. (measured between stub ends)	10.5 in. (266.7 mm)
Rear Shaft	
— Type	tubular, with universal joint yokes
— Diameter	2.756 in (70 mm)
— Length, auto. and manual (measured between universal joint centers)	30.5 in (774.7 mm)
Center Pillow Block	flexible, with sealed ball bearing
Joints	
— Front	flexible
— Center	universal
— Rear	universal
Fit clearance between universal joint spider journals and needle bearings	0.004 to 0.016 inch (0.01 to 0.04 mm)
Thickness range of service snap rings for adjusting clearance between universal spider journals and needle bearings	0.0591, 0.0602, 0.0614, 0.0626, 0.0638, 0.0649 inch (1.5, 1.53, 1.56, 1.59, 1.62, 1.65 mm)

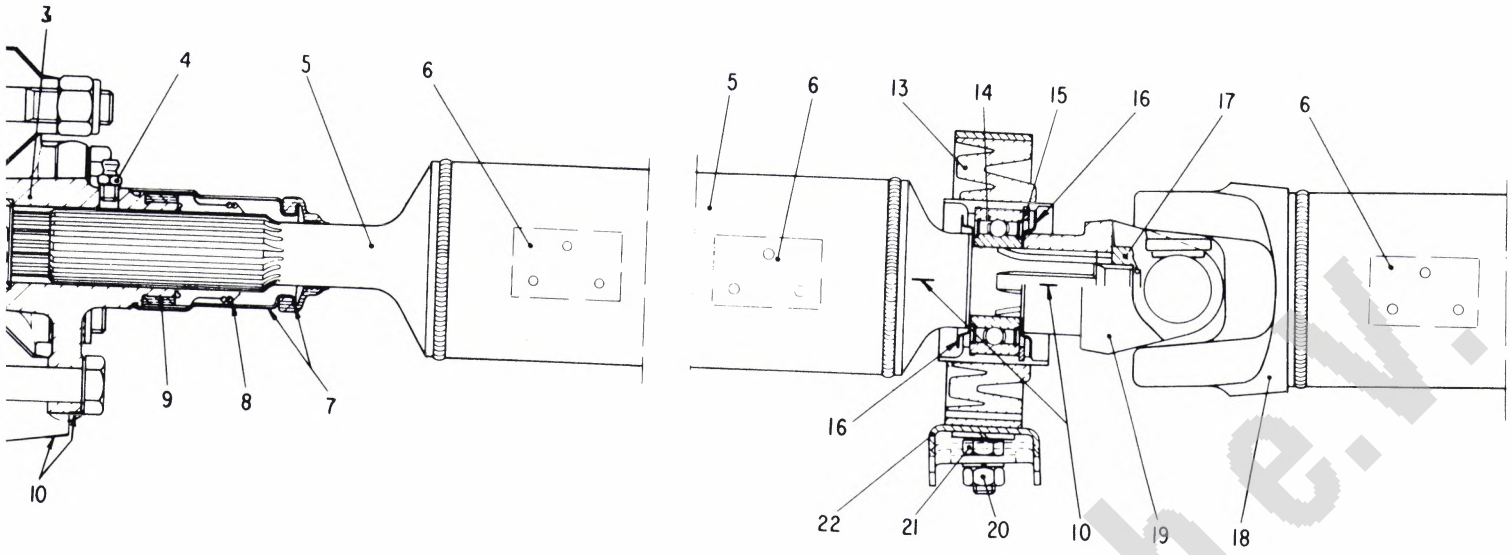
TORQUE SPECIFICATION

DESCRIPTION	THREAD (METRIC)	TORQUE N·m	TORQUE FT. LB.	TORQUE Kgm
Flange nut, yoke to support	M16 x 1.5	29.4	21	3
Self-locking nut, flexible joint to transmission and drive shaft bolt	M12 x 1.25	68.6	51	7
Self-locking nut, drive shaft to rear axle bolt	M8	34.3	25	3.5
Bolt, drive shaft pillow block to crossmember	M8	25	18	2.5

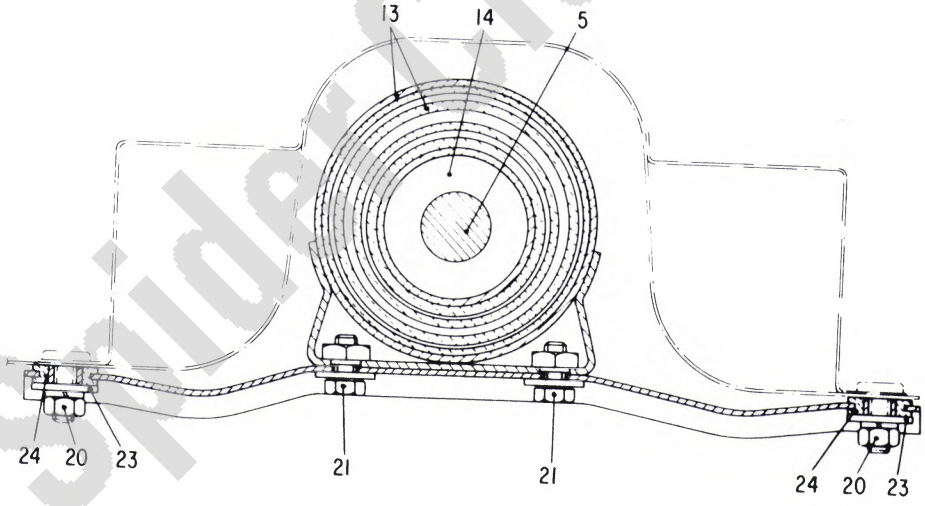


1. Bolt
2. Nut
3. Rear shaft
4. Crossmember
5. Lock washer
6. Flat washer
7. Lock washer
8. Bolt
9. Bolt
10. Bolt
11. Lock washer
12. Flat washer
13. Protection bracket
14. Bolt
15. Nut
16. Front shaft

DRIVE SHAFT ASSEMBLY



ıg flexible coupling to transmission 2. Flexible
ı sleeve 4. Sliding sleeve lubrication fitting
6. Shaft balancing plate 7. Gasket and socket
spring 9. Rubber ring 10. Assembly reference
n bushing 12. Location ring 13. Center pillow
ring 15. Snap ring 16. Bearing shield 17. Nut,
int yoke to front drive shaft 18. Rear drive shaft
oke 20. Nuts securing crossmember to body
llow block to crossmember 22. Crossmember
4. Rubber grommets



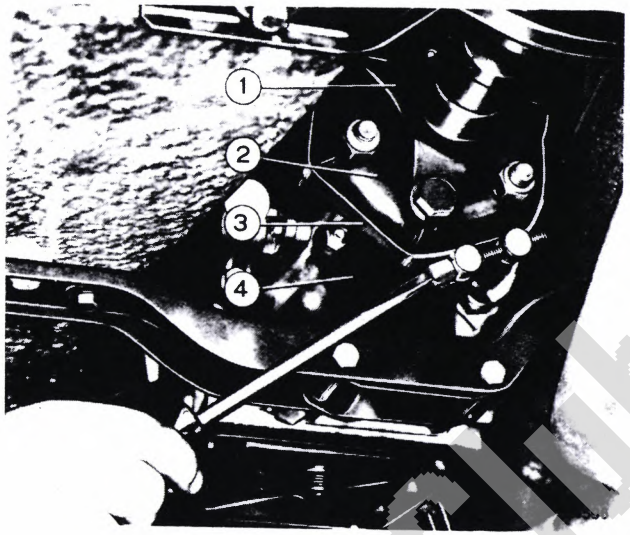
LONGITUDINAL SECTIONS OF DRIVE SHAFT THROUGH FLEXIBLE COUPLING AND CENTER PILLOW BLOCK

DRIVE SHAFT

REMOVAL AND INSTALLATION

Install compressor (3) on flexible coupling (2). Remove nuts and bolts holding coupling (2) to transmission flange.

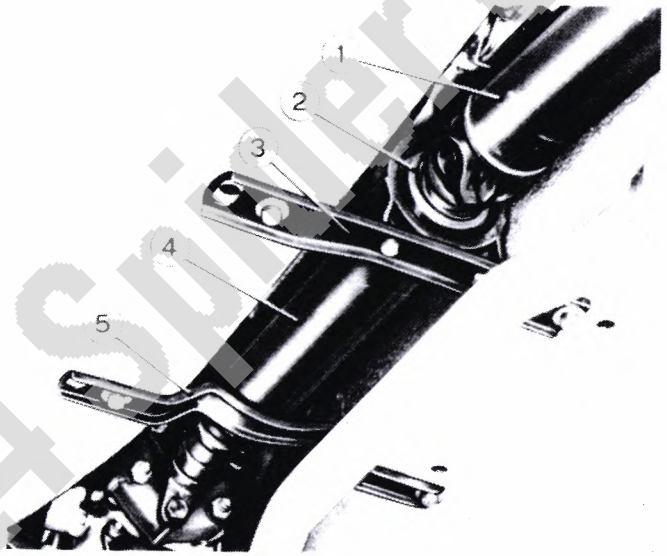
1. Drive shaft yoke 2. Flexible coupling 3. Compressor
4. Transmission mount



Remove bolts holding crossmember (3) for pillow block (2).

Remove bolts holding protection bracket (5) for front shaft (4).

1. Rear shaft 2. Pillow block 3. Crossmember 4. Front shaft
5. Protection bracket

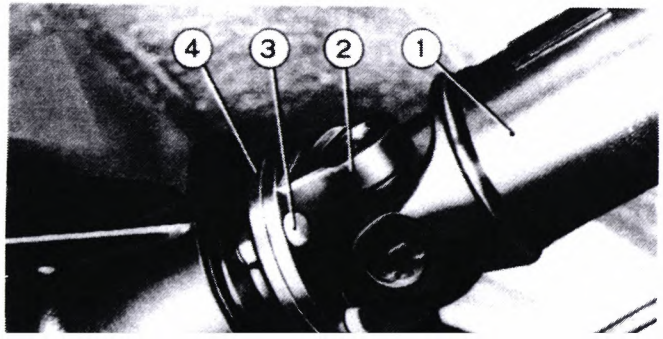


Remove nuts holding rear shaft yoke (2) to differential flange (4). Remove drive shaft.

NOTE: If installing new flexible joint do not remove metal band until all 6 bolts are installed.

When connecting flexible joint, make sure all bolts are installed with bolt heads against flanges.

1. Rear shaft 2. Yoke 3. Bolts 4. Differential flange



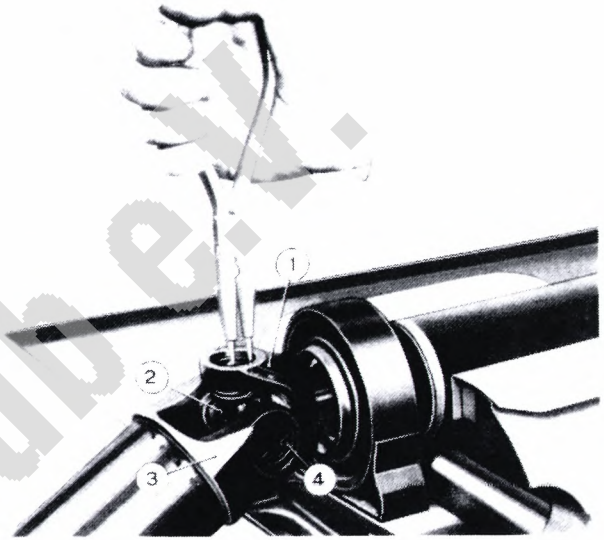
CENTER PILLOW BLOCK

REMOVING

Remove drive shaft. Remove 2 bolts holding cross member to block.

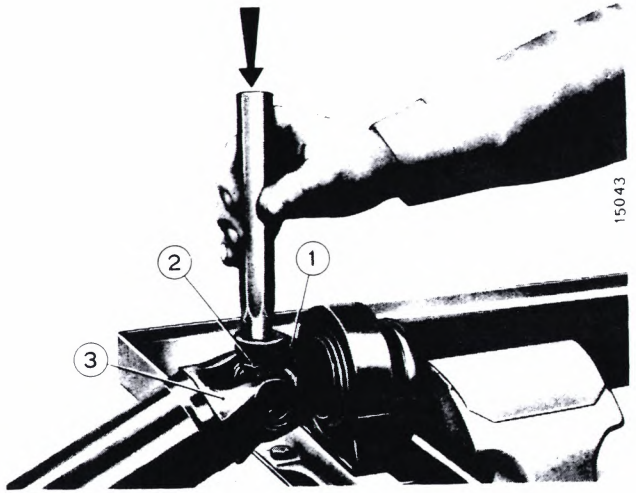
Remove snap rings (4) holding spider (2) in front shaft.

1. Sleeve 2. Spider 3. Rear shaft 4. Snap ring



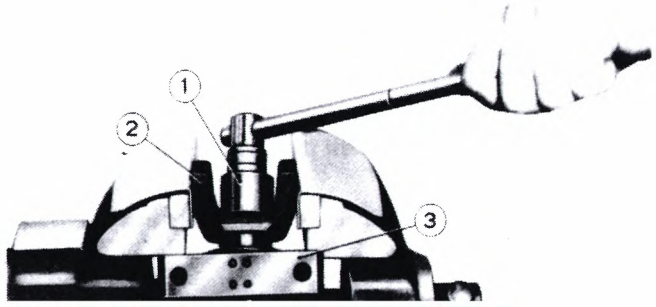
Tap spider out of sleeve. Use a driver.

1. Sleeve 2. Spider 3. Rear shaft



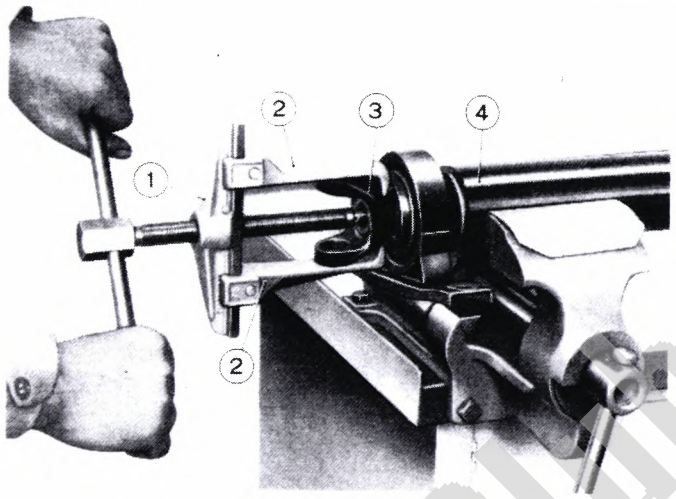
Mark shaft and sleeve for reassembly. Place sleeve in front shaft in vice. Remove nut holding sleeve to shaft.

1. Socket 2. Sleeve 3. Pillow block 4. Front shaft



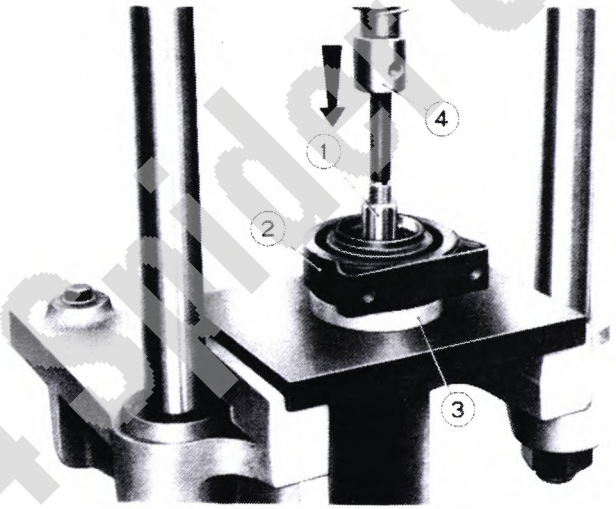
Remove sleeve and dust cover. Use a puller.

1. Puller 2. Puller jaws 3. Sleeve 4. Shaft



Place shaft in press. Press shaft out of pillow block.

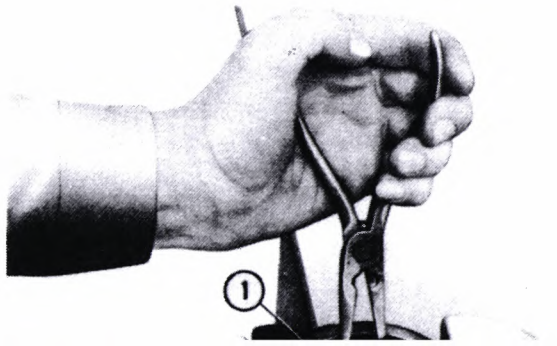
1. Shaft end 2. Pillow block 3. Adapter 4. Press



DISASSEMBLING

Remove snap ring (1) holding bearing (2) in pillow block (3). Pull bearing out of pillow block. Use a universal puller.

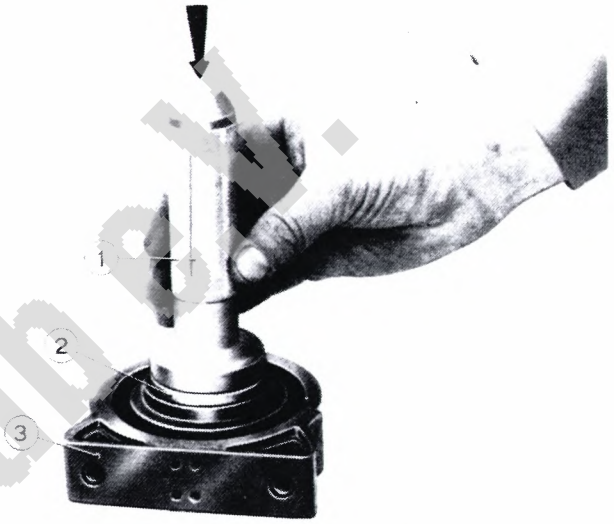
1. Snap ring 2. Bearing 3. Pillow block



ASSEMBLING

Press bearing (2) into pillow block (3). Use a drift (1). Install bearing retainer snap ring.

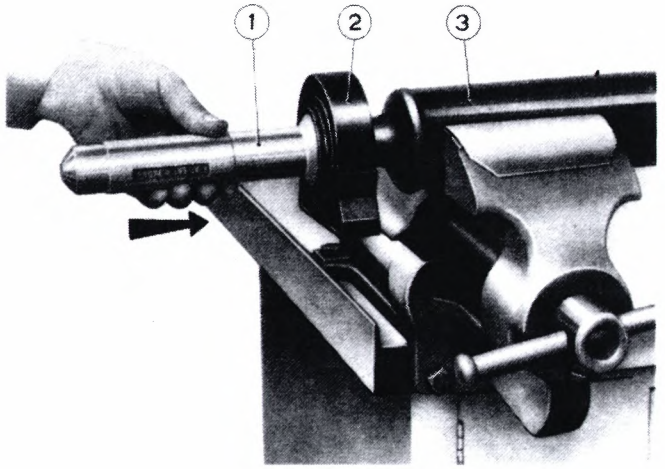
1. Drift 2. Bearing 3. Pillow block



INSTALLING

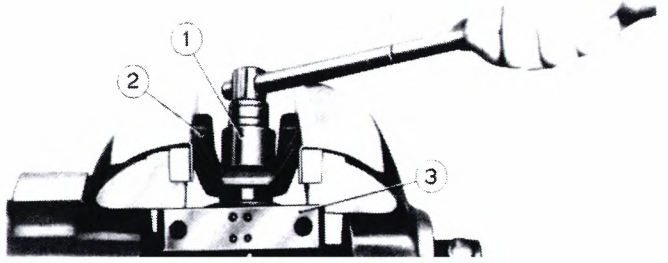
Place dust cover on shaft. Install pillow block (2) on shaft (3). Use a drift (1). Place rear dust cover on shaft.

1. Drift 2. Pillow block 3. Front shaft



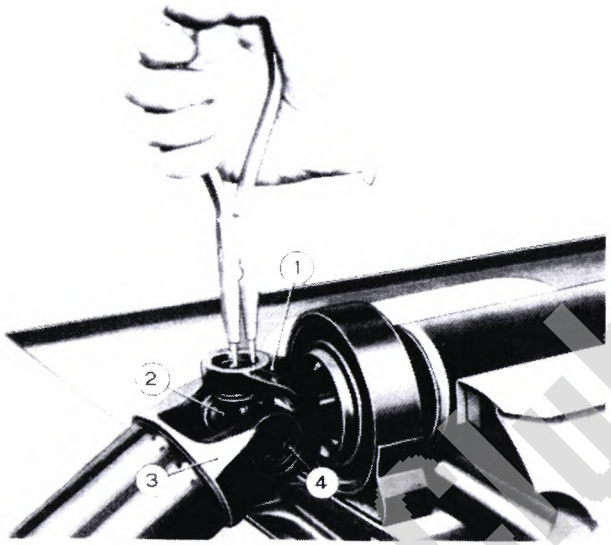
Align mark on sleeve with mark on shaft. Place sleeve on shaft. Install nut on shaft. Torque nut to 69 ft lb. Stake the nut.

1. Socket 2. Sleeve 3. Pillow block 4. Front shaft



Place spider on rear shaft in sleeve on front shaft. Press spider into sleeve. Install two snap rings in sleeve to hold spider.

1. Sleeve 2. Spider 3. Rear shaft 4. Snap ring



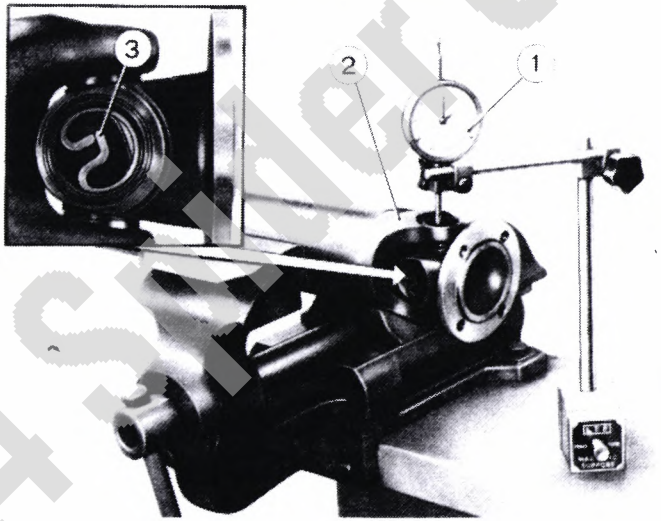
UNIVERSAL JOINT

INSPECTION

Clamp shaft in vice. Using dial indicator, measure play between spider journals and needle bearings.

Play must not exceed 0.0004 to 0.0016 in (0.01 to 0.04 mm). If play exceeds limit, replace snap rings with larger ones. Inspect spider and needle bearings for condition. If interference or looseness between parts is indicated, replace com plete spider.

1. Dial indicator 2. Rear drive shaft 3. Snap ring



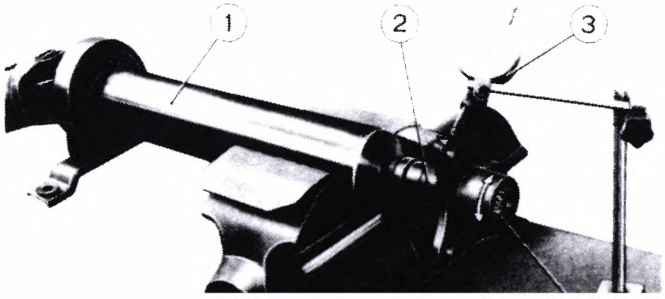
FLEXIBLE JOINT YOKE

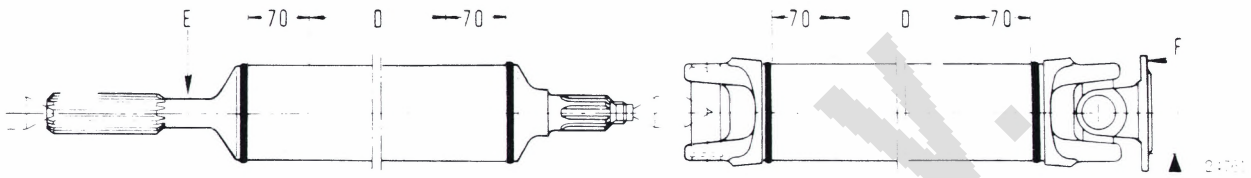
INSPECTION

Set dial indicator as shown. Check lash between yoke (2) and front drive shaft splines (4).

Measure lash at yoke outer edge. Lash should be 0.0069 to 0.0137 in (0.175 to 0.350 mm).

1. Front drive shaft 2. Yoke 3. Dial indicator 4. Front shaft splines





DRIVE SHAFT

INSPECTION

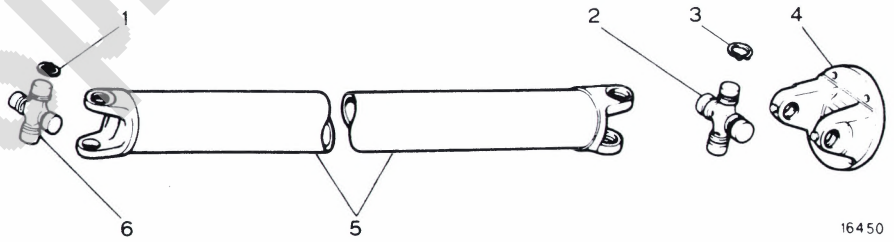
Front Shaft

Support shaft between centers. Set dial indicator on section D and E. Turn shaft by hand and check runout. Runout should not exceed 0.014 in (0.35 mm) at D and 0.006 in (0.15 mm) at E.

Shaft straightening, if required should be done under a press.

Rear Shaft

Install universal joint on shaft. Mount shaft on suitable fixture. Set dial indicator on section D and point F. Turn shaft by hand check runout. Runout should not exceed 0.014 in (0.35 mm) at D and 0.004 in (0.10 mm) at F.



1. Snap ring
2. Needle bearing
3. Snap ring
4. Yoke
5. Drive shaft
6. Needle bearing

NOTE: Number given in parentheses is Kent-Moore catalogue number.

A.70025 (J28087) Compressor, flexible joint removal and installation.

REAR AXLE - 27

REAR AXLE - 27

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
27	Specifications	27-1
	Torque Specifications	27-3
274.01	Rear Axle and Axle Shafts	27-5
274.05	Axle Final Drive and Differential Gears	27-13
27A	Service Tools	27-37

SPECIFICATIONS – Up to Early 1978

Type	semi-floating
Pinion and ring gear set	hypoid
Ratio	4.3 to 1 (10/43)
Pinion bearings	two
Bearing type	taper roller
Bearing preload adjustment	by collapsible spacer and pinion nut tightening
Thickness range of pinion adjustment shims	.100-.102-.104-.106-.108-.110-.112-.114-.116-.118-.120-.122-.124-.126-.128-.130-.132 in. (2.55-2.60-2.65-2.70-2.75-2.80-2.85-2.90-2.95-3.00-3.05-3.10-3.15-3.20-3.25-3.30-3.35 mm)
Pinion rolling torque	14 to 17.40 in. lb. (16 to 20 kgcm)
Differential bearings	two
Bearing type	taper roller
Adjustment	by threaded adjusters
Bearing preload: differential carrier caps spread	.005 to .007 in. (0.14 to 0.18 mm)
Side gear adjustment (not for self-locking differential)	by thrust washers
Thickness range of side gear thrust washers	.071-.073-.075-.077-.079-.081-.083 in. (1.80-1.85-1.90-1.95-2.00-2.05-2.10 mm)
Pinion and ring gear backlash	.003 to .005 in. (.08 to 0.13 mm)
Axle shaft type	semi-floating
Axle shaft bearings	ball
Track, rear	51.81 in. (1316 mm)

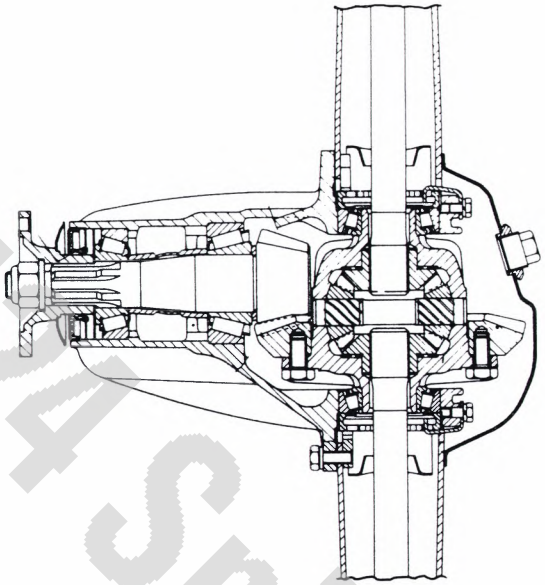
Lubricant – SAE 80 W/90 EP	1.3 LT	1.2 KG	1.4 QT

SPECIFICATIONS – 1978 and On

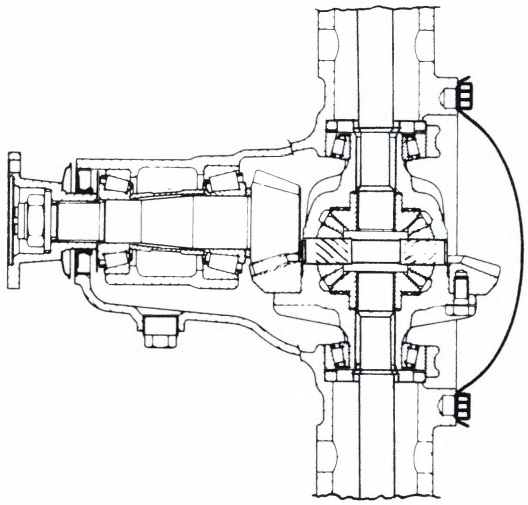
Type	semi-floating
Pinion and ring gear set	hypoid
Ratio	Manual Trans. 3.90 to 1 (10/39) Auto. Trans. 3.58 to 1 (12/43)
Pinion bearings	two
Bearing type	taper roller
Bearing preload adjustment	by tightening pinion nut
Thickness range of pinion nut adjustment shims	0.105, 0.108, 0.110, 0.112, 0.114, 0.116, 0.118, 0.120, 0.122, 0.124, 0.126, 0.128, 0.130, 0.132 in. (2.55, 2.60, 2.65, 2.70, 2.75, 2.80, 2.90, 2.95, 3.00, 3.05, 3.10, 3.15, 3.20, 3.25, 3.30, 3.35 mm)
Pinion rolling torque	14 to 17 in. lbs. (16 to 30 kg cm)
Differential bearings	two
Bearing type	taper roller
Adjustment	by shims
Thickness range of differential adjustment shims	From 6.52 to 7.48 mm in 0.02 mm steps
Differential bearing preload	0.004 in. (0.10 mm)
Differential side gear adjustment	by shims
Thickness range of side gear adjustment shims	.033, .035, .037, .039, .041, .043, .045, .047, .049, .051, .071, .073, .075, .077, .079, .081, .083 in. (.85, .90, .95, 1.00, 1.05, 1.10, 1.15, 1.20, 1.25, 1.30, 1.80, 1.85, 1.90, 1.95, 2.00, 2.05, 2.10 mm)
Rolling torque of one side gear with differential case free and other side gear blocked	22 to 36 ft. lbs. (3 to 5 kgm)
Pinion and ring gear	matched set
Pinion and ring gear backlash	0.00315 to 0.00511 in. (0.08 to 0.13 mm)
Axle shaft type	semi-floating
Axle shaft bearings	ball
Track, rear	51.934 inches (1320 mm)

TORQUE SPECIFICATIONS

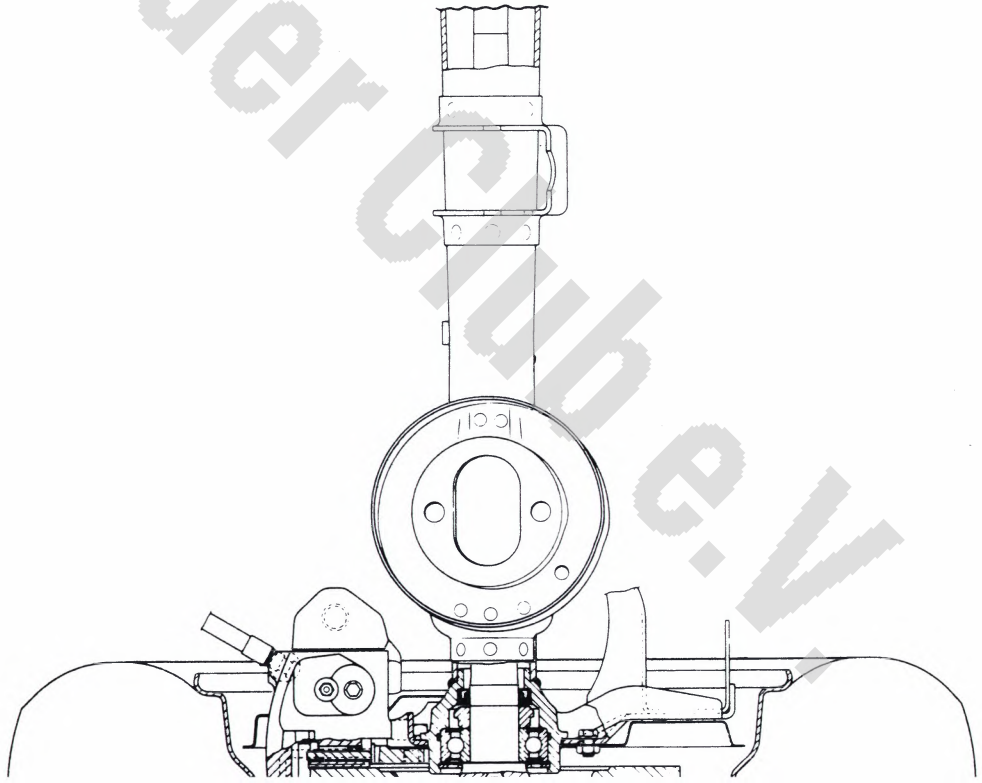
DESCRIPTION (Up to Early 1978)	THREAD (METRIC)	MATERIAL	TORQUE FT. LB.	Kgm	N·m
Bolt, differential carrier-to-axle housing	M 8	R 120 Fosf	33	4.5	44
Bolt, cap-to-differential carrier	M 10 x 1.25	R 80	36	5	51
Bolt, ring gear	M 10 x 1.25	40 Ni Cr Mo 2 R 120 to 135	72	10	98
Wheel stud	M 12 x 1.25	C 35 R Bon Znt	65	9	86
DESCRIPTION (1978 and On)					
Bolt, axle shaft retaining plate to housing	M 10 x 1.25	R 80 Znt	36	5	51
Bolt, differential cover to housing	M 8	R 80 Znt	18	2.5	25
Bolt, caps to differential carrier	M 10 x 1.25	R 80	36	5	51
Bolt, ring gear to carrier	M 10 x 1.25	40 Ni Cr Mo 2 R 120 to 135	72	10	98
Wheel stud	M 12 x 1.25	C 34 R Bon Znt	65	9	86



ALL VEHICLES UP TO EARLY 1978



1978 AND ON



REAR AXLE

REMOVAL AND INSTALLATION

NOTE: Rear axle need not be removed to overhaul differential. Overhaul can be accomplished with axle in place on vehicle.

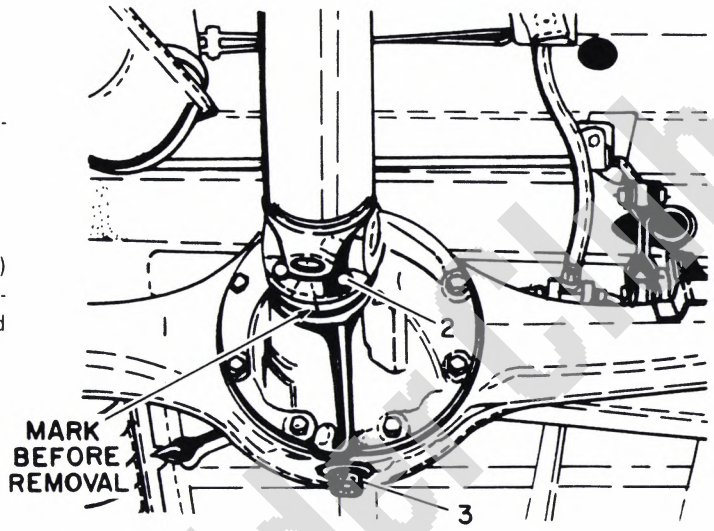
Refer to Suspension Section for removal and installation of rear axle.

REAR AXLE AND AXLE SHAFTS (VEHICLES UP TO EARLY 1978 ONLY)

DISASSEMBLY

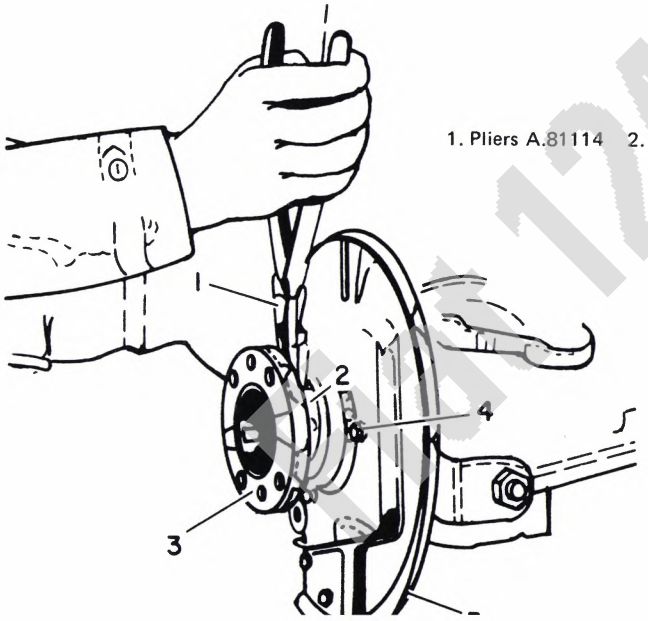
If differential is to be overhauled on vehicle, perform the following:

- Drain oil.
- Remove wheels.
- Remove four bolts (2) and nuts holding drive shaft flange (1) to differential flange. Mark shaft flange in relation to differential flange so that upon installation it will be assembled in same position. Secure drive shaft up, out of way.
- Remove brake calipers and discs (refer to Brakes Section).

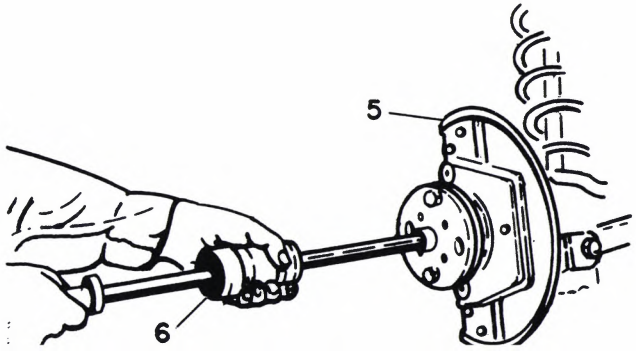


1. Drive shaft flange 2. Bolt 3. Oil drain

Remove four bolts (4) securing brake shield (5). Remove axle shaft snap ring with pliers A.81114 as shown. Attach axle puller A.47017 (6) to axle shaft flange and pull shaft out.

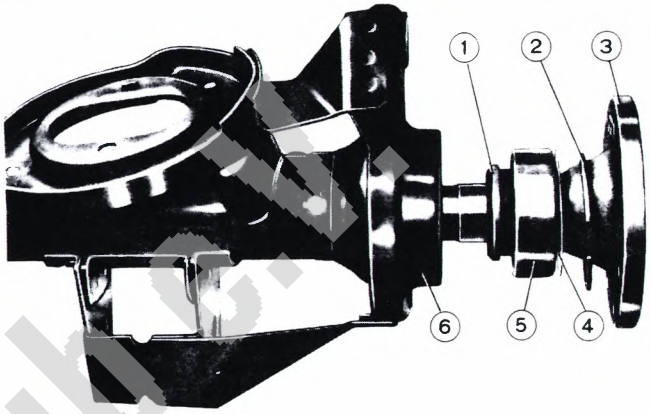


1. Pliers A.81114 2. Snap ring 3. Axle shaft flange 4. Bolt 5. Brake shield 6. Puller A.47017



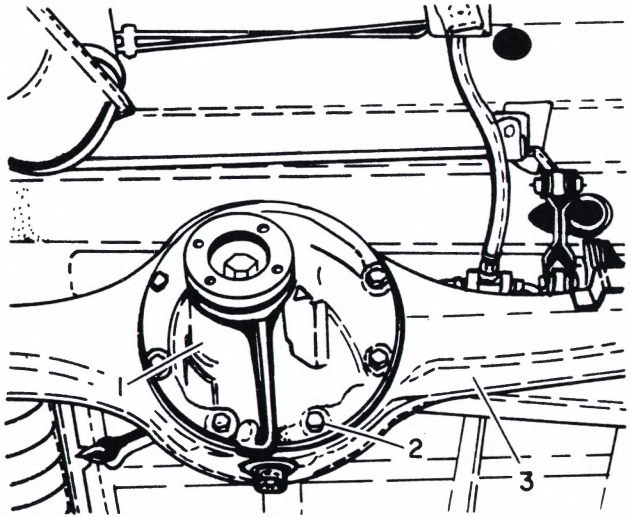
Unless axle shaft service is required, it is only necessary to disengage shafts from differential side gears and not completely remove them.

1. Bearing retaining collar 2. Snap ring 3. Axle shaft 4. Dust shield
5. Ball bearing 6. Axle housing



Support differential assembly (1) and remove eight bolts (2) securing it to axle housing (3). Carefully withdraw differential from housing.

1. Differential assembly 2. Bolt 3. Axle housing

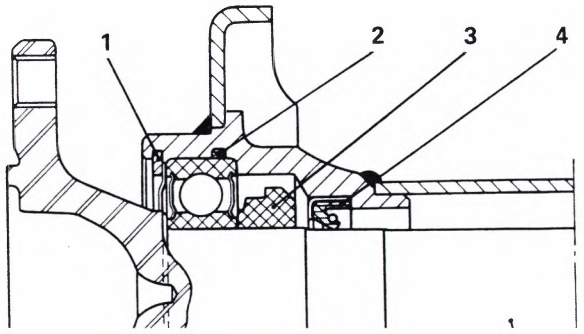


AXLE SHAFT

INSPECTION AND OVERHAUL

After removing axle shaft (5) as described earlier, remove axle shaft oil seal (4) and "O" ring (2) from their seats in housing.

1. Snap ring 2. "O" ring 3. Bearing retainer collar 4. Oil seal
5. Axle shaft 6. Axle housing 7. Ball bearing 8. Dust shield



Check condition of axle shaft and components to make sure that:

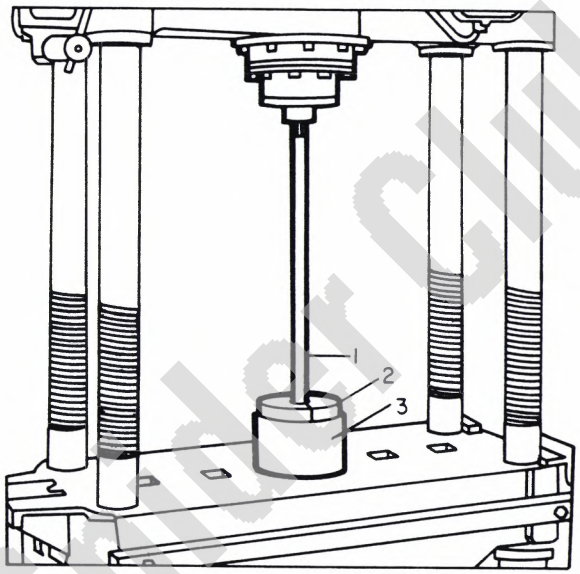
- Shaft is not bent or damaged.
- Ball bearing is not worn or damaged.
- Retaining collar and bearing have not moved from their position on shaft.
- Snap ring, oil seal and "O" ring on bearing seat is not damaged or worn.

Damaged or worn parts must be replaced.

Place shaft (1), with half-rings (2) around retaining collar, in press as shown and press collar off. Check that seating face of collar on shaft is not scored or damaged. Replace shaft if damaged.

Remove bearing, dust shield and snap ring.

1. Axle shaft 2. Half-rings 3. Mounting base

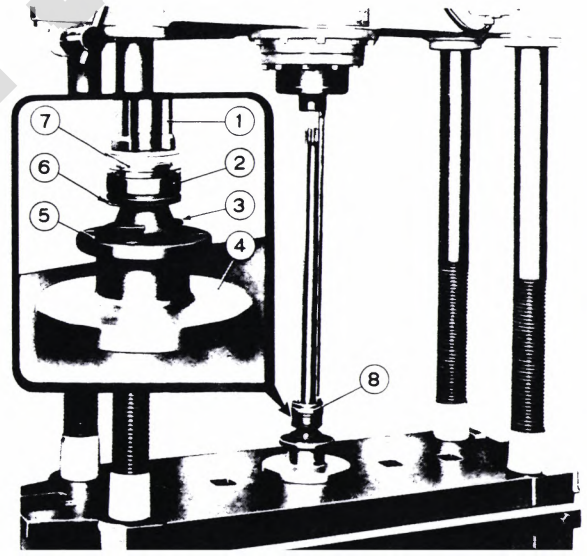


To replace axle shaft components, place shaft in press as shown. Install snap ring (3), dust shield (6) and bearing (2).

Place collar and holder on shaft. Place sleeve (1) in position over shaft onto collar and press down so that inner race of bearing is locked between collar and shaft shoulder.

Check that collar and bearing are tight on shaft (no movement).

1. Sleeve 2. Ball bearing 3. Snap ring 4. Base plate 5. Axle shaft
6. Dust shield 7. Retaining collar 8. Collar holder

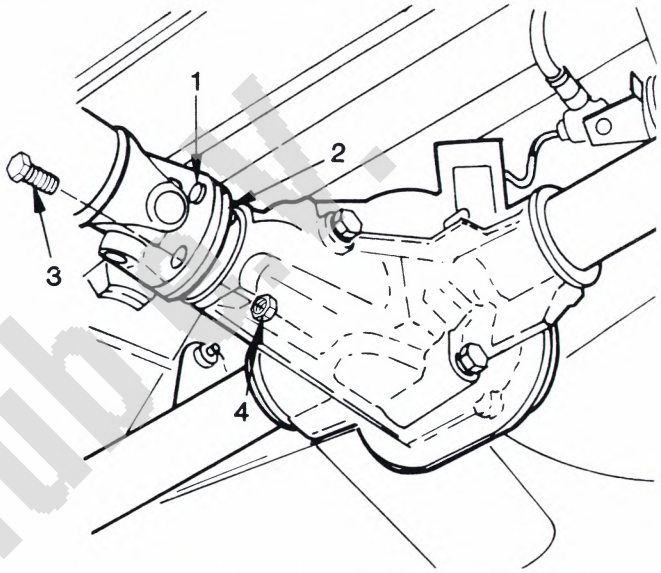


REAR AXLE AND AXLE SHAFTS (1978 AND ON)

DISASSEMBLY

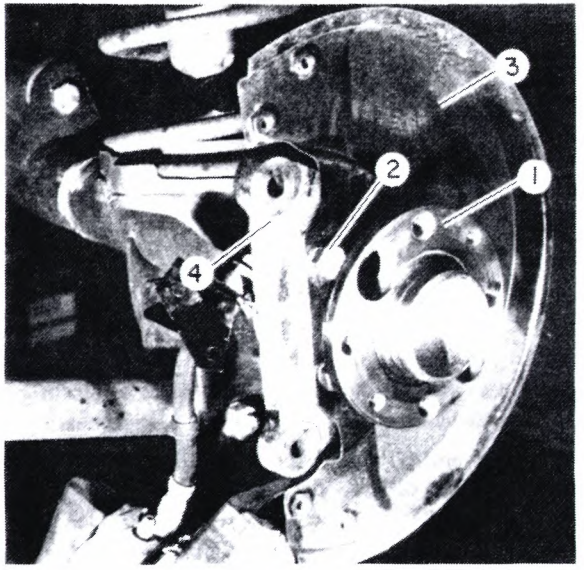
If differential is to be overhauled on vehicle, perform the following:

- Drain oil.
- Remove wheels.
- Remove four bolts (3) and nuts (4) holding drive shaft flange (1) to differential flange (2). Mark shaft flange in relation to differential flange so that upon installation it will be assembled in same position. Secure drive shaft up, out of way.
- Remove brake calipers and discs (refer to Brakes Section).



1. Drive shaft flange 2. Differential flange 3. Bolt 4. Nut

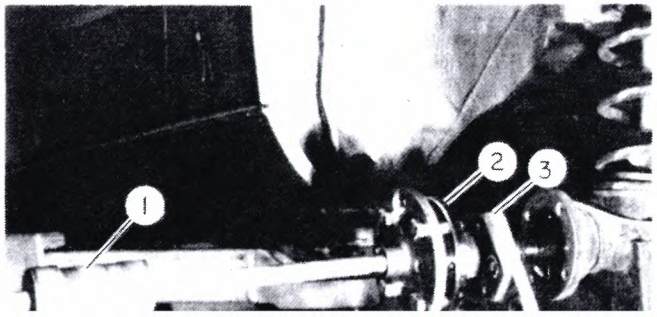
Working thru large holes in axle shaft flange (1), remove four bolts (2) and lockwashers holding brake shield (3) and caliper mounting bracket (4) to axle flange.



1. Axle shaft flange 2. Bolt 3. Brake shield 4. Caliper mounting bracket

Attach axle puller A.47017 (1) to axle shaft flange (2) and pull shaft out.

NOTE: Unless axle shaft service is required, it is only necessary to disengage shafts from differential side gears and not completely remove them.



1. Axle puller A.47017 2. Axle shaft flange 3. Caliper mounting bracket 4. Brake caliper

AXLE SHAFT

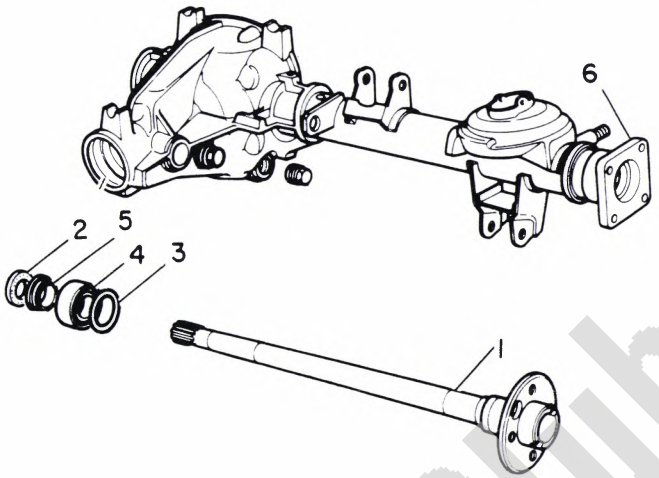
INSPECTION AND OVERHAUL

After removing axle shaft (1), remove shaft oil seal (2) and axle housing "O"-ring (3) from their seats in housing.

Check condition of axle shaft and components to make sure that:

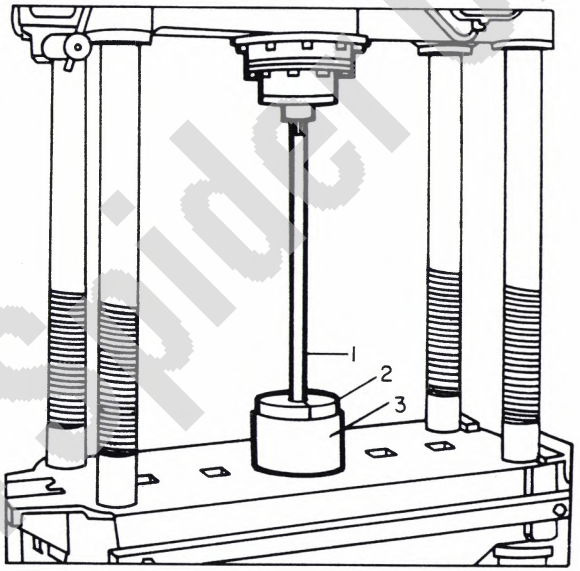
- Shaft is not bent or damaged.
- Ball bearing is not worn or damaged.
- Retainer collar and bearing have not moved from their position on shaft.
- Oil seal and "O"-ring is not damaged.

Damaged or worn parts must be replaced.



1. Axle shaft 2. Oil seal 3. "O"-ring 4. Ball bearing 5. Bearing retainer collar 6. Axle housing

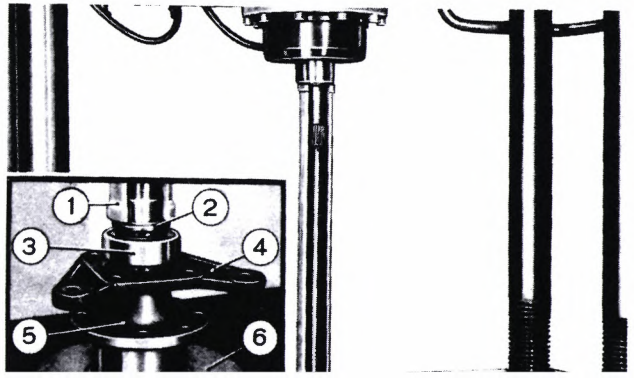
Place shaft (1), with half-rings (2) around retainer collar, in press as shown and press collar off. Check that seating face of collar on shaft is not scored or damaged. Replace shaft if damaged. Remove bearing and caliper mounting bracket.



1. Axle shaft 2. Half-rings 3. Mounting base

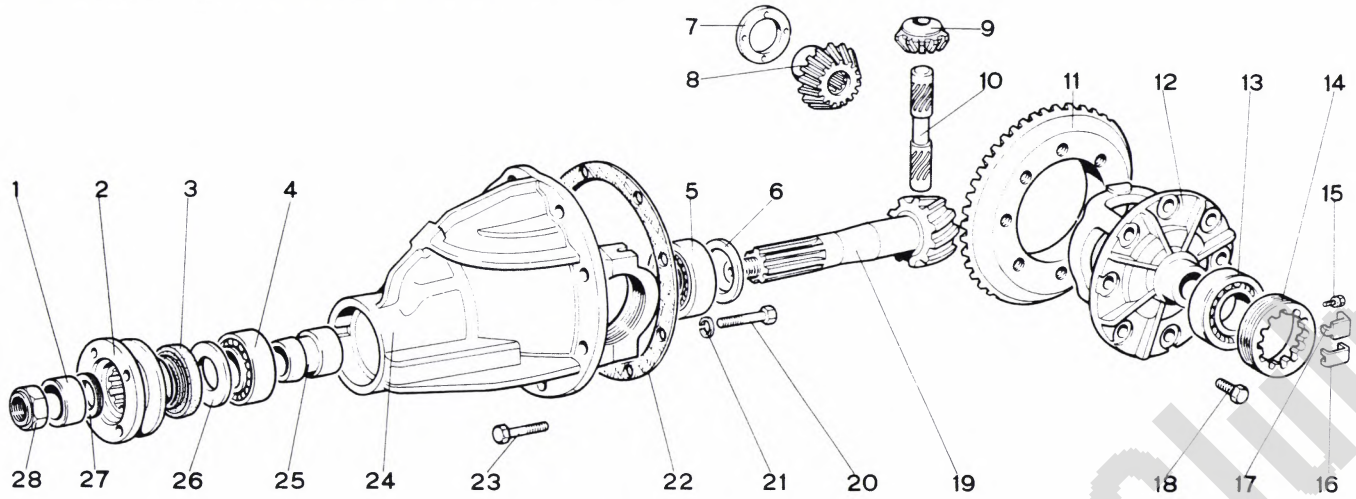
To replace axle shaft components, place shaft in press as shown. Install caliper mounting bracket (4), roller bearings (3) and retainer collar (2). Place sleeve (1) in position over shaft onto collar and press down so that inner race of bearing is locked between collar and shaft shoulder. Check that collar and bearing are tight on shaft (no movement).

Installation of shaft is reverse of removal.



1. Sleeve 2. Retaining collar 3. Roller bearing 4. Caliper mounting bracket 5. Axle flange 6. Mounting base

DIFFERENTIAL (VEHICLES UP TO EARLY 1978)

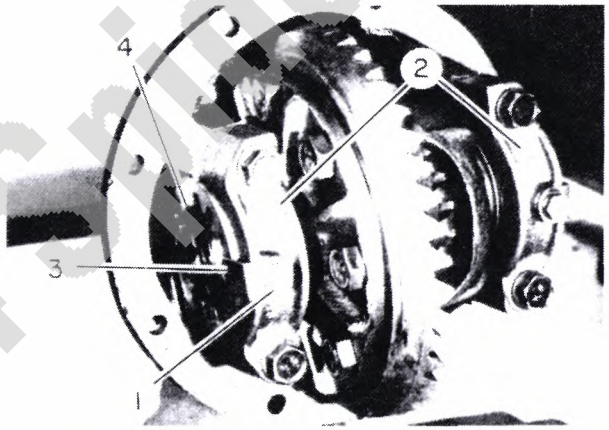


1. Spacer 2. "U" joint sleeve 3. Oil seal 4. Front roller bearing 5. Rear roller bearing 6. Pinion shaft rear roller bearing thrust washer 7. Side gear thrust washer 8. Side gear 9. Pinion gear 10. Pinion gear shaft 11. Ring gear 12. Differential case 13. Differential case roller bearing 14. Bearing adjuster ring 15. Locking plate bolt 16 and 17. Locking plates 18. Bolt fixing ring gear to differential case 19. Bevel pinion 20. Carrier cap bolt 21. Lockwasher 22. Gasket 23. Differential carrier to axle housing bolt 24. Differential carrier 25. Collapsible spacer 26. Oil slinger 27. Plain washer 28. Bevel pinion nut

DIFFERENTIAL CARRIER ASSEMBLY (VEHICLES UP TO EARLY 1978 ONLY)

DISASSEMBLY

Place differential assembly in a vise or stand as shown. Remove two bolts (1) and lockwashers from each bearing cap (2). These secure lock plates (3) which hold adjuster rings (4) in position. Remove lock plates.



1. Bolt 2. Bearing cap 3. Lock plate 4. Adjuster ring

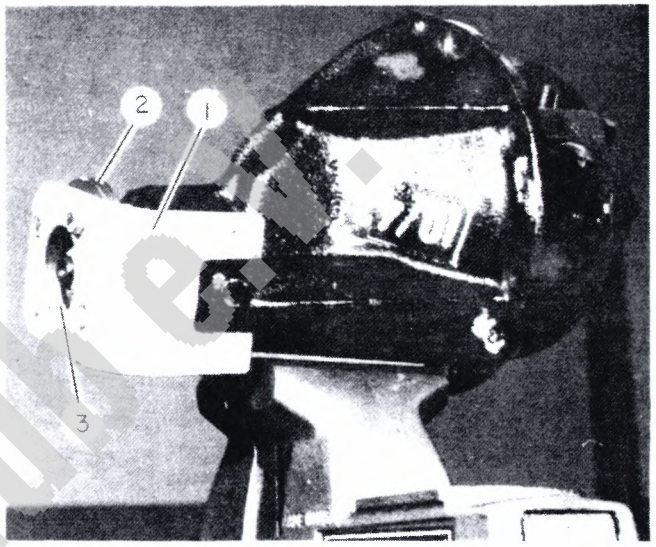
Remove two bolts and lockwashers from both differential case bearing caps. Remove caps, adjuster rings (10) and roller bearing cups.

Withdraw differential case (7) from carrier housing (1), complete with gears and bearings.

1. Differential carrier housing 2. Drive pinion flange 3. Ring gear 4. Pinion gear 5. Side gear 6. Pinion gear shaft 7. Differential case 8. Bearing cap bolt 9. Adjuster lock plate 10. Bearing adjuster 11. Differential case bearing cap

Lock bevel pinion with tool A.70341 (1) or A.70345 as shown. Remove self-locking nut (3) securing "U"-joint sleeve (2) to bevel pinion. Remove sleeve.

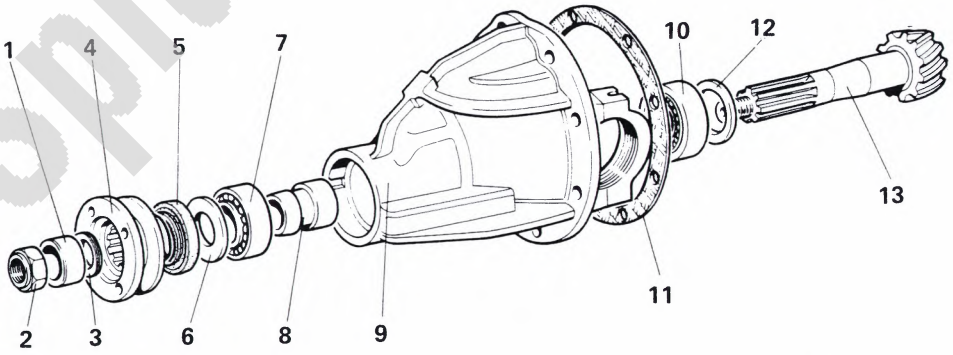
1. Bevel pinion 2. "U"-joint sleeve 3. Self-locking nut



Withdraw bevel pinion (13) complete with thrust washer (12), rear roller bearing (10) and collapsible spacer (8). Remove oil seal (5), oil slinger (6) and front roller bearing (7) from differential carrier.

To remove cup of rear roller bearing, use a drift pin. To remove cup of front roller bearing, use driver A.70198.

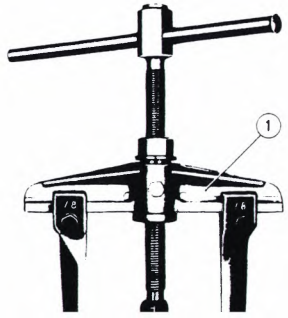
1. Spacer 2. Bevel pinion nut 3. Plain washer 4. "U"-joint sleeve 5. Oil seal 6. Oil slinger 7. Front roller bearing 8. Collapsible spacer 9. Differential carrier 10. Rear roller bearing 11. Gasket 12. Thrust washer 13. Bevel pinion



Slide collapsible spacer off bevel pinion (2).

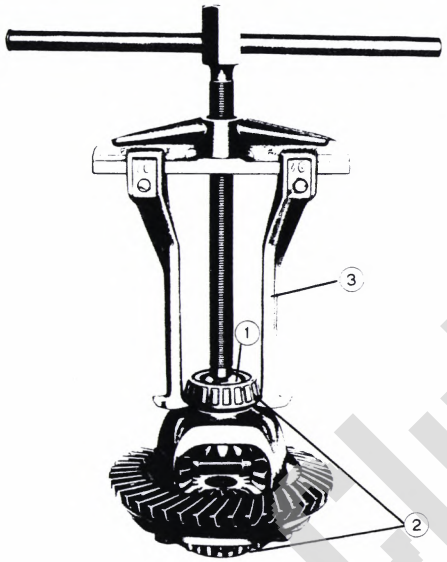
With a universal puller (1) and tool A.45008 (4), remove rear roller bearing (3). Thrust washer can then be removed.

1. Universal puller 2. Bevel pinion 3. Roller bearing
4. Tool A.45008



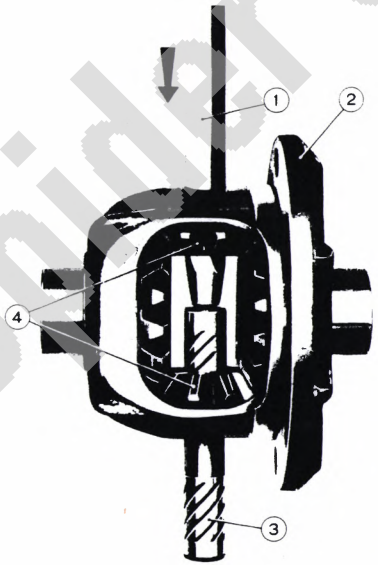
With a universal puller (3) and tool A.45028 (1), remove both differential roller bearings (2).

1. Tool A.45028 2. Roller bearing 3. Universal puller



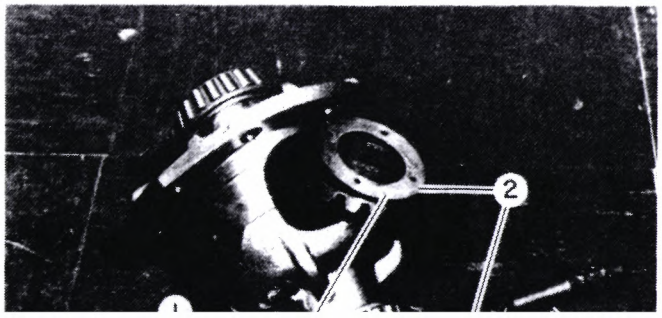
Mark position of ring gear in relation to case and remove eight bolts holding ring gear to differential case (2). With a drift pin (1), drive pinion gears shaft (3) from case.

1. Drift pin 2. Differential case 3. Pinion gear shaft 4. Pinion gears



Turn gears to bring pinion gears (1) opposite openings in case, and withdraw gears. Then remove side gears (2) with their thrust rings (3).

1. Pinion gears 2. Side gears 3. Thrust rings 4. Pinion gears shaft



INSPECTION

Before inspecting components, clean them thoroughly, as this will enable faults and wear to be more easily detected.

Check that teeth are not worn or damaged and that they make contact over their entire faces. If excessive wear is found, change parts affected. If teeth are not making correct contact, check for cause. Should any gears have chipped teeth, they must be changed.

NOTE: Bevel pinion and ring gear are supplied in matched pairs; if one is damaged, both must be changed.

Check that surface of pinion gear shaft and bores of pinion gears are not damaged. If damage is slight, polish surfaces with very fine abrasive paper, otherwise replace them. This also applies to side gears.

Inspect roller bearings of pinion and case; they should be in perfect condition. If there is any doubt about condition, replace them since incorrect bearing operation will cause noise and damage to teeth.

Inspect surfaces of side gear thrust washers; if they are only slightly defective, polish them. If necessary, replace them using standard or oversize parts. Washers are supplied in the following thicknesses: .070, 0.72, 0.74, 0.76, 0.78, 0.80 and 0.82 in. (1.80, 1.85, 1.90, 1.95, 2.00, 2.05 and 2.10 mm).

Check that differential carrier and case are not deformed or cracked. If so, replace them.

ASSEMBLY

Assemble side gears (2) with their thrust washers, in case. Insert pinion gears (3) thru openings in case and engage them with side gears. Turn the four gears so as to bring holes in pinion gears in line with corresponding holes in case. Insert pinion gears shaft.

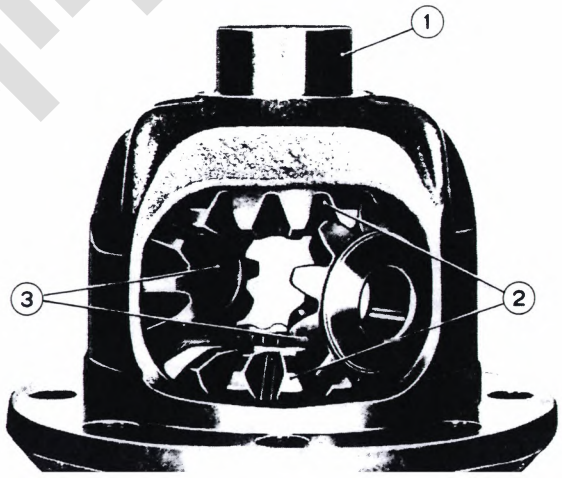
Check axial play in each side gear; it should not exceed .004 in. (0.10 mm). If it is more than this, there is excessive wear between gear pairs, and side gear thrust washers must be replaced with thicker ones.

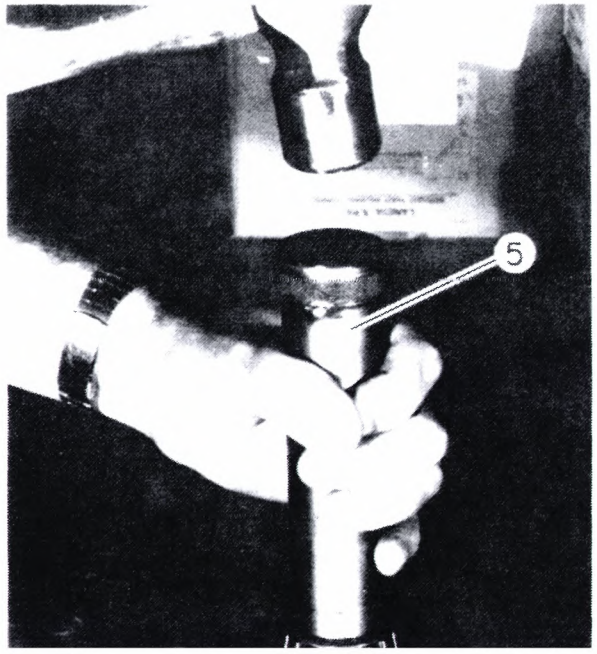
After changing thrust washers, measure clearance again. If correct clearance is not obtained, gear teeth are excessively worn and must be replaced.

Install ring gear to case (with alignment marks aligned) with eight bolts (4) and torque to 72 ft. lb. (10 kgm).

Using driver A.70152 (5) install both roller bearings (6) on case.

1. Differential case 2. Side gears 3. Pinion gears
4. Bolt 5. Driver A.70152 6. Roller bearing



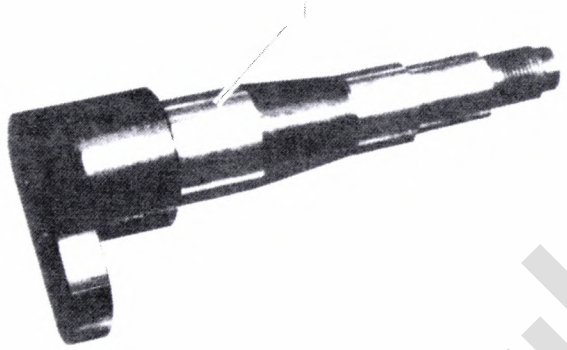


Bevel Pinion Assembly and Adjustment

To ensure correct meshing between ring gear and pinion, a thrust washer of suitable thickness must be placed between pinion and rear roller bearing, to compensate for any difference in machining between pinion and differential carrier.

Dummy pinion A.70184 (1) and a dial indicator are needed to determine thickness of washer.

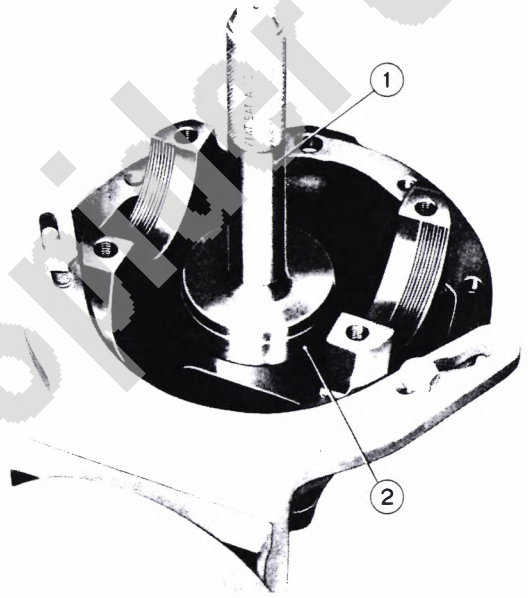
NOTE: Pinion roller bearing thrust washers are supplied for service in the following thicknesses: .100, .102, .104, .106, .108, .110, .112, .114, .116, .118, .120, .122, .124, .126, .128, .130, and .132 in. (2.55, 2.60, 2.65, 2.70, 2.75, 2.80, 2.85, 2.90, 2.95, 3.00, 3.05, 3.10, 3.15, 3.20, 3.25, 3.30, and 3.35 mm).



1. Dummy pinion A.70184

Mount differential carrier on suitable stand.

Place front and rear roller bearing cups of bevel pinion in their seats. Using driver A.70185 for front and driver A.70171 for rear, install cups in seats as shown.



1. Driver A.70171 2. Roller bearing cup

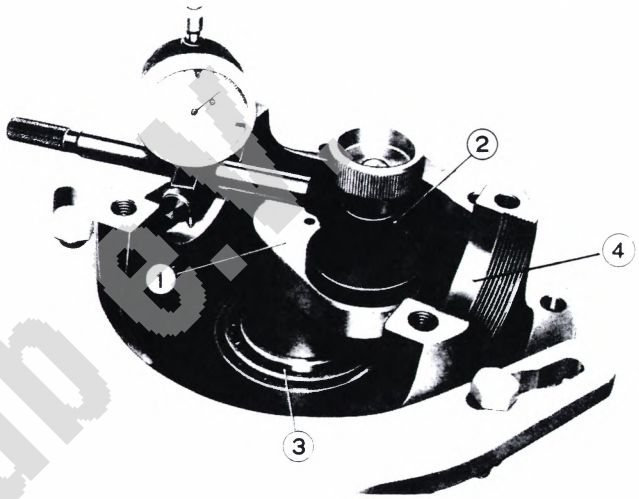
Using tool A.70152, fit rear roller bearing (2) to dummy pinion A.70184 (3). Insert dummy pinion into its seat in differential carrier.

1. Tool A.70152 2. Rear roller bearing 3. Dummy pinion A.70184

Install front roller bearing on dummy pinion. Install "U"-joint sleeve, pinion nut and washer, turn nut a few times to seat bearings. Then tighten nut firmly.

Zero dial indicator on a surface plate. Mount it to dummy pinion (1) with plunger in contact with one of roller bearing seats (4) as shown. Move dial indicator right and left horizontally and when minimum reading is obtained, make note of it. Repeat operation for other seat.

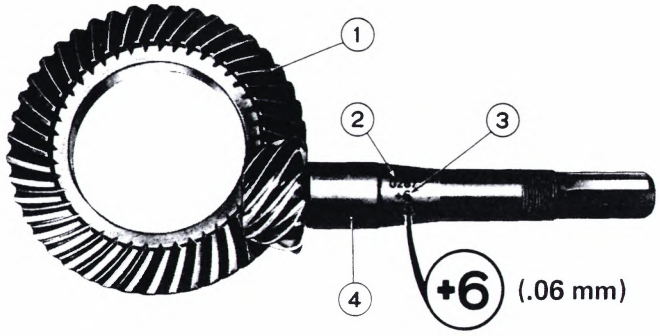
Average out the two readings and this will be (a) (refer to next page).



1. Dummy pinion A.70184 2. Dial indicator base 3. Rear roller bearing 4. Differential case bearing seat

Thickness(s) of thrust washer to be inserted between pinion head and shoulder of rear roller bearing is obtained by adding or subtracting value stamped at factory on bevel pinion (4), from value (a). If number is preceded by a plus (+), subtract it from (a). If number is preceded by a minus (–) add it to (a) (refer to next page).

Remove dummy pinion and parts mounted on it.

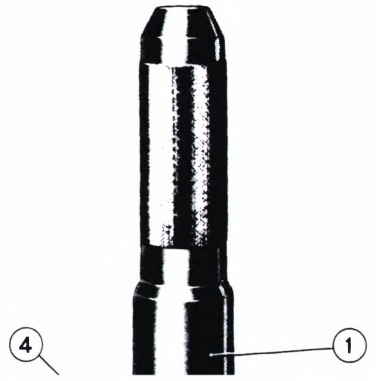


1. Ring gear 2. Serial production and matching number, stamped on pinion shank and ring gear 3. Value of difference between actual and nominal distance 4. Bevel pinion

Install thrust washer (2) to correct thickness on pinion (3). Using tool A.70152 (1), install rear roller bearing (4) as shown. Install collapsible spacer and then insert pinion assembly into carrier.

NOTE: If bevel pinion, pinion bearings and differential carrier are not changed, the collapsible spacer can be used again. If any of these parts are changed, a new spacer must be used.

From forward end of carrier, install front roller bearing, oil slinger, oil seal and "U"-joint sleeve.



HOW TO DETERMINE THICKNESS OF BEVEL PINION REAR BEARING THRUST WASHER

If ≪ a ≫ is mean reading obtained by dial gauge measurements on two bearing seats and ≪ b ≫ the value stamped on pinion a factory, thickness ≪ S ≫ of required new thrust washer is given by the following formula:

$$S = a - (+ b) = a - b$$
$$\text{or } S = a - (- b) = a + b$$

In other words:

- if number stamped on pinion is preceded by a **plus** sign, thickness of washer is to be obtained by **subtracting** this number from dial gauge reading;
- if number stamped on pinion is preceded by a **minus** sign, thickness of washer is obtained by **adding** this to dial gauge reading.

Example:

let ≪ a ≫ be 2.90 (dial gauge reading)
and let ≪ b ≫ be – 5 (number stamped on pinion)
then ≪ S ≫ = a – (– b)

S	= 2.90 – (– 0.05)	.114" – (– .002")
S	= 2.90 + 0.05	.114" + .002"
S	= 2.95	.116"

In this case a thrust washer .116" (2.95 mm) thick will be needed.

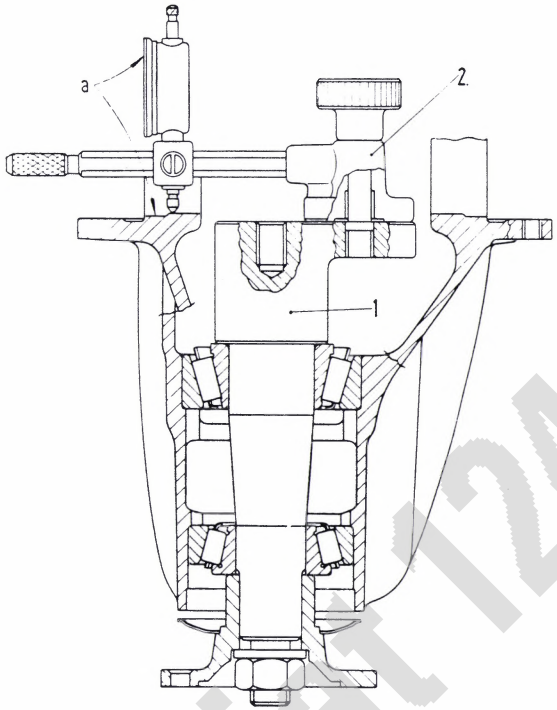


Diagram showing how to fit dummy pinion and support with dial gauge to determine thickness of thrust washer required for rear bearing of bevel pinion.

1. Dummy pinion A.70184 2. Dial gauge a. Mean value of both measurements taken with dial gauge on bearing seats.

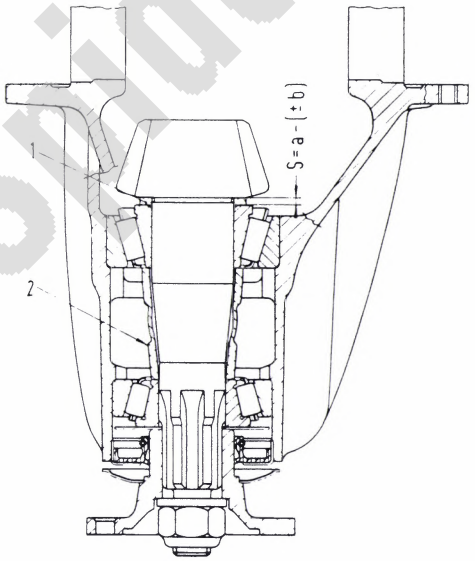


Diagram showing how to fit bevel pinion.

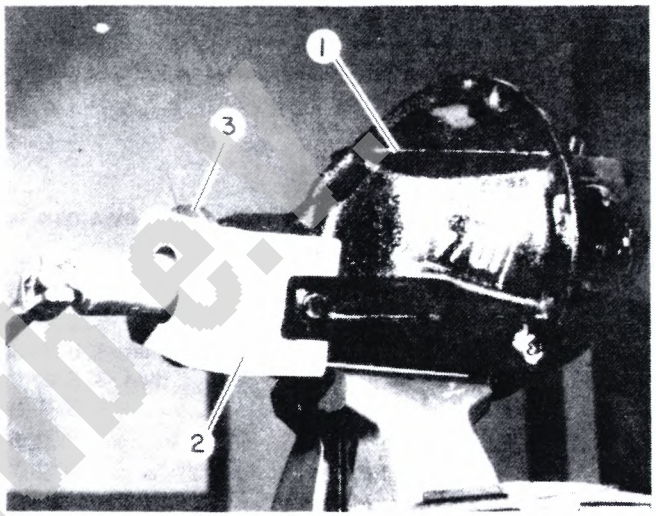
S = Thickness of rear bearing thrust washer.
a = Dial gauge reading.
b = Value stamped on bevel pinion.

1. Rear bearing thrust washer 2. Collapsible spacer between roller bearings

Install washer and self-locking nut on pinion shaft.

With carrier (1) mounted in suitable stand, install holding tool A.70341 (2) or A.70345 on "U"-joint sleeve (3).

With a torque wrench, gradually in stages, tighten nut to a torque of between 87 and 166 ft. lb. (12 to 23 kgm), checking turning torque of pinion itself as this is done (next step). Once the turning torque of bevel pinion is between 14 and 17 in. lb. (16 to 20 kgcm), do not torque any further.



1. Differential carrier 2. Holding tool A.70341 3. "U"-joint sleeve

To check turning torque proceed as follows:

Remove holding tool from "U"-joint sleeve.

Attach dynamometer A.95697 (1) and socket (2) to pinion nut. Move pointer to 17 in. lb. (20 kgcm) graduation on scale.

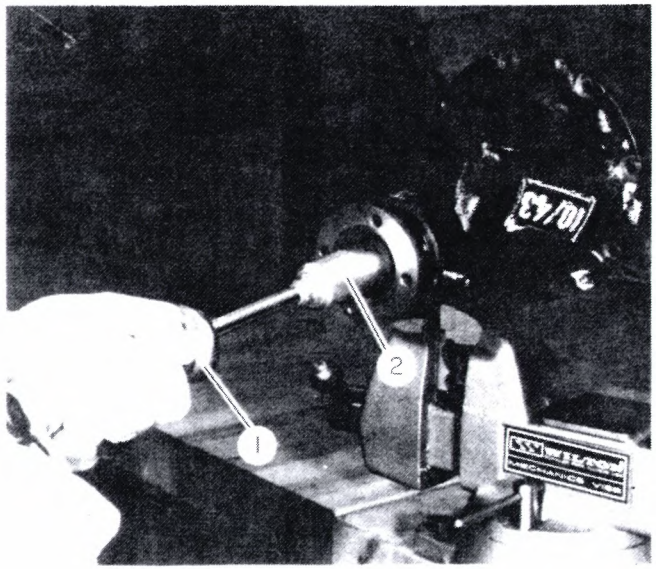
With lever, rotate dynamometer thru a few turns. As pinion turns, check that moving pointer does not pass pointer set at 17 in. lb. (20 kgcm), and is not below 14 in. lb. (16 kgcm) mark.

If turning torque is more than 17 in. lb. (20 kgcm), bearing preload is too high.

NOTE: Do not loosen nut to obtain preload. Pinion must be removed and new collapsible spacer installed, then repeat operation.

If turning torque is less than 14 in. lb. (16 kgcm), pinion nut must be tightened further without exceeding maximum torque of 166 ft. lb. (23 kgm), and turning torque checked again.

If prescribed turning torque cannot be obtained, change spacer, as it will have been compressed to a point of being unserviceable.



1. Dynamometer A.95697 2. Socket

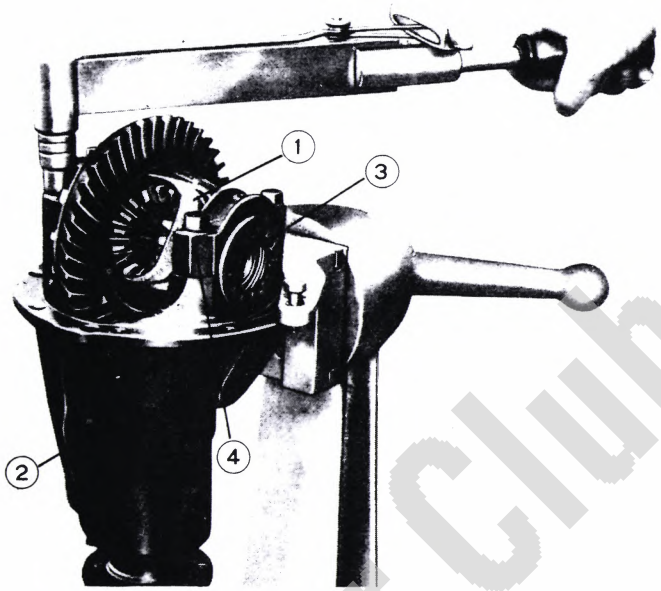
Differential Case Installation Into Carrier

Place differential case (1), complete with bearings, in carrier (2).

Install two bearing retaining and adjusting rings (3). Screw them into contact with bearings.

Fit bearing caps (4) and torque cap bolts to 36 ft. lb. (5 kgm).

1. Differential case 2. Carrier 3. Adjusting rings 4. Bearing caps



Preloading Differential Case Bearings and Adjusting Bevel Gears Backlash

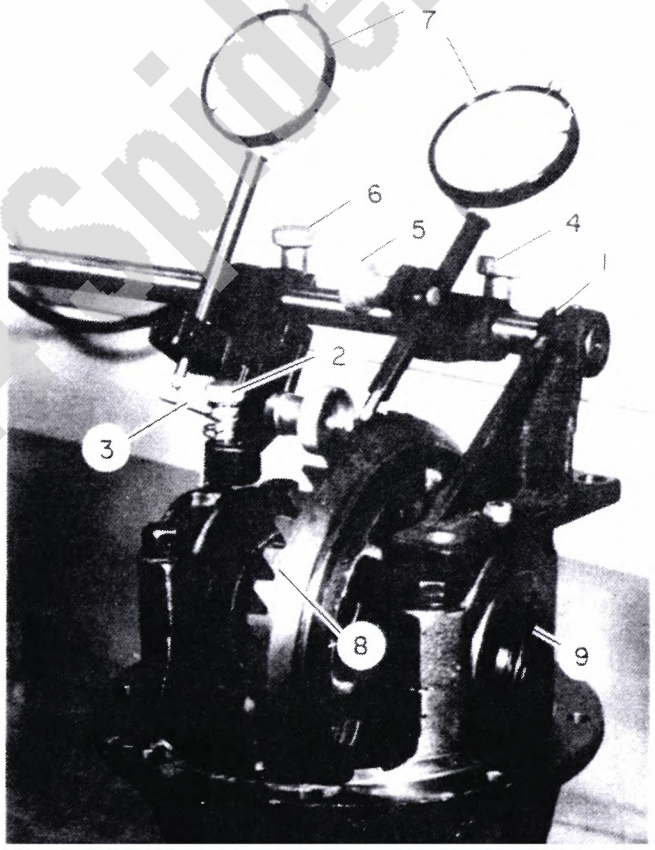
These two operations must be carried out at the same time, using tool A.95688 and wrench A.55025. Install Tool A.95688 (1) into differential carrier locking plate bolt holes with bolt and clamping knob (2).

Move support to bring lever (3) into contact with outer side face of cap, then tighten knob (6).

Unscrew knobs (4) and (5) and adjust support so that plunger of dial indicator (7) bears on side face of one tooth of ring gear (8). Tighten knobs.

Adjust backlash between ring gear and pinion temporarily to .0031 to .0051 in. (.08 to .13 mm) by means of adjusting rings (9). This must be done so that bearings are not pre-loaded to any extent, the rings must just be in contact with bearings, otherwise the subsequent preloading measurements will be incorrect.

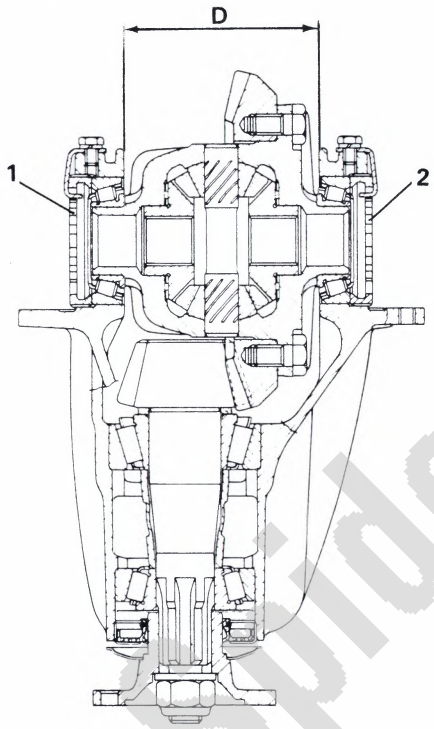
1. Tool A.95688 2. Clamping knob 3. Lever 4, 5, & 6. Adjusting knobs 7. Dial indicator 8. Ring gear 9. Adjusting rings

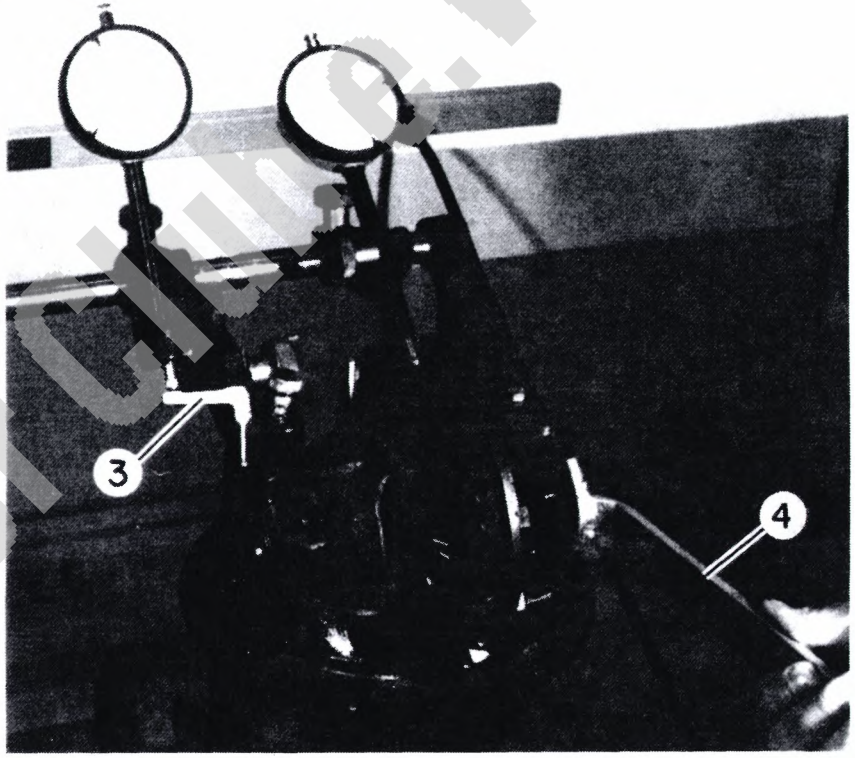


With wrench A.55025 (4), tighten two bearing adjustment rings (1 and 2) alternately the same number of turns; in this way, differential case caps will be moved slightly apart and distance "D" increased. This increased spacing will be shown by dial indicator thru lever (3).

NOTE: Differential case bearing adjusting rings must be tightened until an increase of .0055 to .0071 in. (0.14 to 0.18 mm) in distance "D" is obtained.

1 & 2. Adjusting rings 3. Lever 4. Wrench A.55085

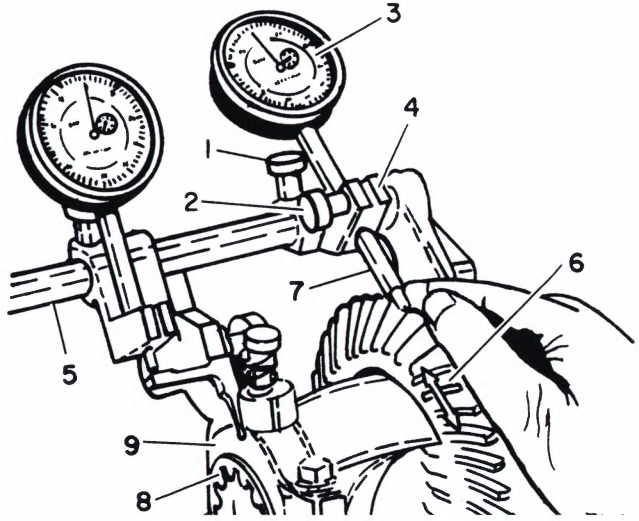




When exact preloading of differential case bearings has been accomplished, make a final check of backlash, .0031 to .0051 in. (.08 to .13 mm) as follows: clamp pinion so that it will not move. Bring teeth into contact, and place dial indicator plunger (7) against flank of one of ring gear (6) teeth. Zero dial indicator (3). Turn ring gear in opposite direction and read amount of movement on dial gauge. It should be between .0031 and .0051 in. (.08 and .13 mm). If it is more or less than this, ring gear must be moved nearer to or farther from pinion by tightening one adjustment ring (8) and slackening the other.

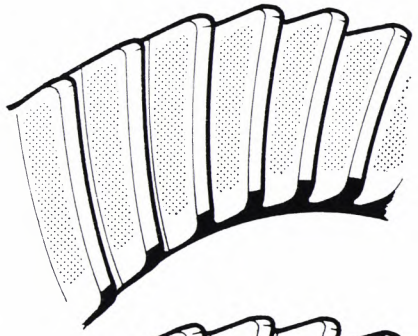
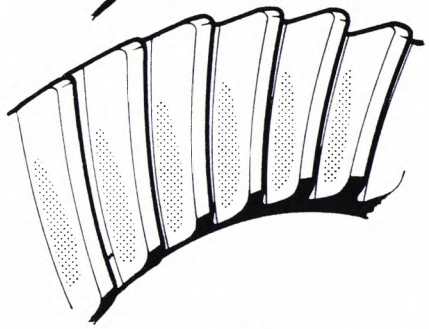
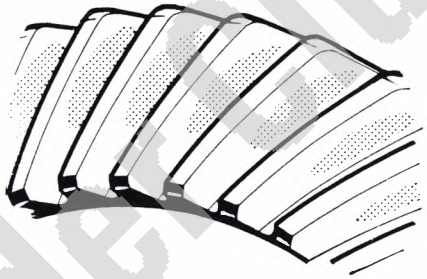
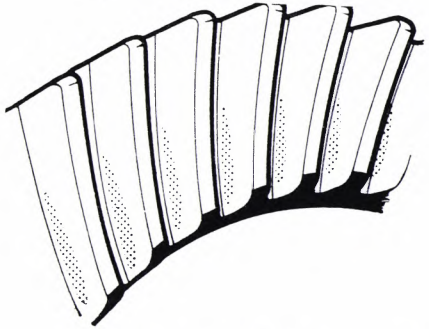
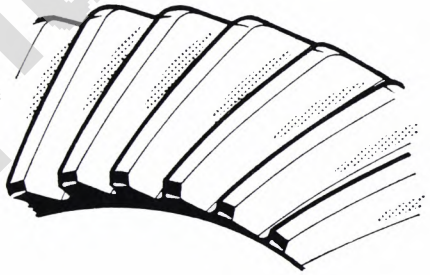
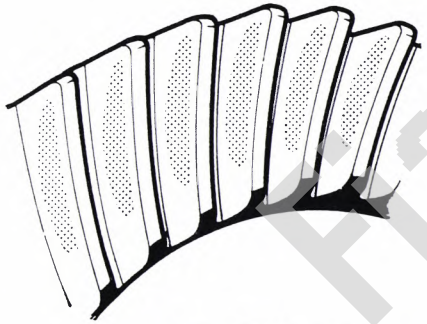
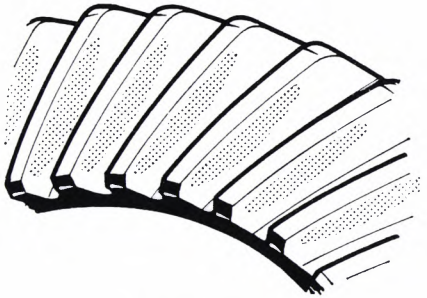
NOTE: It is very important that when one of the rings is turned, the other should be turned the same amount so as not to alter preloading already obtained.

Set dial indicator to zero. After one ring has been tightened, bearing cap (9) spacing will increase and indicator will reflect it. Now slacken other ring until indicator reading returns to zero. Check again on dial indicator that correct backlash has been obtained; if not, repeat operation.

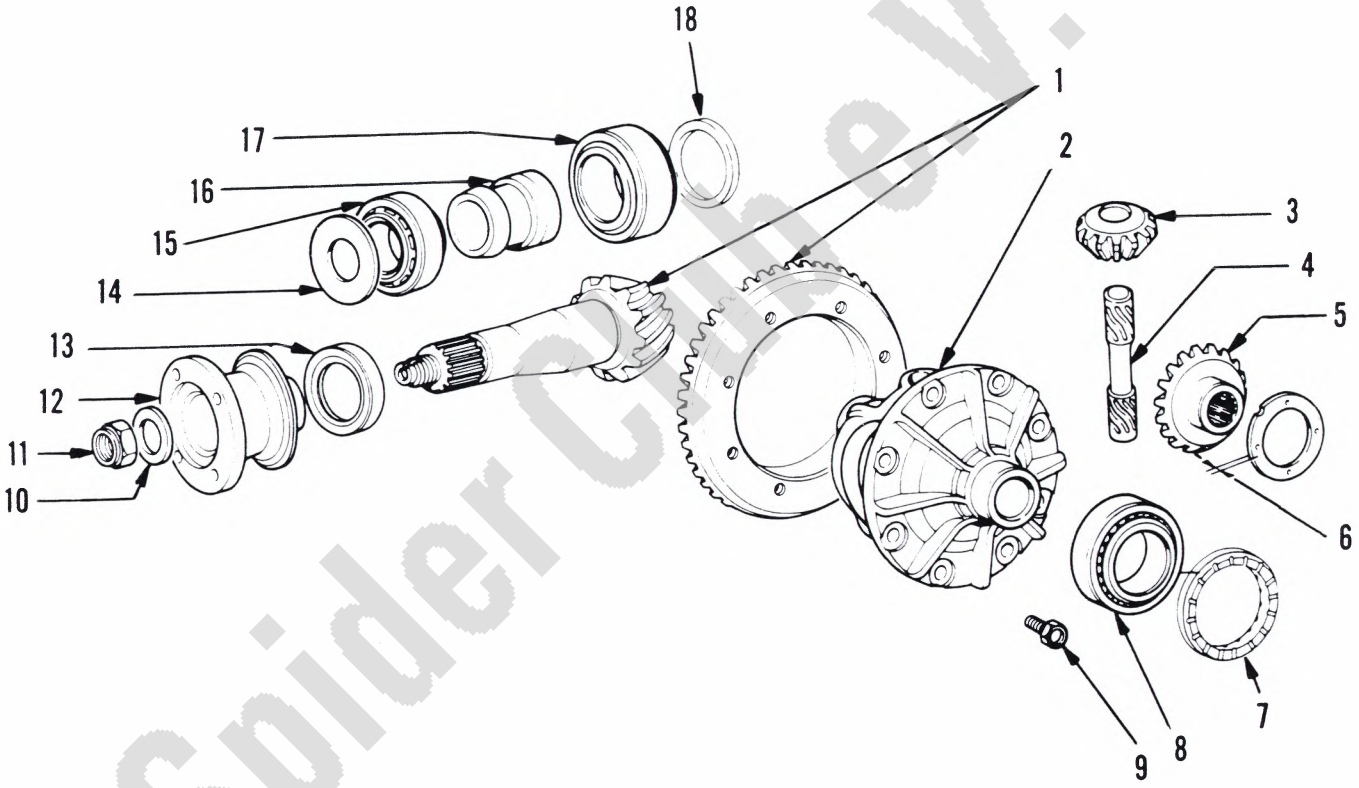


Gear Teeth Pattern Check

Coat ring gear teeth with red lead or prussian blue. Rotate ring gear about 15 turns in each direction while applying a load to drive pinion flange. If pattern is uniformly distributed over both tooth faces, adjustment is correct.

Drive Side		Coast Side
	**Correct mesh.** The contact pattern is uniformly distributed over both tooth faces, drive and coast.	
	**Incorrect mesh.** Drive side: contact on toe of tooth and towards center. Coast side: contact on heel of tooth and towards center. Move pinion away from ring gear, using thinner thrust washer.	
	**Incorrect mesh.** Drive side: Toe contact, localized at root. Coast side: Heel contact, localized at root. Move pinion away from ring gear, using thinner thrust washer.	
	**Incorrect mesh.** Drive side: Heel contact, towards center of tooth. Coast side: Toe contact, towards center of tooth. Move pinion closer to ring gear, using thicker thrust washer.	
	**Incorrect mesh.**	

DIFFERENTIAL (1978 AND ON)



1. Ring and pinion
2. Carrier
3. Pinion gear
4. Pinion shaft
5. Side gear
6. Shim
7. Shim
8. Bearing
9. Bolt
10. Washer
11. Nut
12. Flange
13. Oil seal
14. Washer
15. Bearing
16. Collapsible spacer
17. Bearing
18. Shims

DIFFERENTIAL ASSEMBLY

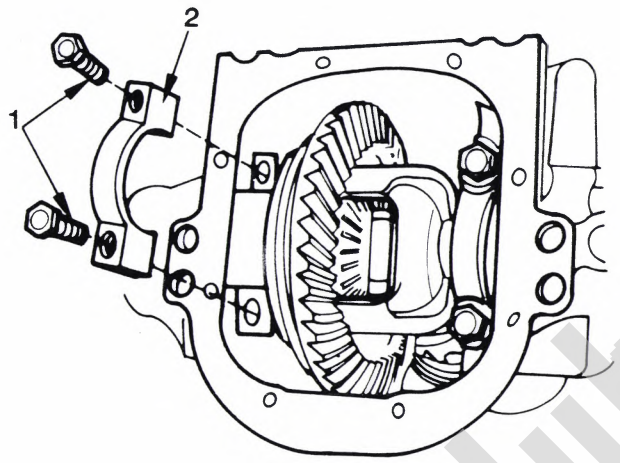
DISASSEMBLY

Remove eight bolts and washers holding cover on axle housing.

Before disassembling, the following checks should be made:

- ring gear runout and backlash
- tooth contact pattern.

Remove two bolts (1) and washers holding side bearing caps (2). Note markings on caps and housing. Do not mix caps.



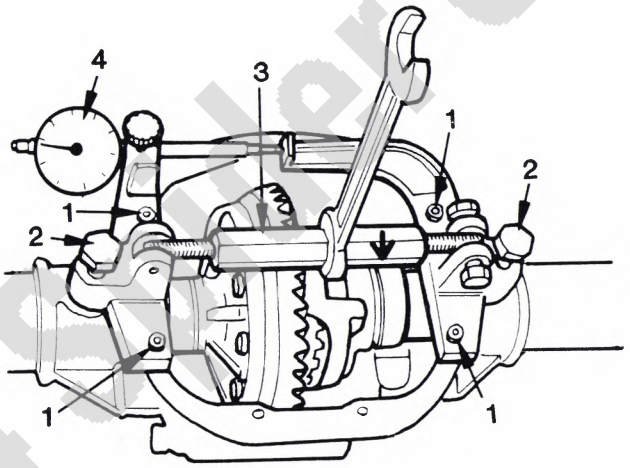
1. Bolts 2. Side bearing cap

Install differential housing spreader (Kent Moore No. 28294) as follows:

- secure spreader to housing with four bolts (1)
- torque side bolts (2) of tool to 1 kgm (7.23 ft. lbs.)
- calibrate dial indicator (4) by preloading indicator until needle travels half full travel. Set indicator dial to zero at needle.
- rotate turnbuckle (3) in direction of arrow until indicator reads 0.6 to 0.8 mm (0.024 to 0.031 inch).

CAUTION: Spreading case more than 0.8 mm (0.031 inch) could cause permanent distortion.

- return turnbuckle to starting position
- check tightness of anchor bolts and side bolts.



1. Anchor bolts 2. Side bolts 3. Turnbuckle 4. Dial indicator

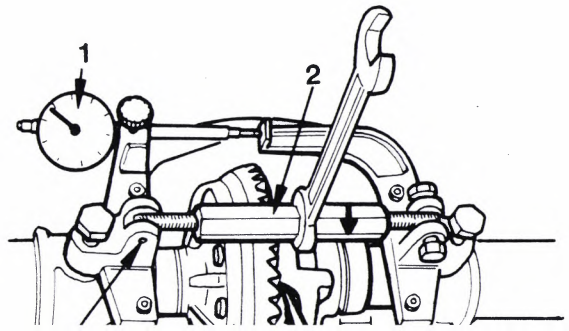
Reset dial indicator (1) to zero. Rotate turnbuckle (2) until indicator reads 0.6 to 0.8 mm (0.024 to 0.031 inch).

Using a suitable lever, remove differential case (3) from housing.

Loosen turnbuckle to relieve force from housing. Remove turnbuckle bolt (4).

NOTE: Make sure dial indicator returns to zero.

Remove differential case, shims and bearings. Do not mix up adjusting shims and bearings. Keep caps, bearings, and shims of same side together.

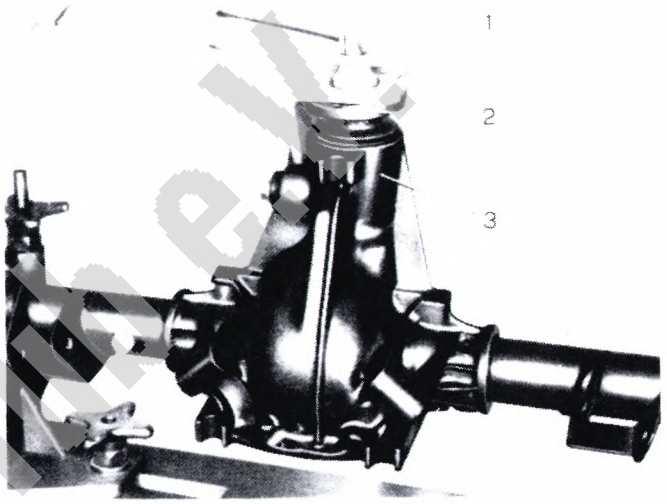


Install holding tool (1) (Kent Moore No. 28115) on pinion flange (2). Remove nut, washer, and flange from pinion shaft.

Push drive pinion gear out rear of housing (3).

Remove collapsible spacer from pinion.

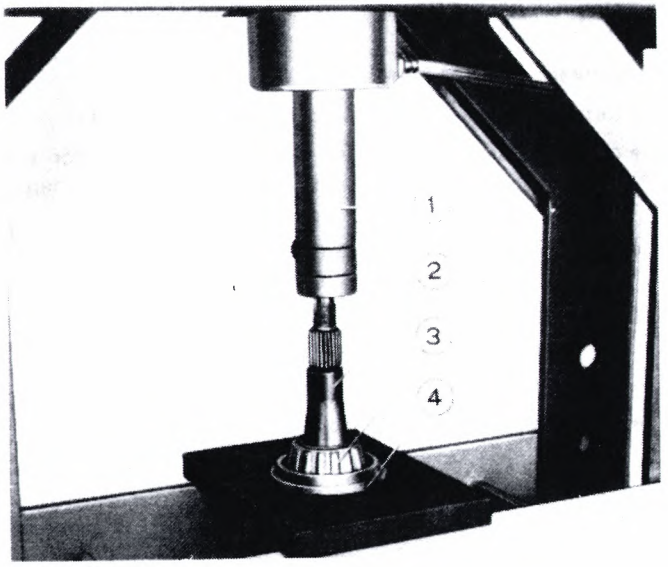
1. Holding tool 2. Pinion flange 3. Axle housing



Place drive pinion shaft in press.

Press rear bearing (3) off shaft (2). Remove and retain shim from under pinion bearing.

1. Press 2. Pinion shaft 3. Rear bearing 4. Plate

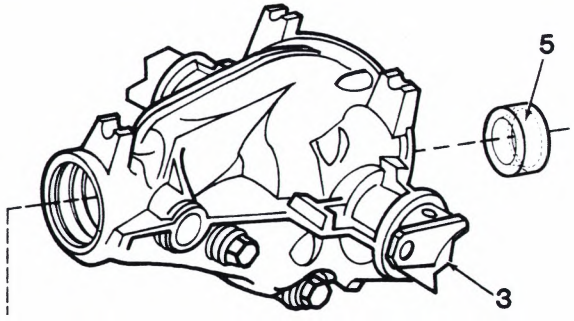


Remove oil seal (1) and dust shield (2) from housing (3).

Remove front pinion bearing (4) from housing.

Remove rear pinion bearing outer race (5) from housing.

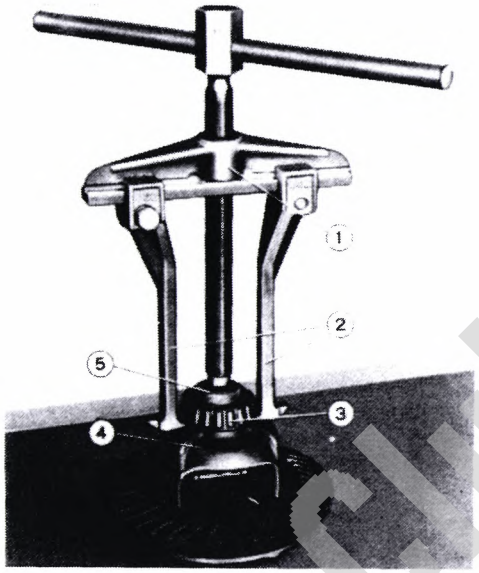
1. Oil seal 2. Dust shield 3. Axle housing 4. Front pinion bearing
5. Rear pinion bearing outer race



Using a puller, remove side bearings (3) from carrier (4).

Keep bearings with outer race, cap, and shims from same side. Do not mix bearings and outer races.

1. Puller 2. Puller arms 3. Bearing 4. Carrier 5. Adapter



Put locating reference marks on ring gear and carrier.

Remove eight bolts holding ring gear (3) to carrier (2).

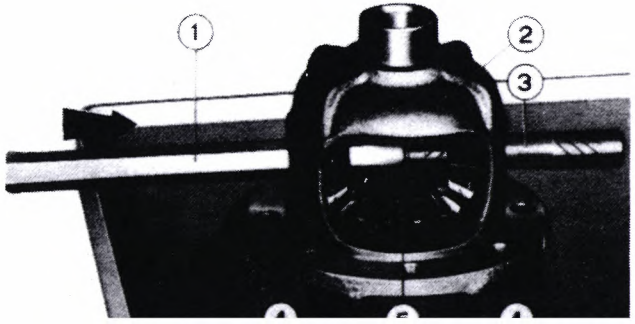
NOTE: Drive ring gear from carrier using a soft mallet.

1. Wrench 2. Carrier 3. Ring gear

Using a soft drift, drive pinion gear shaft (3) out of carrier (2).

Remove pinion gears (4), side gears (5) and side gear thrust washers.

1. Soft drift 2. Carrier 3. Pinion gear shaft 4. Pinion gears
5. Side gears



INSPECTION

Wash all parts in a suitable cleaning solvent.

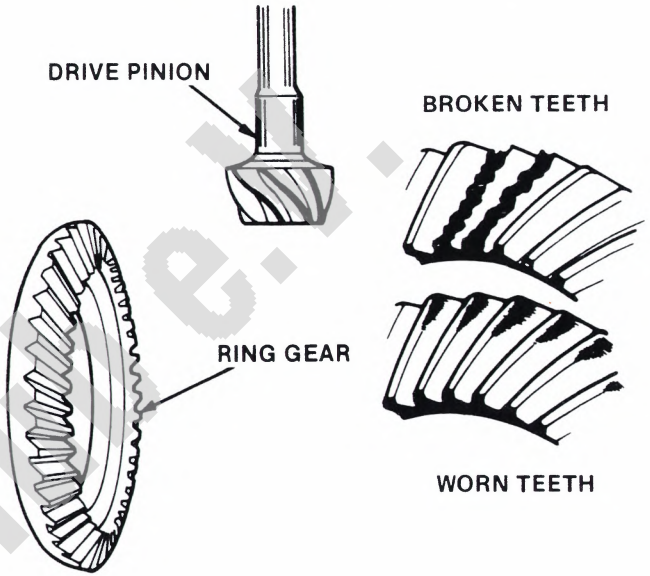
With the exception of the bearings, dry with compressed air.

Gears

Make sure teeth on gears are not excessively worn. Replace as necessary.

Check gears for irregular wear pattern and investigate causes.

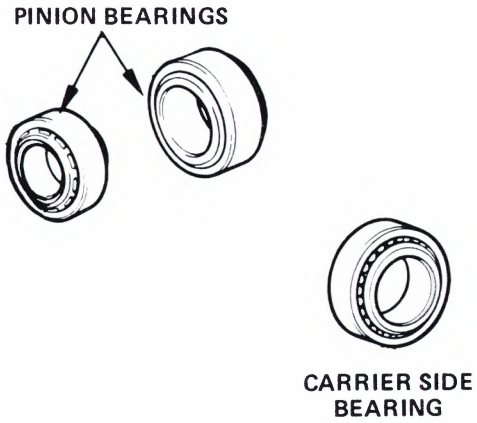
Make sure there are not chipped teeth.



Check bearings for wear or damage.

Determine the cause.

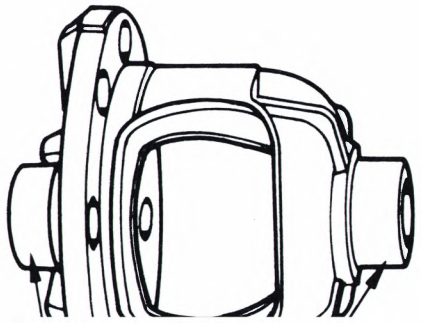
Make all repairs, following recommended procedures.



Check that all machined contact surfaces are smooth and free of any raised edges.

Check for cracks and distortions.

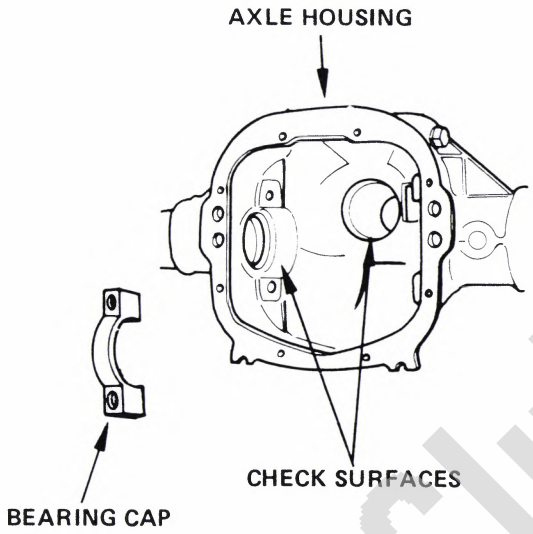
Check thrust washers for damage or excessive wear.



Check that all machined contact surfaces in housing and bearing caps are smooth and free of any raised edges.

Check condition of oil seal contact surfaces on pinion flange.

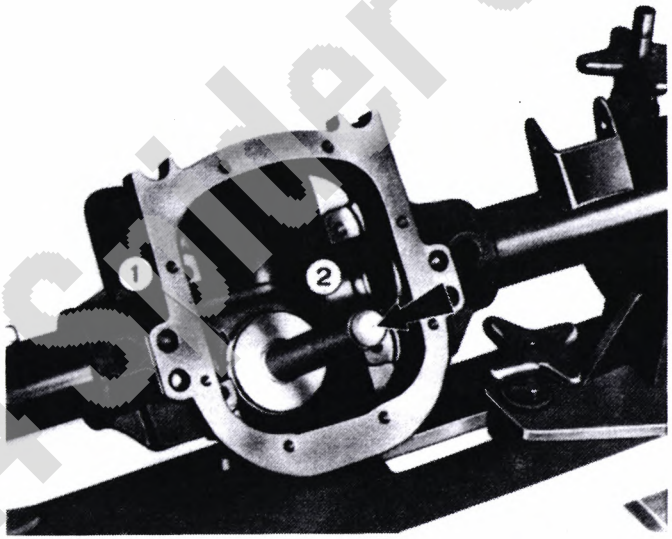
Check for distortions or cracks.



ASSEMBLY

Install outer race (1) for pinion shaft rear bearing in housing. Use installer (Kent Moore No. 28105).

1. Outer race 2. Installer



Install outer race for pinion shaft rear bearing in housing (2). Use installer (Kent Moore No. 28248).

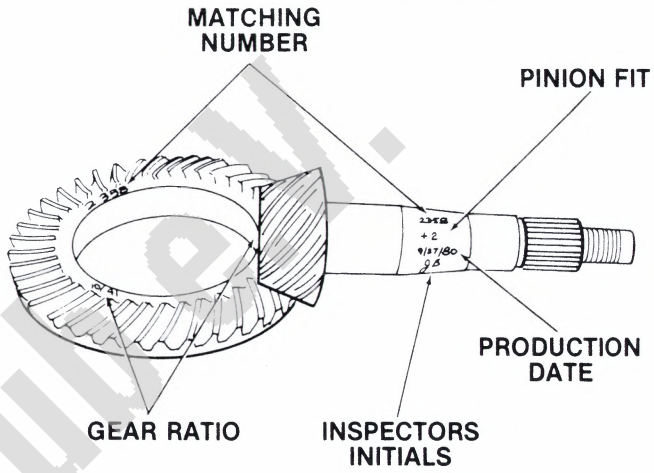
1. Installer 2. Housing

NOTE: Drive pinion and ring gear are supplied in matched pairs; if one is damaged, both must be replaced.

The drive pinion is marked on the shaft with the following:

- production date
- Inspector's initials
- gear ratio — also on ring gear
- production number — same number on ring gear, mating ring gear to pinion
- pinion fit — value in hundreds of mm showing difference between actual and ideal pinion fit.

NOTE: Subtract positive values and add negative values to shim size.



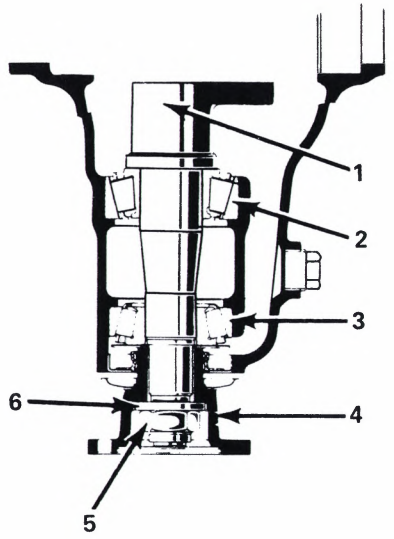
Calculating Pinion Depth

Install dummy pinion (1) (Kent Moore No. 28249) with bearings (2 and 3).

Install flange (4), flatwasher (6), and nut (5).

Tighten nut. Rotate dummy pinion a few times to seat bearings and retighten nut.

1. Dummy pinion 2. Bearing 3. Bearing 4. Drive flange 5. Nut 6. Flat washer



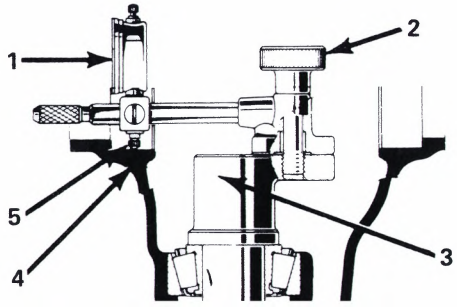
Zero dial indicator on a flat surface.

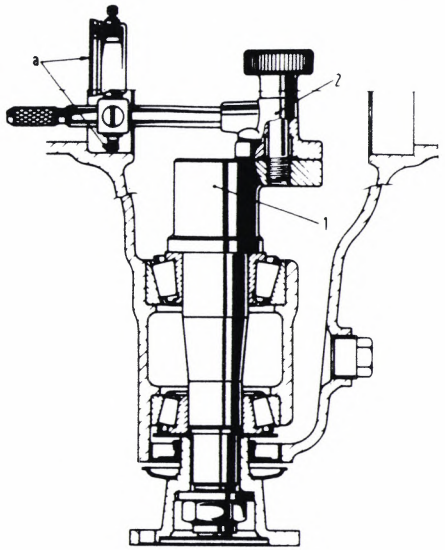
Install dial indicator (1) (Kent Moore No. 28193) on dummy pinion (3) with plunger (5) on carrier bearing seat (4). Tighten knurled bolt (2).

Note reading on dial indicator.

Note markings on new drive pinion.

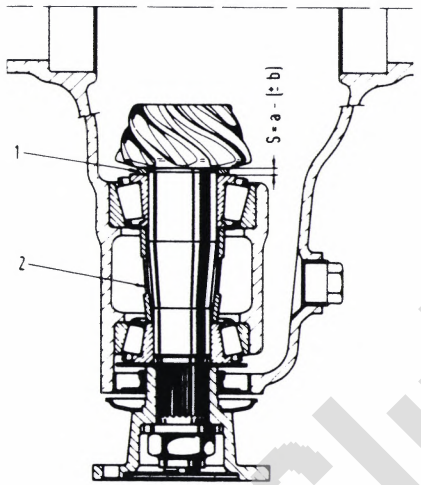
Determine size of shim necessary to obtain proper pinion depth as shown on next page.





1. Dummy pinion 2. Dial indicator

a = Dial indicator reading from which factory marking on pinion must be subtracted.



1. Rear pinion bearing shim 2. Collapsible spacer

s = Thickness of rear pinion bearing mounting shim.
a = Dial indicator reading.
b = Factory marking on pinion.

HOW TO DETERMINE THICKNESS OF REAR PINION BEARING SHIM

If (a) is dial indicator reading and (b) factory marking (in hundredths of a millimeter), thickness (S) of shim is determined as follows:

$$S = a - (+b) = a - b$$
$$\text{or } S = a - (-b) = a + b$$

in other words

– If factory marking on pinion is proceeded by PLUS (+), subtract this number from dial indicator reading to obtain shim thickness.

– If factory marking on pinion is proceeded by MINUS (–), add this number to dial indicator reading to obtain shim thickness.

Example:

If a = 2.90 (indicator reading)
and b = –5 (marking on pinion)
then S = a – (–b)
S = 2.90 – (–0.05)
S = 2.90 + 0.05
S = 2.95

In this case a shim 2.95 mm thick must be used.

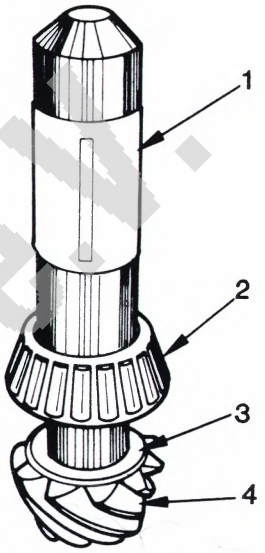
NOTE: Shims are available from 2.55 mm to 3.35 mm in graduations of 0.5 mm.

Place shim (3) previously calculated on pinion (4).

NOTE: If original ring and pinion gears will be used for reassembly, and ring to drive pinion gear tooth contact pattern is satisfactory, use original shims.

Install inner race (2) of pinion bearing on pinion. Use drift (Kent Moore No. 28101).

1. Drift 2. Pinion bearing inner race 3. Shim 4. Drive pinion

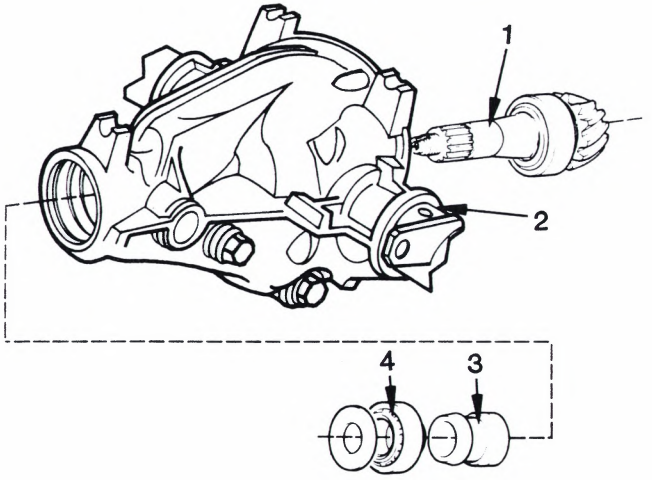


Pinion Installation

Lubricate the bearings with oil.

Place pinion (1) in housing (2). Install collapsible spacer (3), bearing (4), and plate on drive pinion.

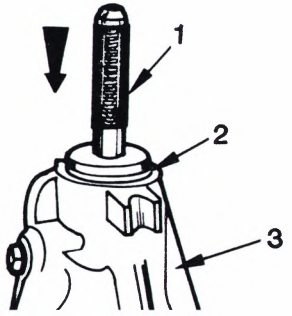
1. Pinion 2. Housing 3. Collapsible spacer 4. Bearing



Hold drive pinion in housing.

Place oil seal on housing and install with tool (1) (Kent Moore No. J28252).

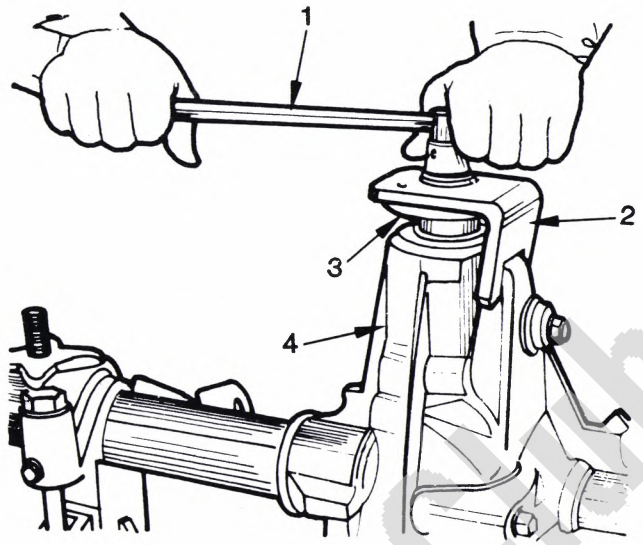
1. Tool 2. Oil seal 3. Housing



Install flange (3), washer, and nut on pinion shaft.

Install holding tool (2) on pinion flange (3). Tighten nut down gradually and check rolling torque of pinion.

1. Wrench 2. Holding tool 3. Pinion flange 4. Housing

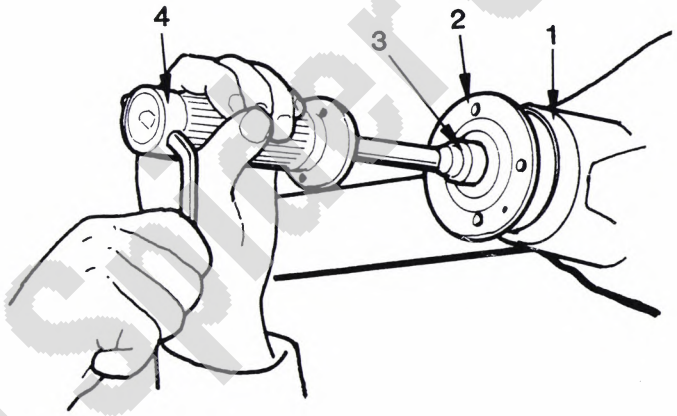


The nut is tightened sufficiently when the rolling torque of the pinion is 14 to 17 in. lbs. (16 to 20 kgcm).

NOTE: If rolling torque is exceeded, start procedure over using a new collapsible spacer. Do not loosen nut to obtain preload.

Using a punch, burr collar of nut securing flange ot drive pinion.

1. Housing 2. Pinion flange 3. Socket 4. Rolling torque wrench (Kent Moore No. 28194)



Differential Carrier Assembly

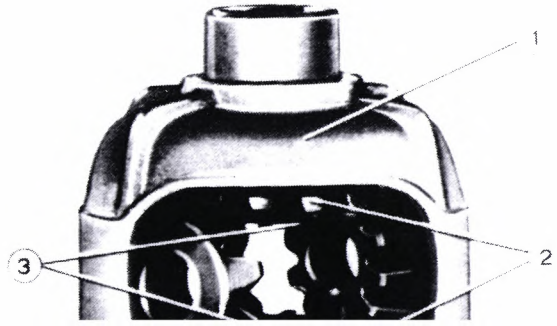
Place thrust washers under side gears (2). Install side gears (2) in carrier (1).

Mesh pinion gears (3) with side gears. Rotate pinion gears on side gears until aligned with hole in carrier. Install pinion shaft.

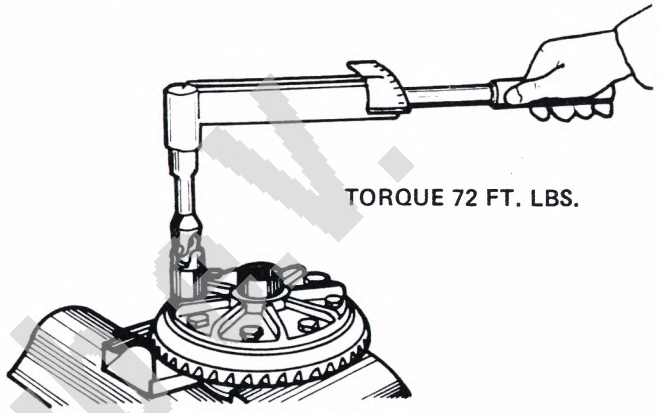
Block one side gear and check rolling torque on other side gear. Use rolling torque wrench (Kent Moore No. 28194).

Rolling torque = 22 to 36 ft. lbs. (3 to 5 kgm).

If torque is not within specifications, install new thrust washers.



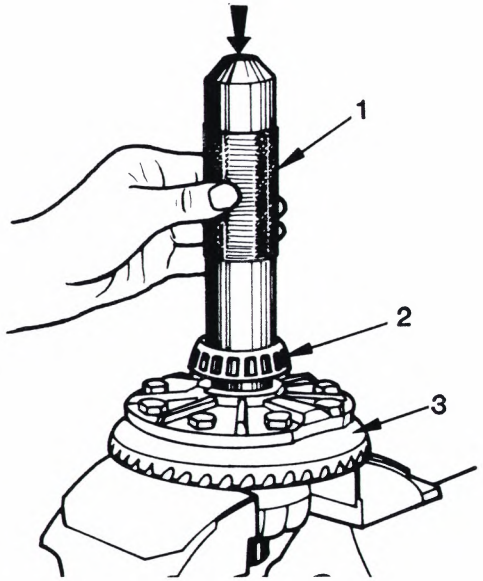
Align reference mark on ring gear with mark on carrier. Install eight bolts through carrier into ring gear. Torque bolts to 72 ft. lbs. (10 kgm).



Press side bearings (2) onto carrier (3) using installer (Kent Moore No. 28101).

If using old bearings, make sure they are installed on same side from which they were removed.

1. Installer 2. Bearing 3. Carrier



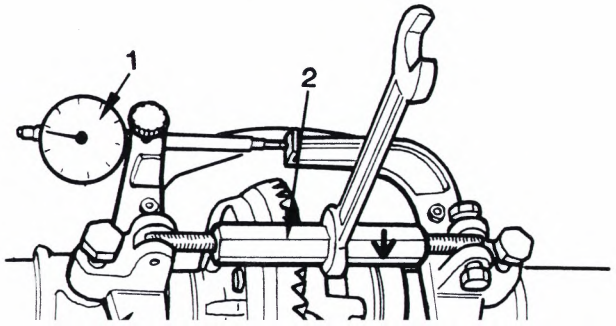
Reinstall carrier into housing. Make sure side bearing outer races are seated.

Reinstall turnbuckle (2) in spreader (3).

Calibrate dial indicator (1) by

- preloading indicator until needle travels ½ full travel
- set indicator dial to zero at needle.

Rotate turnbuckle (2) to spread housing 0.6 to 0.8 mm (0.024 to 0.031 inch) to facilitate side shim adjustment.



Shim Selection

Use original shims if:

- Incorrect backlash or gear wear pattern was not a problem
- Old side bearings and races are reused.
- Shims, side bearings and races were kept separate during removal and can be installed on same side from which they were removed.

Select new shims if:

- Wear pattern indicates incorrect backlash.
- New side bearings were used.
- Shims were mixed up during disassembly.

Make sure side bearing outer races are seated properly.

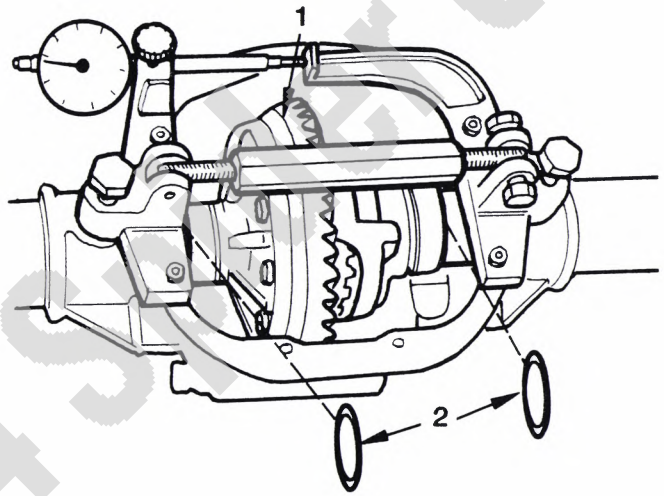
Move ring gear (1) against drive pinion to obtain zero backlash.

Fit largest shim (2) on ring gear side that will just take up clearance.

Install shim (2) on opposite side to take up clearance plus desired preload.

NOTE: This is only a starting point. Shim sizes may have to be changed to obtain desired preload and backlash.

1. Ring gear 2. Shim

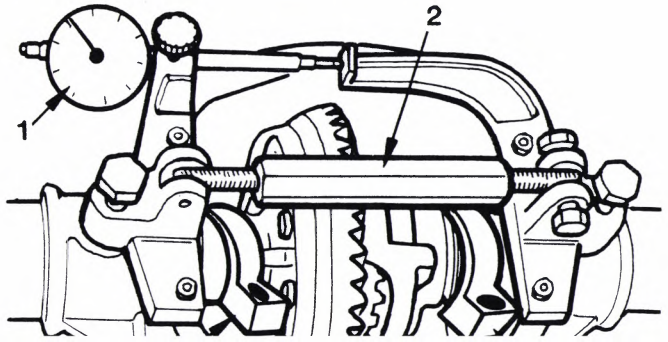


Loosen turnbuckle to the rest position. Check that dial indicator reading is 0.10 mm (0.004 inch). This is the bearing preload.

If necessary, adjust shims to obtain correct preload.

Install side bearing caps on same side from which they were removed. Torque bolts to 36 ft. lbs. (5 kgm).

1. Dial indicator 2. Turnbuckle 3. Side bearing caps



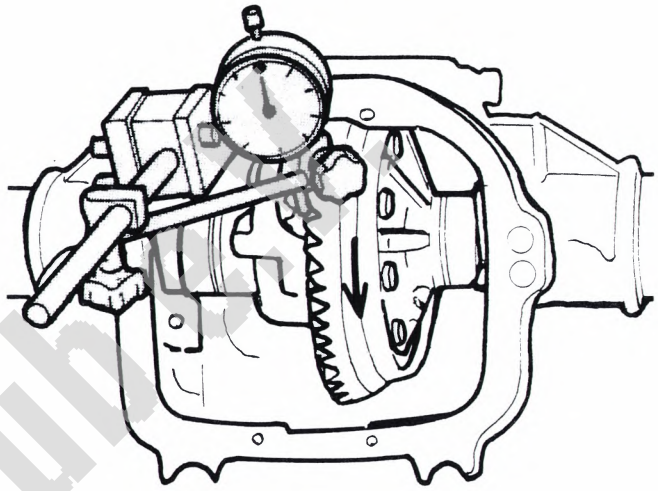
NOTE: Correct backlash is required for normal gear life and quiet operation.

Make sure bearing preload is adjusted correctly and caps are installed.

Install holding tool on pinion flange to block it from turning.

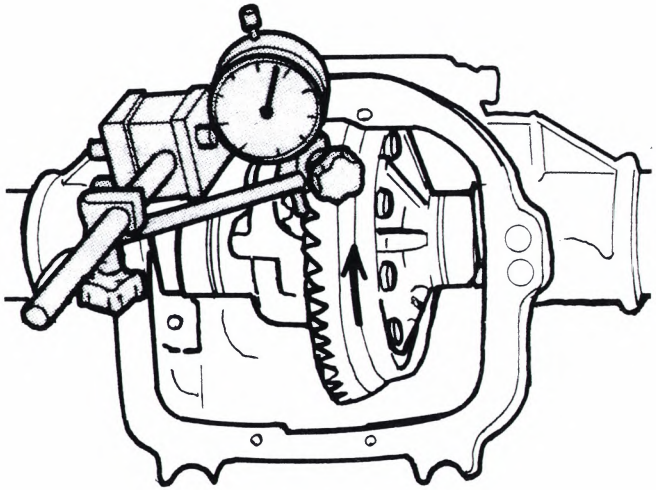
Mount dial indicator on housing with plunger contacting ring gear at right angle to teeth.

Rotate ring gear in on direction as far as it will go. Preload indicator until needle travels half full travel. Set indicator dial to zero at needle.



Rotate ring gear in other direction as far as it will go and read indicator. Backlash reading = 0.08 to 0.13 mm (0.003 to 0.005 inch).

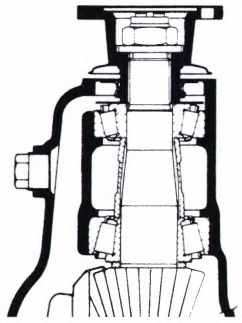
Repeat check at two more different points on the ring gear circumference.



Adjust backlash by changing the size of the shims.

- To increase backlash, increase the size of the shim on pinion side of carrier and decrease size of shim on ring gear side.
- To decrease backlash, increase size of shim on ring gear side and decrease size of shim on pinion side.

CAUTION: Make sure you increase one side and decrease other side the same amount to maintain preload.



TOOTH CONTACT PATTERN CHECK

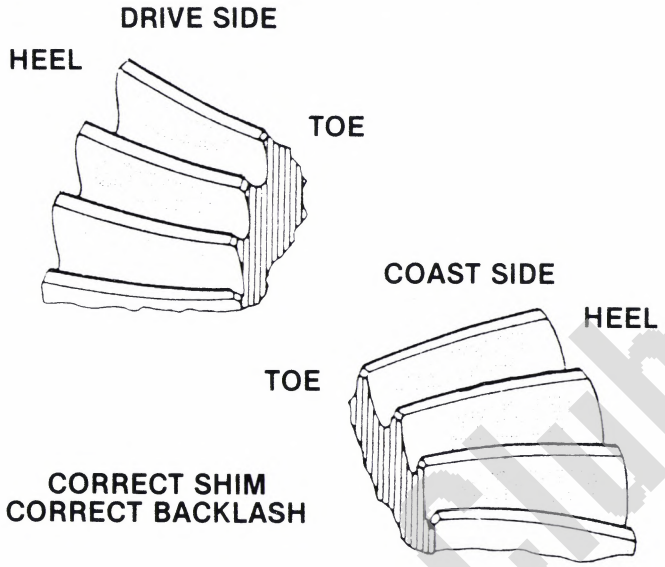
Coat ring gear teeth with red lead or Prussian blue.

Rotate ring gear about 15 turns in each direction while applying a load to the drive pinion flange.

If pattern is uniformly distributed over both tooth faces, the adjustment is correct.

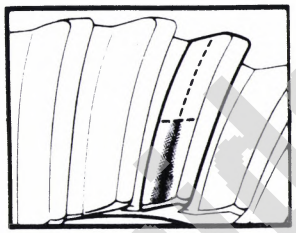
If readjustment is necessary, move ring gear or pinion in small amounts. Before rechecking the pattern, be sure

- bearings are properly preloaded
- cap bolts are torqued
- backlash is correct.



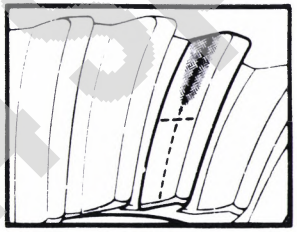
Toe Contact

Too little backlash. Move ring gear away from pinion to increase backlash.



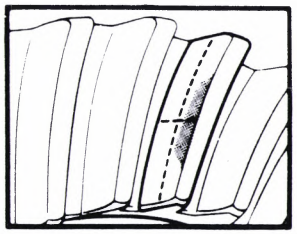
Heel Contact

Too much backlash. Move ring gear toward pinion to decrease backlash.



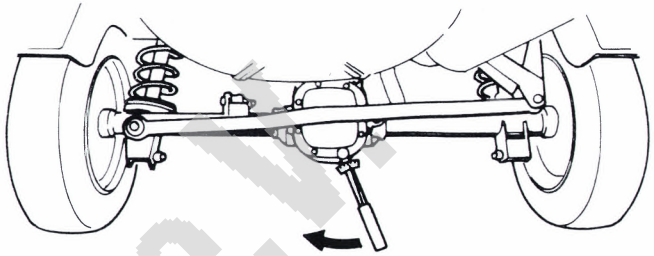
High Face Contact

Pinion too far from ring gear. Increase pinion shim to move pinion toward ring gear.



Install new gasket and cover. Torque cover bolts to 18 ft. lbs. (2.5 kgm).

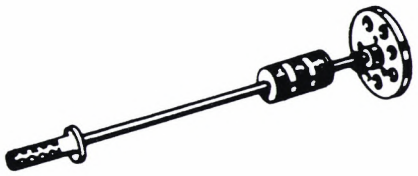
Fill differential with hypoid gear oil, SAE 80 W/90 EP to MIL-L-2105B (1.4 quarts).



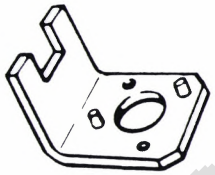
TORQUE 18 FT. LBS.

NOTE: Number given in parentheses is Kent Moore catalogue number.

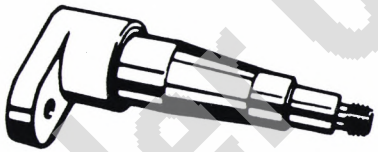
A.47017 (J28010) Axle puller



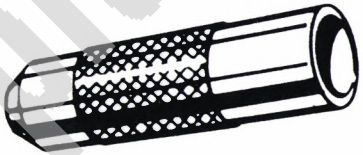
A.70341 (J28115) Pinion flange holding tool



A.70184 (J28106) Dummy pinion

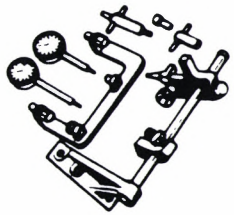


A.70152 (J28101) Side bearing and rear pinion bearing installer



A.70171 (J28105) Rear pinion bearing outer race installer

A.95688 (J28192) Pinion height and side bearing preload gage set



A.45008 (J28005) Rear pinion bearing remover

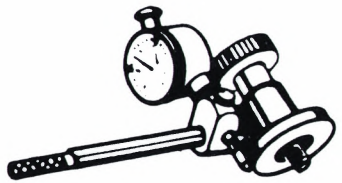
A.45028 (J28007) Side bearing puller pilot

A.55015 (J28041) Side bearing lockring adjusting wrench

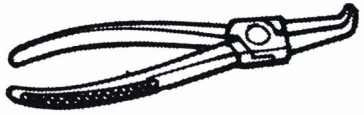
A.70198 (J28107) Pinion bearing outer race remover

A.95753 (J28294) Differential housing spreader

A.95690 (J28193) Dial indicator



A.81114 (J28148) Snap ring pliers



BRAKES - 33

BRAKES - 33

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
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	Torque Specifications	33-2
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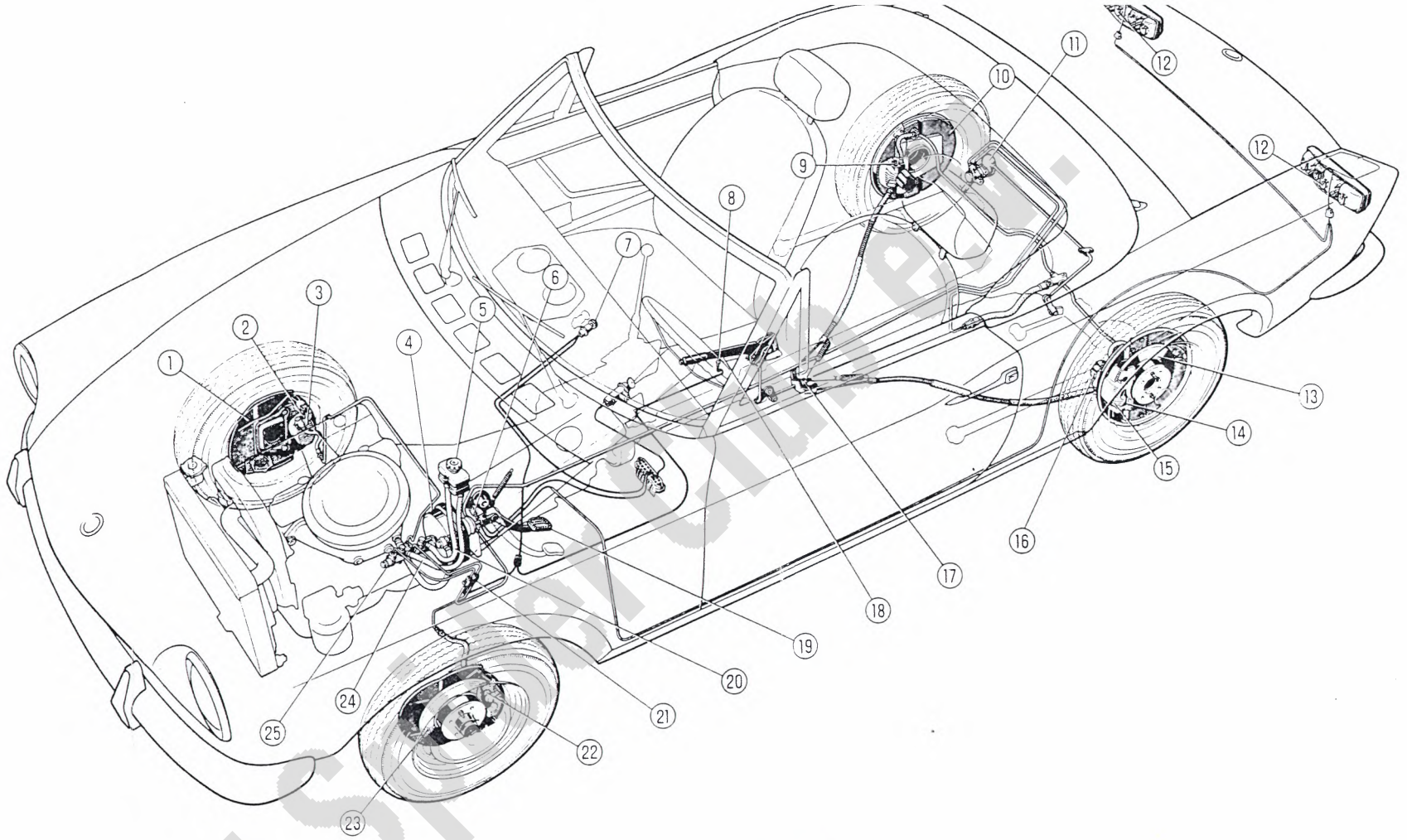
DATA AND SPECIFICATIONS

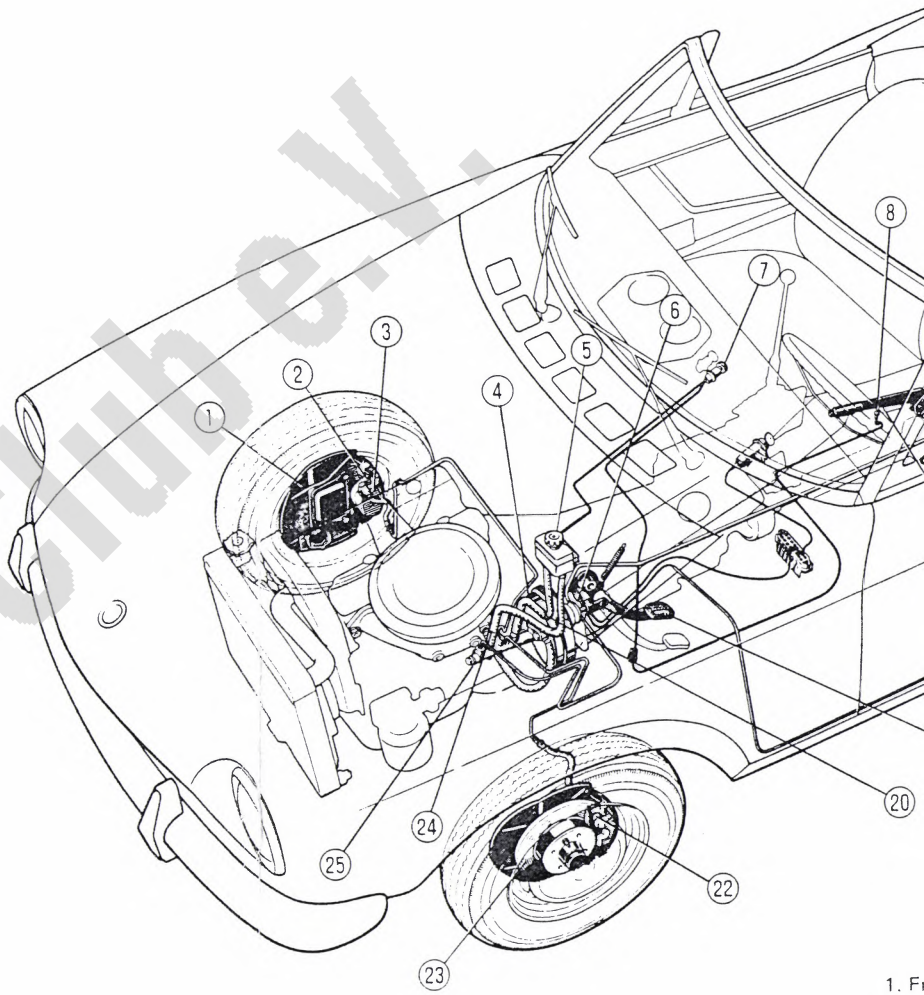
Type	hydraulically operated disc brakes on the four wheels, with dual brake circuit
Brake disc diameter	8.94" (227 mm)
Brake disc thickness:	
– nominal	.3917" to .3995" (9.95 to 10.15 mm)
– minimum allowable after refacing: front	.3680" (9.35 mm)
rear	.3719" (9.45 mm)
– minimum allowable from wear	.354" (9 mm)
Brake disc runout, maximum allowable (total dial indicator reading, at .08" – 2 mm apart from disc edge)	.006" (0.15 mm)
Brake lining clearance	self-adjusting
Distance between lining inner faces	not less than .41" (10.5 mm)
Lining thickness, minimum allowable	.0787" (2 mm) approx.
Master cylinder bore	¾" (19.05 mm)
Brake calipers	floating, single cylinder type
Caliper cylinder bore: front	1-7/8" (48 mm)
rear	1-3/8" (34 mm)
Brake regulator	acting on rear wheels
– regulator ratio	0.46 to 1
Power brake	Vacuum type
– type	Master-Vac
– vacuum cylinder bore	6.2" (158.5 mm)
– distance between hydraulic piston control rod and master cylinder resting plate	.0408" to .0758" (1.035 to 1.925 mm)
Parking hand brake	acting mechanically on rear brake calipers

TORQUE SPECIFICATIONS

DESCRIPTION	THREAD (METRIC)	TORQUE Kgm	TORQUE N·m	TORQUE FT. LB.
HYDRAULIC BRAKE SYSTEM				
Master cylinder nut	M 8	2.49	25	18
Brake regulator-to-body nut	M 8	1.52	15	11
Brake regulator-to-bracket bolt	M 8	1.9	20	14
Torsion bar link rod-to-axle case self-locking nut, type S	M 6	.41	4.9	3
Caliper support bracket bolt		5	49	36
PEDALS				
Brake and clutch pedal nut	M 12 x 1.25	1.9	20	14
Pedal support-to-dashboard nut	M 8	1.52	15	11
Pedal support-to-crossmember nut	M 8	2.49	25	18
ELECTRICAL				
Back-up light switch (5 A)	M 14 x 1.5	4.42	43	32
POWER BRAKE				
Power brake-to-support nut	M 8	2.49	25	18



1. Front brake disc shield
2. Front brake bleeder connection
3. Front brake calipers
4. Vacuum servo
5. Dual brake fluid reservoir with level switch
6. Stop lights switch
7. Brake circuit effectiveness and hand brake ON indicator
8. Jam switch for hand-brake ON signal and efficiency indicator
9. Rear brake bleeder connection
10. Rear brake disc shield
11. Braking action compensator
12. Stop lights
13. Rear brake disc
14. Caliper carrier plate
15. Rear disc brake caliper
16. Mechanical parking hand brake
17. Hand brake cable stretcher
18. Hand brake control lever
19. Service brake pedal
20. Front brake circuit
21. Pressure switch for indicator 7
22. Friction pad carrier plate
23. Front brake disc
24. Rear brake circuit



1. Fr
2. Fr
3. Fr
4. V
5. D
6. St
7. Br
8. Ja
9. R
10. R
11. Br
12. St
13. R
14. Ca
15. R
16. M
17. H
18. H
19. Se
20. Fr
22. Fr
23. Fr
24. R
25. M

BRAKE PEDAL

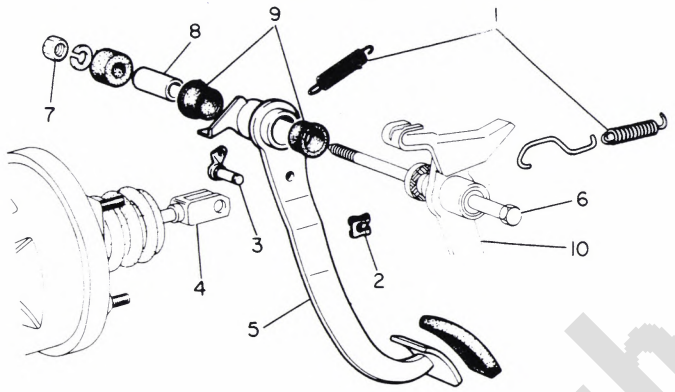
REMOVAL AND INSTALLATION
(Manual Transmission)

Remove brake and clutch pedal return springs (1).

Remove retainer clip (2) and pin (3) to release servo push rod (4) from brake pedal (5).

Using 5/8 in. wrench, remove pivot bolt (6) and nut (7). Remove brake and clutch pedals along with spacers (8) and bushings (9).

Installation is reverse of removal. Lubricate all bearing surfaces with white grease.



1. Return spring 2. Retainer clip 3. Pin 4. Servo push rod
5. Brake pedal 6. Pivot bolt 7. Nut 8. Spacer 9. Bushing
10. Clutch pedal

BRAKE PEDAL

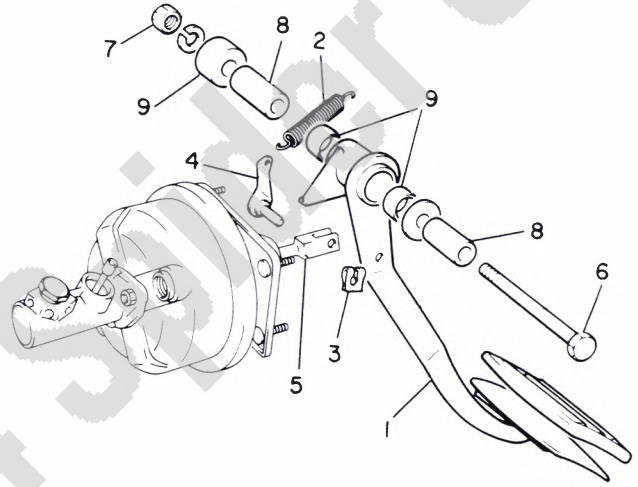
REMOVAL AND INSTALLATION
(Automatic Transmission)

Remove brake pedal (1) return spring (2).

Remove retainer clip (3) and pin (4) to release servo push rod (5) from brake pedal.

Using 5/8 in. wrench, remove pivot bolt (6) and nut (7). Remove brake pedal along with spacers (8) and bushings (9).

Installation is reverse of removal. Lubricate all bearing surfaces with white grease.



1. Brake pedal 2. Return spring 3. Retainer clip 4. Pin 5. Servo push rod 6. Pivot bolt 7. Nut 8. Spacer 9. Bushing

RESERVOIR AND MASTER CYLINDER

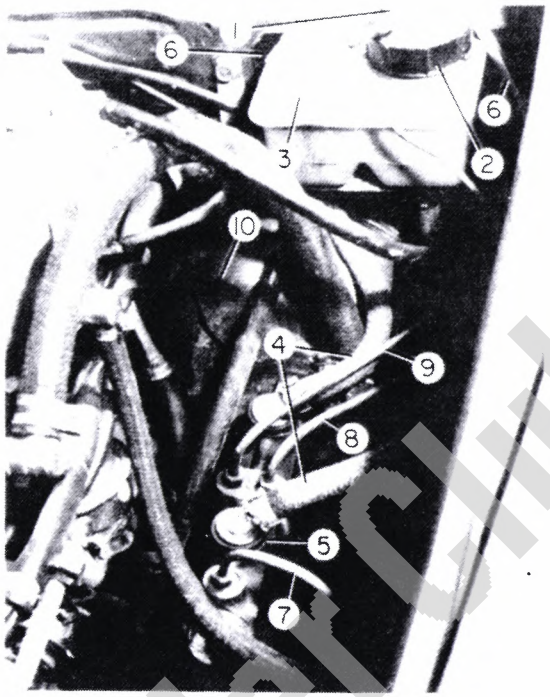
REMOVAL AND INSTALLATION

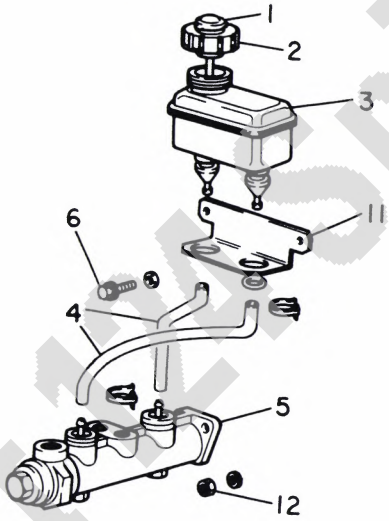
While holding brake fluid level switch (1), unscrew cover (2) from reservoir (3). Drain or siphon reservoir fluid.

CAUTION: Provide container to catch brake fluid. Do not allow fluid to contact paint surfaces.

Using gentle side-to-side rocking motion, pull reservoir lines (4) from master cylinder (5). Remove two bolts (6) holding reservoir support bracket (11) to firewall and remove reservoir assembly. Disconnect three brake lines (7, 8 & 9) from master cylinder. Cap lines to prevent dirt entry. Remove two nuts (12) and lockwashers, then pull master cylinder away from power brake servo (10). Install in reverse order of removal making sure all parts and fittings are clean.

1. Fluid level switch 2. Reservoir cover 3. Reservoir 4. Reservoir lines 5. Master cylinder 6. Bolt 7. Brake line, rear 8. Brake line, left front 9. Brake line, right front 10. Power brake servo 11. Bracket 12. Nut





MASTER CYLINDER

OVERHAUL

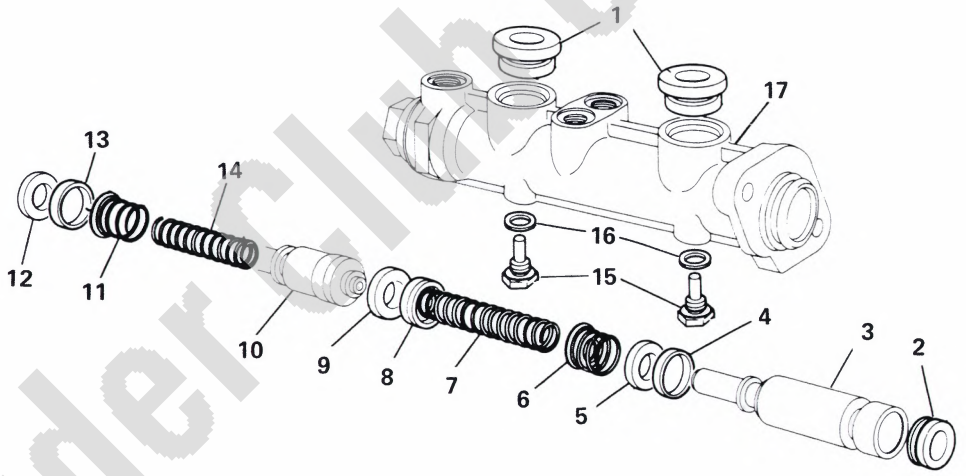
Remove two connectors (1) and dust cover (2).

Remove two stop bolts (15) and seals (16).

Remove remaining internal parts (items 3 through 14) from body (17).

Carefully inspect cylinder bore and piston surfaces. They should have a mirror-like finish without any kind of roughness. The cylinder bore can be honed to prevent leaks or excessive wear of seals and pistons. Do not increase size of bore. Replace seals and dust covers. Clean all parts with denatured alcohol and lubricate with brake fluid. Reassemble in reverse order of disassembly.

1. Connector
2. Seal
3. Rear piston
4. Spacer
5. Seal
6. Spring and cup
7. Spring and cup
8. Flat washer
9. Seal
10. Front piston
11. Spring and cup
12. Seal
13. Spacer
14. Spring and cup
15. Stop bolt
16. Seal
17. Cylinder body



FRONT CALIPER

OVERHAUL

Remove caliper (Refer to FRONT WHEEL BRAKES).

To disassemble caliper, remove dust seal (4). Then apply compressed air to brake fluid hose connection (2) to remove piston (5).

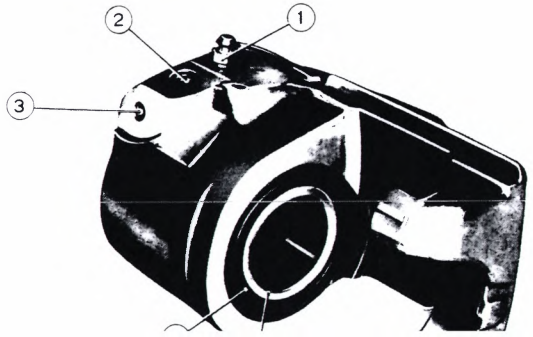
WARNING: Apply air pressure gradually or piston will eject with high force.

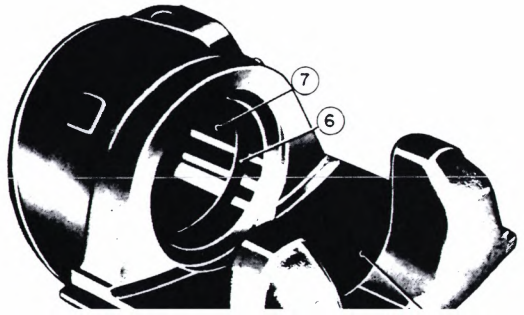
Remove seal from caliper bore using care not to damage bore surface.

Inspect caliper bore (7) for corrosion, scoring, or pitting. Replace entire caliper if damaged.

Replace piston (8), seal (6) and dust cover (4).

Clean all parts with denatured alcohol, and lubricate with brake fluid. Assemble in reverse order of disassembly using care not to damage surface of caliper bore or piston.





REAR CALIPER

OVERHAUL

Remove dust seal (15). Remove piston (13) by unscrewing it from brake plunger (6) using a screwdriver in slot formed in piston head. Remove piston seal (14) from caliper bore using care not to damage bore surface. Remove hand brake lever dust cover (1). Withdraw snap ring (3) and bushing (2) from cam lever (5).

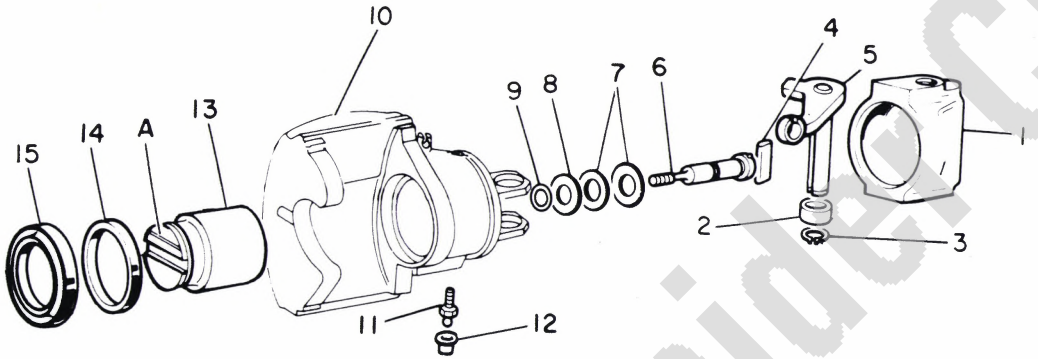
Remove cam lever, hand brake plunger, plunger seal (9), disc springs (7) and spring thrust washer (8).

Inspect caliper bore for corrosion, scoring or pitting. Replace entire caliper if damaged.

Replace piston (13), seal (14), and dust seal (15). Replace any worn or damaged components from hand brake assembly.

Assemble in reverse order of disassembly using care not to damage surface of caliper bore or piston. Screw piston in all the way, with mark "A" opposite bleed screw (11).

CAUTION: Reference mark "A" must be on side of bleed screw or system cannot be bled properly and brake action will be irregular.



1. Dust cover
2. Bushing
3. Snap ring
4. Pawl
5. Hand brake cam lever
6. Plunger
7. Disc springs
8. Thrust washer
9. Plunger seal
10. Caliper body
11. Bleed screw
12. Protective cap
13. Piston
14. Piston seal
15. Dust seal

COMPENSATOR CONTROL SYSTEM

1. Compensator valve 2. Torsion bar 3. Torsion bar link 4. Mounting bracket 5. Fluid lines

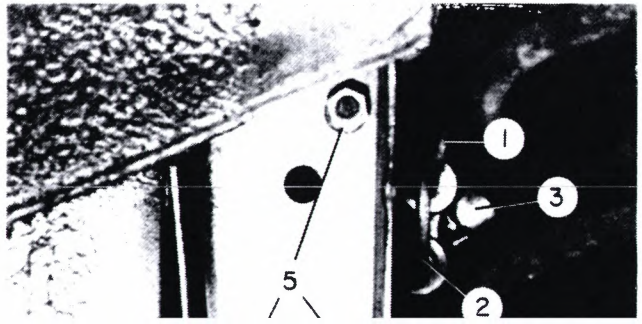
The function of rear brake compensator system is to regulate brake fluid pressure to rear calipers. The amount of pressure delivered to rear calipers is directly proportional to the load on rear wheels. As load increases or decreases, the torsion bar transmits load changes to the compensator valve which then regulates amount of fluid pressure to rear calipers. With increased load more pressure is delivered, a decreased load lessens pressure to calipers.

COMPENSATOR

REMOVAL

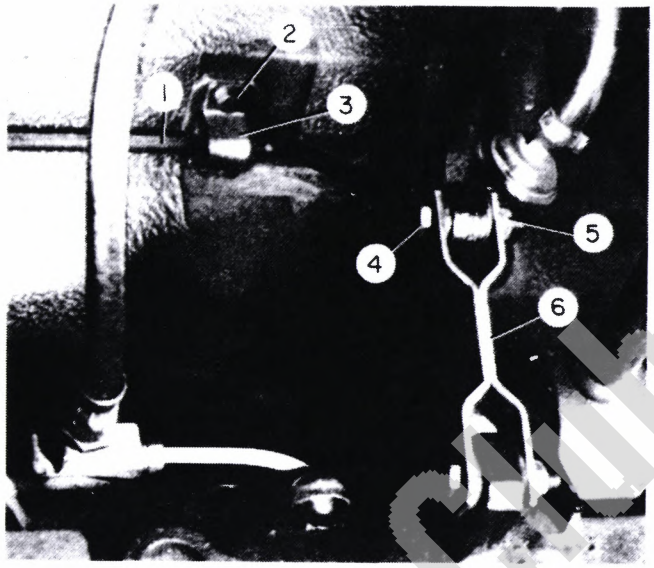
Disconnect two brake fluid lines (1 & 2) from compensator valve (3). Cap to prevent dirt entry. Remove protection boot from compensator by unclipping plastic clamp (4). Move boot to gain access to torsion bar pivot bolt. Loosen bolt. Remove right rear road wheel. Remove three nuts (5) holding regulator mounting bracket (6) to frame. Remove bracket and regulator assembly from torsion bar. Separate regulator from bracket by removing two bolts (8).

1. Fluid line to rear brakes 2. Fluid line from master cylinder 3. Compensator valve 4. Plastic clamp 5. Nut 6. Mounting bracket 7. Rubber bumper 8. Bolt



To remove torsion bar (1), remove two bolts (2) and lockwashers holding torsion bar support bracket (3). Then remove bolt (4) and nut (5) from torsion bar link (6).

1. Torsion bar 2. Bolt 3. Support bracket 4. Bolt 5. Nut
6. Torsion bar link



INSPECTION

Inspect compensator valve for leaks or jammed piston. Overhaul or replace if damaged (Refer to COMPENSATOR VALVE OVERHAUL).

Check that torsion bar pivot is not worn. Replace if worn.

Check that all bushings are not worn or deteriorated. Replace if damaged.

Check rubber boot for breaks or cracks that would permit moisture entry. Replace if damaged.

INSTALLATION

Coat bushings with silicone grease, and pivot with chassis grease.

Assemble all parts to the vehicle except do not fully tighten compensator valve bolts and do not attach torsion bar to connecting link.

Bleed system (Refer to BLEEDING HYDRAULIC SYSTEM).

Perform adjustment (Refer to COMPENSATOR CONTROL ADJUSTMENT).

Clean all parts in denatured alcohol. Lubricate with brake fluid. Reassemble in reverse order of disassembly.

COMPENSATOR VALVE

OVERHAUL

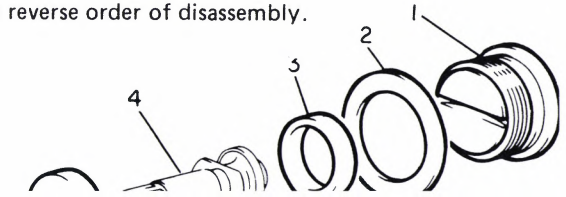
Using tool A.56124 or similar type wrench, remove plug (1). Remove remaining parts (items 2 and 9) from body (10).

Inspect piston (4) and body (10) for wear, pitting, corrosion, scratches, or cracks.

Replace entire compensator valve if piston or body is damaged.

Replace seals (5 and 9) and cups (6 and 8). Check remaining parts for damage. Replace if damaged.

Clean all parts in denatured alcohol. Lubricate with brake fluid. Reassemble in reverse order of disassembly.



COMPENSATOR CONTROL

ADJUSTMENT

Raise vehicle on lift.

NOTE: Adjustment can be accomplished on either drive-on or frame type lifts.

Loosen bolts (2) securing compensator (3) to support bracket (4). Unclip plastic clamp and slide dust boot (5) from compensator.

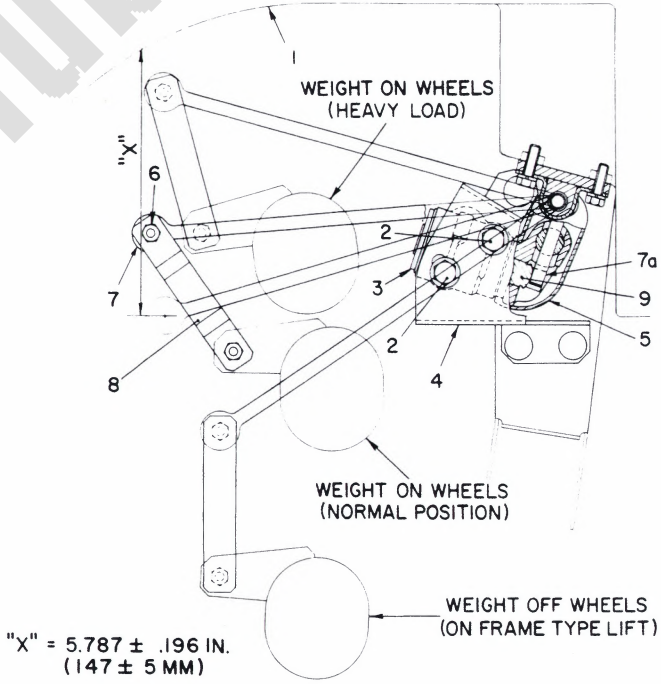
Remove bolt and nut (6) to disconnect torsion bar (7) from connecting link (8). Bring end of torsion bar pivot point to distance "X" of 5.787 ± .196 in. (147 ± 5 mm) as measured with a ruler held "straight up". Dimension "X" is measured from center of torsion bar pivot point to underside of floor pan (1).

With torsion bar held in this position, rotate compensator until piston (9) is just touching torsion bar (7a). Torque bolts (2) to 18 ft lbs (2.5 kgm) to secure compensator in this position.

Connect torsion bar to connecting link.

Slide dust boot on compensator and install plastic clamp.

1. Floor pan
2. Bolt
3. Compensator valve
4. Mounting bracket
5. Dust boot
6. Nut
7. & 7a. Torsion bar
8. Connecting link
9. Piston



BRAKE LINES

REMOVAL AND INSTALLATION

Brake lines normally last the life of the vehicle. However, if damaged, brake lines may be repaired by splicing in a new section of line, or must be replaced. When replaced, make sure lines are secured to prevent chafing from vibration.

After installing, bleed system (Refer to HYDRAULIC SYSTEM BLEEDING).

BRAKE HOSES

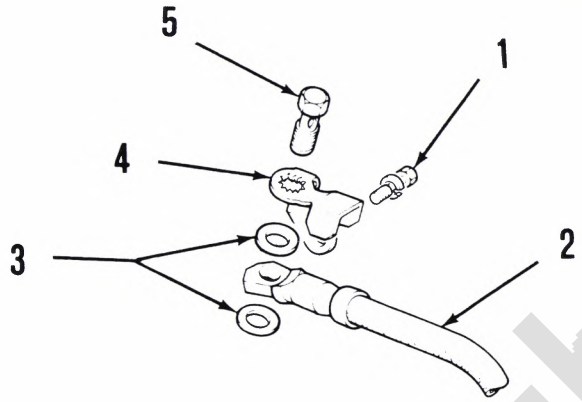
REMOVAL AND INSTALLATION

Remove connector (5) and bolt (1) to remove brake hose (2).

Check that hose is not frayed, worn or brittle. Replace if damaged.

When installing, use new gaskets (3).

Bleed system (Refer to HYDRAULIC SYSTEM BLEEDING).



1. Bolt 2. Hose 3. Gasket 4. Bracket 5. Connector

HYDRAULIC SYSTEM

BLEEDING

When the front or rear hydraulic system is opened for any reason, it must be bled to remove all entrapped air. The front and rear systems are independent and need not be bled together. After all repairs are made, proceed as follows:

NOTE: Should the brake system have been completely drained, it is advisable to carry out the following operation before bleeding. Loosen all wheel bleeder screws and pump brake pedal, as fluid begins to escape tighten bleeder screws. Keep fluid reservoir filled with DOT 3 brake fluid.

Clean all dirt and foreign material from bleeder screws and remove protective cap.

Attach bleeder hose over bleeder fitting in brake caliper. Submerge other end of bleeder hose into a clean jar half filled with brake fluid.

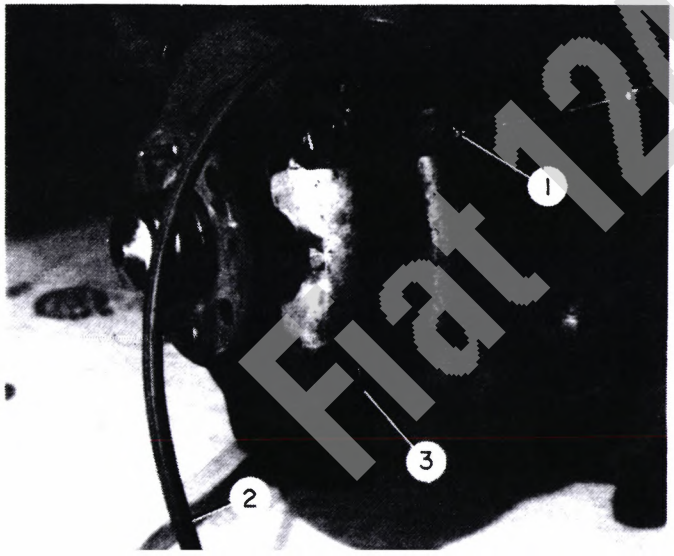
Loosen bleeder screw one or two turns and press brake pedal down, allowing it to return slowly. Do this several times until no more air bubbles escape from rubber hose.

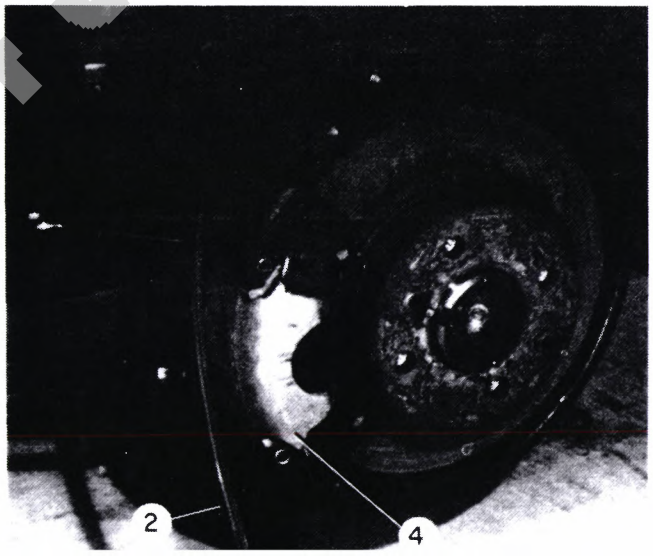
Keep brake pedal depressed, remove bleeder hose and tighten bleeder screw. Refit protection cap.

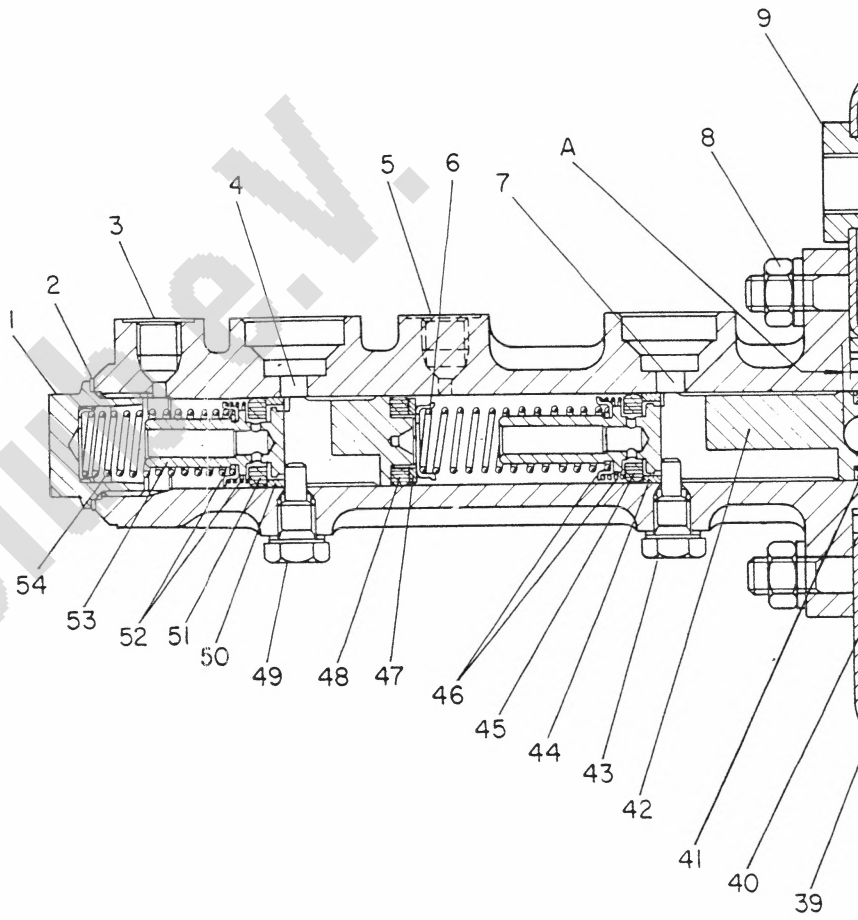
Repeat above on other wheels, making certain that fluid level in reservoir is maintained.

After bleeding, top up reservoir to prescribed maximum level.

1. Bleed screw 2. Bleed hose 3. Front brake assembly 4. Rear brake assembly







1. Plug	1
2. Seal	2
3. Rear wheel brake connector	2
4. Connector seat	2
5. Front wheel brake connector	2
6. Spring and cup	2
7. Connector sear	2
8. Nut	2
9. Vacuum line fitting	2
10. Front seal	2
11. Piston control rod	2
12. Vacuum duct	3
13. Piston valve	3
14. Vacuum duct orifice	3
15. Valve	3
16. Cup	3
17. Cup	3
18. Control piston guide tube	3

A = Distance piston control rod extenc
B = Front chamber
C = Rear chamber

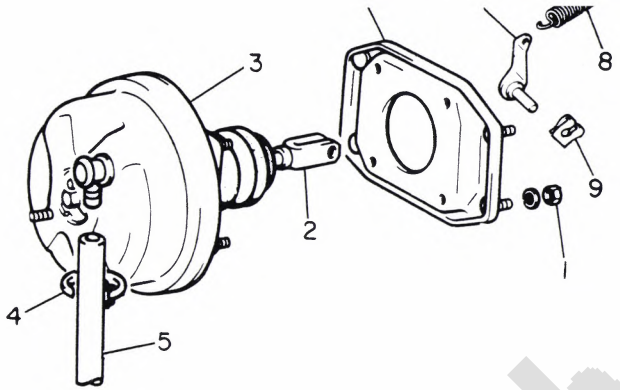
REMOVAL AND INSTALLATION

Remove reservoir and master cylinder (Refer to RESERVOIR AND MASTER CYLINDER REMOVAL AND INSTALLATION).

Loosen clamp (4). Disconnect vacuum hose (5) from brake servo (3).

From inside vehicle, remove return spring (8), clip (9) and pin (7) from servo push rod (2). Remove four nuts (1) and lockwashers to remove servo from mounting plate (6).

Install in reverse order of removal.



1. Nut 2. Brake servo push rod 3. Brake servo 4. Clamp
5. Vacuum hose 6. Mounting plate 7. Pin 8. Spring 9. Clip

OVERHAUL

Remove check valve (9) by carefully pulling from bushing (10). Using wood blocks positioned on the six mounting studs, place brake servo in a vise.

Carefully squeeze front cover (6) and rear chamber (18) until rear chamber can be twisted to clear the lock tabs on front cover.

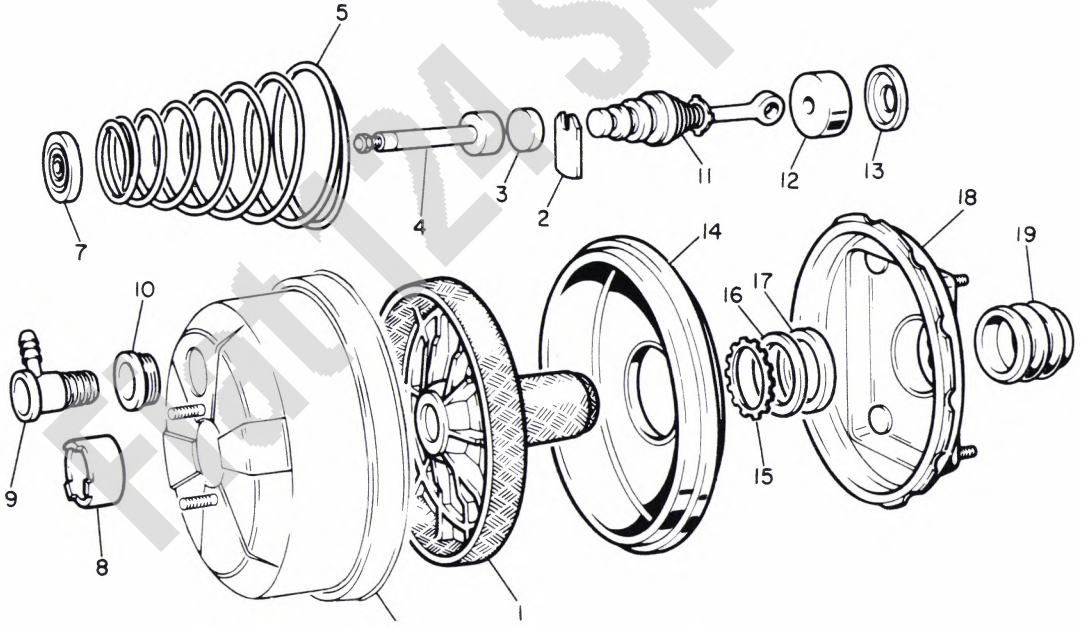
WARNING: Use care when releasing vice. Servo is spring loaded.

Carefully open vise until spring (5) pressure is released. Remove from vise and separate parts.

Remove rubber boot (19). Remove metal cup (13) and key (2) to remove plunger and valve (11). Separate remaining parts. Do not upset adjustment on vacuum piston rod (4).

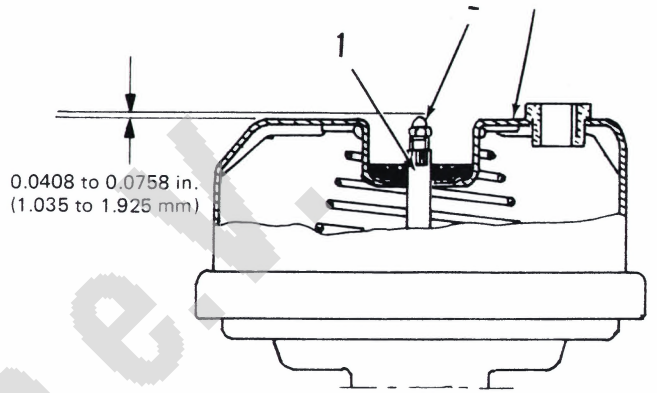
Replace the following kit supplied parts: bushing plate (3), front seal (7), filter (12), cup (13), diaphragm (14), cup (15), seal (16), rear seal (17) and rubber boot (19).

Inspect remaining parts for damage and wear. Replace as required. Lubricate shafts of vacuum piston rod (4), plunger and valve (11) with white grease. Reassemble in reverse order of disassembly.



(1.035 to 1.925 mm).

1. Vacuum piston rod 2. Tip 3. Front cover

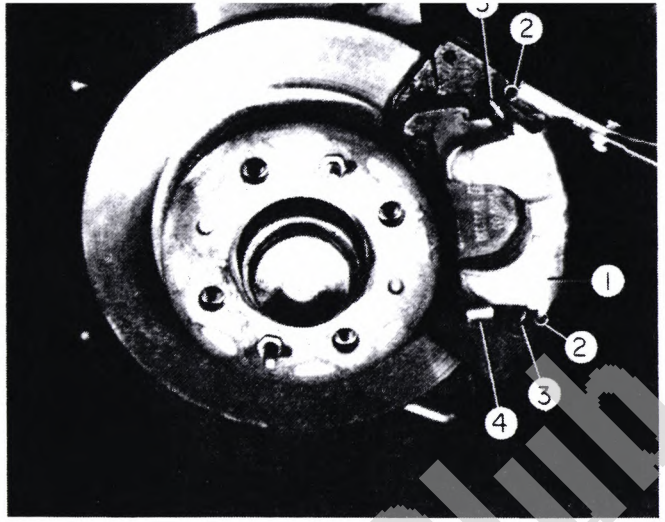


REMOVAL AND INSTALLATION

Remove wheels.

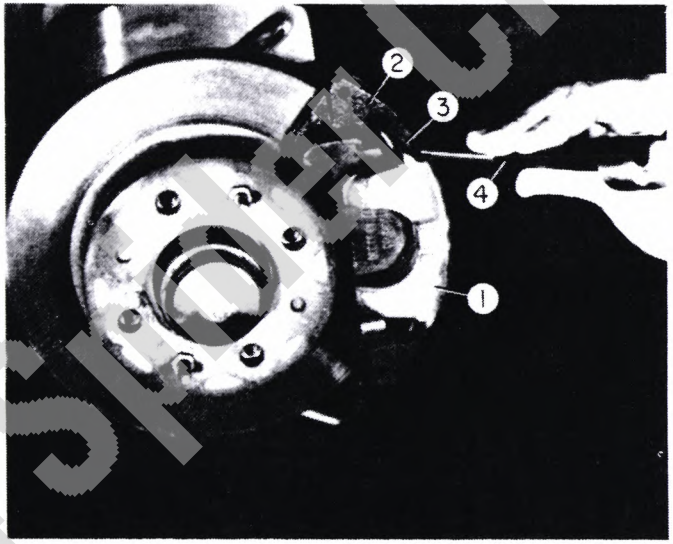
Remove four cotter pins (2).

1. Caliper body 2. Cotter pins 3. Caliper spring 4. Brake pad retainer spring



Remove two caliper locking blocks (3) with drift pin (4).

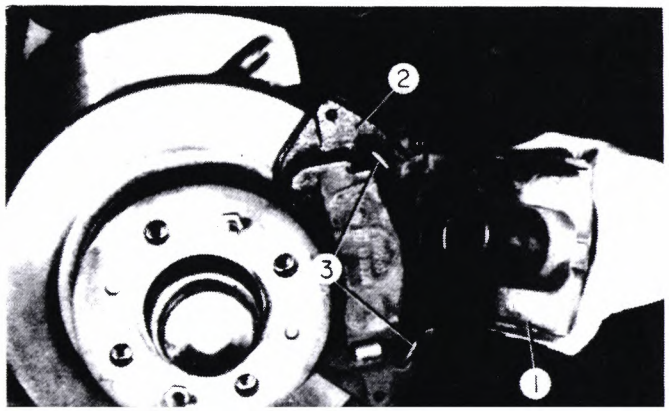
1. Caliper body 2. Support brackets 3. Caliper locking block 4. Drift pin



Separate caliper (1) from caliper support bracket (2).

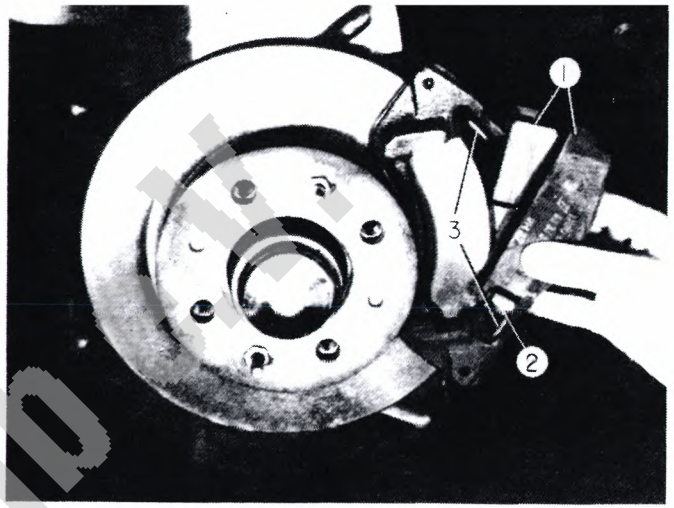
To remove caliper for replacement or overhaul, disconnect brake line. Cap line to prevent dirt entry.

1. Caliper body 2. Caliper support bracket 3. Caliper spring



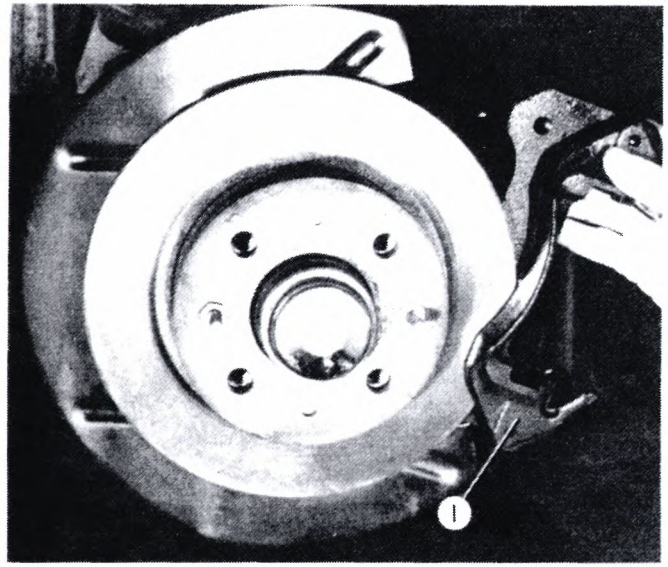
Inspect two retainer springs (2) and two caliper springs (3) for breakage. Replace if necessary.

1. Brake pad 2. Brake pad retainer spring 3. Caliper spring



To remove caliper support bracket (1), remove two bolts at rear of bracket.

1. Caliper support bracket



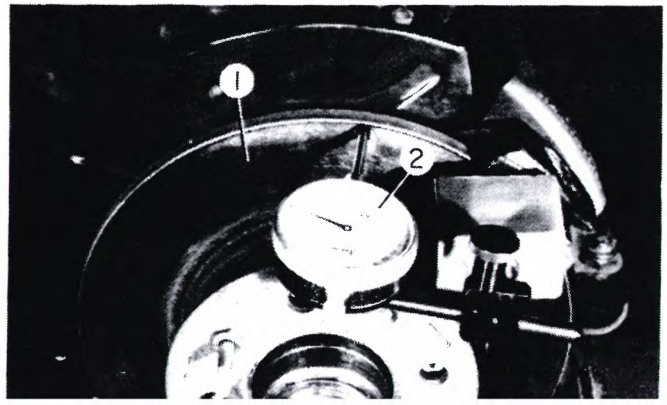
Check disc (1) for runout by placing a dial indicator (2) 0.08 in. (2 mm) from disc outer edge.

Runout must not be greater than 0.006 in. (0.15 mm), otherwise reface disc.

Thickness of disc after refacing must not be less than 0.368 in. (9.35 mm).

Minimum permissible thickness from wear is 0.354 in. (9 mm). Replace disc if less.

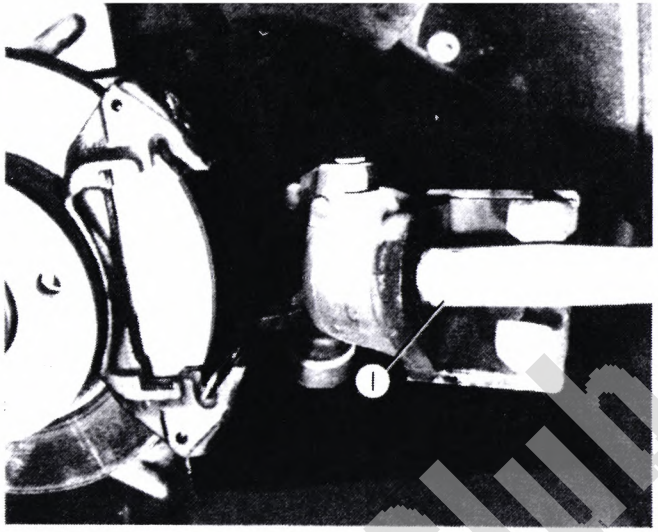
1. Brake disc 2. Dial indicator



If new brake pads are being installed, it will be necessary to fully seat caliper piston (1) in bore in order to have installation clearance for calipers. Push in on center of piston with blunt object as shown (hammer handle, etc.) until piston bottoms out.

NOTE: Brake fluid will back up into master cylinder and may overflow.

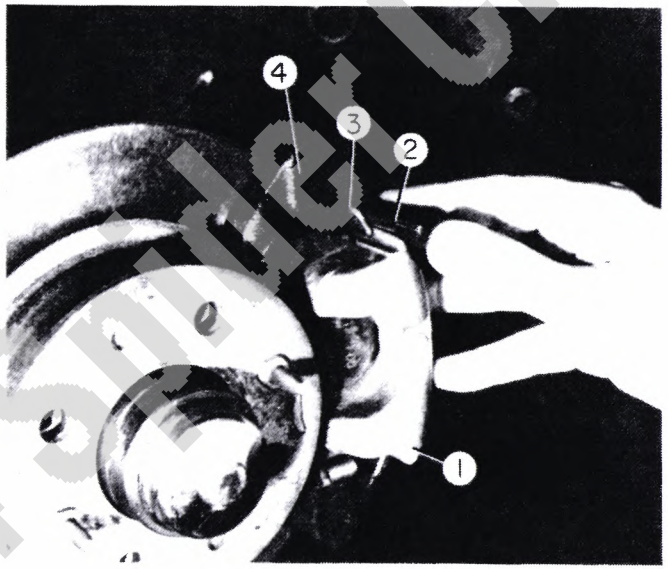
1. Caliper piston



Torque caliper support bracket (4) bolts to 36 ft lb (5 kgm).

After installing caliper, install lower locking block first, then with hand pressure against front of caliper (1) force caliper back far enough to insert top locking block (2).

1. Caliper 2. Caliper locking block 3. Caliper spring 4. Caliper support bracket



If caliper lines have been disconnected, bleed system (Refer to HYDRAULIC SYSTEM BLEEDING).

CAUTION: Before driving vehicle, pump brake pedal a few times to make sure caliper pistons are seated against pads and pedal is firm.

Disc

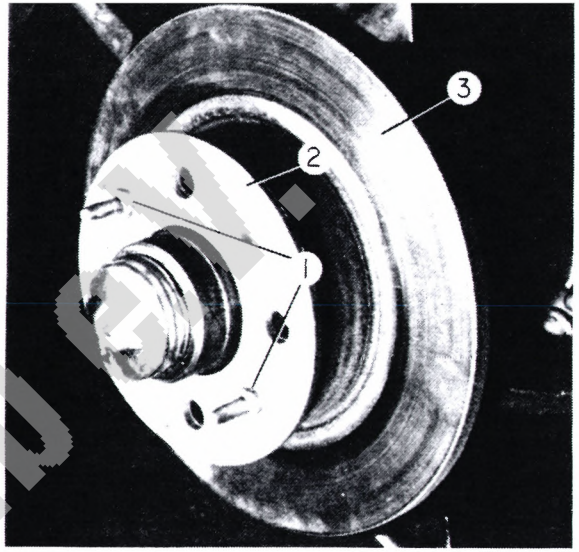
REMOVAL AND INSTALLATION

Remove caliper pads (Refer to CALIPER AND PADS REMOVAL AND INSTALLATION).

Remove two locating pin bolts (1). Remove plate (2) and disc (3).

Inspect disc for scoring or cracks. Discs can be refaced for scoring. Minimum thickness after refacing is 0.368 in. (9.35 mm). Replace disc if cracked.

Install in reverse order of removal.



1. Disc 2. Plate 3. Locking pin bolt

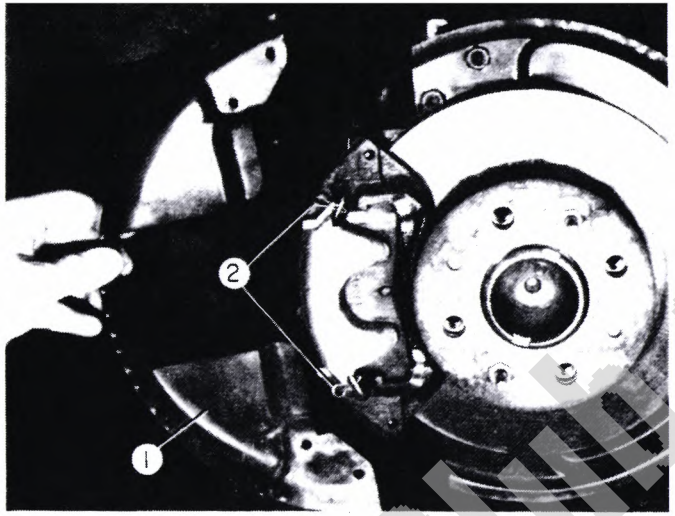
REMOVAL AND INSTALLATION

Remove wheels.

Remove four bolts and lockwashers to remove front section of backing plate (1).

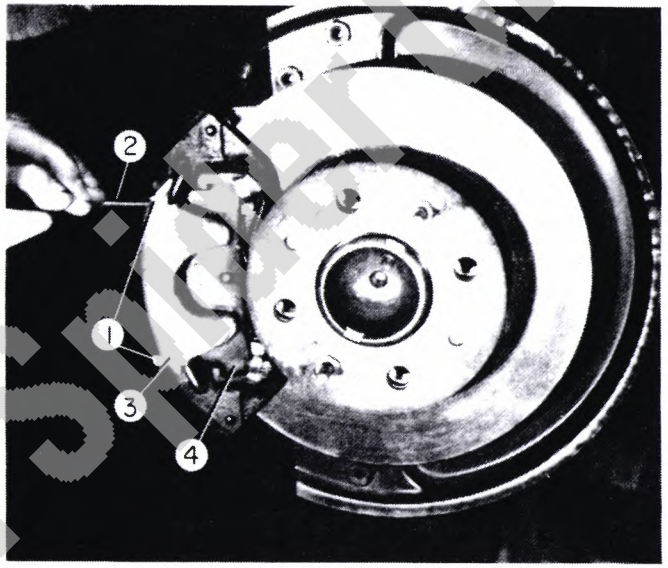
Remove four cotter pins (2).

1. Backing plate 2. Cotter pin



Remove two caliper locking blocks (1) with a drift pin (2).

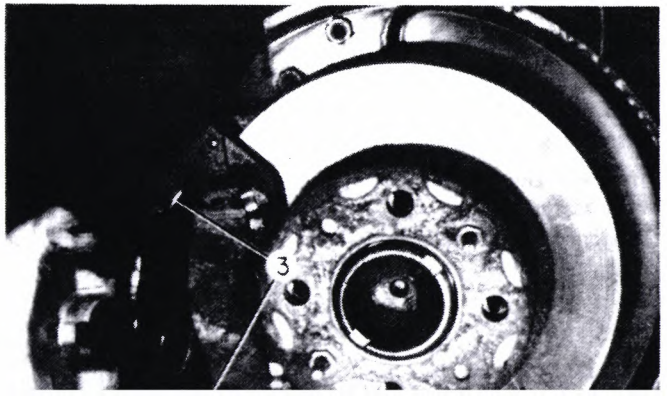
1. Locking block 2. Drift pin 3. Caliper 4. Brake pad



Separate caliper (1) from caliper support bracket (2).

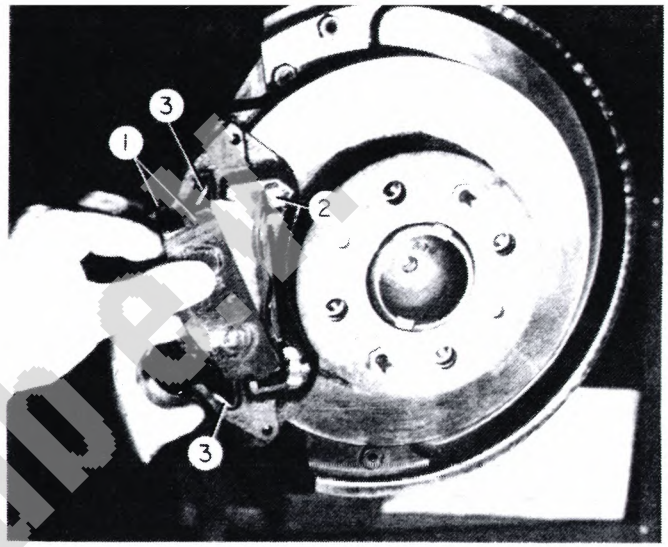
To remove caliper for replacement or overhaul, disconnect brake line and hand brake cable from caliper. Cap brake line to prevent dirt entry.

1. Caliper 2. Caliper support bracket 3. Caliper spring



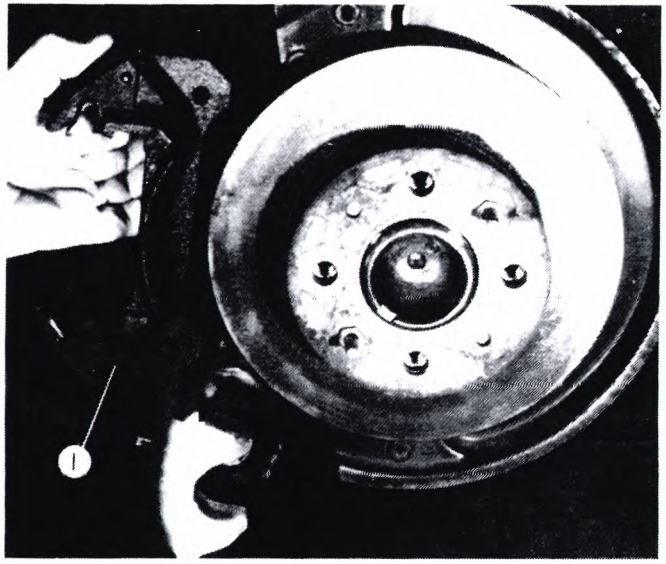
Inspect two retainer springs (2) and two caliper springs (3) for breakage. Replace if necessary.

1. Brake pad 2. Brake pad retainer spring 3. Caliper spring



To remove caliper support bracket (1), remove two bolts at rear of bracket.

1. Caliper support bracket



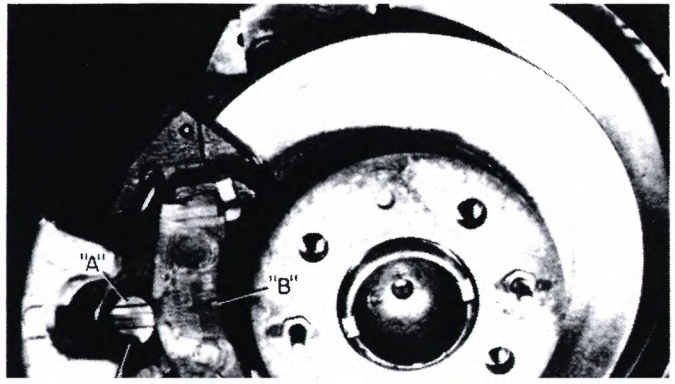
CAUTION: Before reassembling, make sure hand brake is completely off (cable slack). Make sure actuator lever is also completely bottomed to off position. If not done, hand brake operation will be ineffective.

Installation is reverse of removal.

If new brake pads are being installed, it will be necessary to fully seat caliper piston (1) in bore in order to have installation clearance for calipers. Push in on center of piston with blunt object (hammer handle, etc.) until piston bottoms out.

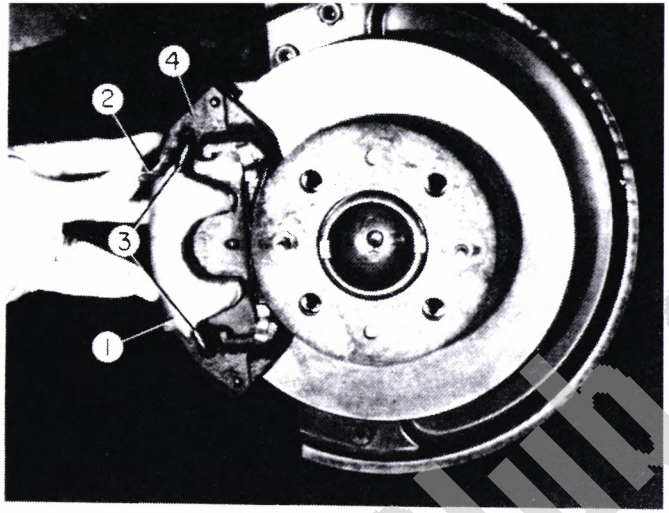
NOTE: Brake fluid will back up into master cylinder and may overflow.

CAUTION: Piston must be in position shown, with groove



After installing caliper, install lower locking block first, then with hand pressure against front of caliper (1) force caliper back far enough to insert top locking block (2).

1. Caliper 2. Caliper locking block 3. Caliper spring 4. Caliper support bracket



If caliper lines have been disconnected, bleed system (Refer to HYDRAULIC SYSTEM BLEEDING).

CAUTION: Before driving vehicle, pump brake pedal a few times to make sure caliper pistons are seated against pads and pedal is firm.

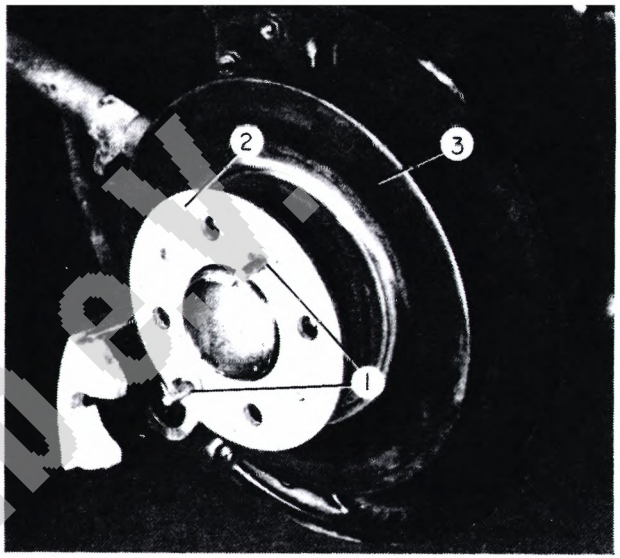
REMOVAL AND INSTALLATION

Remove caliper and pads (Refer to CALIPER AND PADS REMOVAL AND INSTALLATION).

Remove two locating pin bolts (1). Remove plate (2) and disc (3).

Inspect discs for scoring or cracks. Discs can be refaced for scoring. Minimum thickness after refacing is 0.368 in. (9.35 mm). Replace disc if cracked.

Install in reverse order of removal.

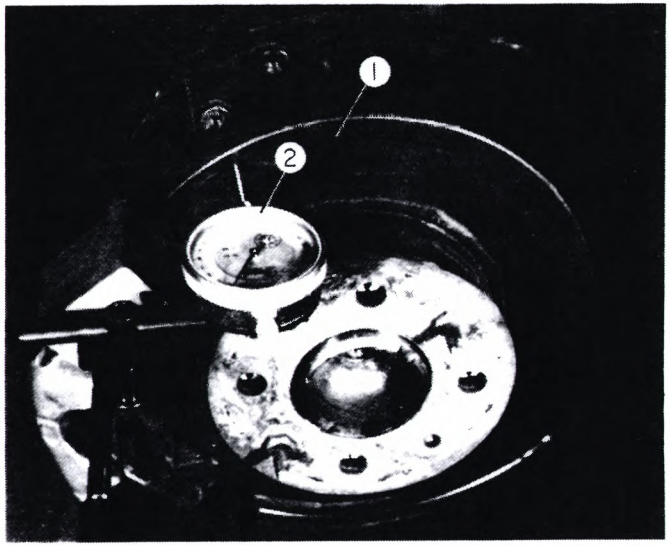


1. Locking pin bolt 2. Plate 3. Disc

Check disc (1) for runout by placing a dial indicator (2) 0.08 in. (2 mm) from disc outer edge as shown. Runout must not be greater than 0.006 in. (0.15 mm), otherwise reface disc.

Thickness of disc after refacing must not be less than 0.372 in. (9.45 mm).

Minimum permissible thickness from wear is 0.354 in. (9 mm). Replace disc if less.



1. Brake disc 2. Dial indicator

REMOVAL AND INSTALLATION

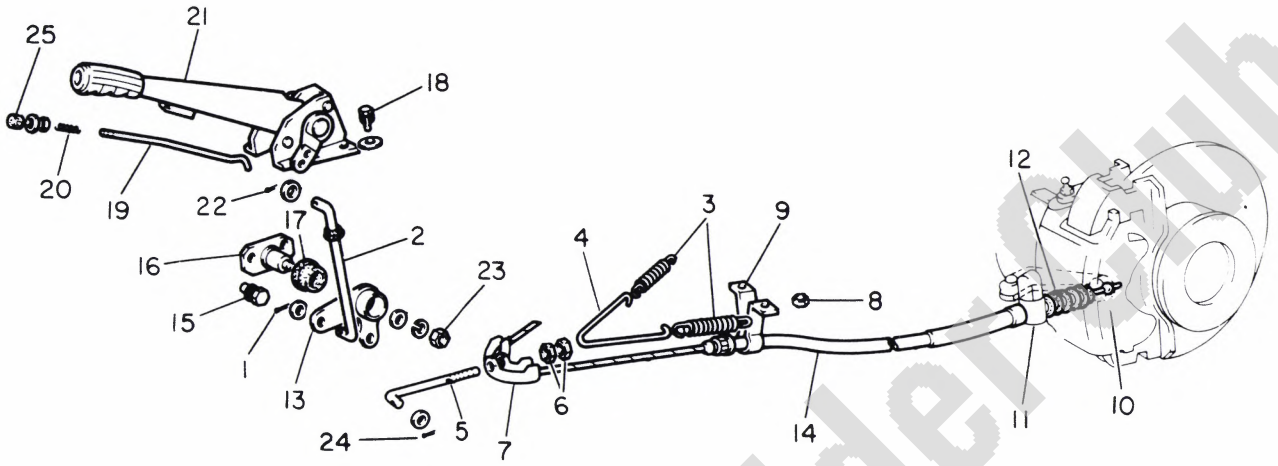
Place hand brake in off position.

From under vehicle remove cotter pin (1) and washer to disconnect hand brake rod (2). Disconnect return springs (3) and remove spring equalizer (7).

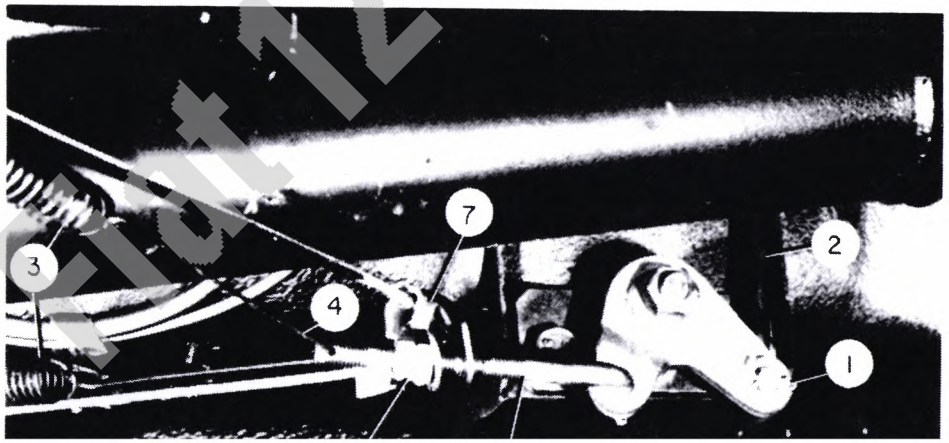
Remove nuts (8) holding cable support brackets (9).

Pull ball end (10) of cable out of lever socket. To remove cable assembly from support (11), slide rubber boot (12) out of way and compress spring. Remove cable assembly (14) from support.

Install in reverse order of removal. Lubricate bearing surfaces with white grease.



1. Cotter pin
2. Hand brake rod
3. Return spring
4. Spring holder
5. Cable rod
6. Nut
7. Cable equalizer
8. Nut
9. Support
10. Cable, ball end
11. Support
12. Rubber boot
13. Control arm
14. Cable assembly
15. Bolt
16. Mounting bracket
17. Bushing
18. Bolt
19. Spring hook
20. Spring
21. Hand brake lever
22. Cotter pin
23. Nut
24. Cotter pin
25. Push button



ADJUSTMENT

Excessive free travel of handbrake is caused by cable stretching. Whenever free travel is excessive or after replacing rear brakes or handbrake cable, adjust as follows:

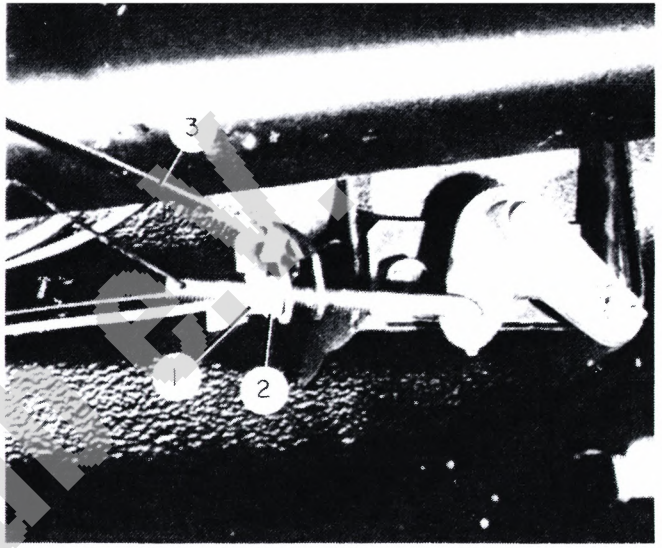
NOTE: Brakes and hydraulic system must be in good condition for correct adjustment.

First place brake lever in off position, and then pull it up one or two clicks.

From under vehicle, loosen locknut (1) and turn adjusting nut (2) until cable (3) is taut. Tighten locknut against adjusting nut.

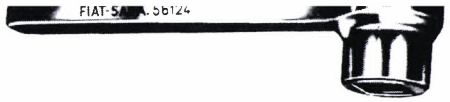
Hand brake is correctly adjusted when three clicks of hand brake will firmly actuate rear brakes.

If one or both rear brakes are locked with hand brake released, check linkages and cables for free movement.



1. Locknut 2. Adjusting nut 3. Cable

A.56124 Tool for dismantling compensator valve



A.56126 Wrench for brake pipe unions

STEERING - 41

STEERING - 41

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
41	Specifications	41-1
	Torque Specifications	41-2
412.01	Steering Column	41-3
412.02	Steering Box	41-5
412.10	Steering Linkage	41-7

Type	worm and roller
Gear ratio	16.4 to 1
Worm shaft bearings	two, ball bearings
Cross shaft bearings	three, needle bearings
Steering column	in three sections, with two universal joints
Turning circle diameter	34.11 ft. (10.40 m)
Steering wheel turns, right to left, abt.	2¾
Steering linkage	symmetrical and independent tie rods with center link and idler arm
Steering box lubrication	7¼ ozs. SAE 90 EP oil
Tie rods	with adjustable ball joints
Center link	with non-adjustable ball joints
Ball joint type	lubricated "for-life"
Idler arm support	with double acting hydraulic damper
Lock angle: — outer wheel — inner wheel	 35°50'±1°30' 28°30'
Front wheel toe-in, car laden (*)	.12"±.039" (3±2 mm) (on rim edge)

DESCRIPTION	THREAD (METRIC)	MATERIAL	TORQUE FT. LB. N·m		Kgm
STEERING					
Anti-theft device and steering column support rear mounting bolt	M 8	r 80 Fosf	25	18	2.5
Universal joint clamp self-locking nut (nylon-lined)	M 8	R 80 Znt (Bolt R 100 Cdt)	26	18	2.6
Steering wheel to column nut	M 16 x 1.5	R 50 Znt (Shaft C 30 Norm)	49	36	5
Steering box-to-body self-locking nut, type S	M 10 x 1.25	R 50 Cdt (Bolt R 80 Znt)	29	22	3
Pitman arm nut	M 20 1.5	R 80 Cdt (Shaft 30 Cd 4)	235	173	23.5
Hydraulic damper-to-body self-locking nut, type S	M 10 x 1.25	R 50 Cdt (Bolt R 80 Znt)	29	22	3
Track rod clamp nut	M 8	R 50 Znt (Bolt R 80 Znt)	17	11	1.7
Ball joint-to-steering rod self-locking nut (nylon-lined)	M 10 x 1.25	R 50 Znt (Pin 12 Nc 3 Carbn)	34	25	3.5

REMOVAL AND INSTALLATION

Center steering wheel and front wheels.

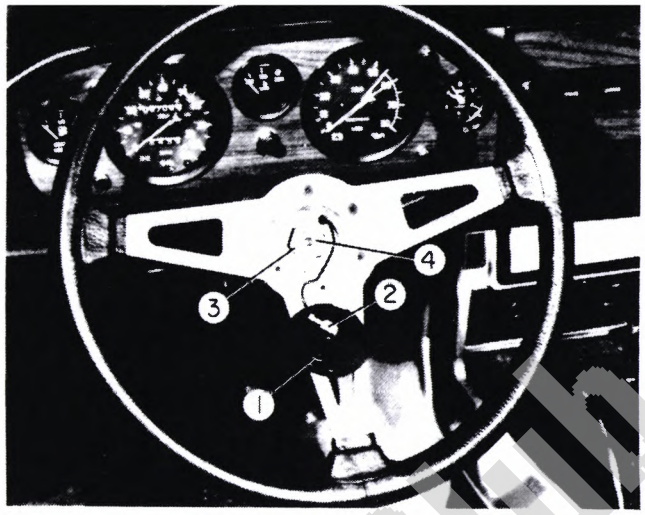
Disconnect battery ground cable.

Pull horn button (1) from steering wheel and disconnect electrical connector (2).

Remove nut (3) holding wheel to shaft (4). Mark steering wheel and steering shaft for reinstallation in same position. Pull wheel off shaft.

Install in reverse order of removal. Torque nut to 36 ft lb (5 kgm).

1. Horn button 2. Electrical connector 3. Nut 4. Steering shaft



STEERING COLUMN

REMOVAL AND INSTALLATION

Remove steering wheel as described above.

Remove four screws to remove upper and lower cover halfs (1).

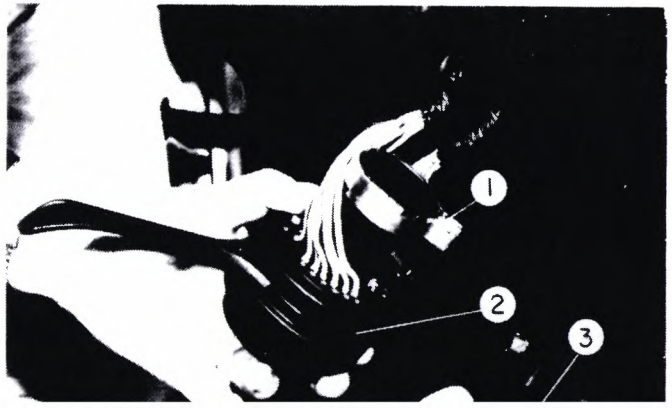
Disconnect two ignition switch electrical connectors (2).

1. Steering column cover half 2. Electrical connector

Loosen clamp (1) holding lights/wiper/directional switch assembly (2) to column.

Remove two bolts and two nuts securing steering column (3) to underdash frame. Lower column and simultaneously slide lights/wiper/directional switch assembly off column.

1. Clamp 2. Lights/wiper/directional switch assembly
3. Steering column

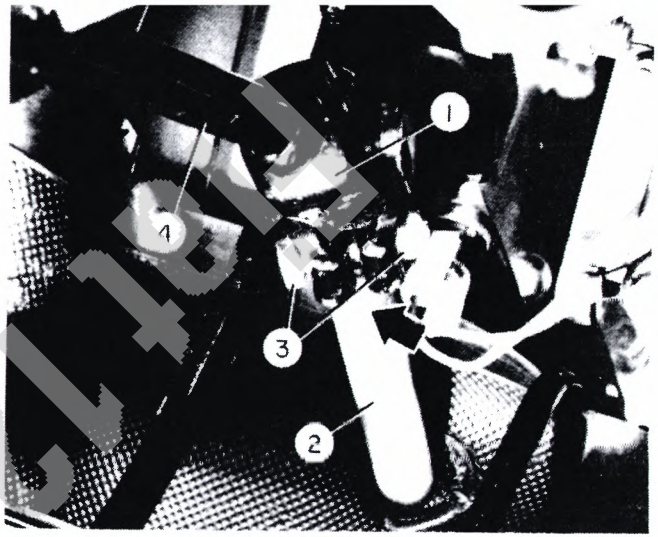


to steering box shaft (2).

Remove bolt and nut (3). Slide entire column (4) off steering box shaft.

Install in reverse order of removal. Torque U-joint clamp nut to 18 ft lb (2.6 kgm).

1. U-joint 2. Steering box shaft 3. Bolt and nut 4. Steering column



INSPECTION

Inspect U-joints (1) for wear. Replace if worn.

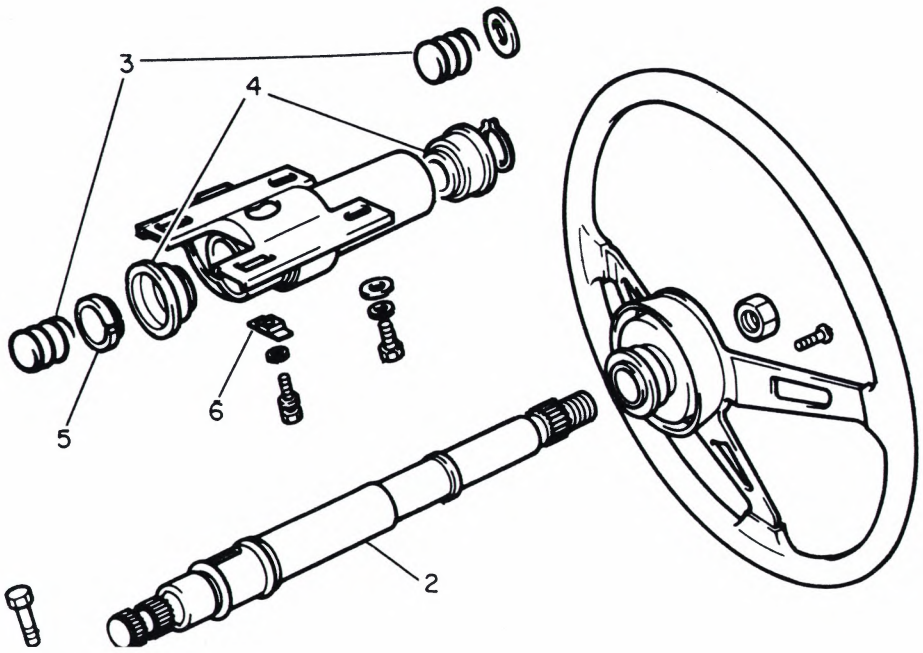
Inspect splines and shaft (2) for wear or damage. Replace if necessary.

Inspect springs (3) for breakage. Replace if broken.

Inspect bearings (4) and bushing (5) for wear. Replace if worn.

Replace retainers (6) if broken.

1. U-joint 2. Steering shaft 3. Spring 4. Bearing 5. Bushing 6. Retainer

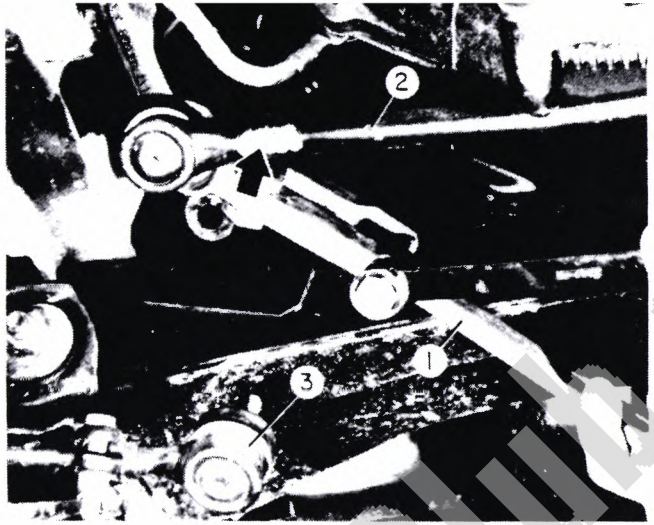


REMOVAL AND INSTALLATION

Remove tie rods from pitman arm with tool A.47038 (1) as shown.

NOTE: Mark one side (arrow) of intermediate tie rod (2) so that it will be assembled in same position.

1. Tool A.47038 2. Intermediate tie rod 3. L. side tie rod assembly



Disconnect starter (refer to Electrical Section) and move it out of way.

Remove lower bolt on left wheel well shield to gain access to steering box (1) mounting nuts. Remove three bolts (2) and nuts.

Remove steering box by withdrawing steering box shaft thru firewall.

Install in reverse order of removal. Torque steering box mounting nuts to 22 ft lb (3 kgm). Torque pitman arm tie rod nuts to 25 ft lb (3.5 kgm).

1. Steering box 2. Bolt

IDLER ARM SUPPORT/STEERING DAMPNER

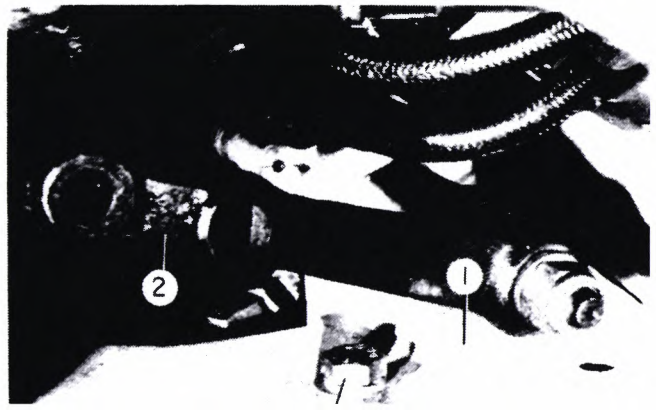
REMOVAL AND INSTALLATION

Remove tie rods from idler arm (2) with tool A.47038.

Remove lower bolt on right wheel well shield in order to gain access to dampner mounting nut. Remove two bolts (3) and nuts to remove dampner (1).

Install in reverse order of removal. Torque dampner mounting nuts to 22 ft lb (3 kgm). Torque idler arm tie rod nuts to 25 ft lb (3.5 kgm).

1. Idler arm support/steering dampner 2. Idler arm 3. Bolt



Before adjusting steering, first check that steering linkage joints are not worn, since this will cause excessive free play in steering wheel.

If, with front wheels in straight ahead position, steering wheel free travel at rim is more than one inch, steering box may need adjustment.

NOTE: Adjustment between worm and roller must be made with pitman arm in mid position (front wheels straight ahead).

Loosen locknut (1). Turn adjusting screw (2) clockwise until steering wheel free play is less than one inch.

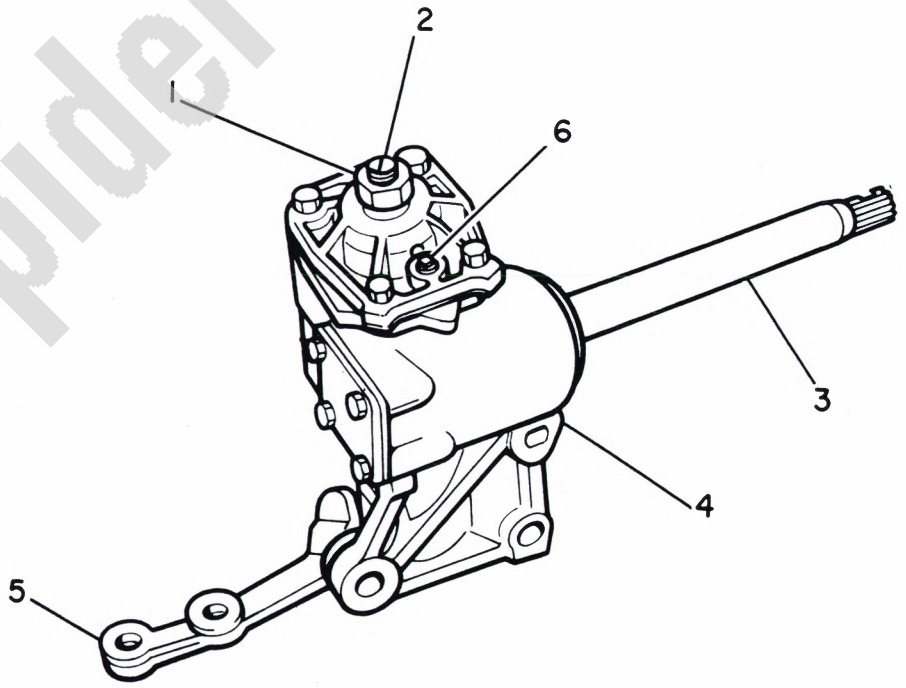
To check that adjustment is not too tight, move steering wheel from left turn to full right turn (this is best accomplished with front end jacked up or wheels on slip plates). There should be no binding or tightness at end of wheel travel. If tightness is felt, back off on adjustment until it is eliminated.

With screwdriver holding adjusting screw in position, tighten locknut to secure adjustment.

LUBRICATION

Steering box is filled with 7¼ ozs. of SAE 90 EP oil. Top up thru filler plug (6).

1. Locknut
2. Adjusting screw
3. Steering shaft
4. Steering box
5. Pitman arm
6. Oil filler plug



REMOVAL AND INSTALLATION

Remove self-locking nuts which secure side rod ball joints (2) to steering arms (1). With tool A.47038 remove ball joint pins from taper seats in arms.

Repeat operation for remaining side rod ball joints on pitman (3) and ilder (4) arms.

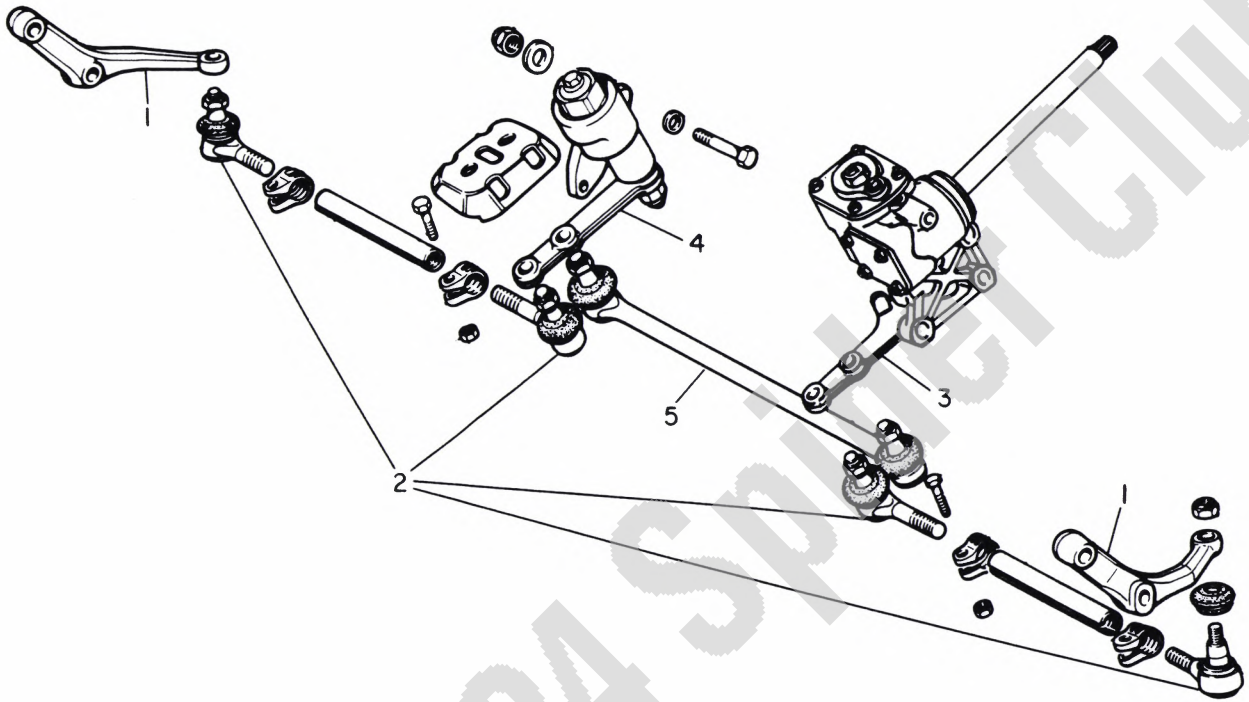
NOTE: Before removing intermediate arm (5), mark one side of arm so that it will be reassembled in same position.

Remove intermediate arm with tool A.47038.

Installation is reverse of removal. Torque all ball joint self-locking nuts to 25 ft lb (3.5 kgm).

Adjust toe-in (refer to Suspension section).

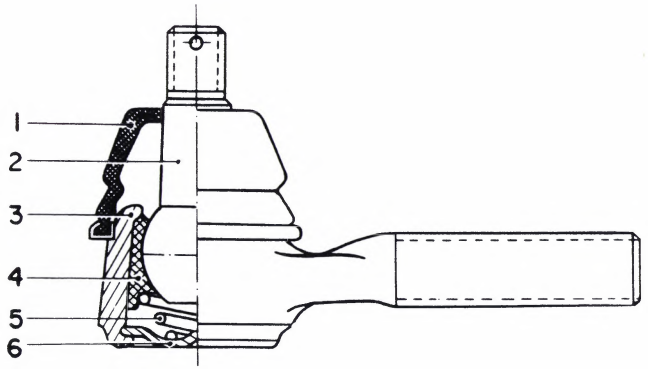
1. Steering arm 2. Rod ball joints 3. Pitman arm 4. Idler arm 5. Intermediate arm

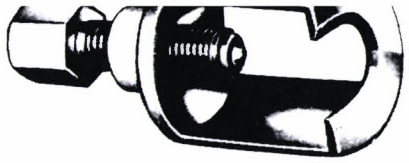


INSPECTION

Check that ball joints are not too loose in their sockets (3) and that pins (2) and rubber boots (1) are in good condition. If not, replace entire rod for the intermediate rod, and replace ball joints for the side rods.

1. Rubber boot 2. Ball pin 3. Socket 4. Spherical bushing
5. Spring 6. Cover plate





SUSPENSION - 44

SUSPENSION - 44

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
44	Specifications	44-1
	Torque Specifications	44-3
443.01	Front Suspension	44-5
443.02	Front Shock Absorbers	44-17
443.05	Rear Suspension	44-19
443.06	Rear Shock Absorbers	44-23
443.14	Steering Knuckle	44-25
44A	Service Tools	44-27

Type: Independent wheel with control arms, coil springs, sway bar and hydraulic, telescopic, double-acting shock absorbers on lower control arm. Joints lubricated ≪ for life ≫.

Steering Knuckles.

Inclination angle	6°
Caster angle (car laden*)	3°30′ ± 30′
Caster adjustment: by shims inserted between body and upper control arm.	

Wheels.

Camber (car laden*)	0°30′ ± 30′
Camber adjustment: by shims inserted between body and upper control arm.	
Toe-in (car laden*)	.12 ± .039″ (3 ± 2 mm)
Toe-in adjustment: by threaded sleeves on steering tie rods.	
Locking suspension: with car laden*	

Coil Springs.

Length under a load of 970.03 ± 33 lb. (440 ± 15 kg)	8.8189″ (224 mm)
Minimum permissible load referred to above length	892 lb. (405 kg)
Coil springs are divided into two classes color coded as follows:	
– yellow: springs which under a load of 970.03 lb. (440 kg) have a length of more than	8.8189″ (224 mm)
– green: springs which under a load of 970.03 lb. (440 kg) have a length equal to or less than	8.8189″ (224 mm)
Spring pairs belonging to the same class should be fitted.	

Shock Absorbers.

Pressure cylinder bore	1.063 (27 mm)
Length: – extended (abutting begins)	12.046″ $^{+.118''}_{-.039''}$ (306^{+3}_{-1} mm)
– retracted	8.464 ± 0.787″ (215.5 ± 2 mm)
Stroke (abutting begins)	3.563″ (90.5 mm)

(*) Car laden: 2 persons + 130 lb. (59 kg).

Type: Solid axle, anchored to body by four reaction rods and one cross strut through resilient mountings. Coil springs and hydraulic, telescopic, double-acting shock absorbers.

Coil Springs.

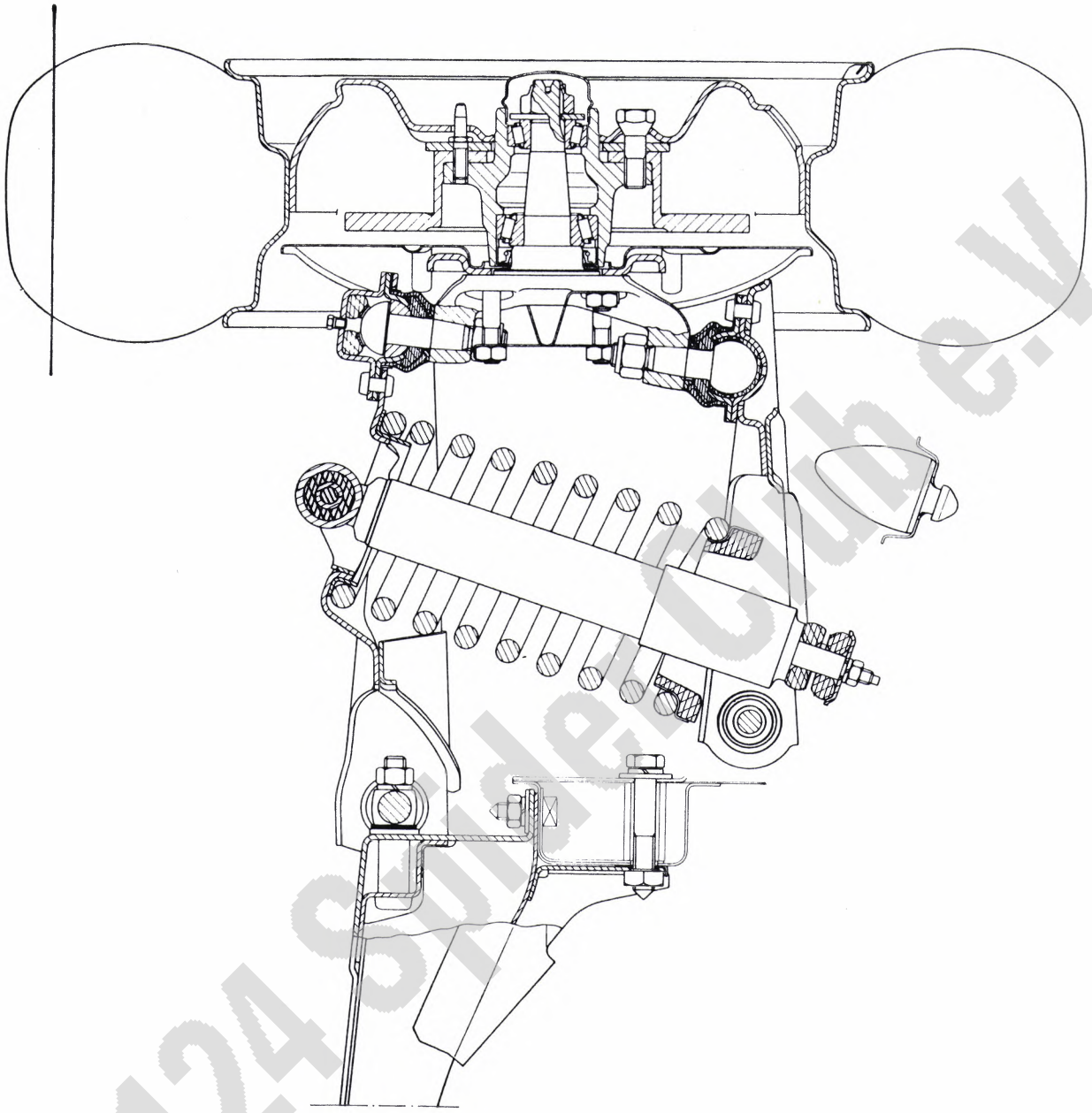
Length of spring under a load of 628 ± 29 lb. (285 ± 13 kg)	11.61" (295 mm)
Minimum permissible load referred to above length	589 lb. (267 kg)
Coil springs are divided into two classes color coded as follows:	
– yellow: springs which, under a load of 628 lb. (285 kg) have a length of more than	11.61" (295 mm)
– green: springs which, under a load of 628 lb. (285 kg) have a length equal to or less than	11.61" (295 mm)
Spring pairs belonging to the same class should be fitted.	
Locking struts resilient mountings: with car laden*.	

Shock Absorbers.

Pressure cylinder bore	1.063" (27 mm)
Length: – extended (abutting begins)	20.71" ± .08" (526 ± 2 mm)
– retracted	13.70" ± .08" (348 ± 2 mm)
Stroke (abutting begins)	7.00" (178 mm)

(*) Car laden: 2 persons + 130 lb. (59 kg) of luggage.

DESCRIPTION	THREAD (METRIC)	MATERIAL	TORQUE N·m	FT. LB.	Kgm
FRONT SUSPENSION					
Front wheel stud	M 12 x 1.25	C 35 R Bon Znt	86	65	9
Crossmember-to-side member bolt	M 12 x 1.25	R 80 Znt	93	69	9.5
Crossmember-to-side member lower nut	M 10 x 1.25	R 50 Znt (Bolt R 80 Znt)	56	40	5.5
Lower control arm-to-crossmember nut	M 12 x 1.25	R 50 Znt (Bolt R 50 Sd Stab)	59	43	6
Lower control arm-to-pivot bar nut	M 14 x 1.5	R 50 Znt	98	72	10
Self-locking nut, type S, securing ball joint to lower control arm	M 14 x 1.5	R 50 Cdt (Pin 25 Mc 6 Rct Glob Estr Dist Fosf R 65 ± 5)	52	40	5.5
Upper control arm self-locking nut (nylon-lined)	M 14 x 1.5	R 80 Znt (Pin R 80 Cdt)	88	65	9
Shock absorber upper mounting nut	M 8	R 50 Znt (Stem R 50)	15	11	1.5
Shock absorber lower mounting nut	M 10 x 1.25	R 80 Znt (Bolt R 100)	59	43	6
Sway bar bracket-to-lower control arm nut	M 8	R 50 Znt (Bolt R 50 Sd Stab)	18	14	2
Sway bar center mounting nut	M 8	R 50 Znt (Bolt R 50 Sd Stab)	18	14	2
Ball joint-to-knuckle self-locking nut (nylon-lined	M 14 x 1.5	R 50 Znt (Pins 35 Nc 5 R 40 Ni Cr Mo 2R)	98	72	10
Caliper plate and steering arm-to-knuckle nut	M 10 x 1.25	R 80 Znt (Bolt R 100 Cdt)	59	43	6
Brake caliper carrier plate bolt	M 10 x 1.25	R 80 Fosf Black	49	36	5
Front brake bleeding screw	M 8	R 50 Ind Cdt	6,4	3	.4
Front wheel brake hose connector	3/8-24Unf-2A	C 4 Mf Trf Bon Cdt Bright	27	22	3
REAR SUSPENSION					
Shock absorber upper mount nut	M 8	R 50 Znt (Shank R 50)	15	11	1.5
Shock absorber lower mount nut	M 10 x 1.25	R 50 Znt (Bolt R 80 Znt)	49	36	5
Shock absorber lower mount support self-locking nut (nylon-lined)	M 8	R 50 Znt (Bolt R 50 SD Stab)	18	14	2
Reaction and cross rods nut	M 12 x 1.25	R 50 Znt (Bolt R 80 Znt)	78	58	8
Upper reaction rod-to-body self-locking nut (nylon-lined)	M 12 x 1.25	R 80 Znt	78	58	8



REMOVAL

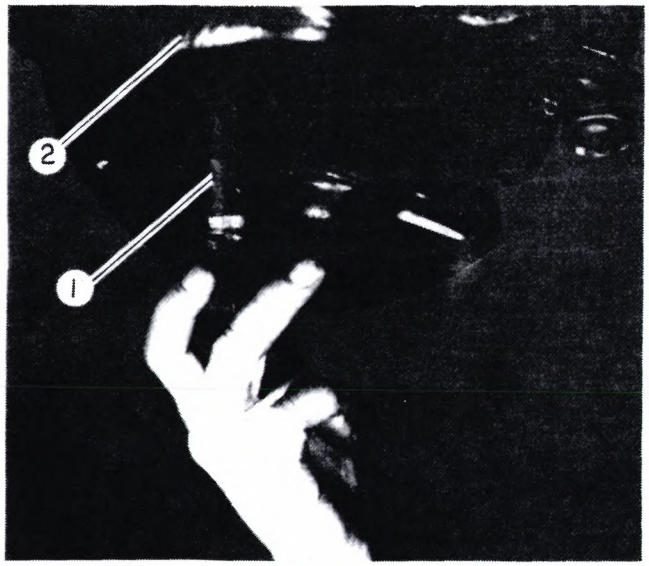
Raise vehicle on lift. Remove road wheels.

From inside engine compartment, disconnect nut (1) on upper end of shock absorber, holding shank (2) from turning with wrench A.57070.

1. Nut 2. Shank

From under vehicle, remove bolt and nut holding shock absorber (1) to lower control arm (2). Withdraw shock absorber thru lower control arm.

1. Shock absorber 2. Lower control arm



Fit tool A.74174 (1) to coil spring as shown and turn crank to compress spring and relieve tension on control arms.

Remove two nuts holding sway bar to lower control arm.

Remove tie rod (2) attached to steering knuckle arm (3) (refer to Steering Section).

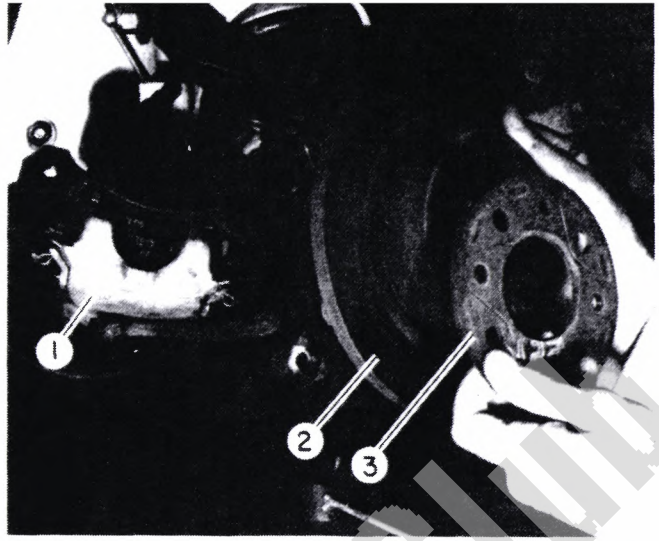
1. Tool A.74174 2. Tie rod 3. Steering knuckle arm

and lay to one side.

Remove two locating bolts to remove brake disc (2) and plate (3).

Remove bearing cap. Remove nut and washer and withdraw wheel hub.

1. Caliper assembly 2. Brake disc 3. Plate



Remove five bolts (1) holding fender splash shield (4) to body and withdraw shield.

Remove nut (2) from pivot bolt (3). Drive pivot bolt out with brass drift pin.

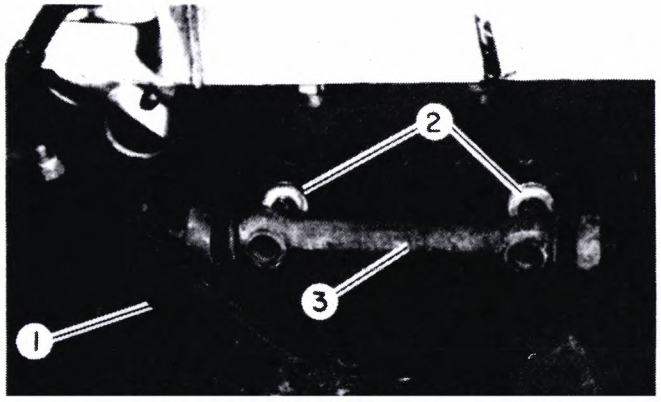
NOTE: If coil spring compressor does not completely release spring tension, lower vehicle until lower control arm just contacts jack, this will take tension off upper control arm pivot bolt.

1. Bolt 2. Nut 3. Pivot bolt 4. Splash shield

Remove two nuts which secure lower control arm (1) to cross-member. Entire assembly can now be removed.

NOTE: If shims (2) are removed when removing lower control arm, note number and location of shims between pivot bar (3) and body. Shims control caster and camber adjustments.

1. Lower control arm 2. Shims 3. Pivot bar



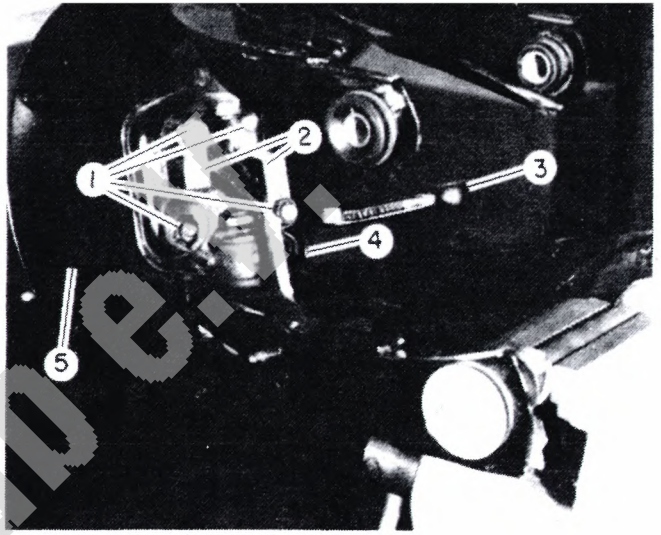
DISASSEMBLY AND REASSEMBLY

Clamp lower control arm in a vise. Be careful not to damage assembly.

Remove four nuts (1) and lock tabs (2) holding steering arm (3), brake caliper bracket (4) and brake disc guard (5) to steering knuckle.

Reassemble in reverse order of disassembly. Torque nuts to 43 ft. lb. (6 kgm).

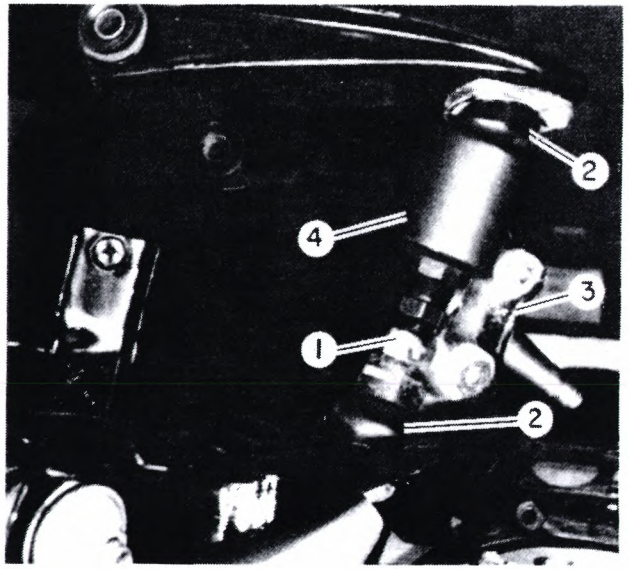
1. Nut 2. Lock tab 3. Steering arm 4. Brake caliper bracket 5. Brake disc guard



Remove two nuts (1) fixing ball joints (2) to steering knuckle (3). With ball joint removing tool (4), press ball joints, one at a time, out of tapered seats in knuckle.

Reassemble in reverse order of disassembly. Torque nuts to 72 ft. lb. (10 kgm).

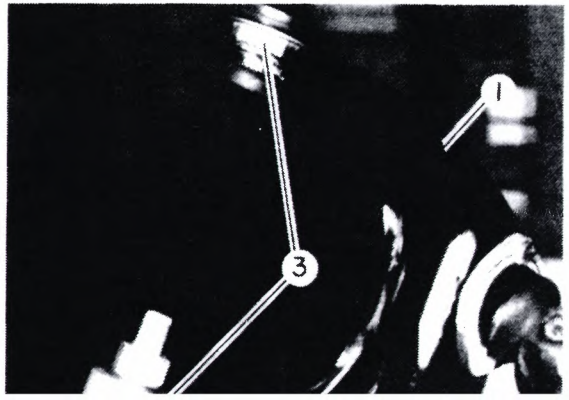
1. Nut 2. Ball joint 3. Steering knuckle 4. Ball joint removing tool A.47042



Clamp upper control arm (1) in vise and with special tool (2) press out bushings (3) as shown.

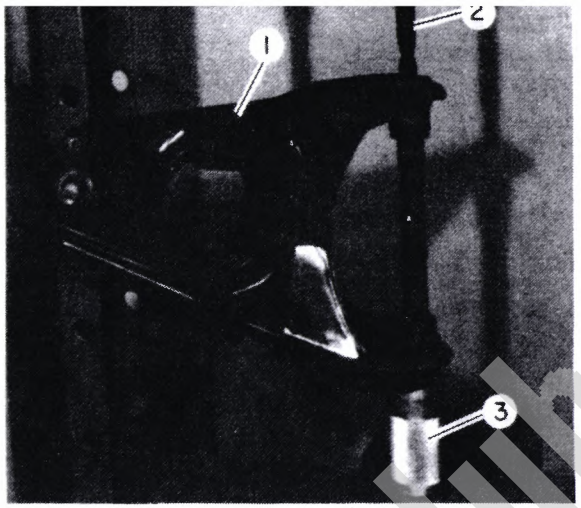
Reverse tool to press in new bushings. Tighten nut until bushing bottoms out.

1. Upper control arm 2. Bushing tool 3. Bushing



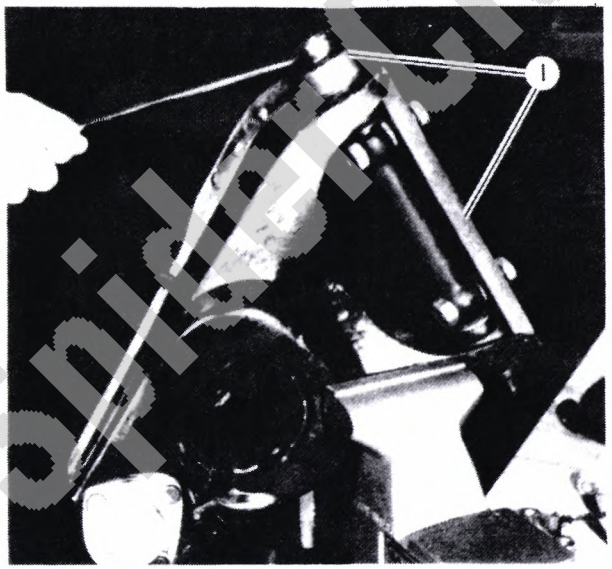
Turn control arm around and repeat operation to extract other bushing.

1. Lower control arm 2. Pin 3. Collar



Install new bushings with special collars (1) as shown. Tighten nut until bushing bottoms out.

1. Bushing installation collars



INSTALLATION

With control arm assembly together, attach lower control arm to crossmember with two nuts (1). Do not torque nuts at this time.

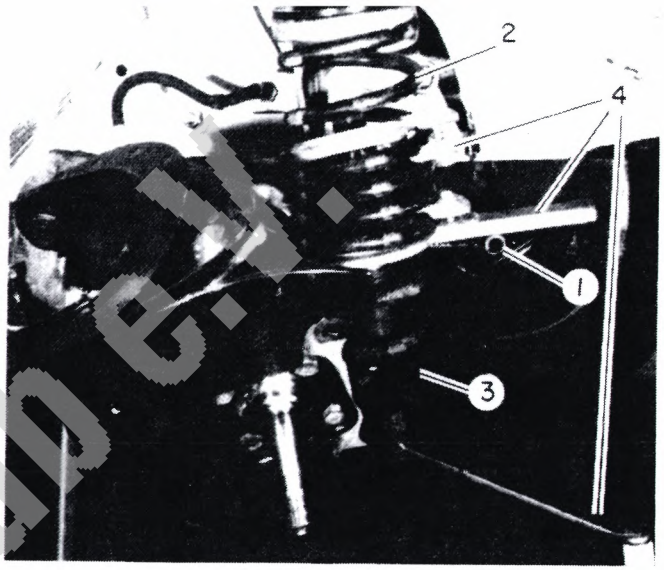
NOTE: Be certain that same number of shims are in place as were found during removal.

Place coil spring assembly (2) on lower control arm (3).

NOTE: Coil springs are divided into two classes, color coded yellow or green. Spring pairs must be the same color code. Also, both front and rear must be the same color code.

Fit tool A.74174 (4) to spring and compress it to reduce its height as shown.

Insert upper portion of spring along with pad and seat into body recess.



1. Nut 2. Coil spring assembly 3. Lower control arm
4. Tool A.74174

Connect upper control arm (1) to body with pivot bolt and nut.

NOTE: It may be necessary to lower vehicle as shown, until lower control arm just contacts jack, in order to insert pivot bolt freely thru upper control arm.

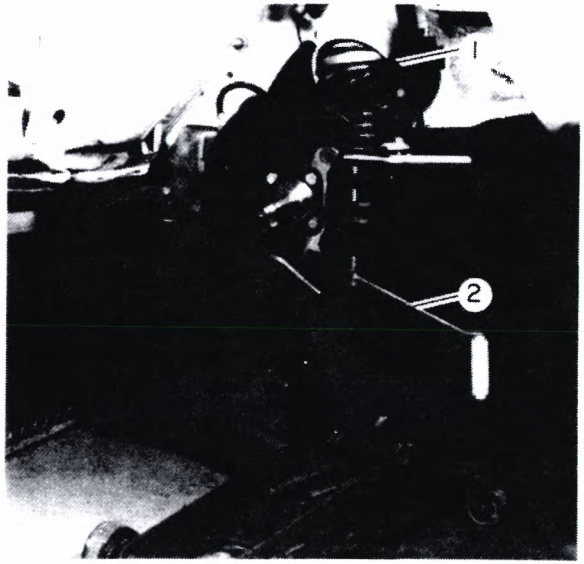
Do not fully tighten nut at this time.

Turn crank of tool A.74174 (2) to release spring gradually until it seats on lower control arm and body. Remove tool A.74174.

Install shock absorber. Torque upper nut to 11 ft. lb. (1.5 kgm) and lower nut to 43 ft. lb. (6 kgm).

Fix sway bar to lower control arm and torque nuts to 14 ft. lb. (2 kgm).

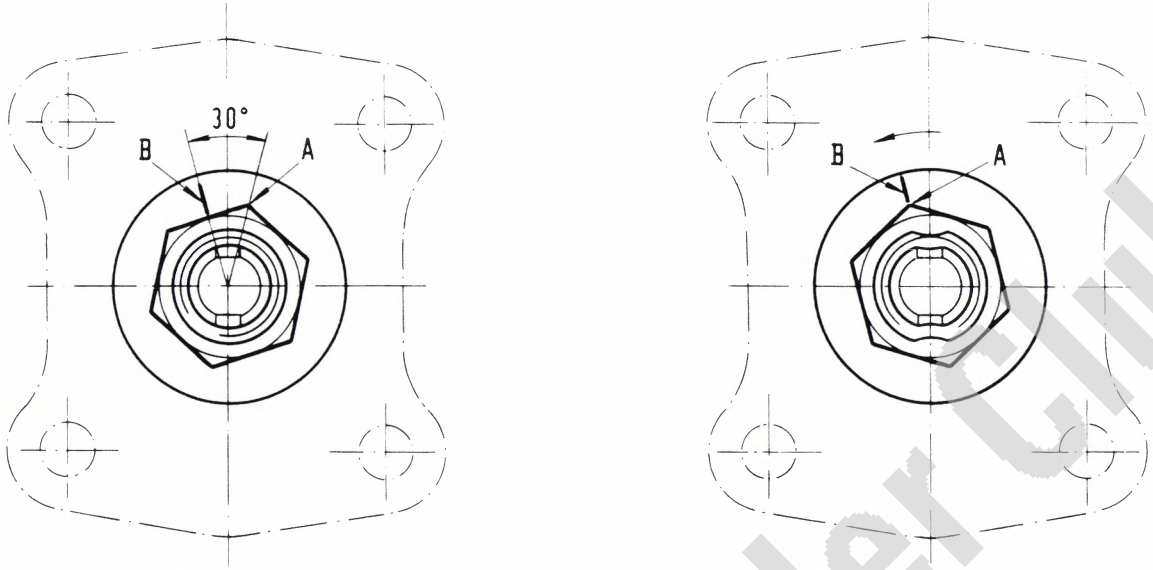
Connect tie rod to steering knuckle arm and torque nut to 25 ft. lb. (3.5 kgm).



1. Upper control arm 2. Tool A.74174

Install outer bearing thrust washer, inserting tab in groove on knuckle spindle. Install new hub nut and tighten it with a torque of 14.5 ft. lb. (2 kgm) at the same time turning hub in both directions four or five times to ensure that bearings are properly seated. Unscrew nut and then torque it to 5 ft. lb. (0.7 kgm).

Unscrew nut 30°. To do this first make a chisel mark "B" on washer opposite the middle of one face of hex nut as shown. Then unscrew nut until next angle "A" of nut is opposite mark "B".



Nut tightened with a torque of 5 ft.lbs (0.7 kgm).

Nut unscrewed by 30°.

A. Angle of nut. - B. Reference mark on washer.

Figure shows adjustment of left front wheel hub. Reverse procedure for right hand hub as nut has a left-hand thread.

When nut has been unscrewed 30°, lock it in this position by crimping its lock collar with tool A.74140 (1) as shown.

Fill wheel hub cover with bearing grease and install on hub (2) by gently tapping until it seats.

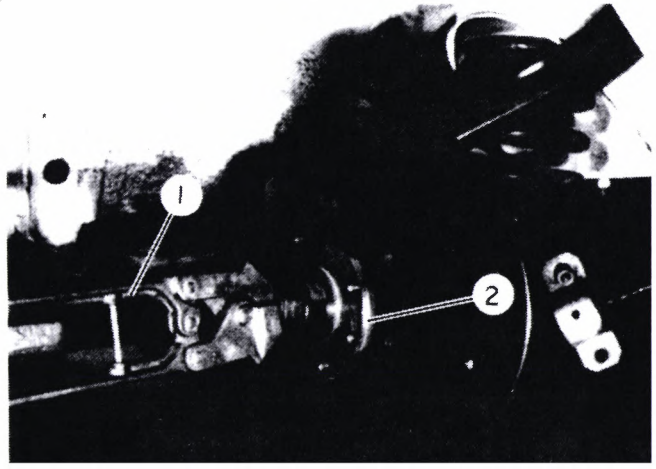
Install brake disc and plate to wheel hub with two locating bolts.

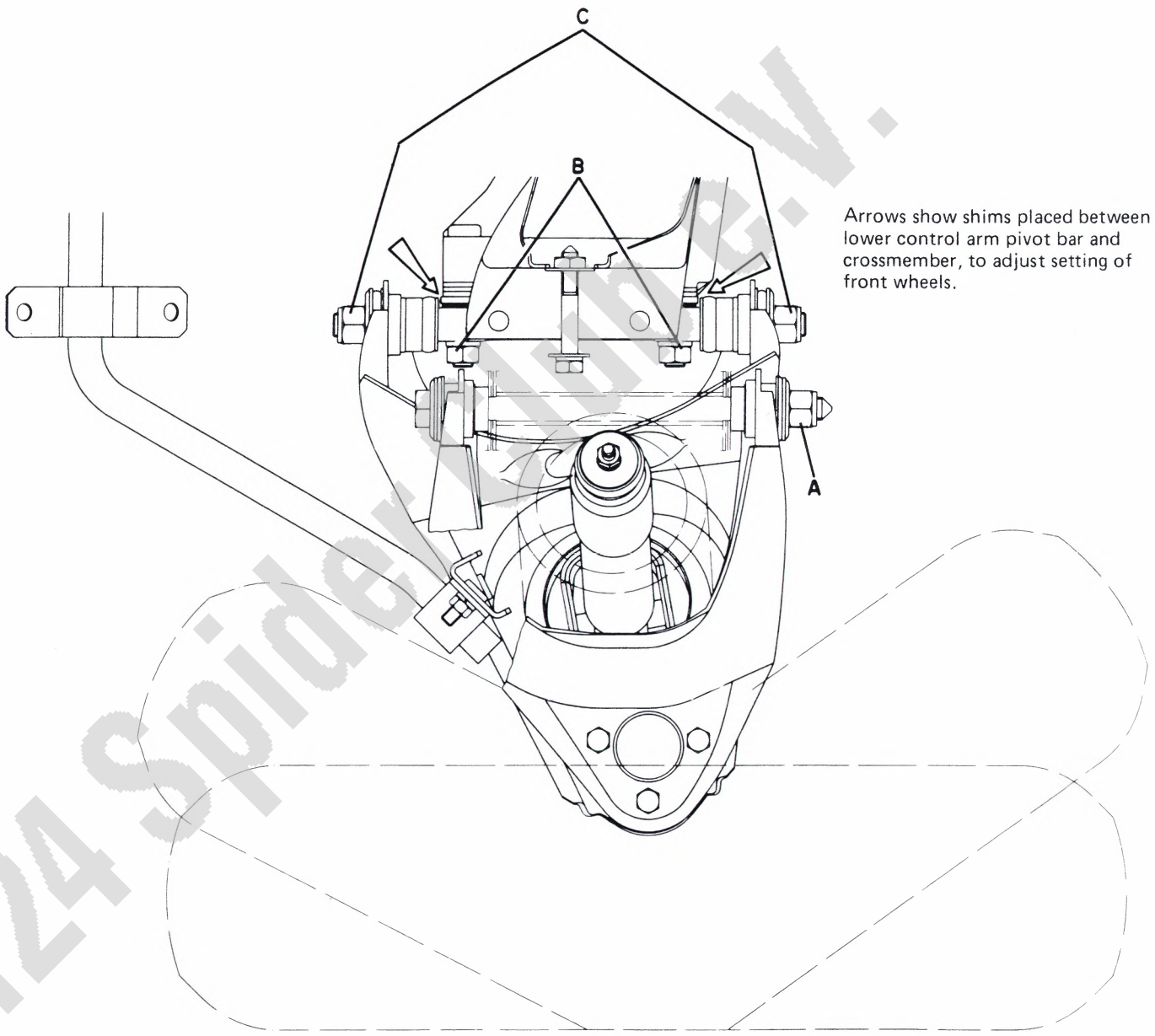
Install complete caliper assembly to mounting bracket with two bolts. Torque to 36 ft. lb. (5 kgm).

Install road wheels. Torque wheel bolts to 65 ft. lb. (9 kgm). Check tire pressures for conformance to specifications.

Lower vehicle and set front wheels straight ahead.

NOTE: Rubber bushing nuts and bolts must be tightened with vehicle laden with two persons + 130 lb. (59 kg) of luggage to avoid abnormal stresses on bushings. Refer





Arrows show shims placed between lower control arm pivot bar and crossmember, to adjust setting of front wheels.

A — Upper control arm pivot bolt nut (65 ft. lb./9 kgm)
B — Lower control arm pivot bolt to crossmember nuts (43 ft. lb./6 kgm)
C — Nuts fixing lower control arm to pivot bolt (72 ft. lb./10 kgm)

Plan View of Front L.H. Suspension

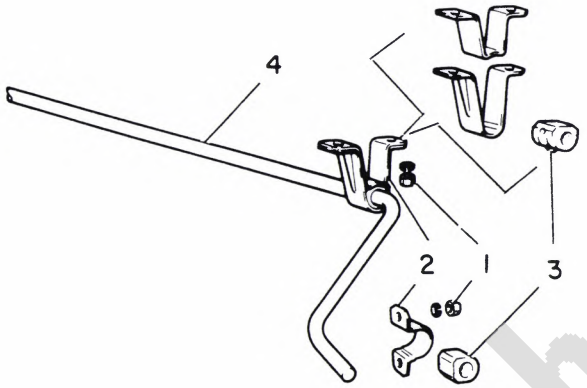
REMOVAL AND INSTALLATION

Remove eight bolts to remove front splash shield.

Remove eight nuts (1) and lockwashers holding sway bar supports (2) and bushings (3). Remove sway bar.

Install in reverse order of removal. Torque nuts to 14 ft. lb. (2 kgm).

1. Nut 2. Support bracket 3. Bushing



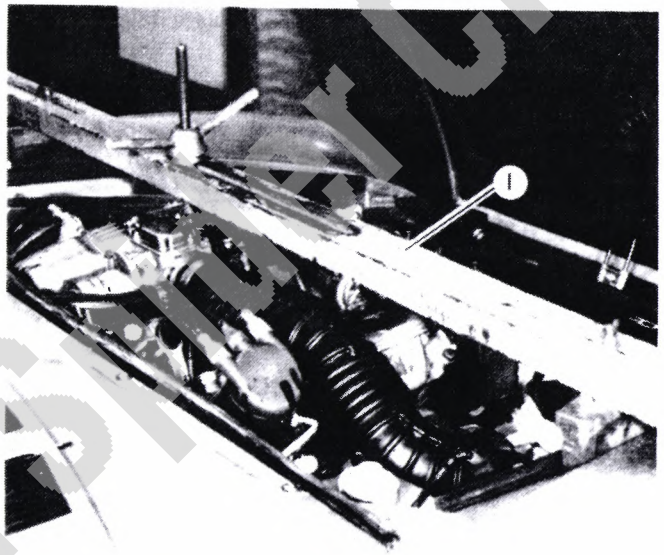
CROSSMEMBER

REMOVAL AND INSTALLATION

Support engine with bar A.70526 (1) as shown.

Remove both front suspension assemblies as described in this section.

1. Engine Support A.70526

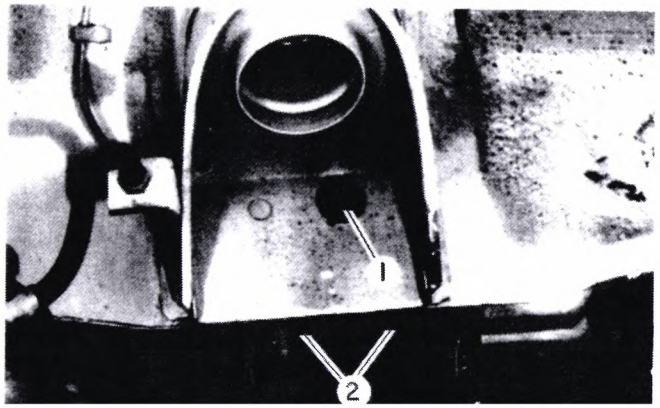


Remove two bolts (1), four nuts (2) and washers holding crossmember (3) to frame. Remove two nuts and washers, thru crossmember opening (arrow), holding engine mounts to crossmember. Remove crossmember.

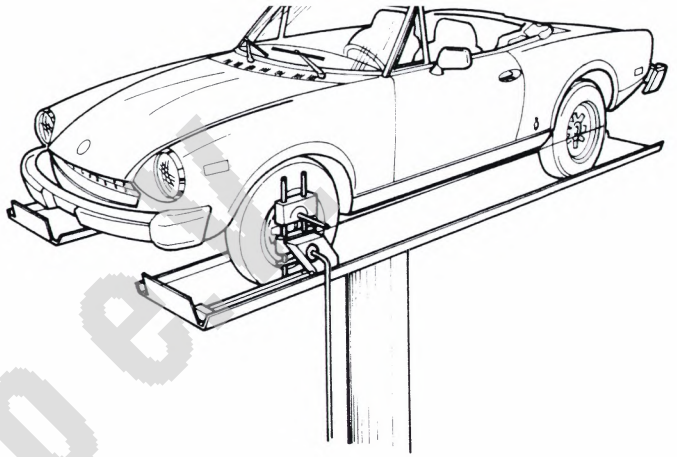
Note location of any shims between body and crossmember.

Install in reverse order of removal. Torque bolts to 69 ft. lb. (9.5 kgm) and nuts to 40 ft. lb. (5.5 kgm). Torque engine mount nuts to 25 ft. lb. (3.5 kgm).

1. Bolt 2. Nut 3. Crossmember



ALIGNMENT



Alignment can only be performed with special tools and equipment. Before aligning the front suspension, it must be checked for possible worn or misadjusted components.

Check the following:

- Tire pressure (28 psi).
- Tire radial and lateral runout (not more than 3 mm).
- Wheel lug tightness (65 ft. lb./9 kgm).
- Wheel bearing end play (if perceptible, wheel bearings may be worn, or wheel bearings may need tightening).
- Ball joints on upper and lower control arms for wear.
- Ball joints on steering arms for wear.
- Upper and lower control arm bushings for deterioration (overhaul or replace control arm).
- Lower control arm mounting tightness (43 ft. lb./6 kgm).
- Lash between steering gear worm and roller, adjust if necessary (refer to Steering Section).
- Condition of shock absorbers, replace if necessary.

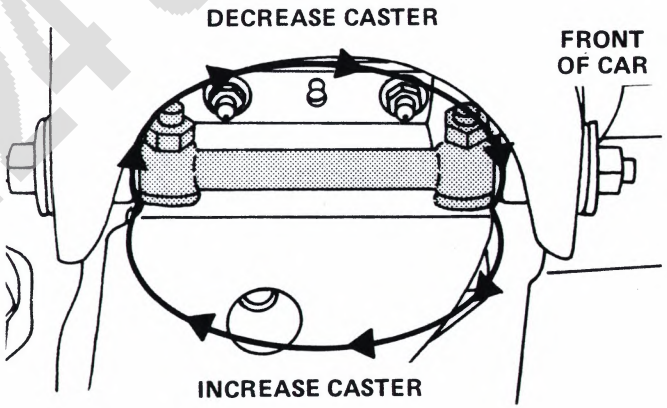
CASTER AND CAMBER ADJUSTMENT

Changes in caster and camber are made by adding or removing shims from behind lower control arm pivot bar (refer to figure on next page).

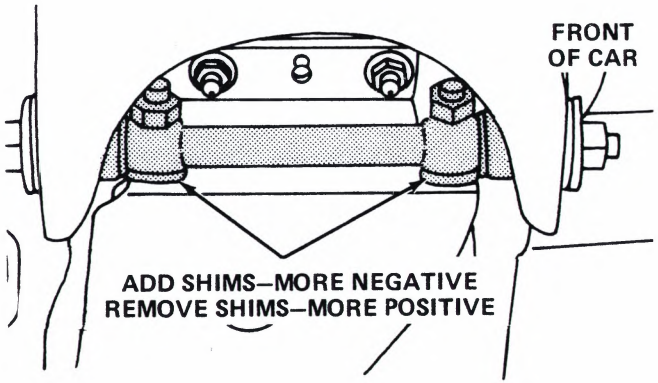
To increase caster angle, transfer shims from front stud "F" to rear one "G". To reduce caster angle, transfer shims from rear stud "G" to front one "F".

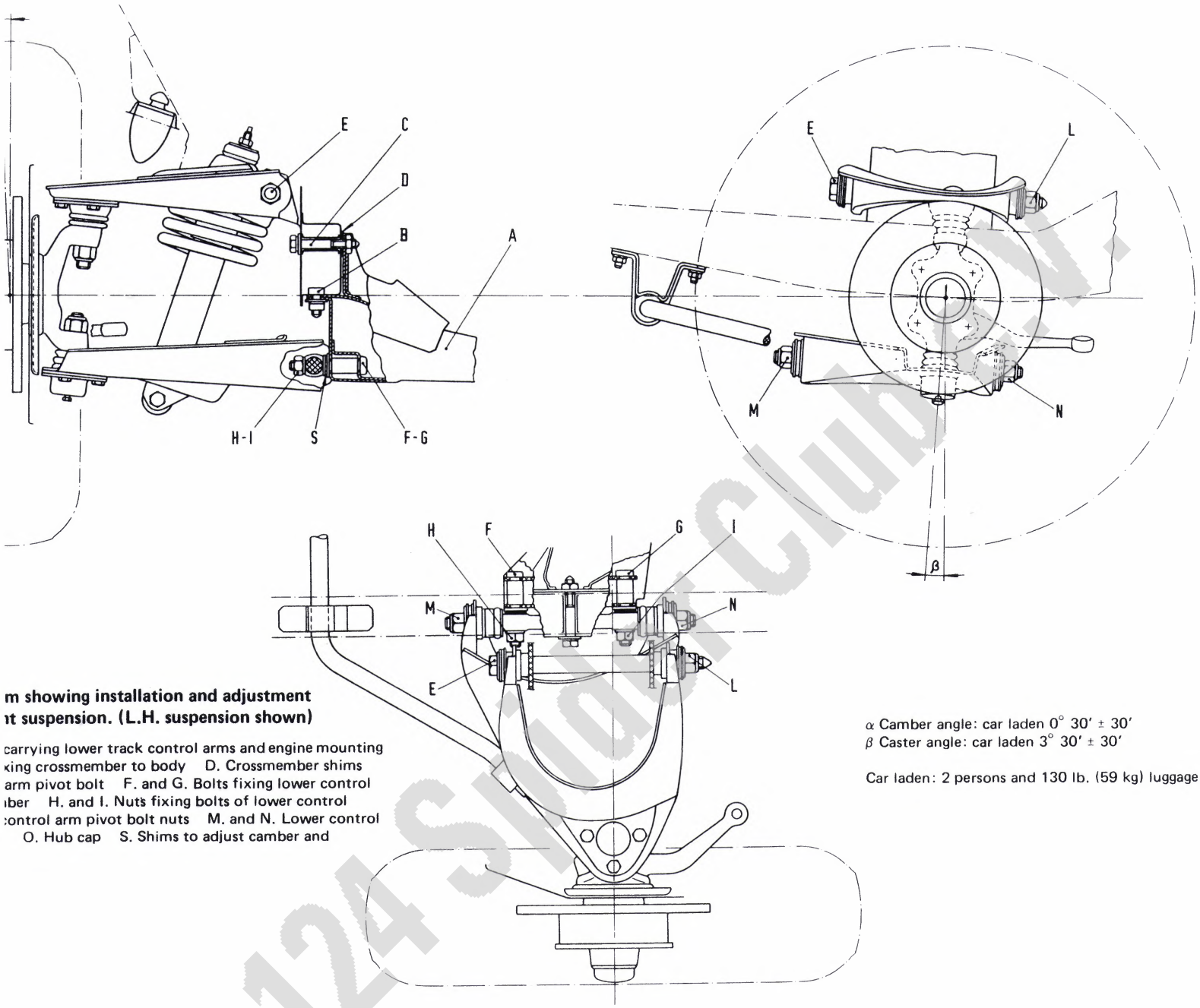
To increase camber angle, remove the same number of shims from both studs. To reduce camber angle, add the same number of shims to both studs.

CASTER ADJUSTMENT



CAMBER ADJUSTMENT





m showing installation and adjustment
ıt suspension. (L.H. suspension shown)

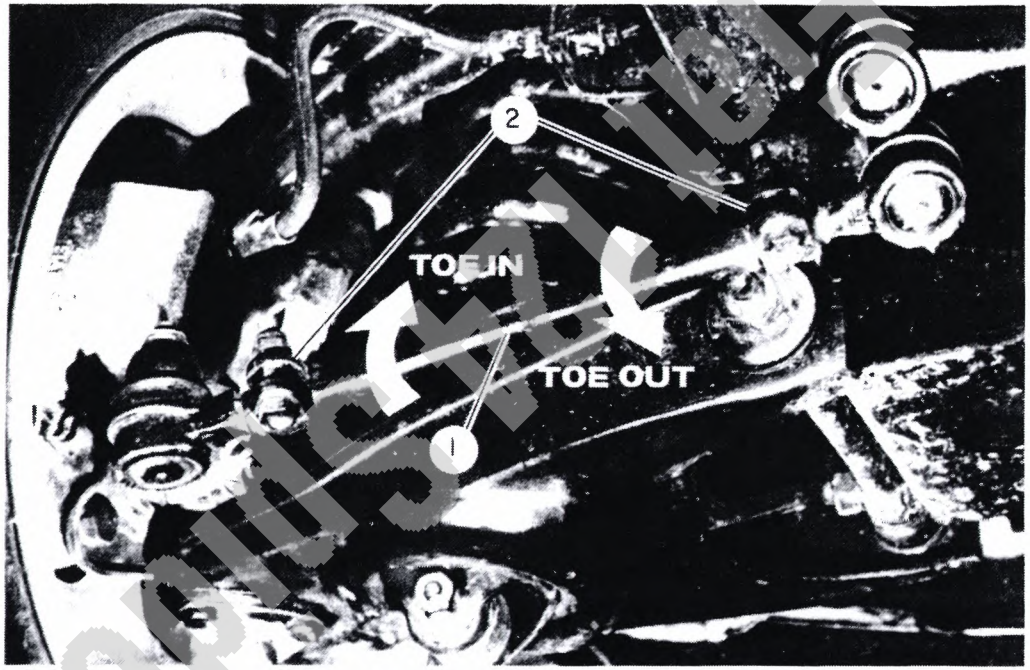
carrying lower track control arms and engine mounting
king crossmember to body D. Crossmember shims
arm pivot bolt F. and G. Bolts fixing lower control
ıber H. and I. Nuts fixing bolts of lower control
:ontrol arm pivot bolt nuts M. and N. Lower control
O. Hub cap S. Shims to adjust camber and

α Camber angle: car laden 0° 30′ ± 30′
β Caster angle: car laden 3° 30′ ± 30′

Car laden: 2 persons and 130 lb. (59 kg) luggage.

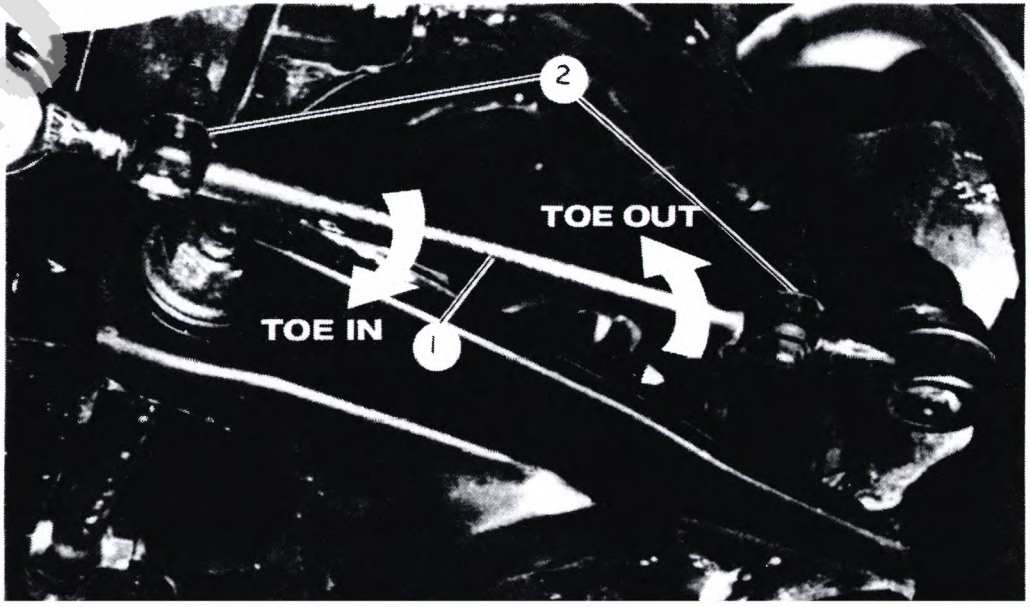
Changes in toe settings are made by adjustment sleeves (1) on steering tie rods. Loosening of lockclamps (2) and turning sleeves will change toe setting.

Turning R.H. sleeve up will result in wheel toeing out. Turning L.H. sleeve down will result in wheel toeing out.



L.H. Tie Rod Adjustment

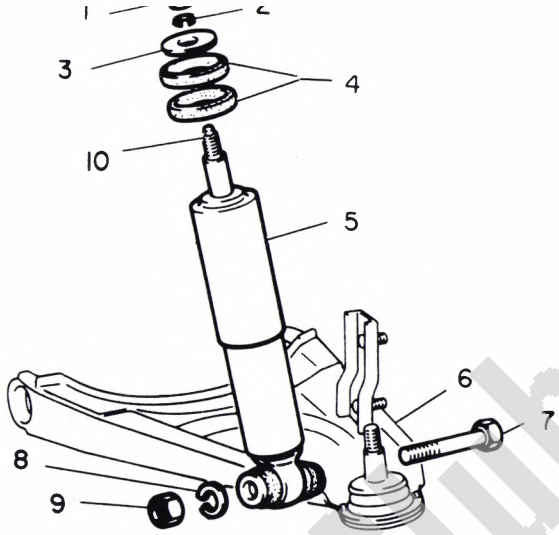
1. Adjustment sleeve 2. Lockclamp



From inside engine compartment, disconnect nut (1) on upper end of shock absorber (5), holding shank (10) from turning with wrench A.57070.

From under vehicle, remove bolt (7) and nut (9) holding shock absorber to lower control arm (6). Withdraw shock absorber thru lower control arm.

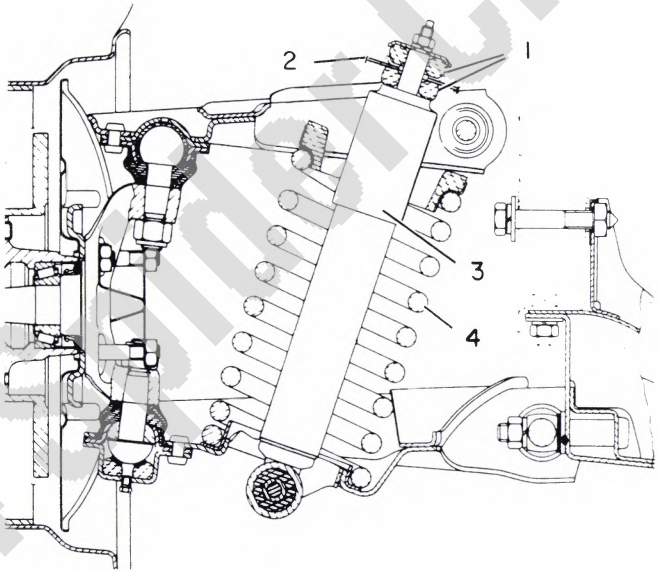
1. Nut 2. Lockwasher 3. Flat washer 4. Rubber bushing
5. Shock absorber 6. Lower control arm 7. Bolt 8. Lockwasher
9. Nut



Installation is reverse of removal.

Be certain that rubber bushings (1) are installed between body (2) and shock absorber (3) as shown. Torque lower nut to 43 ft. lb. (6 kgm) and upper nut to 11 ft. lb. (1.5 kgm).

1. Rubber bushing 2. Body section 3. Shock absorber 4. Coil spring



REMOVAL

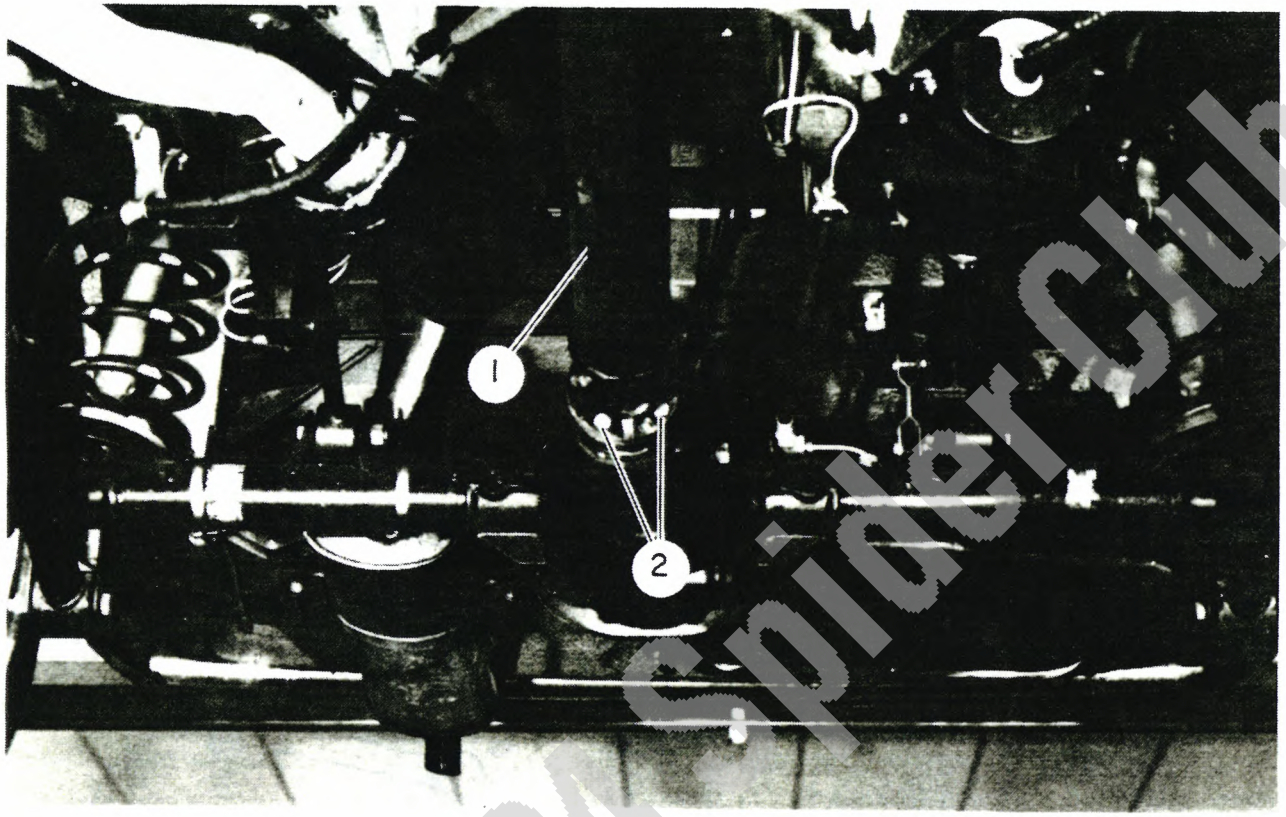
Raise vehicle on lift. Remove both rear road wheels.

Disconnect drive shaft (1) at differential by removing four bolts (2) and nuts.

NOTE: Mark shaft flange in relation to differential flange so that upon installation it will be assembled in same position.

Secure shaft out of way.

1. Drive shaft 2. Bolt

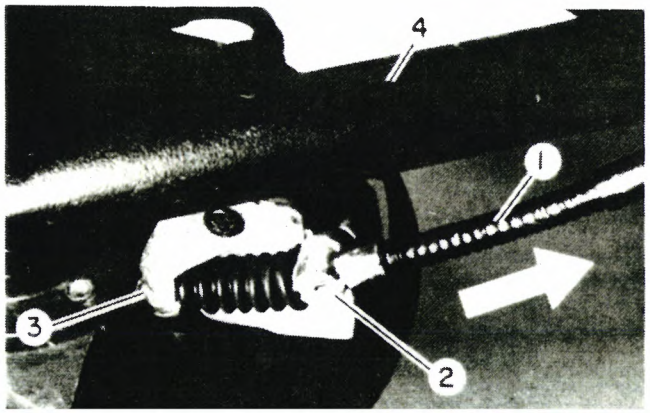


Disconnect ends of hand brake cable by first loosening cable adjustment with adjusting nuts.

Pull cable (1) out of support housing (2) in direction shown (arrow) and remove ball end (3) from socket.

Free cables from clips on lower reaction rods (4).

1. Hand brake cable 2. Support housing 3. Cable ball end
4. Lower reaction rod

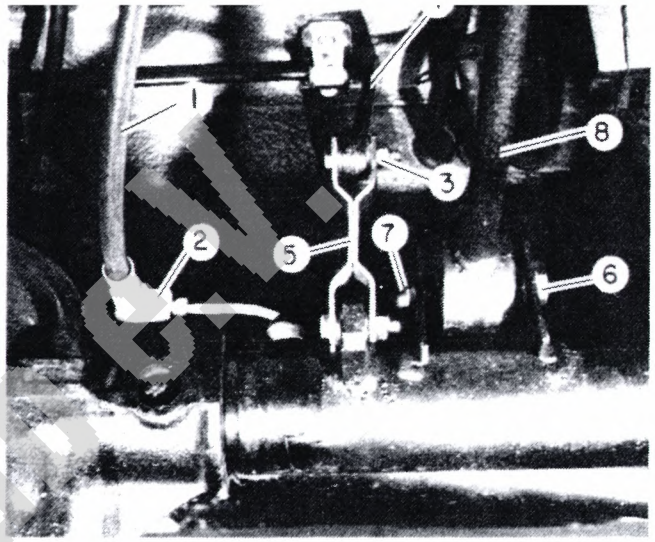


lines to prevent dirt entry.

Remove bolt and nut (3) to disconnect brake compensator torsion bar (4) from link (5).

Remove bolt (6) and nut (7) to disconnect upper reaction rod (8). Repeat for other side.

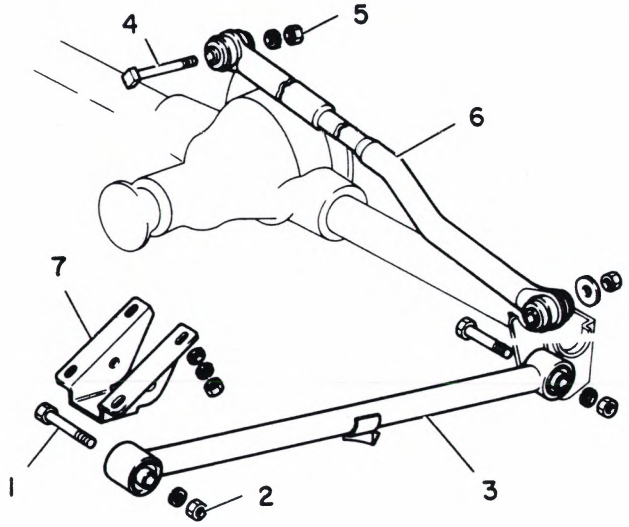
1. Brake pressure line 2. "T" fitting 3. Nut 4. Torsion bar 5. Link 6. Bolt 7. Nut 8. Upper reaction rod



Remove bolt (1) and nut (2) to disconnect each lower reaction rod (3).

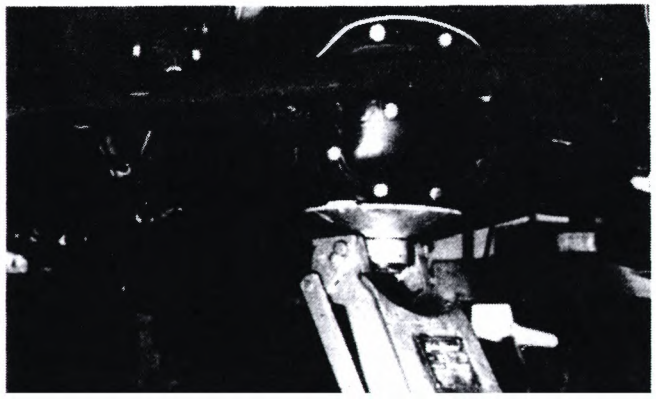
Remove bolt (4) and nut (5) to disconnect cross rod (6).

1. Bolt 2. Nut 3. Lower reaction rod 4. Bolt 5. Nut 6. Cross rod 7. Mounting bracket



Lower axle housing onto jack, slightly compressing springs, as shown.

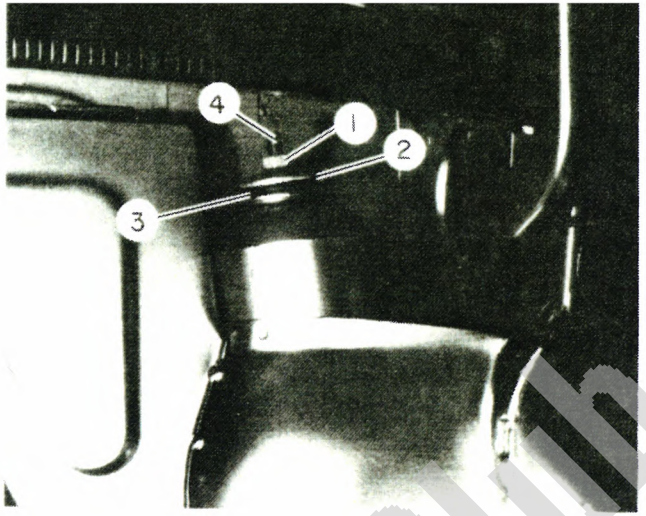
CAUTION: Be sure jack is firmly supporting axle. Upper shock absorber nuts are main support for suspension at this time.



wrench A.57070 to hold shank (4) while removing nut.

Carefully lower jack and withdraw suspension assembly.

1. Nut 2. Washer 3. Rubber bushing 4. Shank



INSTALLATION

Installation is reverse of removal with attention to the following steps:

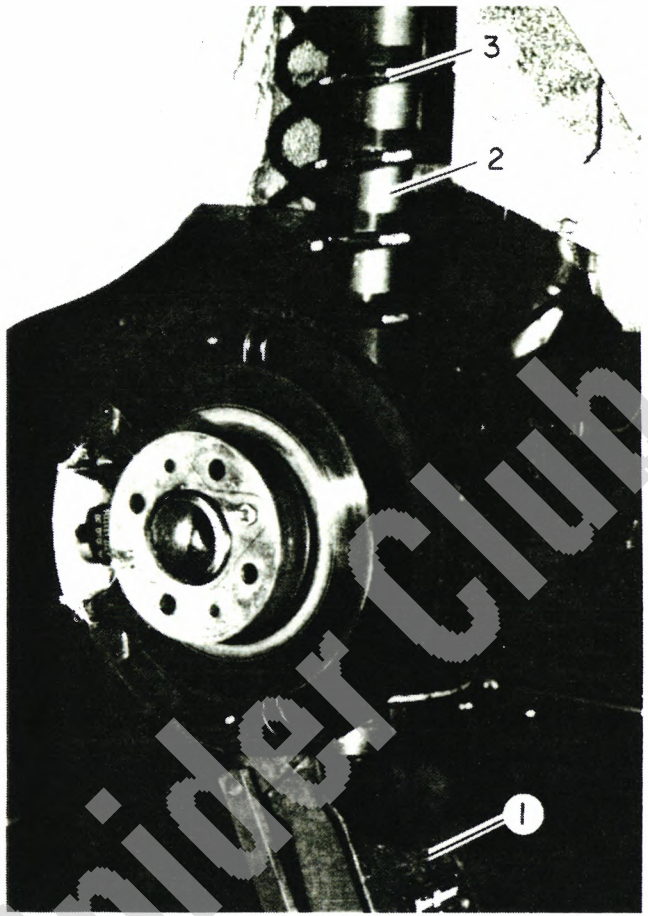
- Coil springs are divided into two classes, color coded yellow or green. Spring pairs must be the same color code. Also, both front and rear must be the same color code.
- Do not fully tighten reaction rod mounting hardware until suspension is completely installed and vehicle is on ground or drive-on lift, and is laden to equivalent of two persons plus 130 lb. (59 kg) of luggage. This is to prevent rubber bushings from being over stressed. Refer to torque specifications at beginning of this section.
- After connecting hydraulic brake hose, bleed system. Refer to Brakes Section.

Raise vehicle on lift.

Remove road wheel.

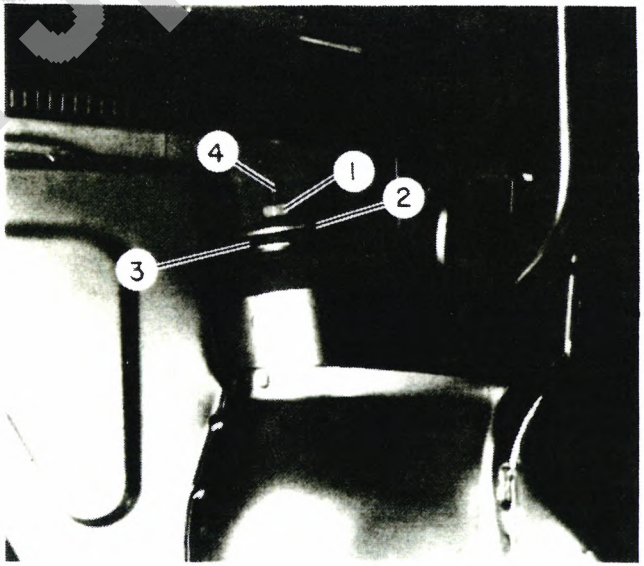
Lower axle onto jack (1) as shown, compressing spring slightly to take tension off upper nut on shock absorber (2).

1. Jack 2. Shock absorber 3. Coil spring



Remove nut (1), washer (2) and rubber bushing (3). To keep shank (4) from turning while removing nut, use wrench A.57070.

1. Nut 2. Washer 3. Rubber bushing 4. Shank



Compress top half of shock absorber (1) to lower shank (2) thru body opening.

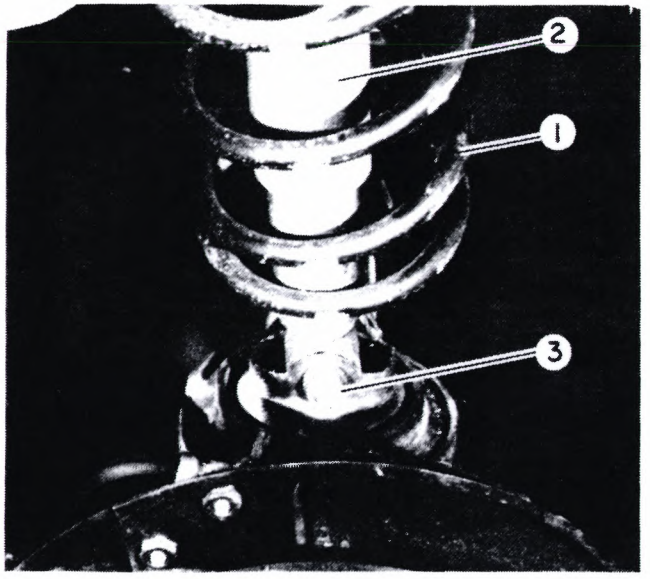
With pry bar, compress spring (3) enough so that it can be pulled away from seat in body.

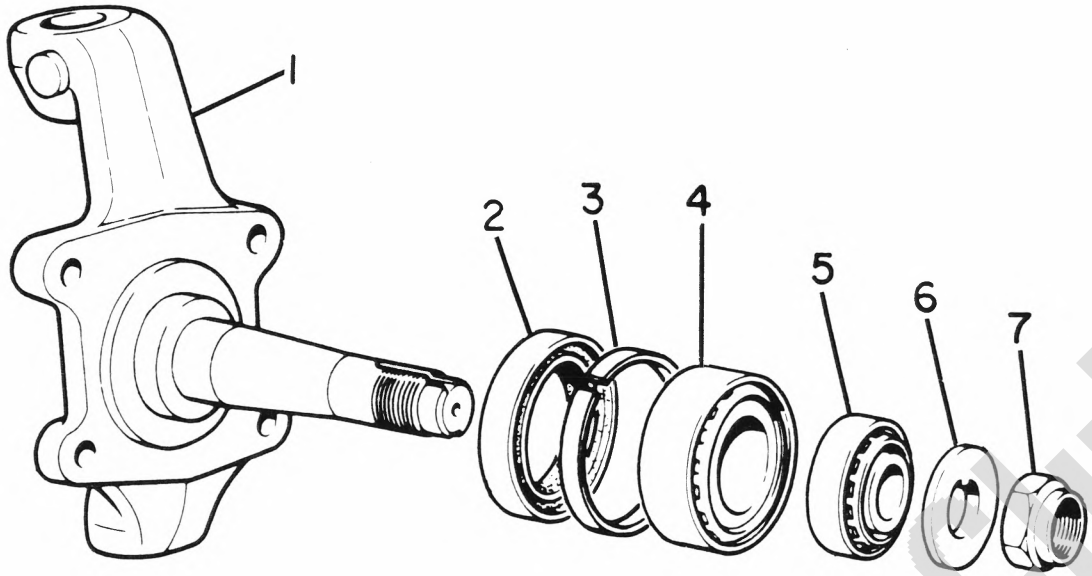
1. Shock absorber 2. Shank 3. Spring

Lift spring (1) up to gain access to lower mount on shock absorber (2). Remove bolt and nut (3) and withdraw shock absorber.

Install in reverse order of removal. Torque upper nut to 11 ft. lb. (1.5 kgm) and lower nut to 36 ft. lb. (5 kgm).

1. Spring 2. Shock absorber 3. Nut



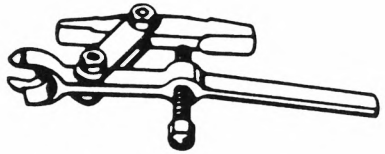


1. Steering knuckle 2. Seal with inner spreader spring 3. Snap ring 4. Rear roller bearing 5. Front roller bearing 6. Doweled washer 7. Nut

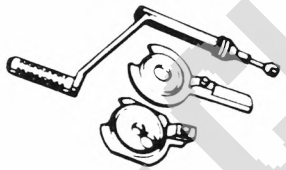
Steering Knuckle Components

A.57070 (J28051) Shock absorber shank wrench

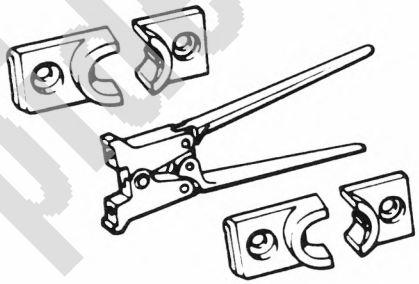
A.47038 (J28013) Tie rod remover



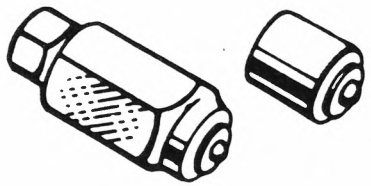
A.74174 (J28131) Front suspension coil pring compressor



A.74140 (J28213) Hub nut staking tool



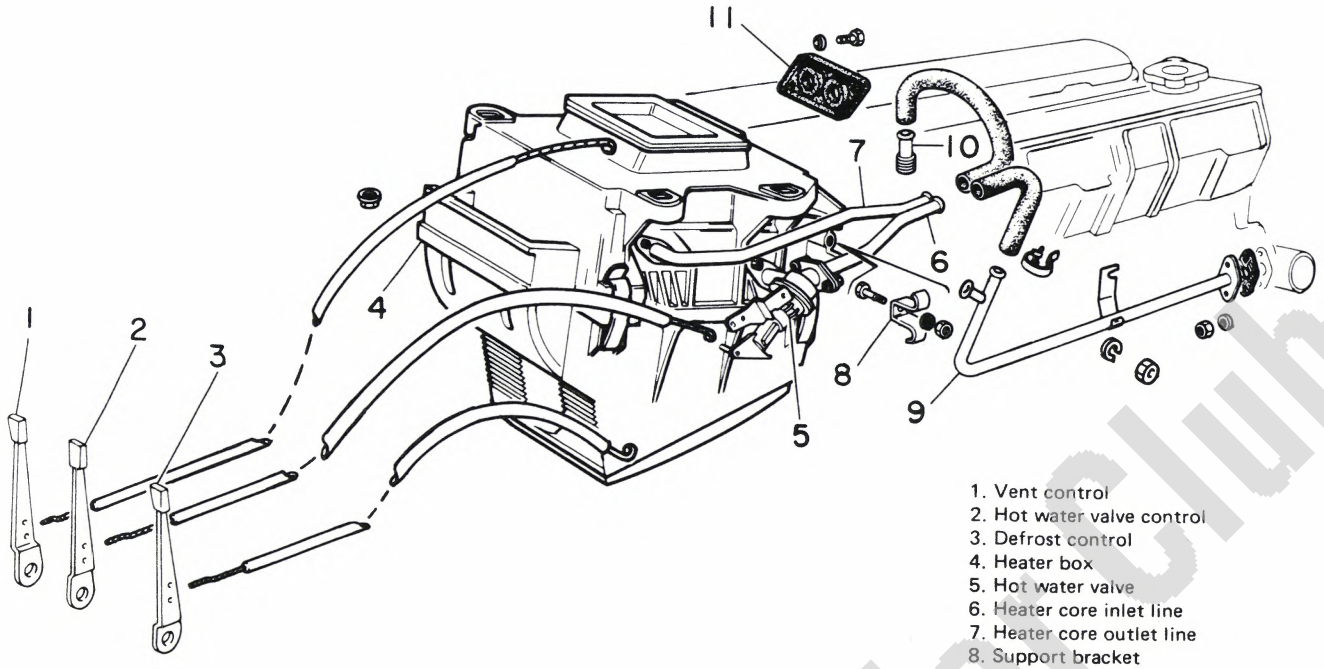
A.47042 (J28015) Ball joint remover



ACCESSORIES - 50

ACCESSORIES - 50

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
501.01	Ventilation and Heating	50-1
501.17	Windshield Washer	50-9



1. Vent control
2. Hot water valve control
3. Defrost control
4. Heater box
5. Hot water valve
6. Heater core inlet line
7. Heater core outlet line
8. Support bracket
9. Water pump line
10. Cylinder head inlet fitting
11. Firewall gasket

HEAT/VENT/DEFROST ASSEMBLY

Insufficient heat or ventilation may be caused by problems other than a faulty heater. Before disassembly, check for the following:

- Leaves or other debris blocking radiator.
- Leaves or other debris blocking fresh air inlet.
- Faulty coolant thermostat.
- Blown fuse or faulty electrical system components.
- Low coolant level.
- Kinked or otherwise blocked heater hoses.
- Cooling system contamination.

HEATER ASSEMBLY

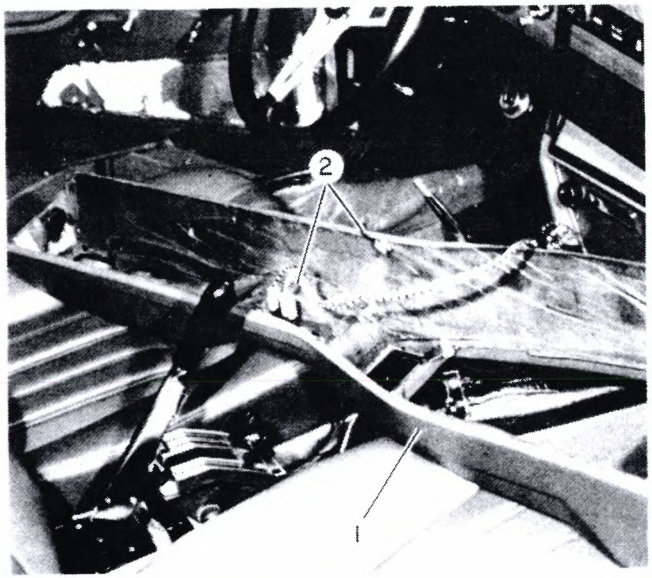
REMOVAL AND INSTALLATION

Disconnect battery.

Move heater valve control lever to on position. Drain cooling system to level below heater.

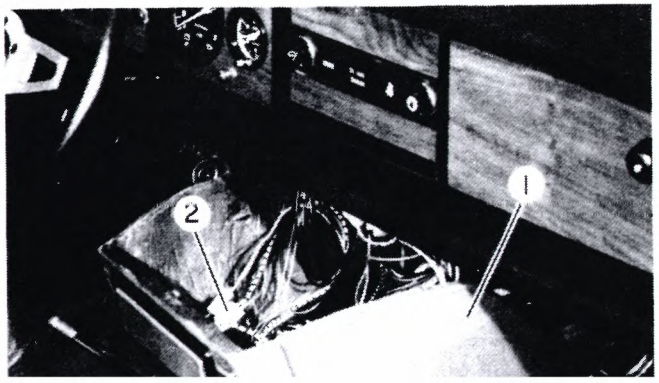
Remove center console (1). Refer to BODY SECTION.

Disconnect electrical connectors (2) from blower switch, noting position for installation. Pry retainer clips open to remove wire harness from console.



1. Center console 2. Electrical connectors

On vehicles with vinyl interior, withdraw center console upper half (1) far enough to gain access to electrical connectors (2). Disconnect electrical connectors from console and radio (if installed) noting position for installation.

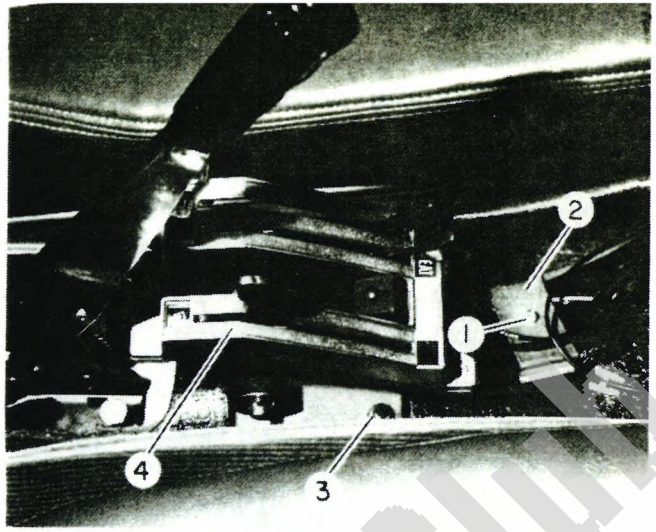


1. Center console upper half 2. Electrical connectors

Pry open clamps on side of transmission hump to release control cables.

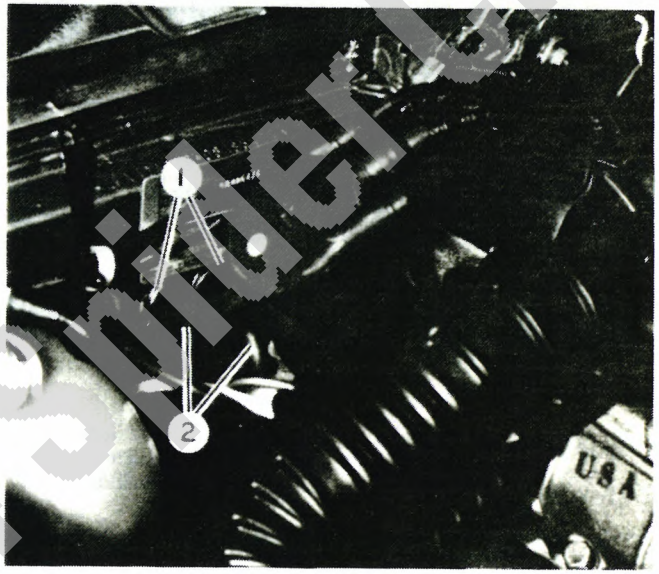
Remove three nuts (3) securing control lever assembly (4) to body.

1. Screw 2. Clamp 3. Nut 4. Control lever assembly



From engine compartment, loosen clamps (1) on two heater hoses (2) at firewall and pull hoses off heater box lines.

1. Clamps 2. Heater hoses



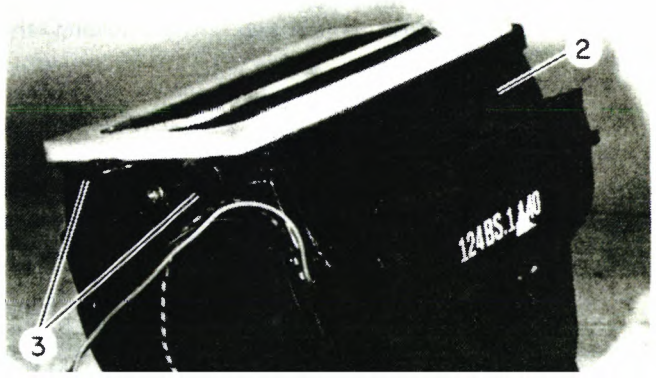
From under instrument panel, remove two screws holding radio rear support bracket to body. Disconnect electrical leads (1).

Remove four nuts holding heater box (2) to body. Lower heater box and carefully withdraw it from under instrument panel.

Installation is reverse of removal.

Refill cooling system and bleed air from system (refer to Engine Section for bleeding procedure).

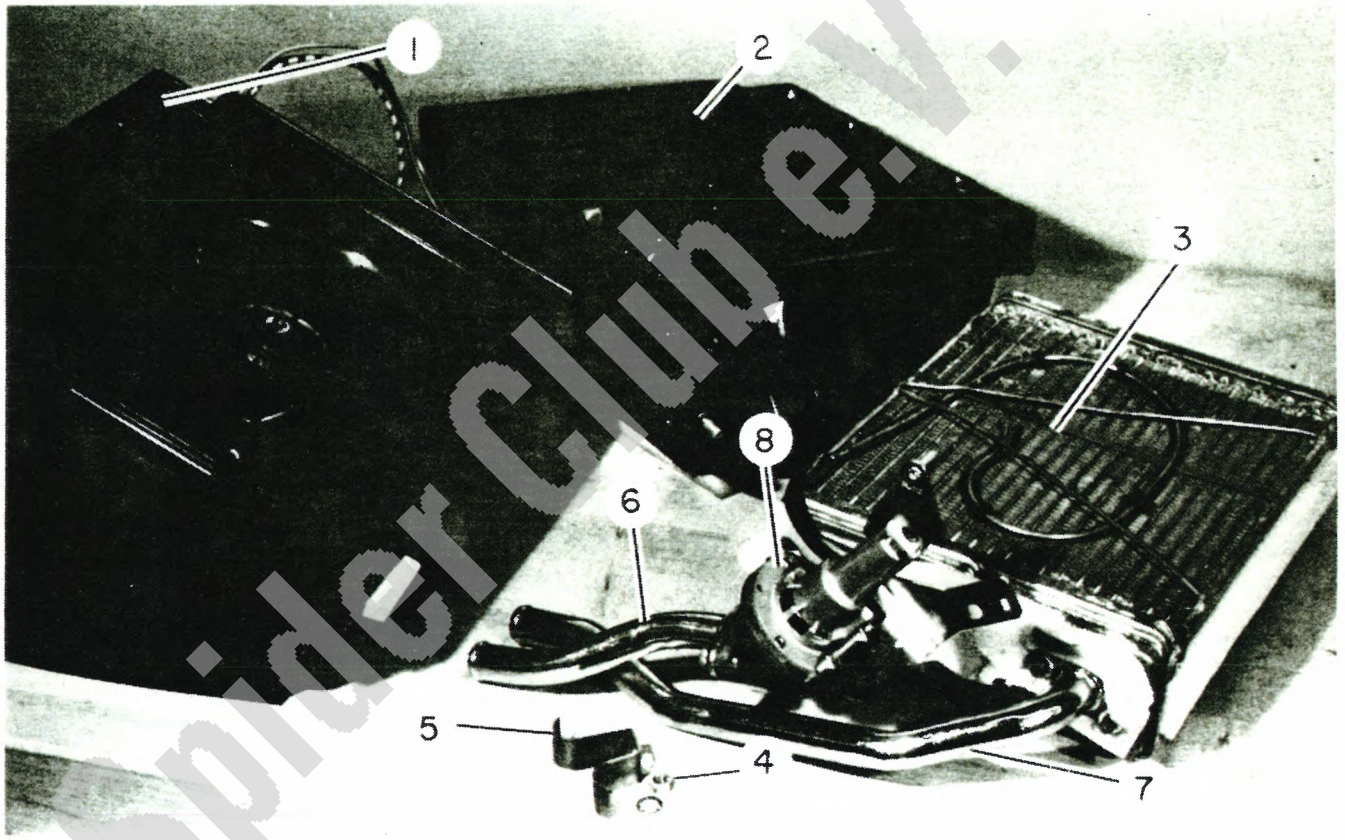
1. Electrical leads 2. Heater box 3. Mounting lugs



DISASSEMBLY AND REASSEMBLY

Remove four clips holding upper half (1) and lower half (2) together. Separate halves.

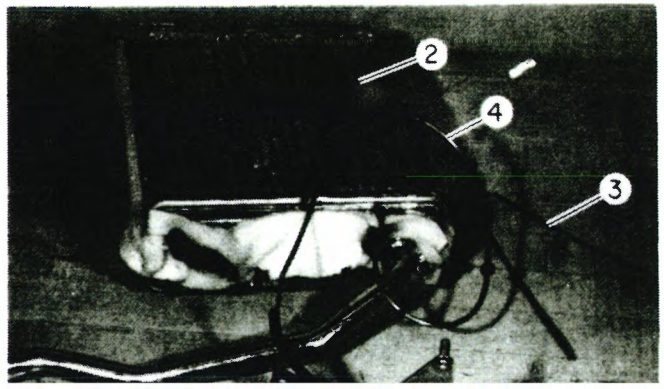
Remove nut (4) holding line support bracket (5). Lift valve/heater core (3) from upper half of heater box.



1. Heater box upper half
2. Heater box lower half
3. Valve/heater core
4. Nut
5. Line support bracket
6. Heater inlet line
7. Heater outlet line
8. Heater control valve

To remove valve (1) from core (2), first release sensor line (4) support clip (3). Then remove two nuts (5) holding valve to core.

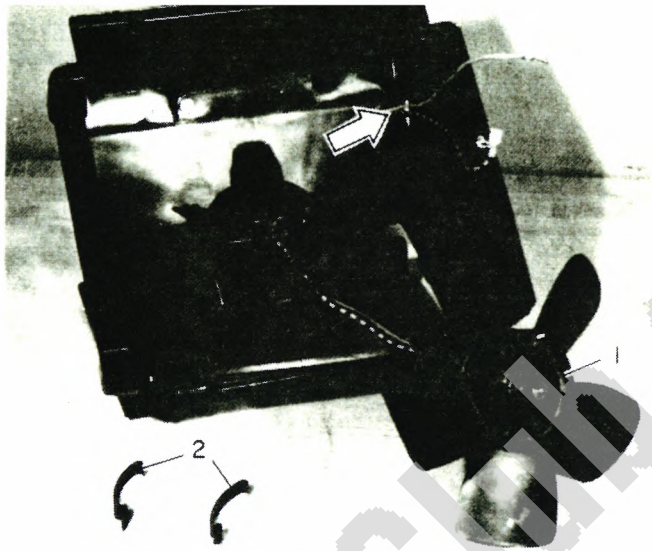
1. Heater control valve 2. Heater core 3. Support clip 4. Sensor line 5. Nut



To remove fan and motor (1), release two clips (2) holding motor to lower half of heater box. While feeding wires thru opening (arrow), lift motor out.

Reassembly is reverse of disassembly.

1. Fan and motor 2. Clip



HEATER BLOWER

REMOVAL AND INSTALLATION

Remove center console. Refer to BODY SECTION.

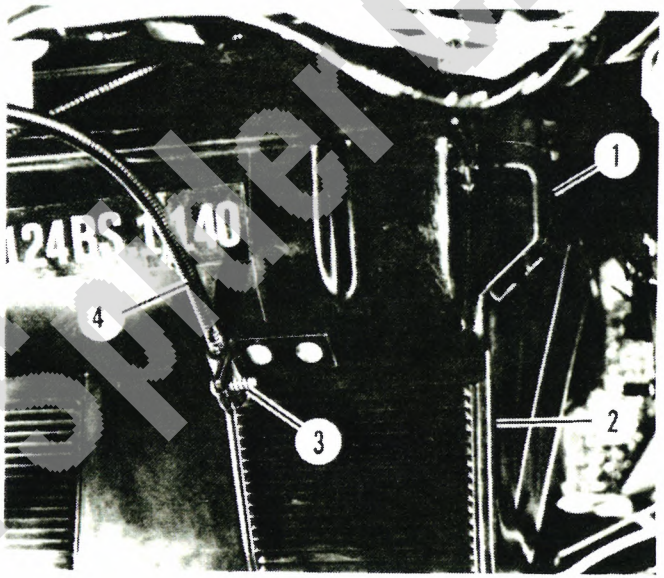
Remove nut securing ground wire for blower to stud above and to left of housing.

Disconnect blower electrical connectors.

Remove screw (3) holding floor door cable (4) to lower half (2) of heater box.

Remove four clips (1) holding lower half (2) to upper half of heater box. Move lower half out to passenger's foot well.

1. Clip 2. Heater box lower half 3. Screw 4. Floor door cable



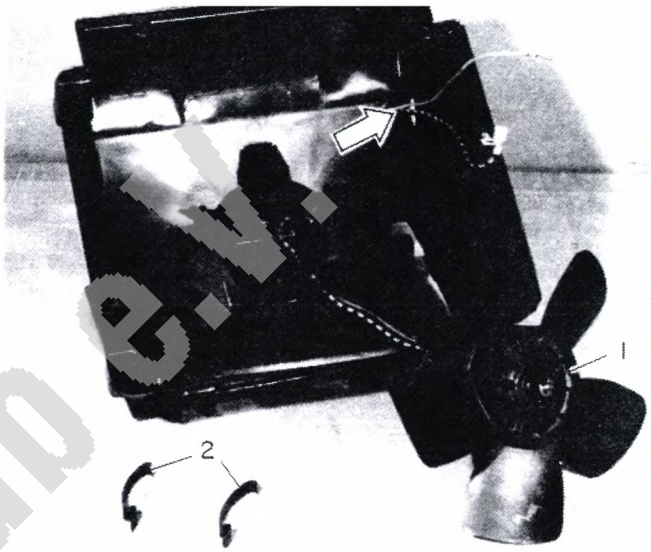
Push floor door cable housing down to fully open door. Pull white plastic clip back to free cable end. Pull cable end out of door.

When reconnecting cable, slide cable through door and plastic clip. Push clip up over cable end to secure cable in door.

To remove fan and motor (1), release two clips (2) holding motor to lower half of heater box. While feeding wires thru opening (arrow), lift motor out.

Installation is reverse of removal.

1. Fan and motor 2. Clip



HEATER CONTROL VALVE/HEATER CORE

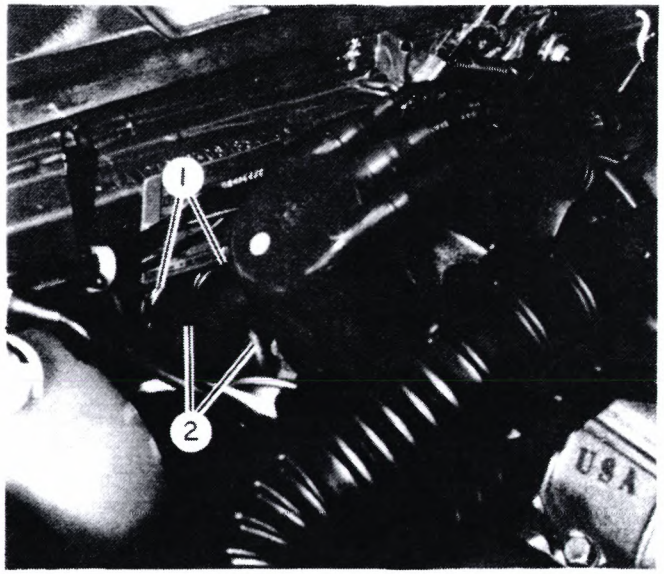
REMOVAL AND INSTALLATION

Move heater control lever to ON position. Drain cooling system to level below heater.

From engine compartment, loosen clamps (1) on two heater hoses (2) at firewall. Pull hoses off heater box lines. Remove grommet from firewall.

Remove lower half of heater box. Refer to BLOWER MOTOR above.

1. Clamps 2. Heater hoses



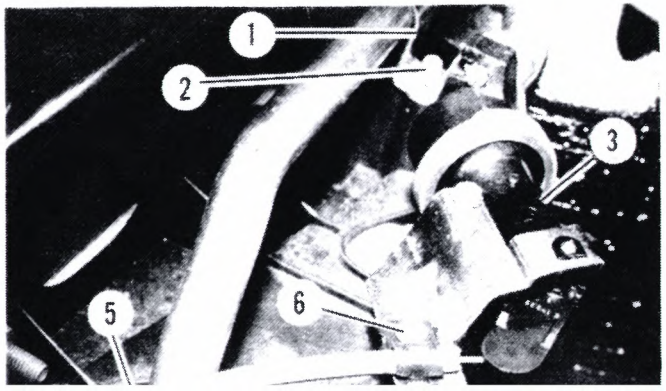
Remove nut (2) holding line support bracket (1) to upper housing.

Remove screw (6) securing heater control valve cable (5) to valve (3). Disconnect cable (6) from control valve (3).

Provide container to catch water from heater lines while removing heater.

Carefully lower heater core (4) with control valve down while draining water from heater.

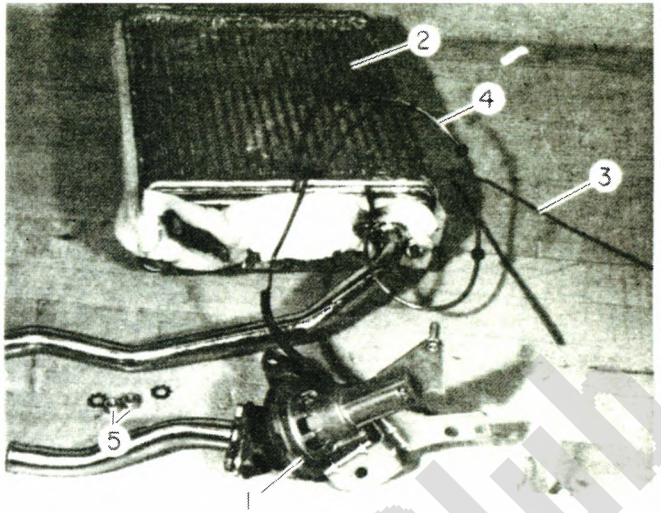
1. Line support bracket 2. Nut 3. Heater control valve
4. Heater core 5. Control cable 6. Screw



line (4) support clip (3). Then remove two nuts (5) holding valve to core.

CAUTION: When installing control valve or outlet line to core be careful not to overtighten nuts. This could damage core.

Installation is reverse of removal.



1. Heater control valve 2. Heater core 3. Support clip 4. Sensor line 5. Nut

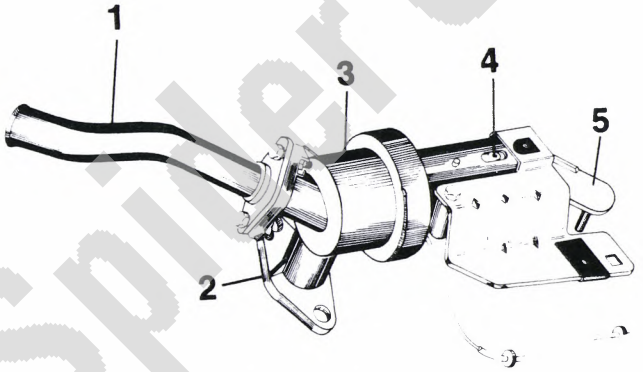
HEATER VALVE

ADJUSTMENT

NOTE: On later versions the heater control valve is adjustable for the full close position. If warm air is coming out of the heater with the heater control off, check heater valve adjustment as follows.

With heater valve removed, make sure lever (5) is in full off position. Blow air through valve (3) and check for air coming out inlet (1). If necessary adjust screw (4) to completely shut off air.

NOTE: Screw (4) can be turned either way to obtain full close position.

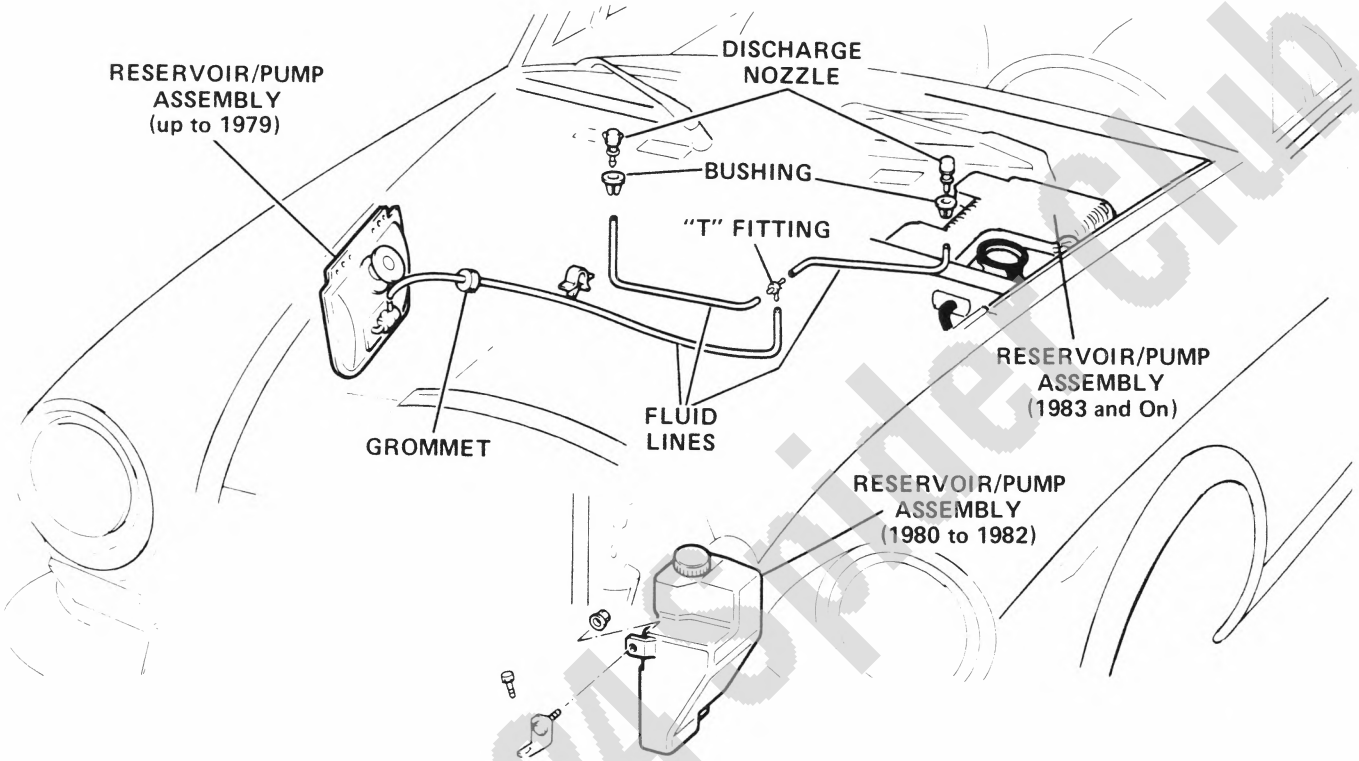


1. Inlet 2. Outlet 3. Valve 4. Adjustment screw 5. Lever

Fluid pressure for windshield washer system is provided by an electric pump which is an integral part of the reservoir. System failure is usually caused by one of the following:

- Low fluid level
- Clogged discharge nozzles
- Disconnected, clogged or kinked fluid lines
- Electrical circuit failure
- Faulty pump

Discharge stream from nozzles can be adjusted with screwdriver at nozzle.



WINDSHIELD WASHER SYSTEM

ELECTRICAL - 55

ELECTRICAL - 55

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IGNITION DISTRIBUTOR (to 1978)

Type	MARELLI S144CAY
Static advance	0°
Centrifugal advance	36° ± 1° 30'
Contact gap	0.015 to 0.017 in.
Terminal-to-ground insulation at 500 Vd.c., more than	10 megohm
Condenser capacity at 50 to 1000 Hz	0.20 to 0.25 microfarad
Breaker contact pressure	19.4 ± 1.8 oz. (550 ± 50 gr)
Opening angle	35° ± 3°
Closing angle	55° ± 3°
Additional breaker points	
– advance of	10° ± 1°
– contact gap	0.015 to 0.017 in.
– opening angle	35° ± 5°
– closing angle	55° ± 5°
– breaker contact pressure	14.1 ± 1.8 oz. (400 ± 50 gr)

IGNITION DISTRIBUTOR (1979 and on)

Type	MARELLI 877AX
Static advance	10°
Centrifugal advance	28° ± 2°
Vacuum advance	
California (carburetor)	10° ± 2° at 12 in. Hg
49 States (carburetor)	14° ± 2° at 12 in. Hg
All (fuel injection)	15° ± 2° at 14 in. Hg
Air gap	0.012 to 0.016 in. (0.30 to 0.40 mm)
Control module input voltage	6 to 18 volts
Current limiter output	4.5 to 6.0 amps
Rotor arm resistance	5,000 ohms

IGNITION COIL (to 1978)

Type	MARELLI BES200A	MARTINETTI G 37 SU
Primary winding ohmic resistance at 68°F (20°C)	2.59 to 2.81 ohms	2.60 to 2.95 ohms
Secondary winding ohmic resistance at 68°F (20°C)	6,750 to 8,250 ohms	7,000 to 8,500 ohms

IGNITION COIL (1979 and on)

Type	MARELLI AEI200A
Primary winding ohmic resistance at 68°F (20°C)	0.75 to 0.81 ohms
Secondary winding ohmic resistance at 68°F (20°C)	10,000 to 11,000 ohms

SPARK PLUGS

Thread diameter and pitch, metric: M14 x 1.25

	(to 1976)	(1977 and on) NORMAL	(1977 and on) RESISTOR
Type: AC	41-2XLS	42XLS	R42XLS
BOSCH		W175T30	W175TR30
CHAMPION	N7Y	N9Y	RN9Y
MARELLI	CW78LP	CW7LP	CW7LPR

(All Except Automatic Transmission, 1981 and on)

Type	MARELLI E 100-1.3/12
Voltage	12 V
Rated output	1,3 kW
Direction of rotation, pinion side	clockwise
Number of poles	4
Field winding	series-parallel
Engagement	free-wheel
Drive	solenoid
Diameter inside pole shoes	2.675" to 2.677" (67.95 to 68.00 mm)
Diameter of armature	2.634" to 2.638" (66.85 to 66.90 mm)
Bench Testing Data	
Running test at 77°F (25°C):	
Current	280 A
Torque developed	5.78 ± .24 ft. lb. (0.8 ± 0.02 kgm)
Speed	1600 ± 100 rpm
Voltage	9.5 V
Stall torque test at 77°F (25°C):	
Current	530 A
Voltage	7 ± 0.3 V
Torque developed	12.58 ± .7 ft. lb. (1.74 ± 0.1 kgm)
No-load test at 77°F (25°C):	
Current	28 A or less
Voltage	12 V
Speed	5200 ± 500 rpm
Check of Mechanical Characteristics	
Brush pressure (unworn)	2.2 ± .2 lb. (1 ± 0.1 kg)
End clearance, armature shaft	.003" to .027" (0.07 to 0.70 mm)
Mica undercut depth	.019" to .027" (0.5 to 0.7 mm)
Free wheel efficiency: static torque to rotate pinion slowly	2 to 2.4 in. lb. (2.3 to 2.8 kgcm)
Solenoid	
Coil resistance at 68°F (20°C)	0.39 ± 0.02 ohm
Contact stroke	.113" to .158" (2.87 to 4.03 mm)
Core stroke	.538" to .638" (13.68 to 16.20 mm)
Lubrication	
Drive unit splines	FIAT VS+ 10 W oil (SAE 10 W)
Contact face of pinion sleeve	FIAT MR 3 grease

(Automatic Transmission, 1981 and on)

Type	BOSCH 0 - 001 - 208 - 408
Voltage	12 V
Rated output	0.95 kW
Direction of rotation, pinion side	clockwise
Number of poles	4
Field winding	series
Engagement	free-wheel
Drive	solenoid

Bench Testing Data

Running test at 77° F (25° C):	
Current	268 A
Torque developed	5.07 ft. lb. (0.7 kgm)
Speed	1560 rpm
Voltage	9.3 V
Stall torque test at 77° F (25° C):	
Current	496 A
Voltage	7.1 V
Torque developed	10.8 ft. lb. (1.5 kgm)
No-load test at 77° F (25° C):	
Current	40 ± 5 A
Voltage	11.6 V
Speed	9600 ± 500 rmp

Check of Mechanical Characteristics

End clearance, armature shaft	.0059" to .017" (0.15 to 0.45 mm)
Mica undercut depth	mica undercutting not necessary

Solenoid

Coil resistance at 68° F (20° C):	
Pull-in	0.375 ± 0.01 ohm
Hold-in	1.65 ± 0.05 ohm

Lubrication

Drive unit splines	FIAT VS+ 10 W oil (SAE 10 W)
Contact face of pinion sleeve	FIAT MR 3 grease

Alternator Specifications	
Type	MARELLI A 12 M 124/12/42 M
Rated voltage	12 V
Maximum output	770 W
(*) Cut-in speed at 12 V (68°F [20°C])	1,000 ± 50 rpm
(*) Current output at 14 V to battery at 7,000 rpm at thermal rate, equal to or more than	44 A
(*) Maximum current output	53 A approx.
Speed — continuous	13,000 rpm
Speed — peak for 15 min	15,000 rpm
Field winding resistance at 68°C (20°C): across the two slip rings	4.3 ± 0.2 ohm
Rotation, drive side	clockwise
Drive ratio, engine to alternator	1 to 1.8

Rectifier Diode Specifications	
Type — Positive diodes	4 AF 2 / E 11
Type — Negative diodes	4 AF 2 / E 12
Permanent direct current at 266°F (130°C), power diodes	25 A
Reverse voltage, equal to or more than	150 V
Maximum operating temperature	302°F (150°C)
Voltage drop with 25 A at 77°F (25°C)	1.1 V or less
Reverse current, 150 V dc, at 266°F (130°C)	2 mA or less

Checking and Setting Voltage Regulator	
Type	RC 2/12 B
Alternator speed for test and setting	5,000 rpm
Battery capacity	40 to 50 A/h
Current for temperature stabilization	7 A
Current for checking 2nd stage	2 to 12 A
Regulating voltage, 2nd stage	14.2 ± 0.3 V
Current for checking 1st stage	25 to 35 A
Regulating voltage for the 1st stage, lower than the voltage read for the 2nd stage by	0.2 to 0.7 V
Resistance between plug 15 and ground at 77° ± 18°F (25° ± 10°C)	27.7 ± 2 ohm
Resistance between plug 15 and plug 67 with contacts open	5.65 ± 0.3 ohm
Armature-to-core air gap	.059" ± .002" (1.5 ± 0.05 mm)
2nd stage contact gap	.018" ± .004" (0.45 ± 0.1 mm)

(*) Readings to be taken with properly bedded-in brushes.

Alternator Specifications	
Type	BOSCH K1 - 14 V - 55A20
Rated voltage	12 V
Maximum output	945 W
(*) Cut-in speed at 12 V (68°F [20°C])	1000 ± 50 rpm
(*) Current output at 14 V to battery at 7,000 rpm at thermal rate, equal to or more than	55 A
(*) Maximum current output	70 A approx.
Speed continuous	12,000 rpm
Speed peak for 15 min	15,000 rpm
Field winding resistance at 68°F (20°C): across the two slip rings	3.36 ± 0.3 ohm
Rotation, drive side	clockwise
Drive ratio, engine to alternator	1 to 1.8

Rectifier Diode Specifications	
Reverse voltage, equal to or more than	150 V
Maximum operating temperature	302°F (150°C)
Voltage drop with 25 A at 77°F (25°C)	1.1 V or less
Reverse current, 150 V dc, at 266°F (130°C)	2 mA or less

Voltage Regulator Specifications (Integral with Alternator)	
Regulating voltage, at 68°F (20°C) and at 30 A	13.6 to 14.1 V

ALTERNATOR
(1981 and on)

Alternator Specifications	
Type	BOSCH K1 - 14 V - 65 A 21
Rated voltage	12 V
Maximum output	1170 W
(*) Cut-in speed at 12 V (68°F [20°C])	1100 ± 50 rpm
(*) Current output at 14 V to battery at 7,000 rpm at thermal rate, equal to or more than	65 A
(*) Maximum current output	80 A approx.
Speed continuous	12,000 rpm
Speed peak for 15 min	15,000 rpm
Field winding resistance at 68°F (20°C): across the two slip rings	3.36 ± 0.3 ohm
Rotation, drive side	clockwise
Drive ratio, engine to alternator	1 to 1.8

Rectifier Diode Specifications	
Reverse voltage, equal to or more than	150 V
Maximum operating temperature	302°F (150°C)
Voltage drop with 25 A at 77°F (25°C)	1.1 V or less
Reverse current, 150 V dc, at 266°F (130°C)	2 mA or less

	FIAT Std. Part No.	SAE Standard
Bulbs		
Headlamps (high beam and low beams)	"Sealed Beam" headlamp unit 4002	
Front lamps turn signal	Norm. 1/41460/90	No. 1034 (32 cp)
Rear lamps turn signal back-up stop	Norm. 1/41469/90	No. 1073 (32 cp)
Front lamps parking Rear lamps tail license plate	Norm. 1/41459/90	No. 67 (4 cp)
Courtesy lamp	12 V - 5 W Norm. 1/08630/90	–
Gear selector indicator light (automatic transmission) "EX. GAS SENSOR" indicator	12 V - 3 W Norm. 1/41431/90	–
Ideogram illumination optical fiber light source	12 V - 5 W Norm. 1/41441/90	–
Turn signal indicator Headlight high beam indicator Battery charge indicator Insufficient oil pressure indicator Fuel reserve indicator Parking and tail lights indicator Instrument cluster lights Fasten belts indicator Vehicular hazard warning signal indicator Low brake fluid level and hand brake "ON" indicator Side marker lights Vehicular hazard warning signal switch light EGR indicator (25,000 miles)	Norm. 1/41439/90 or Norm. 1/41458/90	No. 158 (2cp)
Trunk lamp Cigar lighter housing indicator	12 V - 4 W Norm. 1/41423/90	–

Nine 8-Amp fuses and one 25 Amp fuse, contained in a box located under instrument panel to the left of steering post. Cover is of the snap-on type. Two 3 Amp fuses, one 8 Amp fuse and one 16 Amp fuse in separate holders.

Before replacing a blown fuse trace the cause and remedy accordingly.

Unprotected Circuits

Ignition, starting, ignition coil, battery charge indicator and relay (regulation section excluded), starter relay, engine fan relay winding and headlight high beam relay.

Protected Circuits

A (24 Amps)
- Electropneumatic horns
- Engine fan motor

B (8 Amps)
- Windshield wiper
- Heater fan motor
- Windshield washer pump

C (8 Amps)
- Left headlight high beam
- High beam indicator

D (8 Amps)
- Right headlight high beam

E (8 Amps)
- Right headlight low beam

F (8 Amps)
- Left headlight low beam

G (8 Amps)
- Front left parking lamp
- Parking and tail lights indicator
- Rear right tail light
- Front left/rear right side marker lamps
- License plate lamp (left)
- Cigar lighter housing indicator
- Trunk light
- Instrument cluster lights
- Ideogram illumination optical fibers light source
- Vehicular hazard warning signal switch light

H (8 Amps)
- Front right parking lamp
- Rear left tail light
- Front right/rear left side marker lamps
- License plate lamp (right)

I (8 Amps)
- Turn signal lights and indicator
- Stop lights
- Oil pressure gage and insufficient pressure indicator
- Engine water temperature gage
- Fuel gage, with reserve indicator
- Engine tachometer
- Brake system effectiveness and hand brake-ON indicator
- Back-up lights
- Fast idle electrovalve
- Fasten belts indicator and relay for buzzer
- Starter/Belt interlock electronic control unit (1975 only)
- Idle stop solenoid
- Electrovalve for diverter valve
- Relay winding of electrovalve for diverter valve
- EGR indicator relay winding
- EGR warning system (25,000 miles)
- EGR indicator (25,000 miles)

L (8 Amps)
- Voltage regulator
- Alternator field winding

In separate holder (3 Amps)
- Remove key and fasten belts buzzer
- Starter/Belt interlock electronic control unit (1975 only)

In separate holder (3 Amps)
- EGR indicator reset device (25,000 miles)

In separate holder (16 Amps)
- Cigar lighter
- Clock
- Courtesy light
- Hazard warning and indicator
- Inspection lamp receptacle

In separate holder (8 Amps)
- Fuel pump and relay

FUSES (1977 and 1978)

Eight 8-Amp, one 16-Amp and one 25-Amp fuse, contained in a box located under instrument panel to the left of steering post. Cover is of the snap-on type.

Before replacing a blown fuse trace the cause and remedy accordingly.

Unprotected Circuits

Alternator, starting motor, ignition coil, battery charge indicator and relay (regulation section excluded), starter relay, headlight high beam relay and idle stop solenoid.

Protected Circuits

A (8 Amps)
- Turn signal lamps and indicator
- Stop lamps
- Oil pressure gage and insufficient pressure indicator
- Engine water temperature gage
- Fuel gage, with reserve indicator
- Engine tachometer
- Low brake fluid level and hand brake ON indicator
- Back-up lamps
- Fast idle electrovalve
- Fasten belts indicator and relay for buzzer
- Delay circuit for fasten seat belts indicator and buzzer
- EGR cut-out electrovalve

B (8 Amps)
- Windshield wiper
- Heater fan motor
- Windshield washer pump

C (8 Amps)

F (8 Amps)
- Left headlight low beam

G (8 Amps)
- Front left parking lamp
- Parking and tail lamps indicator
- Rear right tail lamp
- Front left/rear right side marker lamps
- License plate lamp (left)
- Cigar lighter housing indicator
- Trunk light
- Instrument cluster lights
- Ideogram illumination optical fibers light source
- Vehicular hazard warning signal switch light

H (8 Amps)
- Front right parking lamp
- Rear left tail lamp
- Front right/rear left side marker lamps
- License plate lamp (right)

I (16 Amps)
- Horns
- Engine fan motor

L (25 Amps)

Nine 8-Amp and three 16-Amp fuses in a box under dash, driver's side. One 8-Amp and one 16-Amp fuse (fuel injection pump) in separate holder.

Before replacing a blown fuse trace the cause and remedy accordingly.

Unprotected Circuits

Alternator, ignition, starting, battery charge indicator, idle stop solenoid (carburetor), gulp valve electrovalve (carburetor), starting motor relay coil (automatic transmission), power windows relay coil (where fitted), fuel injection system.

Protected Circuits

A (8 Amps)
Turn signal lamps and indicator
Stop lamps
Oil pressure gage and insufficient pressure indicator
Engine coolant temperature gage
Fuel gage, with reserve indicator
Engine tachometer
Low brake fluid level and hand brake ON indicator
Back-up lamps
Fast idle electrovalve
Fasten belts indicator and relay for buzzer
Delay circuit for fasten seat belts indicator and buzzer
Selected gear indicator light (automatic transmission)
30,000 miles pick-up and indicator (fuel injection)

B (8 Amps)
Windshield wiper
Heater fan motor
Windshield washer pump
Windshield wiper sweep rate rheostat

C (8 Amps)
Left headlight high beams
High beam indicator

D (8 Amps)
Right headlight high beams

E (8 Amps)
Left headlight low beam

F (8 Amps)
Right headlight low beam

G (8 Amps)
Front right parking lamp
Rear left tail lamp
Front right/rear left side marker lamps
License plate lamp (right)

H (8 Amp)
Front left parking lamp
Parking and tail lamps indicator
Rear right tail lamp
Front left/rear right side marker lamps
License plate lamp (left)
Cigar lighter housing indicator
Trunk light
Instrument cluster lights
Ideogram illumination optical fibers light source
Vehicular hazard warning signal switch light

I (25 Amps)
Quartz crystal clock
Courtesy light
Hazard warning flasher and indicator
Inspection lamp receptacle
Remove key and fasten belts buzzer

L (16 Amps)
Horns
Engine fan motor

M (16 Amps)
Power window motor (Left - if fitted)

N (16 Amps)
Power window motor (Right - if fitted)

In separate holder (8 Amps)
Cigar lighter

In separate holder (16 Amps)
Fuel pump - supplementary air valve (fuel injection)

FUSES (1983 and ON)

Nine 8-Amp and three 16-Amp fuses in a box under dash, drivers side. One 8-Amp and one 16-Amp fuse (fuel injection pump) in separate holder.

Before replacing a blown fuse trace the cause and remedy accordingly.

Unprotected Circuits

Alternator, ignition, starting, battery charge indicator, fuel injection system (except fuel pump), low beam relay, power window relay coil.

Protected Circuits

A (16 Amps)
Left and right power window motors

B (8 Amps)
Cigarette lighter
Trunk opener solenoid

C (8 Amps)
Left headlight high beam
High beam indicator

D (8 Amps)
Right headlight high beam

E (8 Amps)
Left headlight low beam

F (8 Amps)
Right headlight low beam

G (8 Amps)
Front right/rear left side marker lights
Front right parking light
Rear left tail light
License plate light (left)

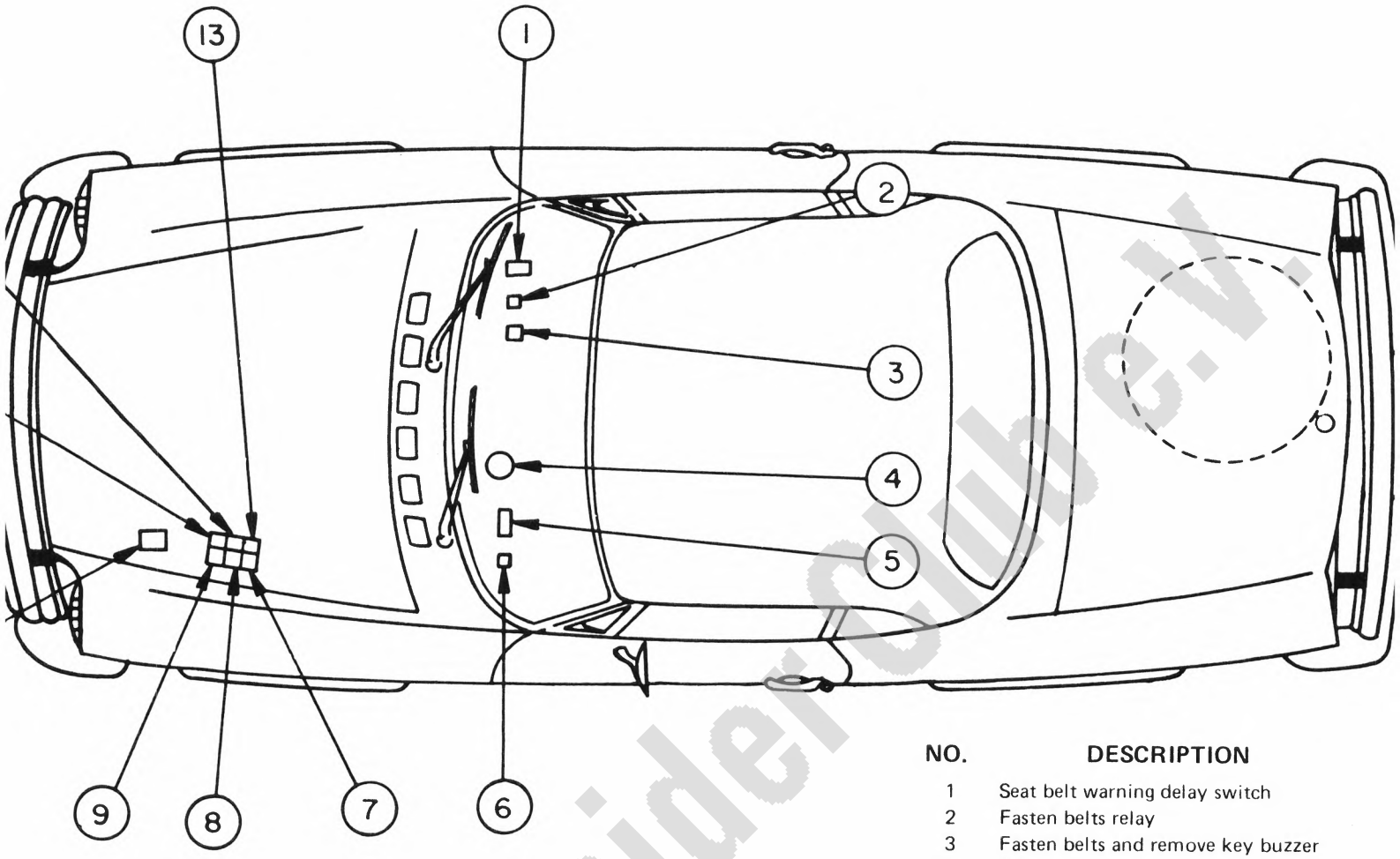
H (8 Amps)
Front left parking light
Rear right tail light

I (8 Amps)
Remove key/fasten belts chime
Digital clock
Courtesy light
Inspection lamp receptacle
Hazard warning indicator

L (16 Amps)
Engine radiator fan motor
Horns

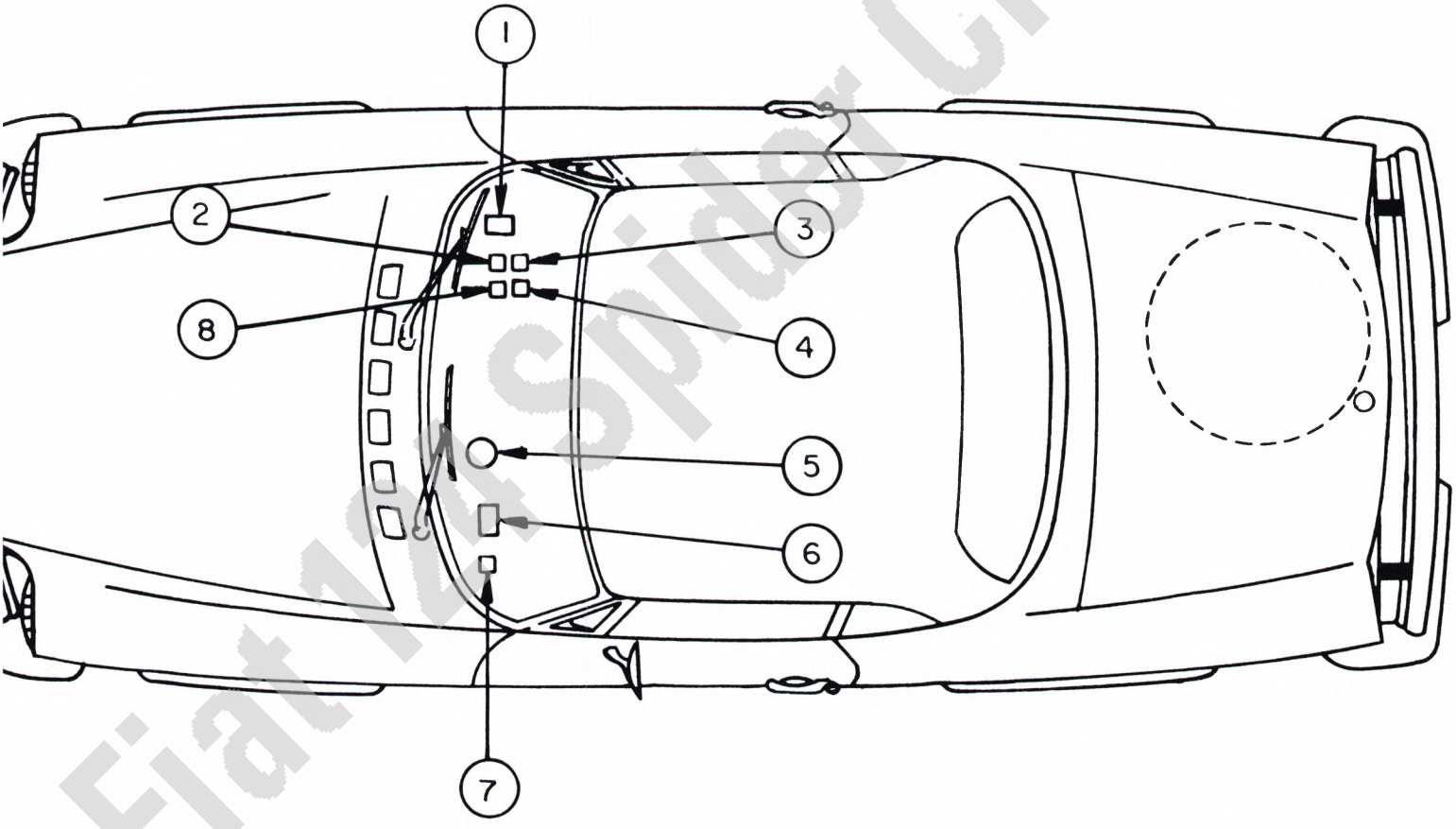
M (8 Amps)
Windshield washer pump
Windshield wiper motor
Windshield wiper interrupter
Radio
Digital clock light
Heater fan motor
Turn signal and indicator
Lambda sensor switch unit and indicator

N (8 Amps)
Fasten belt relay and circuit
Selected gear indicator (automatic transmission)
Tachometer
Insufficient oil pressure indicator
Back up lights



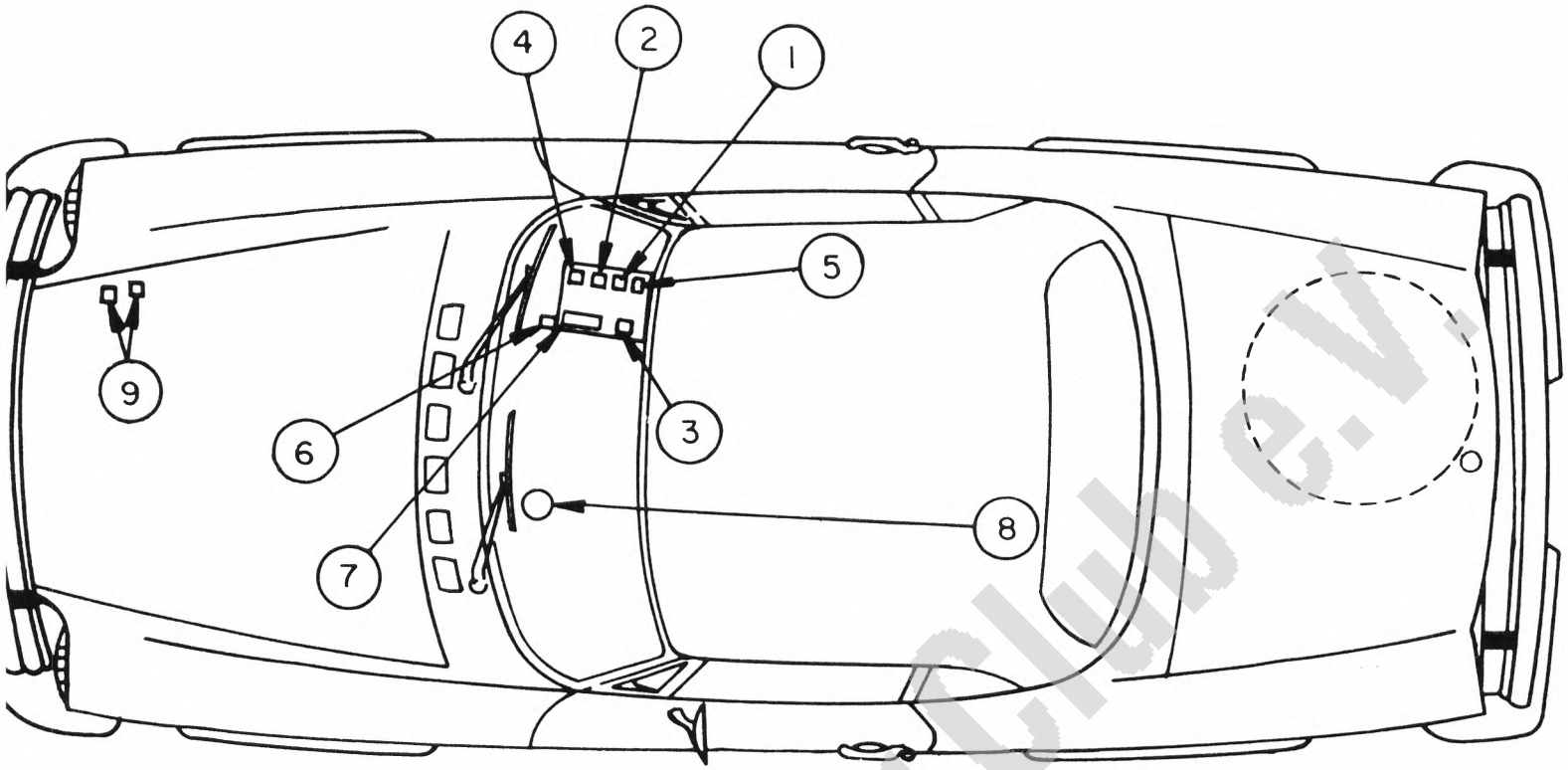
NO.	DESCRIPTION
1	Seat belt warning delay switch
2	Fasten belts relay
3	Fasten belts and remove key buzzer
4	Turn signal flasher
5	Windshield wiper intermittent switch
6	Hazard warning flasher
7	Battery charge relay
8	Fuel/pump relay
9	Ignition mode relay
10	Voltage regulator
11	Diverter valve by-pass relay
12	Engine fan relay
13	Horn relay

RELAY LOCATION 1975 & 1976



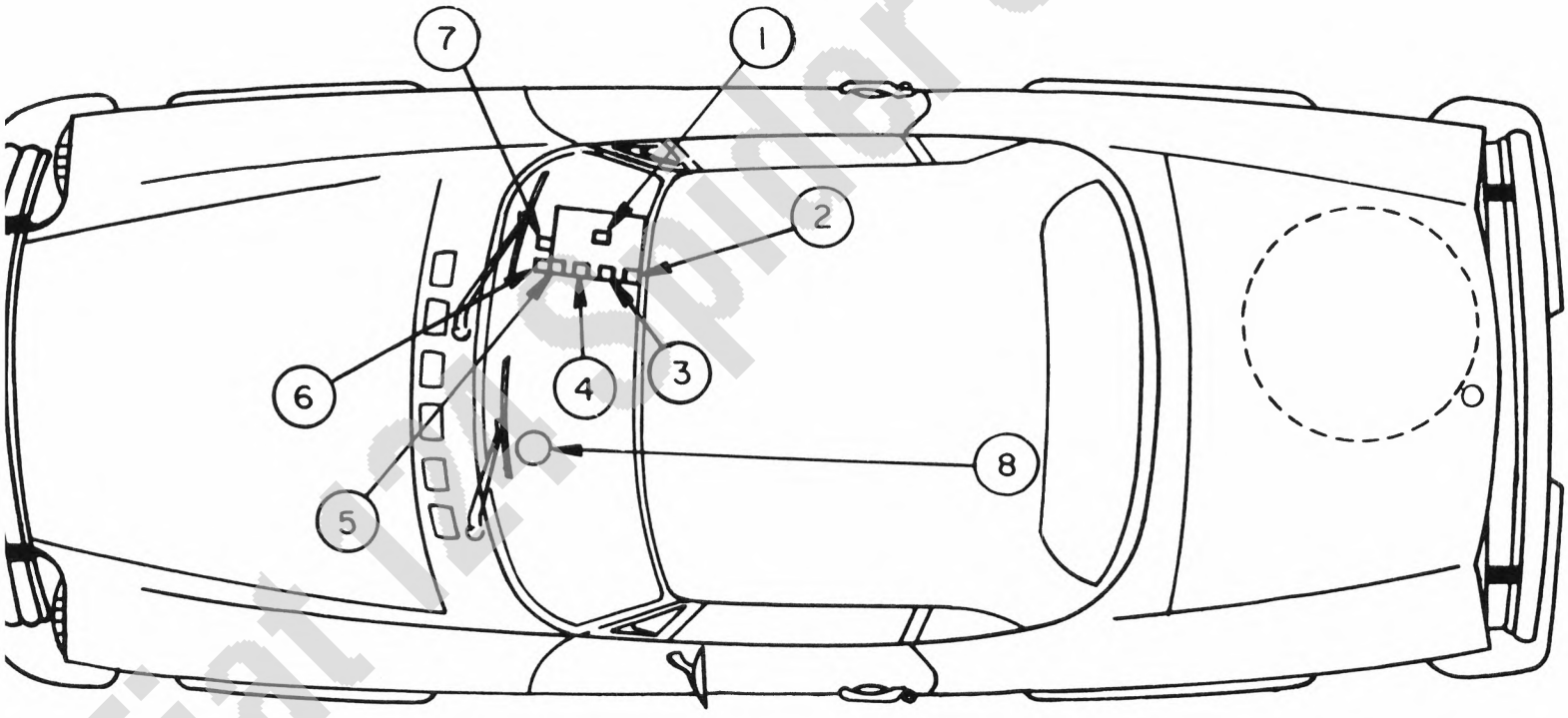
NO.	DESCRIPTION
1	Seat belt warning delay switch
2	Fasten belts relay
3	Ignition mode relay
4	Diverter valve by-pass relay (Calif. only)
5	Turn signal flasher
6	Windshield wiper intermittent switch
7	Hazard warning flasher
8	Horn relay

RELAY LOCATION 1977



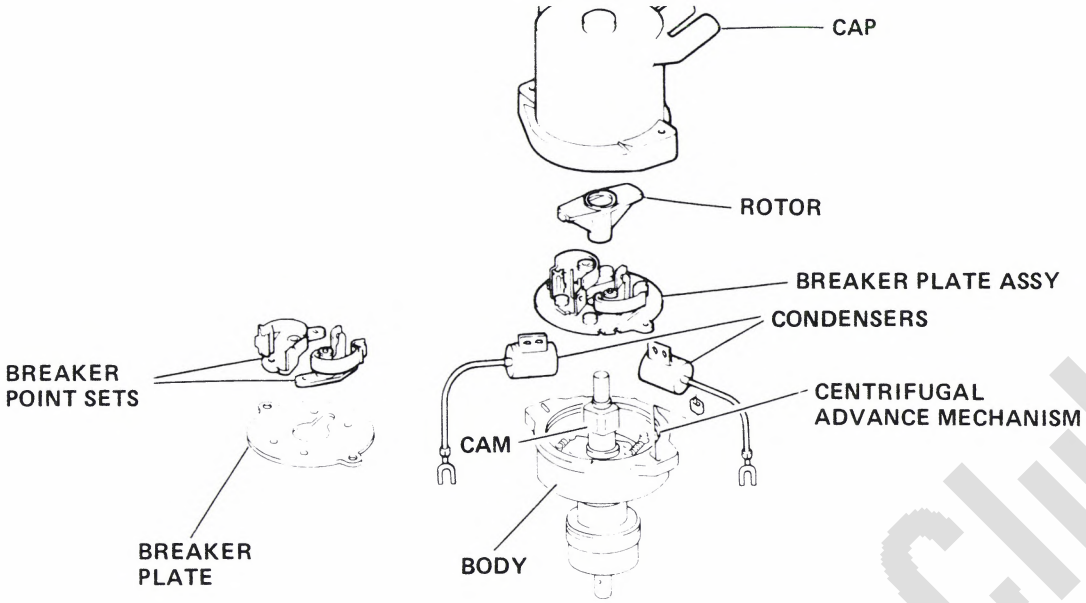
NO.	DESCRIPTION
1	Seat belt warning delay switch
2	Fasten belts relay
3	Automatic transmission starter relay
4	Horn relay
5	Power windows relay
6	Windshield wiper intermittent switch
7	Fuel injection relay set
8	Turn signal and hazard warning flasher
9	Air conditioning relays

RELAY LOCATION 1979, 1980 & 1981

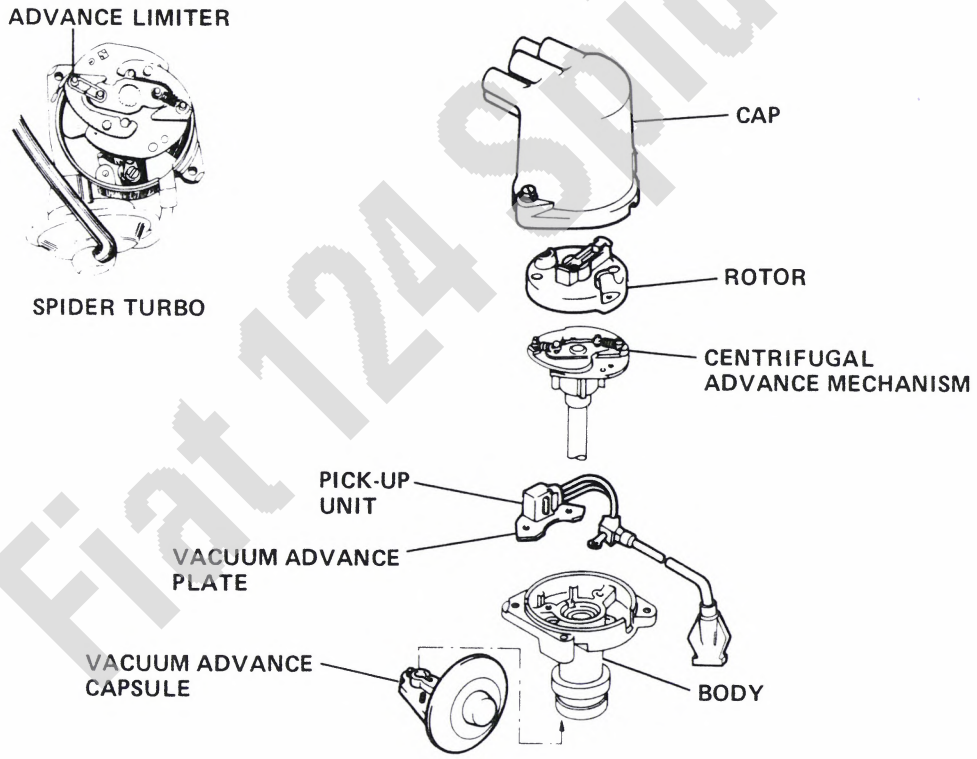


NO.	DESCRIPTION
1	Seat belt warning delay switch
2	Fasten belts relay
3	Ignition mode relay
4	Horn relay
5	Diverter valve by-pass relay (Calif. only)
6	Windshield wiper intermittent switch
7	Hazard warning flasher
8	Turn signal flasher

RELAY LOCATION 1978



BATTERY IGNITION DISTRIBUTOR (to 1978)



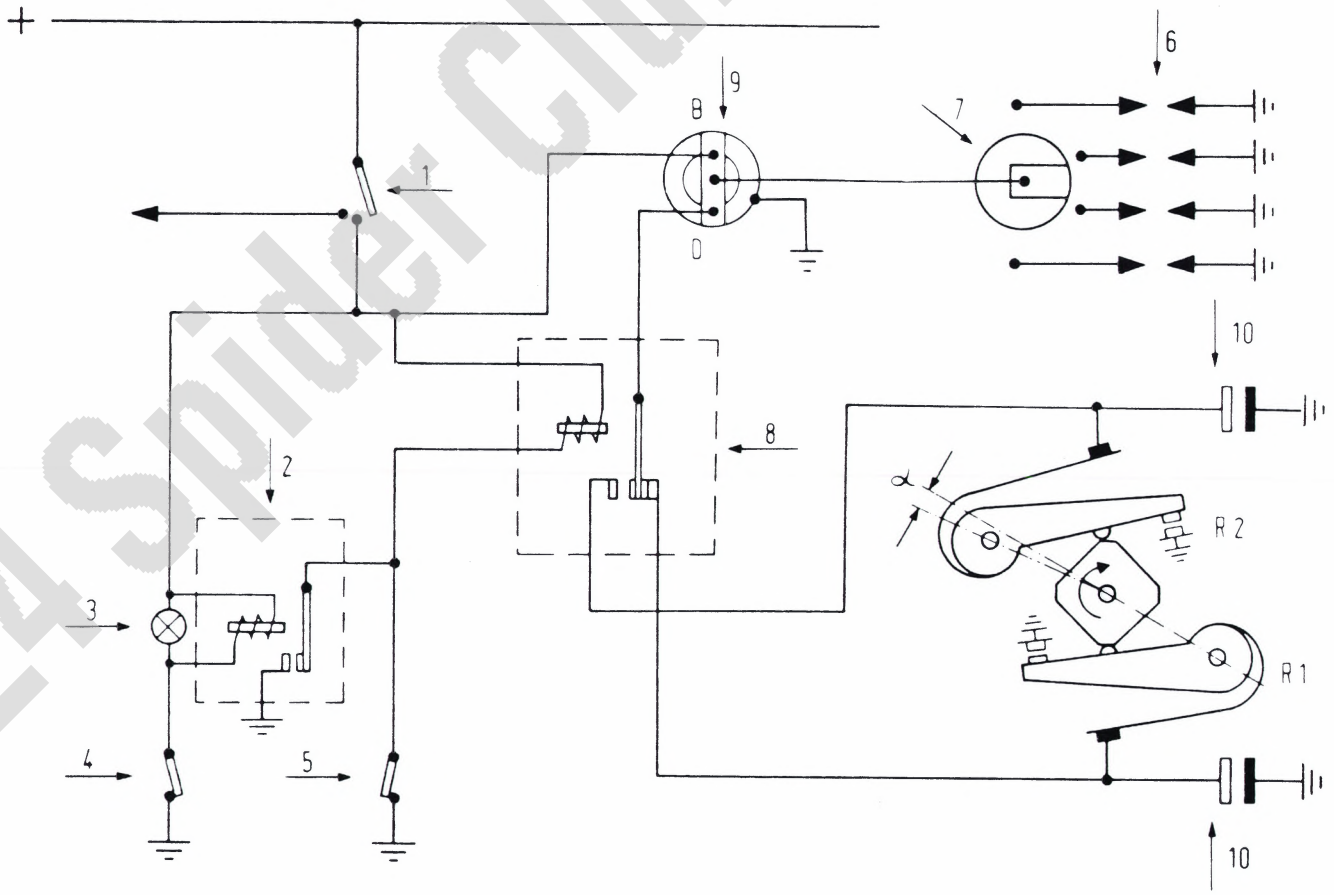
DESCRIPTION

The ignition system used up to 1978 is the standard battery ignition type, except that it uses two sets of breaker points. The auxiliary set provides an additional 10° of timing advance and is used for starting and running until engine reaches about 60°F (15°C), at which point ignition is switched over to the normal running points. This arrangement allows for compliance to emissions standards while providing for good operation during starting and cold running.

For cold starting and running, the system operates as follows:

With ignition switch (1) on, and temperature below 40°F (5°C), current flows through change-over relay (8), engine thermoswitch (5), start relay (2), oil pressure indicator (3) and oil pressure switch (4). With current through change-over relay, ignition system operates on auxiliary points R2. Oil pressure opens switch (4) shutting off start relay, but current is still provided to change-over relay through thermoswitch. System operates on auxiliary points until engine warms up and opens thermoswitch, at which point change-over relay is de-activated and ignition is switched to running points R1.

During starting when engine is warm, ignition is provided by auxiliary points R2 until oil pressure opens switch (4). Start relay and change-over relay are then de-activated and ignition is switched to running points R1.

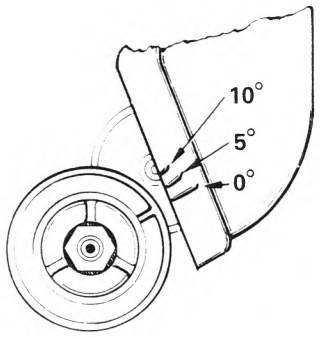


1. Ignition switch
2. Start relay
3. Oil pressure indicator
4. Oil pressure switch
5. Engine thermoswitch
6. Spark plugs
8. Change-over relay
9. Spark coil
10. Capacitor

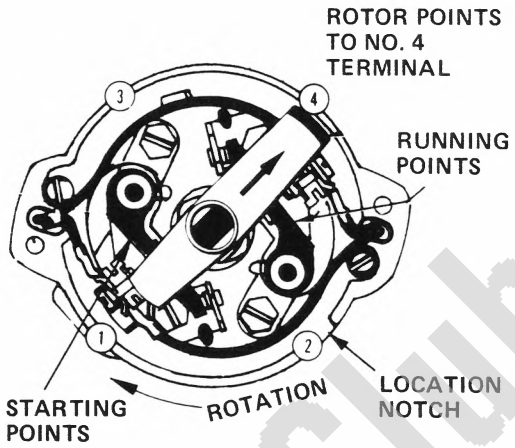
R_1. Running breaker points
R_2. Auxiliary breaker points
α = 10° engine

Position crank pulley notch to index with 0° mark on cover. Remove two screws securing distributor cap to body. Rotor will be positioned at No. 1 or No. 4 terminal as shown.

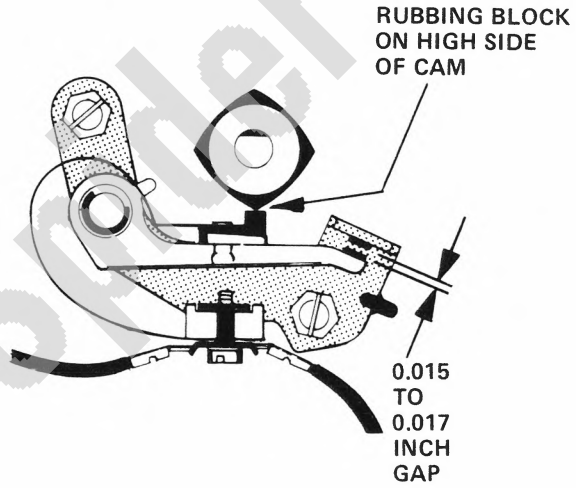
ENGINE POSITION



DISTRIBUTOR POSITION

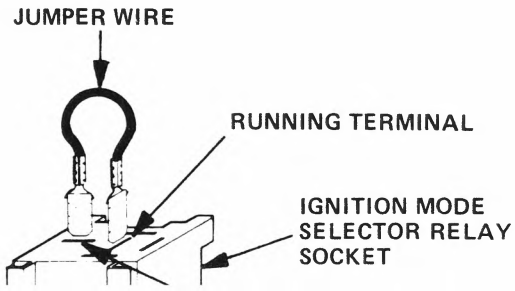


Loosen nut holding distributor body to engine. Turn body until one point set is at maximum opening. Adjust point gap at .015 to .017 in. Repeat with other point set. Then turn distributor body until running points just start to open. Tighten distributor hold-down nut.



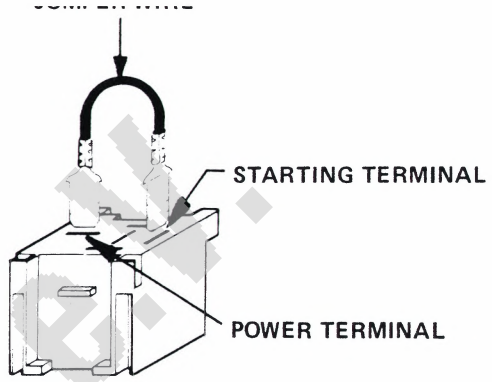
Locate ignition change-over relay (refer to Relay Location Charts). Remove relay.

Connect jumper wire between POWER and RUNNING on plastic base as shown. Connect dwellmeter to running points (green distributor lead). Crank engine. Adjust points to 55° dwell.



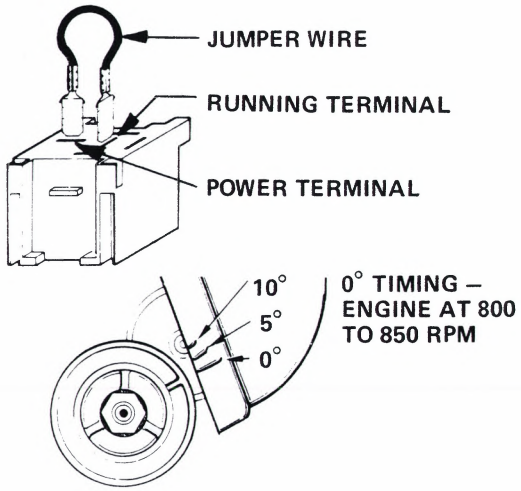
STARTING as shown.

Connect dwellmeter to starting points (green/black lead). Crank engine. Adjust points to 55° dwell.



Move jumper wire back to RUNNING as shown. Install rotor and cap. Connect timing light. Start engine and warm it up.

Check ignition timing at idle (850 rpm). Rotate distributor as necessary to obtain 0° (TDC) reading. Tighten distributor hold-down nut.



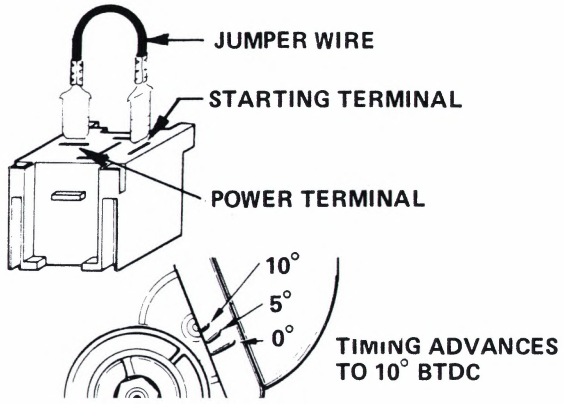
Temporarily reconnect jumper to STARTING as shown. Check that ignition advances to 10°. If not, adjust amount of advance by changing dwell angle of starting points, do not move distributor.

If less than 10°, increase gap to decrease dwell.

If more than 10°, decrease gap to increase dwell.

Remove jumper wire and install relay.

Check maximum centrifugal advance with timing light (36 + 2° at 3600 rpm = about 2 in. on pulley). Disconnect equipment.



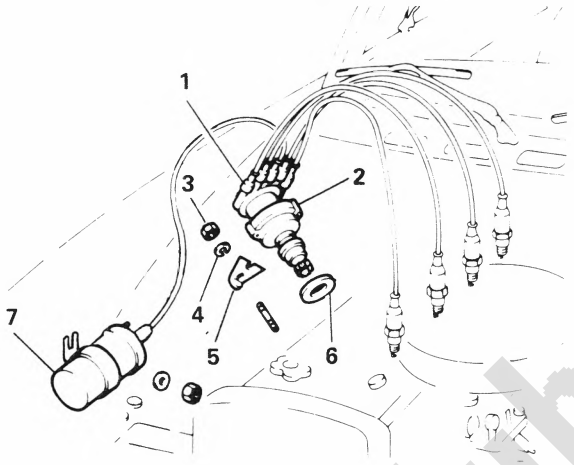
REMOVAL AND INSTALLATION

Remove two screws securing distributor cap (1) to body (2). Place cap to one side.

Crank engine until crankshaft pulley timing mark indexes with timing pointer.

Noting rotor position for installation, remove nut (3), washer (4) and clamp (5). Remove distributor and gasket (6).

1. Cap 2. Body 3. Nut 4. Washer 5. Clamp 6. Gasket
7. Ignition coil



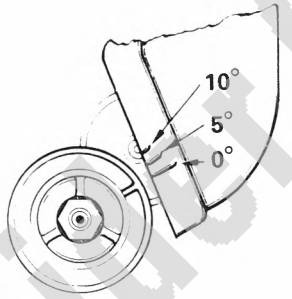
Installation is reverse of removal. Before installing distributor, place rotor in same position as was noted during removal.

Set timing as described in this section.

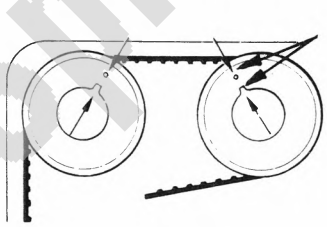
If engine was cranked over during distributor removal, resetting timing of engine and distributor will have to be performed as follows:

Position crank pulley notch to index with 0° mark on cover.

Check that camshaft pulley marks are aligned with indicators on cam housings, if not, rotate crank pulley one full turn to 0° mark (cams turn at ½ crank speed).

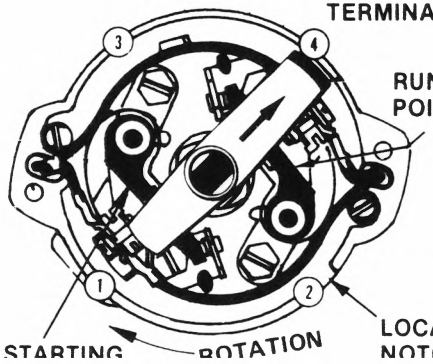


PULLEY TIMING MARK IS AT 0° (TDC)



ALIGN CAMSHAFT TIMING MARKS WITH CAM HOUSING MARKS

Place distributor into engine so that with it fully seated, rotor lines up with No. 4 terminal as shown. Set timing as described in this section.



Remove two screws securing cap to body.

Remove rotor by pulling it off of shaft.

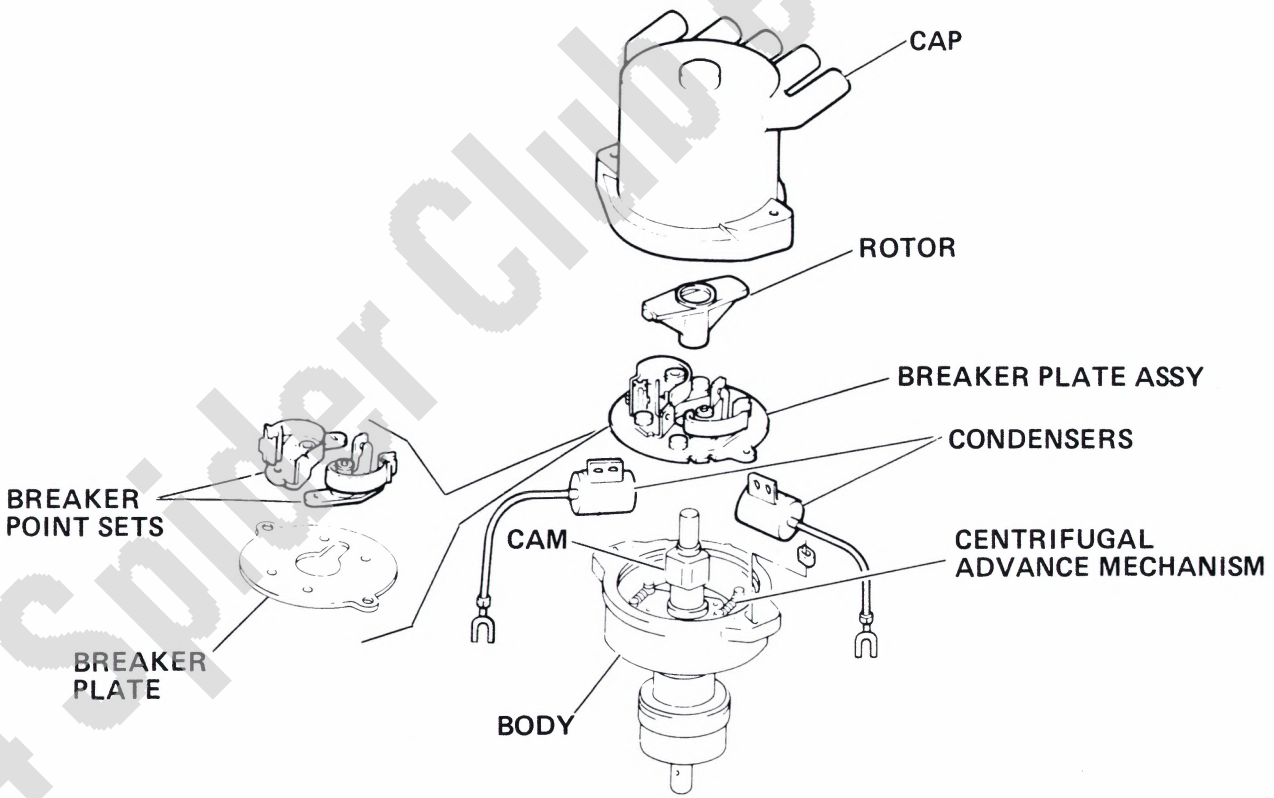
Remove terminal screws at breaker point sets to remove wires. Note where terminal wires are connected.

Remove four screws securing breaker point sets. Remove two screws holding breaker plate to body.

Remove screw holding both condensers to body.

Remove circlip fixing cam and centrifugal advance mechanism to shaft.

Reassembly is reverse of disassembly. Apply a small amount of grease to moving parts of centrifugal advance mechanism. Apply a very light coat of grease to cam surface.



INSPECTION

Check distributor cap for cracks, breaks, or corroded terminals. For light corrosion, clean terminals, otherwise replace.

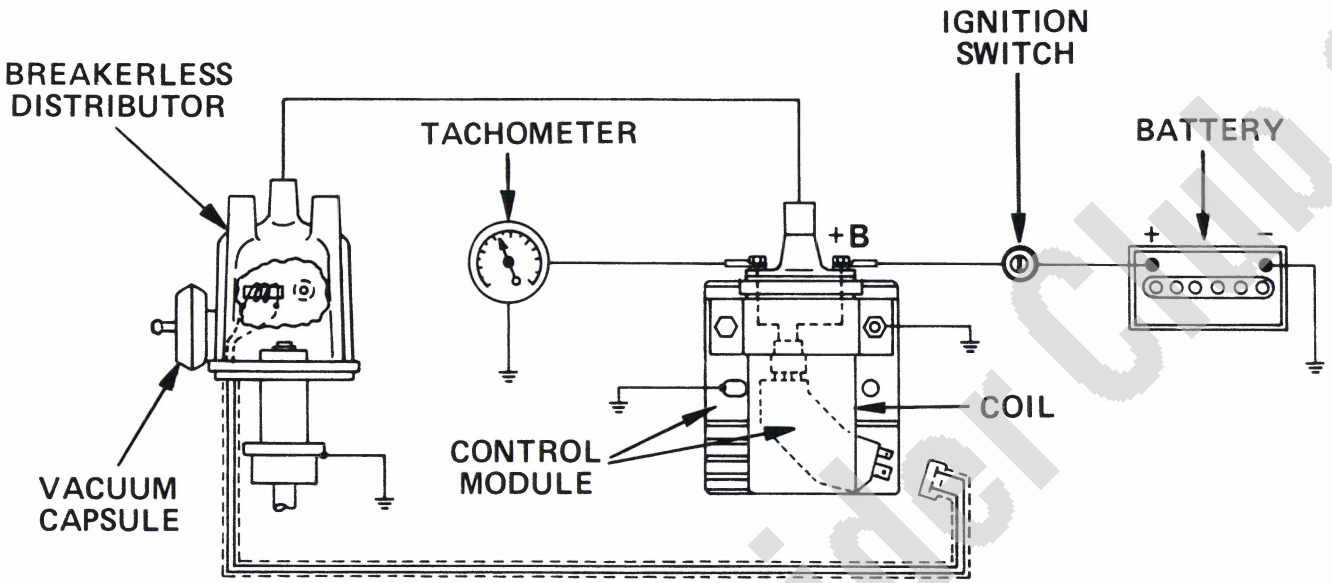
Check rotor for cracks, breaks, or corrosion.

Check body for worn or sticky shaft.

Check breaker points for pitting or corrosion.

DESCRIPTION

The ignition system used for 1979 and on is an electronic ignition type. The system consists of an ignition coil, an electronic control module on a cast support, and a breakerless distributor. Primary voltage is applied to coil from battery through the ignition switch. This voltage is regulated by the control module to supply a regulated current to primary windings of ignition coil. The control module is triggered by an impulse generated in the distributor. This turns coil primary circuit on and off. Each time primary circuit is broken, a high voltage is induced in coil secondary windings. This is distributed to spark plugs through distributor rotor and cap in conventional manner.



SERVICE

Before performing any service, observe the following:

Do Not

- Energize ignition unless coil support base is properly grounded.
- Crank engine with high voltage wire disconnected from coil.
- Disconnect high voltage wire from coil when engine is running.
- Start or crank engine when instrument panel is disconnected.
- Ground primary circuit or use diagnostic equipment to ground primary circuit.
- Test for current or voltage by flashing terminals with each other or to ground.
- Disconnect battery cables when engine is running. The electronic voltage regulator will be damaged.

Do

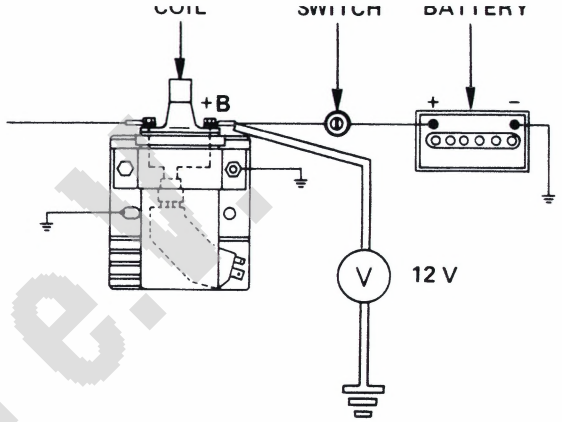
- When required, distributor pick-up assembly may be disconnected when engine is running, or when cranking for compressior testing.

Primary Input Check

Connect voltmeter from coil +B terminal to ground.

With ignition switch on, check for 12 (battery) volts.

If not, check for faulty battery, ignition switch, wiring, or connections.



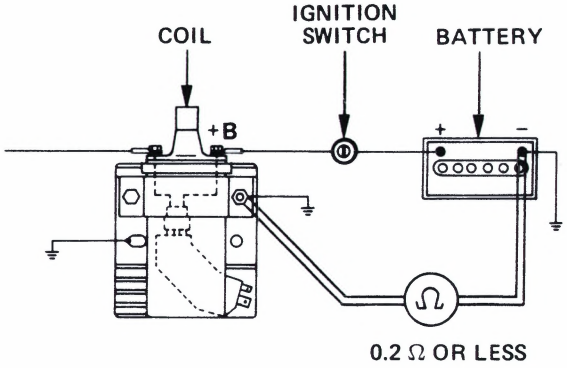
Ground Check

With ignition switch off, connect ohmmeter from coil ground stud to battery ground (–) terminal.

Check for less than 0.2 ohms.

If not, check support, mounting, and battery ground connections.

Also check that control module casing is clean, and that mounting hardware is clean and tight.



Coil Resistance Check

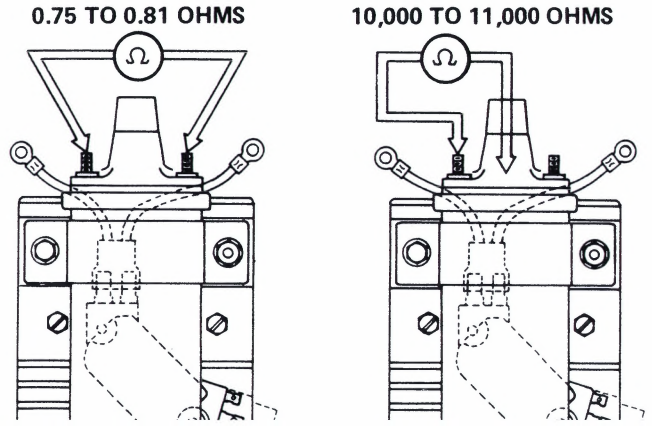
Disconnect primary leads from coil, then connect ohmmeter to coil.

Check for 0.75 to 0.81 ohms.

Reconnect one ohmmeter lead to coil high voltage terminal.

Check for 10K to 11K ohms.

Replace coil if not within specifications.



Connect ohmmeter to pick-up assembly connector.

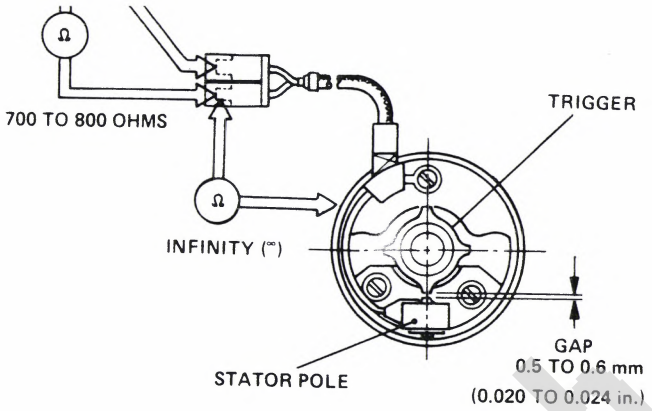
Check for 700 to 800 ohms.

Reconnect one ohmmeter lead to distributor body.

Check for infinity ohms.

Replace pick-up assembly if not within specification.

Using a nonmagnetic feeler gauge, check gap between stator pole and trigger. Adjust as required.



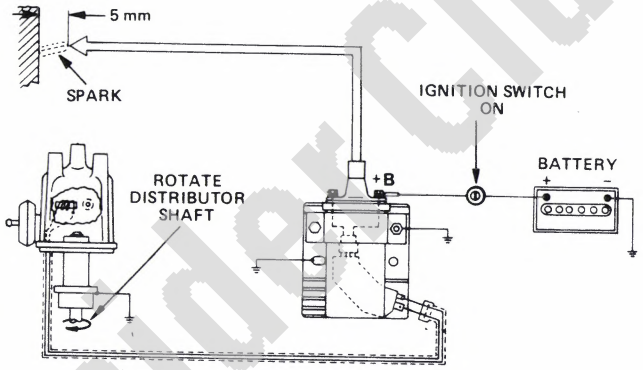
Control Module Check

Reconnect primary leads to coil, and pick-up assembly to control module.

Disconnect high voltage wire from distributor. Do not disconnect from coil.

While holding (use insulated holder) high voltage wire about 5 mm from ground, crank engine and check for spark.

Replace control module if no spark appears.



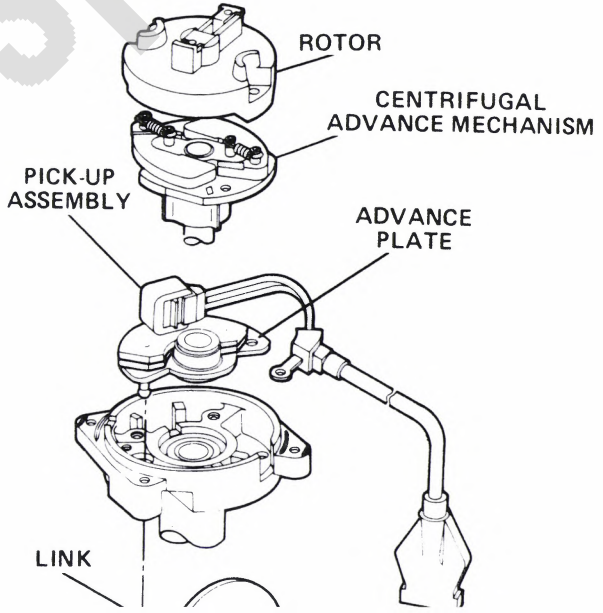
System Parts Check

Check all parts for cracks, wear, or breaks that may affect system operation.

Check cap for corroded terminals.

Clean or replace cap as required.

Using an ohmmeter, check rotor for 4K to 6K ohms. Replace if not within specifications.



REMOVAL AND INSTALLATION

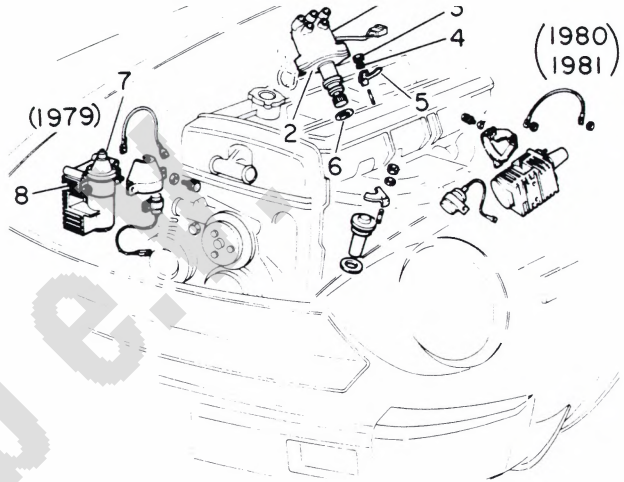
NOTE: The ignition distributor used on vehicles with turbocharger is not interchangeable with non-turbocharger distributor.

Disconnect pick-up assembly ignition connector at control module.

Disconnect vacuum line at vacuum capsule. Remove two screws securing distributor cap (1) to body (2). Place cap to one side.

Crank engine until crankshaft pulley timing mark indexes with timing pointer.

Noting rotor position for installation, remove nut (3), washer (4) and clamp (5). Remove distributor and gasket (6).



1. Cap 2. Body 3. Nut 4. Washer 5. Clamp 6. Gasket
7. Ignition coil 8. Control module

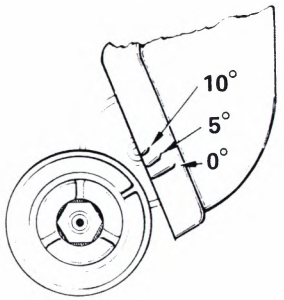
Installation is reverse of removal. Before installing distributor, place rotor in same position as was noted during removal.

Set timing with a timing light.

If engine was cranked over during distributor removal, resetting timing of engine and distributor will have to be performed as follows:

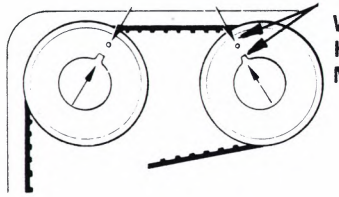
Position crank pulley notch to index with 0° mark on cover.

Check that camshaft pulley marks are aligned with indicators on cam housings, if not, rotate crank pulley one full turn to 0° mark (cams turn at ½ crank speed).



PULLEY TIMING MARK IS AT 0° (TDC)

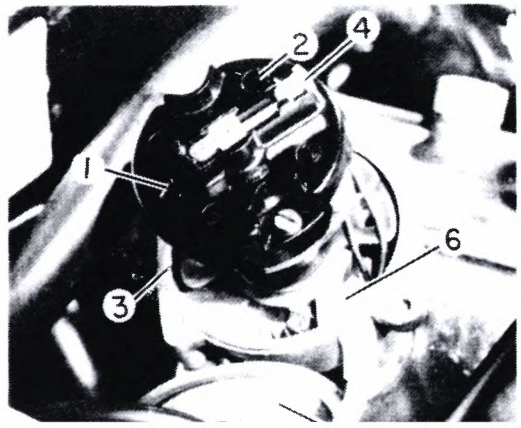
ALIGN CAMSHAFT TIMING MARKS WITH CAM HOUSING MARKS



Place distributor into engine so that with it fully seated, pointer (1) which is molded into rotor (2), points to notch (3) on distributor body. Rotor metal contactor (4) will be pointing to No. 4 terminal.

Set timing at 10° BTDC with timing light.

Tighten distributor hold-down nut.



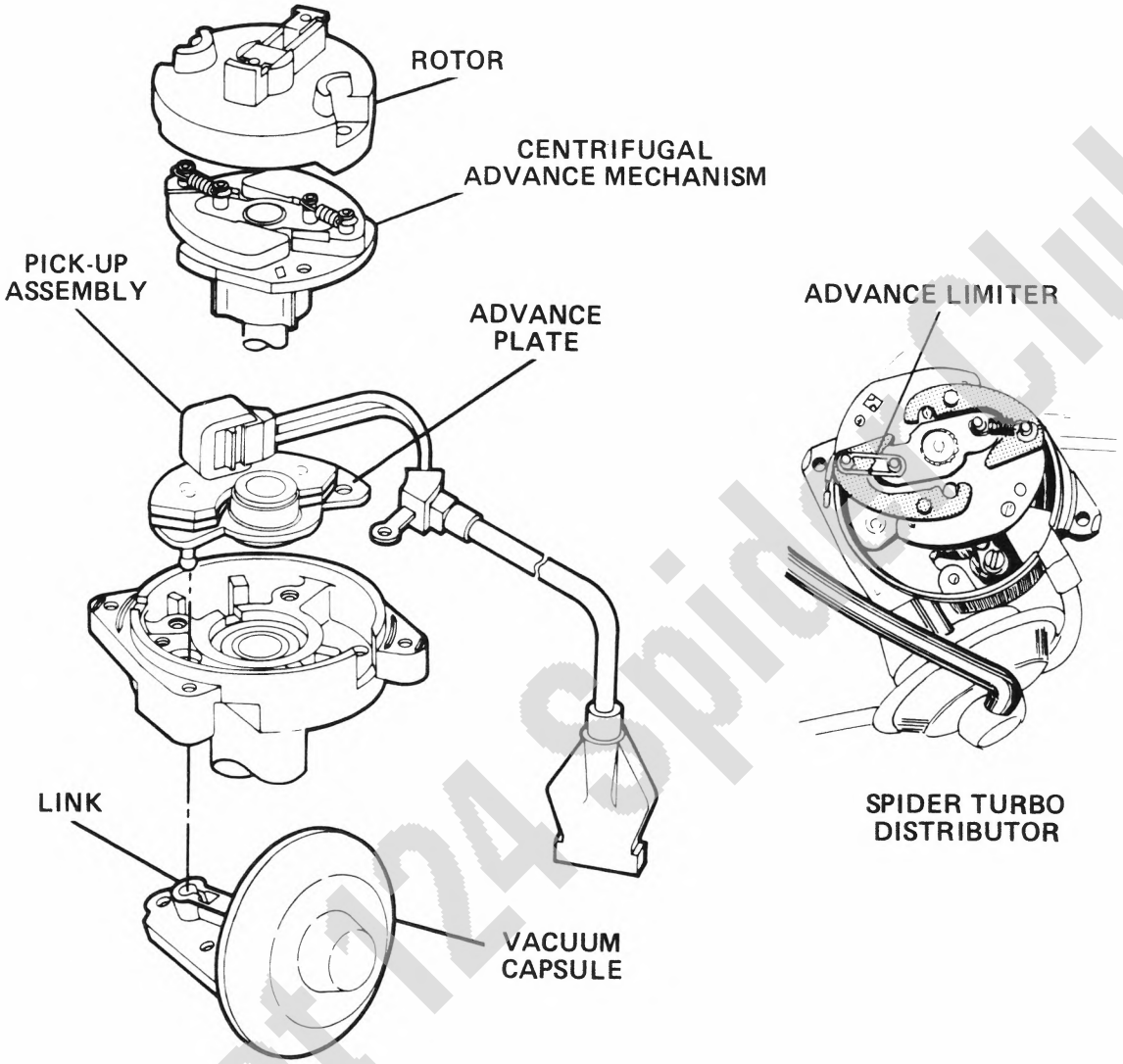
1. Rotor pointer 2. Rotor 3. Notch 4. Metal contactor
5. Vacuum capsule 6. Pick-up assembly

Remove two screws holding rotor to advance mechanism.

Remove screw holding pick-up assembly to body.

Remove three screws holding vacuum capsule to body and disconnect link from advance plate.

Reassembly is reverse of disassembly.



SPIDER TURBO DISTRIBUTOR

INSPECTION

Check distributor cap for cracks, breaks, or corroded terminals. For light corrosion, clean terminals, otherwise replace.

Check rotor for cracks, breaks, or corrosion.

Check pick-up assembly for damaged parts.

Check vacuum capsule for leakage.

Disconnect battery ground lead located in trunk.

Remove five screws securing upper and lower steering shaft covers (1) together.

Disconnect two electrical connectors (4) from ignition switch (3).

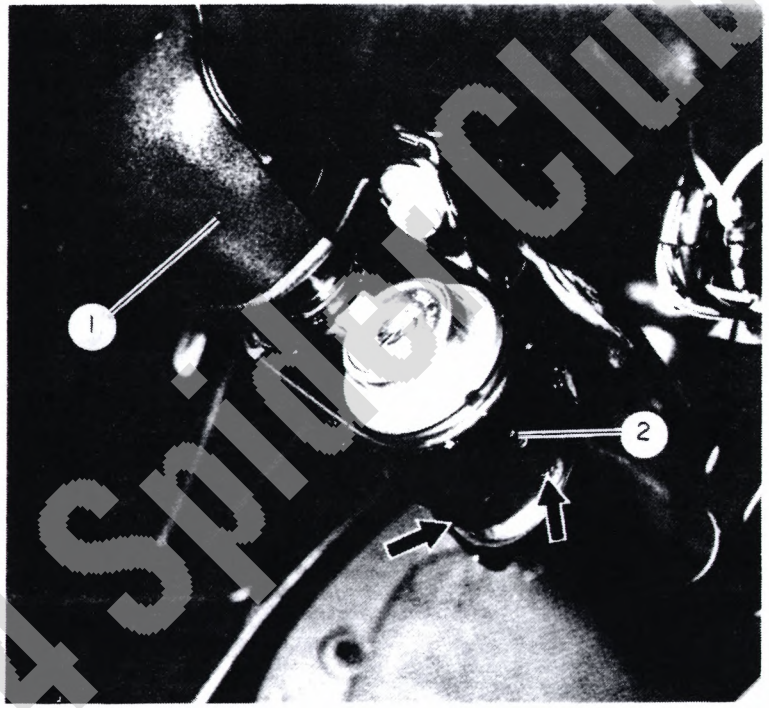
Remove two set screws at base of switch (arrows).

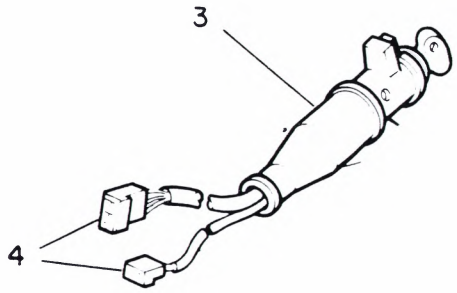
Place ignition key into switch and turn it to arrow mark on switch face.

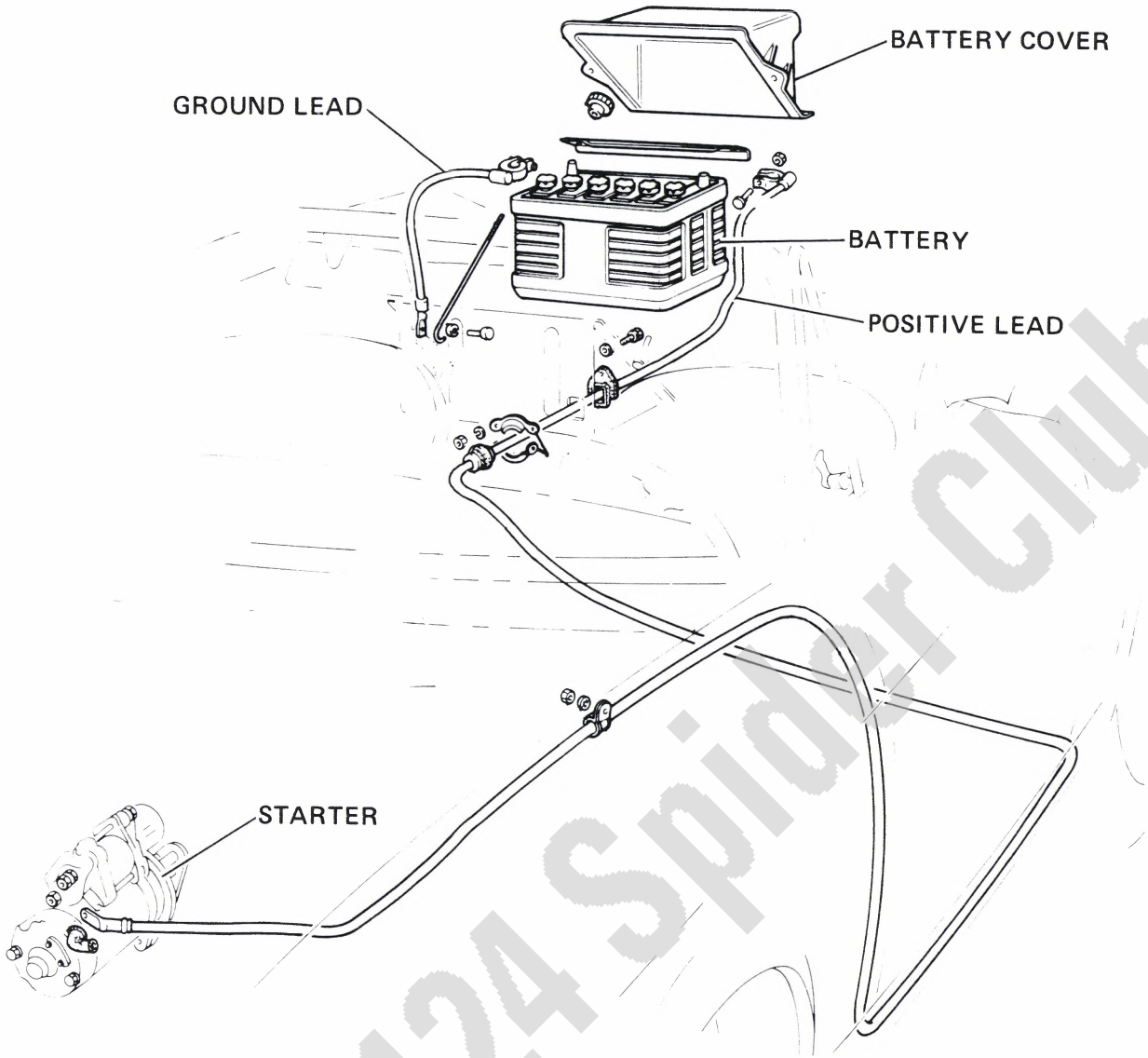
Insert a thin bladed screwdriver or similar tool into opening (2) on right side of switch and push in to unlock. Pull switch assembly out.

Installation is reverse of removal.

1. Steering shaft cover 2. Unlock opening 3. Ignition switch 4. Electrical connectors







STARTER AND BATTERY PLACEMENT

REMOVAL AND INSTALLATION

Disconnect battery ground lead in trunk.

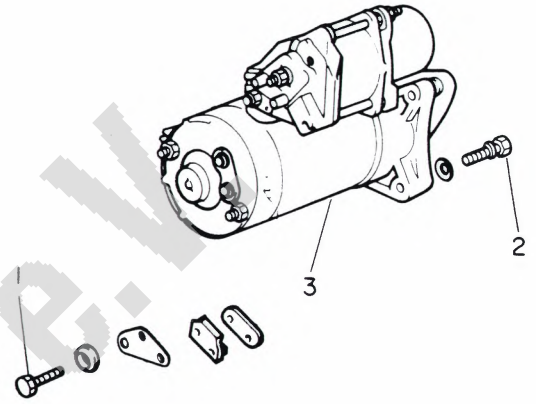
From engine compartment, disconnect electrical leads from starter solenoid. Remove bolt (1) attaching front of starter to engine mount.

Raise vehicle on lift. Disconnect clutch cable and place to one side. Turn road wheels to right to position steering linkage for clearance during removal. Remove three bolts (2) attaching starter (3) to bell housing.

NOTE: Access to top bolt is best accomplished with a long socket extension and U-joint.

Remove starter.

Installation is reverse of removal.



1. Bolt 2. Bolt 3. Starter

DISASSEMBLY AND REASSEMBLY (MARELLI)

Remove nut (16) and washers holding terminal and disconnect terminal from solenoid (1). Remove three bolts (17) securing solenoid to housing.

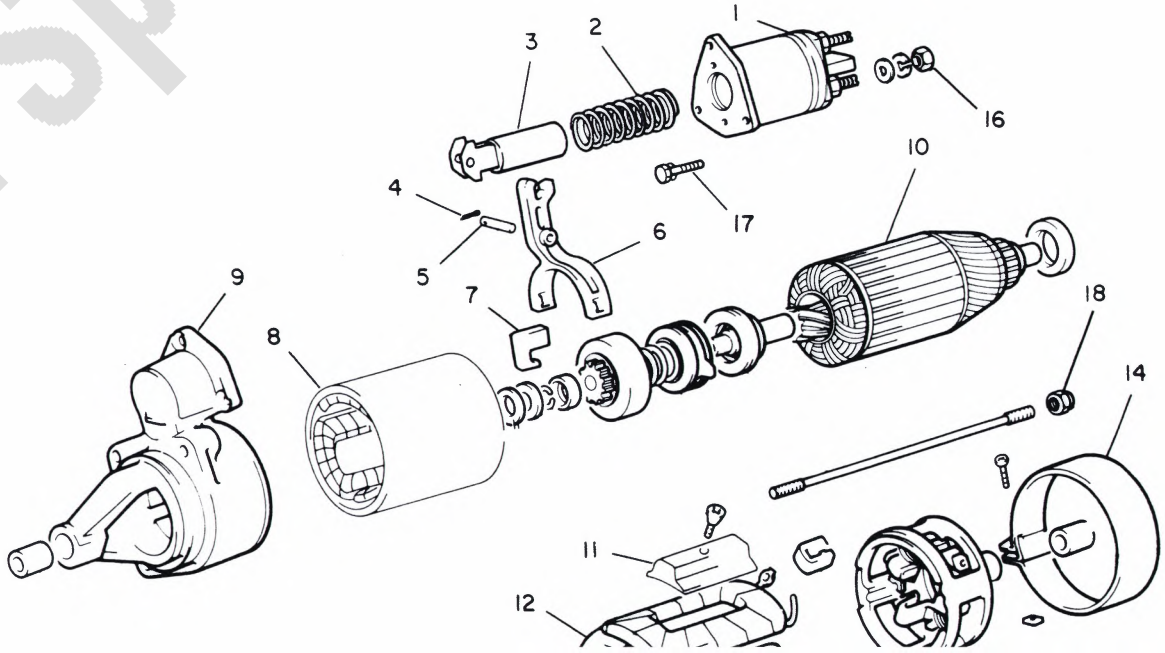
Loosen screw on end frame cover (14) and slide cover off. Remove three screws holding brushes (15) and three field coil leads. Remove two nuts (18) holding commutator end frame (13) and separate frame from field coil housing (8).

Separate field coil housing from drive end frame (9). Remove rubber insert (7) from drive end frame. Remove cotter pin (4) on shift fork pivot pin (5). Drive out pivot pin. Withdraw armature (10) from frame.

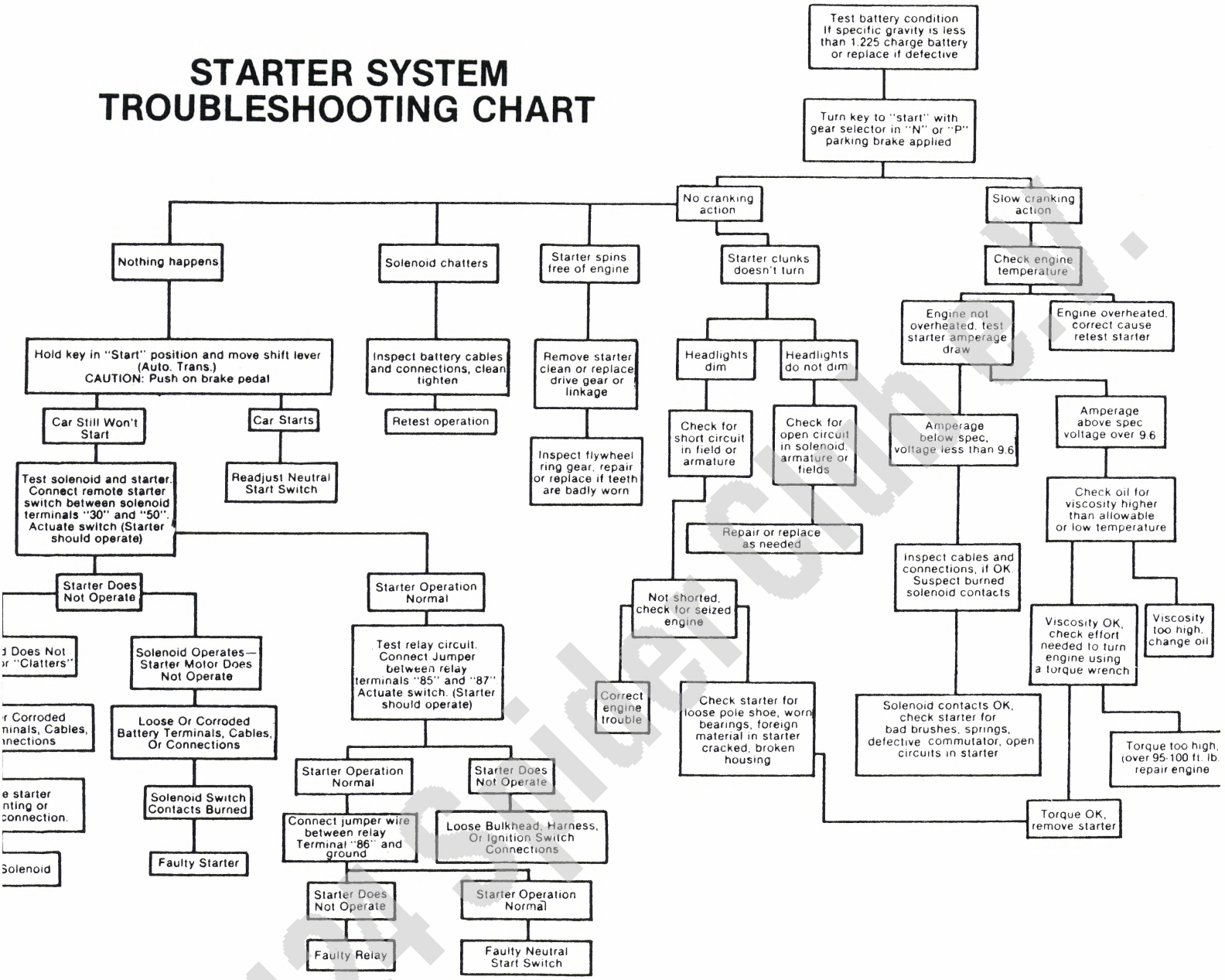
To remove field coil assembly (12), remove four screws and stator cores (11). Carefully slide coil assembly from housing.

Assemble in reverse order of disassembly. If a new coil is installed, preheat to about 120°F (49°C). This will aid fitting in housing.

1. Solenoid 2. Return spring 3. Plunger 4. Cotter pin 5. Pivot pin 6. Shift fork 7. Rubber insert 8. Field coil housing 9. Drive end frame 10. Armature 11. Stator core 12. Field coil 13. Commutator end frame 14. Frame cover 15. Brush assembly 16. Nut 17. Bolt 18. Nut



STARTER SYSTEM TROUBLESHOOTING CHART



STARTER SYSTEM TROUBLESHOOTING CHART

Marelli (44A) with external regulator – On 1975 and 1976.

Bosch (55A) with integral regulator – On 1977 to 1980.

Bosch (65A) with integral regulator – On 1981 and on.

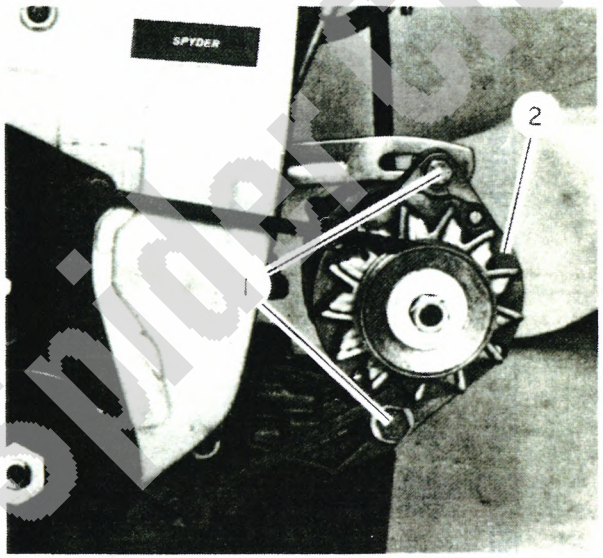
REMOVAL AND INSTALLATION (All)

Disconnect battery ground cable. Mark to identify, then disconnect electrical leads. Remove two nuts and bolts (1) and remove alternator (2).

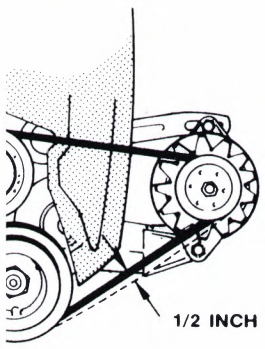
Installation is reverse of removal.

Adjust belt tension.

1. Bolt 2. Alternator

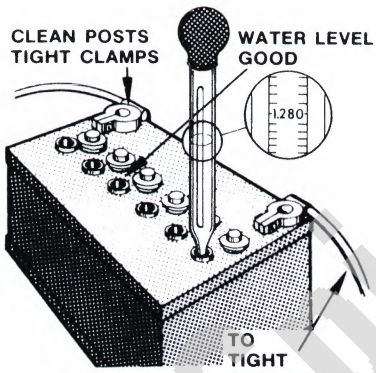


ELT TENSION



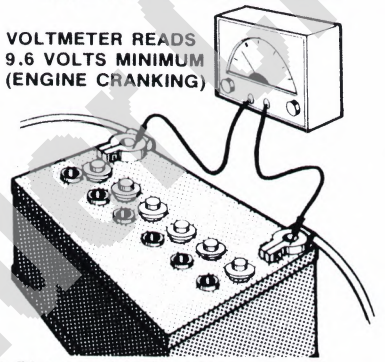
tension. Adjust as required.

BATTERY CHECK



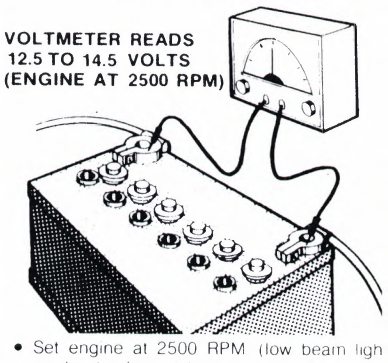
- Check battery condition, water level. Use load tester or hydrometer. Charge, if required.
- Check that battery posts are clean.
- Check that cables are in good condition with tight connections on both ends.

ENGINE CRANK TEST



- Disconnect high voltage cable from ignition coil.
- Connect voltmeter to battery.
- Crank engine 3 to 4 seconds. Note voltmeter reading.
- If voltmeter reads less than 9.6 volts, check for faulty battery.
- Reconnect high voltage cable to ignition coil.

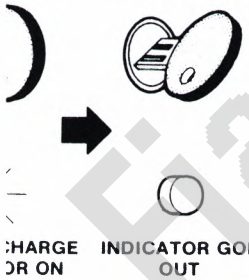
VOLTAGE TEST



- Set engine at 2500 RPM (low beam ligh on, heater fan on high speed). Note vol meter reading.
- If voltmeter reads 12.5 to 14.5 volts, alternator and voltage regulator are good.
- If voltmeter reads greater than 14.5 volt replace voltage regulator.
- If voltmeter reads less than 12.5 volts, sto engine and proceed to next step.

R SYSTEM CHECK

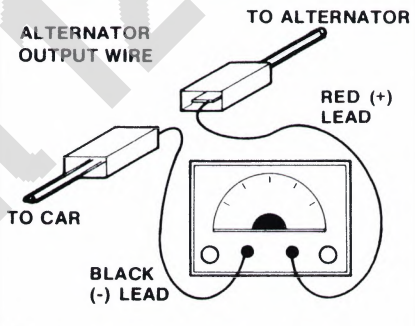
EY ON START ENGINE



CHARGE INDICATOR GOES
OR ON OUT

ition. If battery charge indicator es not light, check for faulty indi- or alternator brushes. Repair oltage Test.
ghts, start engine. Check that in- out.
does not go out, check for rt in excitor system wiring.
goes out, stop engine and go to

CURRENT TEST SETUP

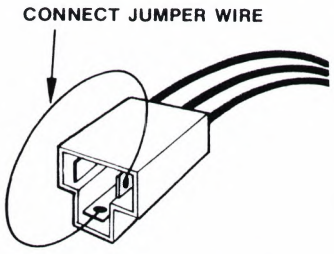


- Disconnect battery ground cable.
- At alternator output wire plug (see wiring diagram for location), connect ammeter red (+) lead to alternator side, and black (-) lead to car side.

CAUTION: Do not allow wires to ground or touch.

- Disconnect connector at voltage regulator.
- Check test setup connections, then reconnect battery ground cable.

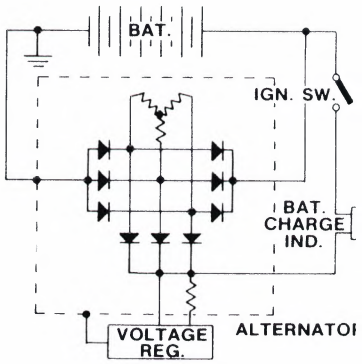
CURRENT TEST



CAUTION: ALTERNATOR MAY BE DAMAGED IF CONNECTION EXCEEDS 5 SECONDS

- Set engine at 2500 RPM, all lights and accessories off.
- Momentarily (5 seconds maximum) connect a jumper wire as shown. Note ammeter reading.
- If ammeter reads 50 or more amps, replace voltage regulator.
- If ammeter reads less than 50 amps, repair or replace alternator.

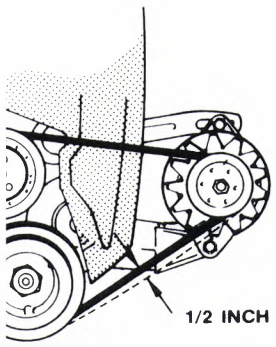
RETEST



- After repairs are made, repeat Voltage an Current Tests.
- Remove test equipment.
- Reconnect alternator and voltage regula tor wiring. Make sure all connections ar tight.

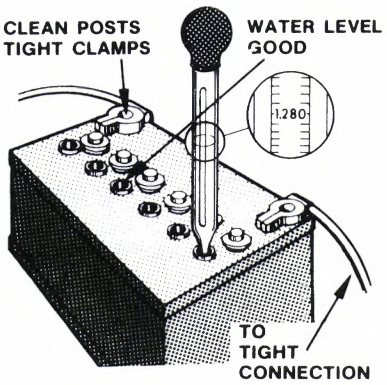
ALTERNATOR SYSTEM CHECK (Marelli)

ELT TENSION



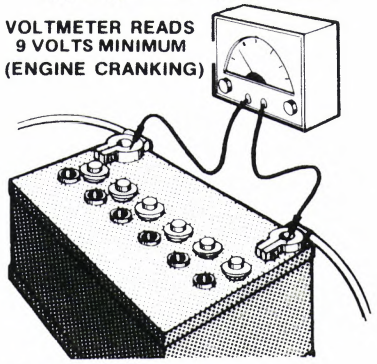
lt tension. Adjust as required.

BATTERY CHECK



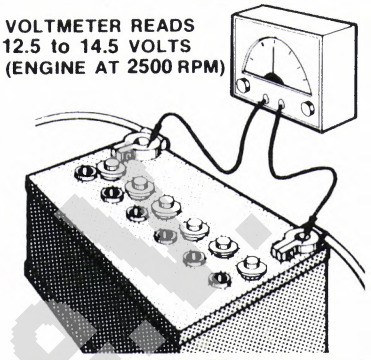
- Check battery condition, water level. Use load tester or hydrometer. Charge if required.
- Check that battery posts are clean.
- Check that cables are in good condition with tight connections on both ends.

ENGINE CRANK TEST



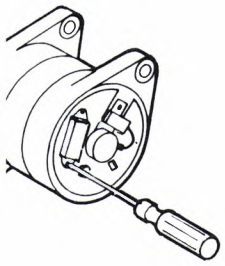
- Disconnect high voltage cable from ignition coil.
- Connect voltmeter to battery.
- Crank engine 3 to 4 seconds. Note voltmeter reading.
- If voltmeter reads less than 9 volts, check for faulty battery.
- Reconnect high voltage cable to ignition coil.

VOLTAGE TEST



- Set engine at 2500 RPM. (low beam h on, heater fan on high speed). Note voltmeter reading.
- If voltmeter reads 12.5 to 14.5 volts, al nator and voltage regulator are good.
- If voltmeter reads greater than 14.5 vo replace voltage regulator.
- If voltmeter reads less than 12.5 volts, s engine and proceed to next step.

UNTING CHECK

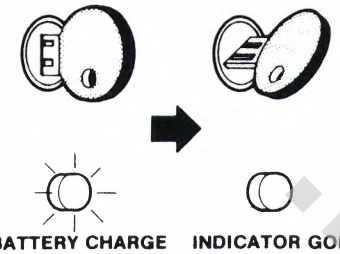


CK FOR CLEAN AND TIGHT OUNTING SCREWS

shield at alternator rear (10mm).

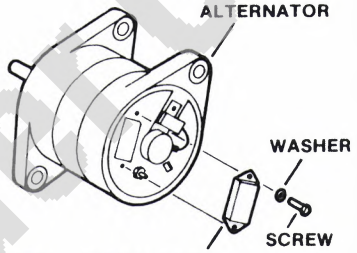
at mounting screws for voltage are not corroded, and are tight.

EXCITOR SYSTEM CHECK



- Turn on ignition. If battery charge indicator (on dash) does not light, check for faulty indicator, wiring or alternator brushes. Repair and repeat Voltage Test.
- If indicator lights, start engine. Check that indicator goes out.
- If indicator does not go out, check for possible short in excitor system wiring.
- If indicator goes out, stop engine and go to next step.

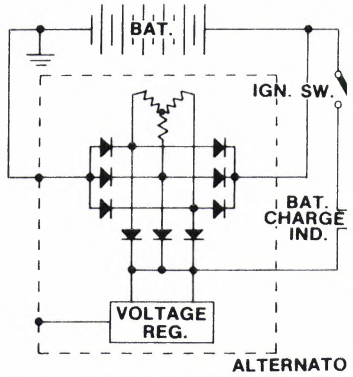
REGULATOR/ALTERNATOR CHECK



INSTALL KNOWN GOOD VOLTAGE REGULATOR

- Disconnect battery ground cable.
- Remove voltage regulator from alternator.
- Install a known good voltage regulator.
- Connect battery cable, then repeat voltage test.
- If voltage is within specifications, the original voltage regulator is defective.
- If voltage is below specifications, repair or replace alternator.

RETEST



- After repairs are made, repeat Voltage a Current Tests.
- Remove test equipment.
- Reinstall alternator shield (10-mm ha ware).

ALTERNATOR SYSTEM CHECK (Bosch)

Remove drive pulley and fan from rotor shaft.

Remove brush holder (29), complete with brushes, by removing screw (28).

Remove Woodruff key (22) from shaft.

Remove four thru-bolt nuts (36) holding end frames together.

Remove drive end frame (23) and rotor assembly (21).

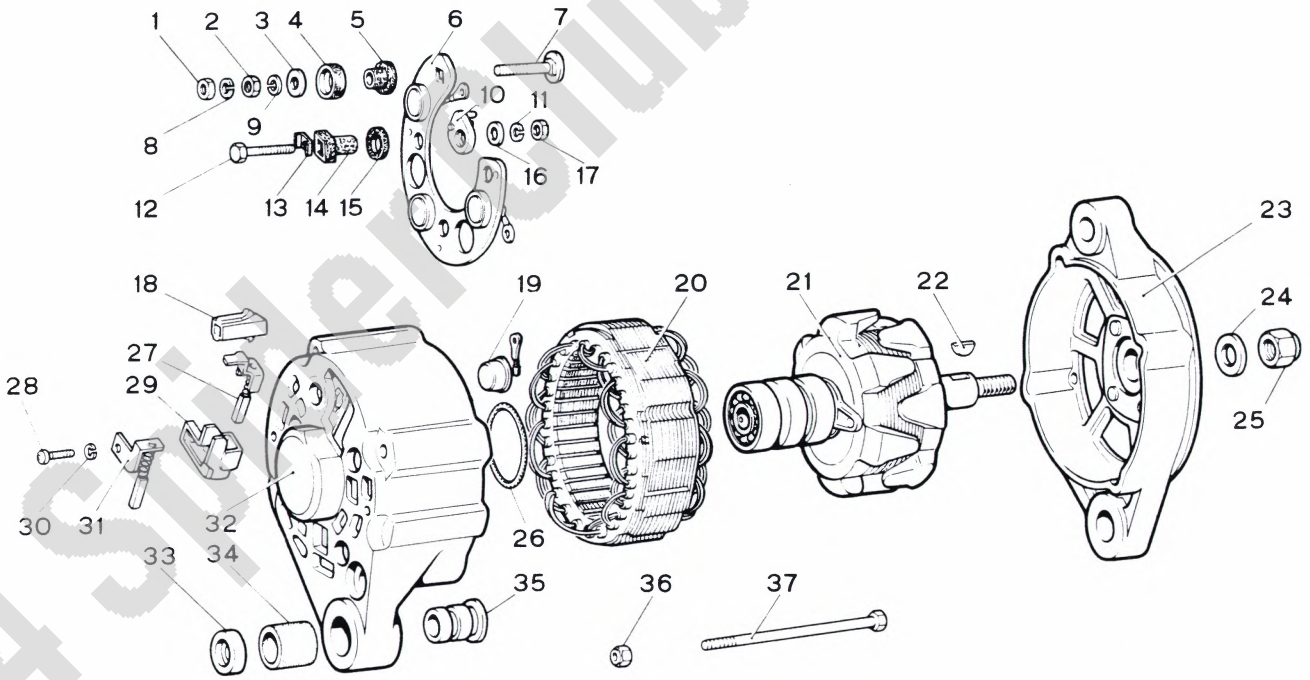
Using a small screwdriver, pry out blade plug from plastic connector (18) on diode end frame (32).

Remove three nuts (17) and bolts (12) attaching stator coil (20) phases to diode ends. Remove stator.

To remove diode plate (6) unscrew nut (2) on terminal "30."

Assemble in reverse order of disassembly.

Apply a small amount of grease to diode end bearing.



1 and 2. Nuts
3. Flat washer
4 and 5. Positive clamp insulators
6. Positive diode plate
7. Screw, positive clamp
8 and 9. Spring washers
10. Diode terminal connector insulator
11. Spring washer
12. Screw, positive diode terminals and stator phases ends attachment
13. Plate
14 and 15. Insulators
16. Flat washer
17. Nut
18. Plastic connector for charge indicator blade plug
19. Negative diode
20. Stator
21. Rotor
22. Key
23. Drive end frame
24. Spring washer
25. Pulley nut
26. Rubber seal, bearing outer race
27. Positive brush
28. Screw
29. Brush holder
30. Spring washer
31. Negative brush
32. Diode end frame
33, 34, 35. Rubber bushing components
36. Nut
37. Thru-bolt

ALTERNATOR, MARELLI A 12 M 124/12/42 M

Disconnect electrical plug and remove screw and lockwasher to remove condenser (7).

Remove two screws to remove voltage regulator/brush assembly (8 & 9).

Remove nut to remove pulley (1), fan (5), spacers and key (13).

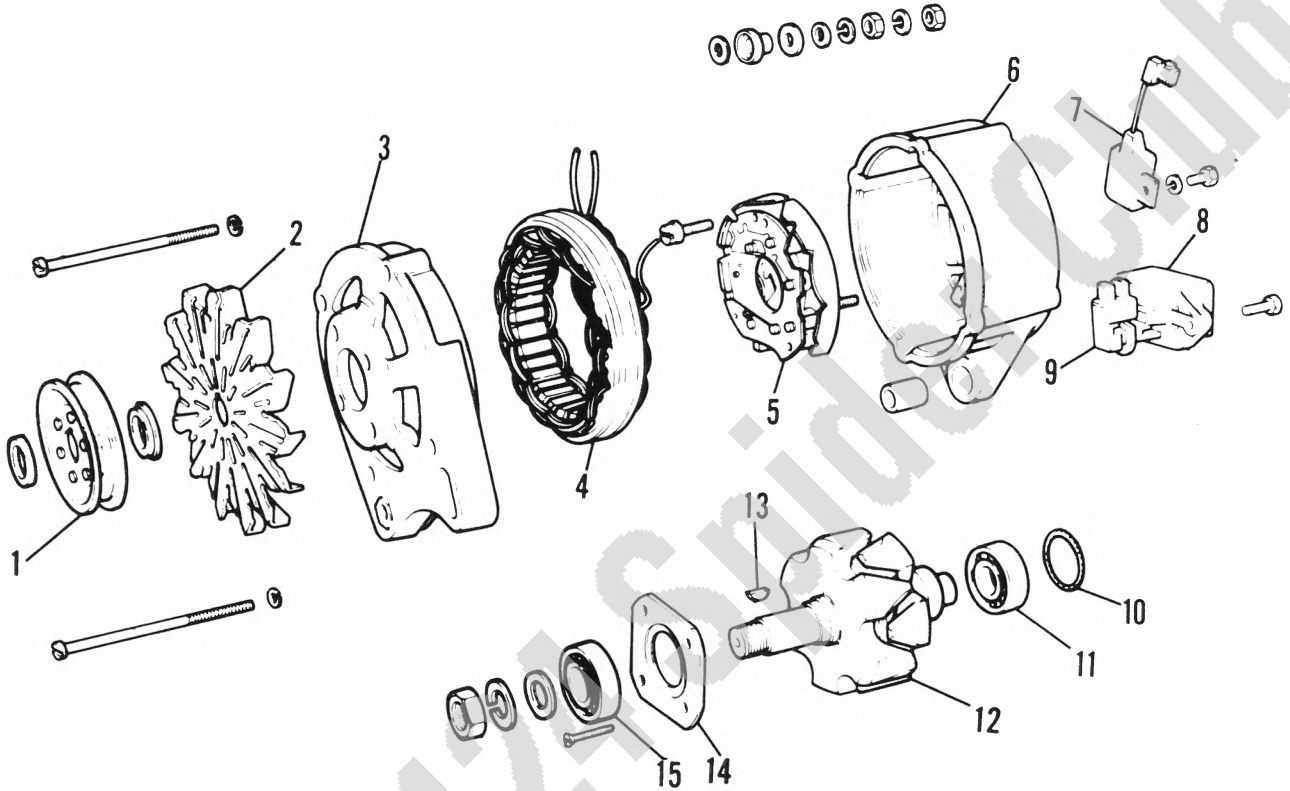
Remove four short screws on front frame (3) to free bearing retainer (14).

Remove four long screws to separate front frame from rear frame (6).

Remove rotor assembly (12) from rear frame by pulling rotor out.

Remove stator assembly (4) and rectifier assembly (5) as a unit by removing three screws. Remove three stator wires from rectifier to separate rectifier.

Reassemble in reverse order of disassembly.



1. Pulley
2. Fan
3. Frame
4. Stator
5. Rectifier
6. Frame
7. Condenser
8. Voltage regulator
9. Brush assembly
10. Seal
11. Bearing
12. Rotor
13. Key
14. Bearing retainer
15. Bearing

ALTERNATOR, BOSCH K1 - 14V - 55A - 21 AND K1 - 14V - 65A - 21

With alternator disassembled, the following components may be tested.

Rotor Short-to-Ground Test

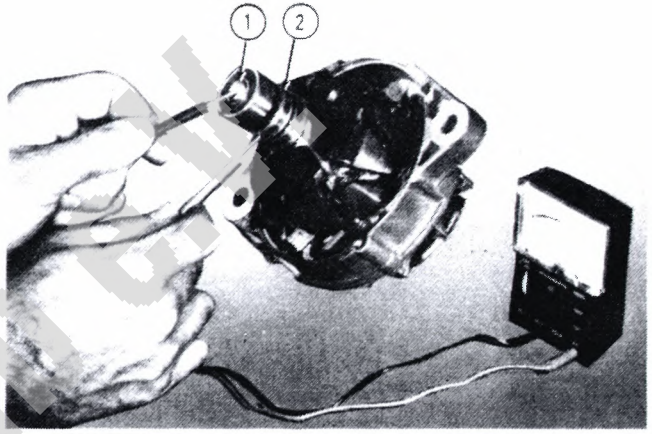
Set ohmmeter to x1000 scale.

Hold one test lead on rotor shaft (1) and other lead on either slip ring (2). Note ohmmeter reading, then put test lead on other slip ring.

In both cases, reading should be infinity (no needle movement). If not, check soldered connections at slip ring and that excess solder is not grounding rotor coil.

Replace rotor if damaged.

1. Rotor shaft 2. Slip ring



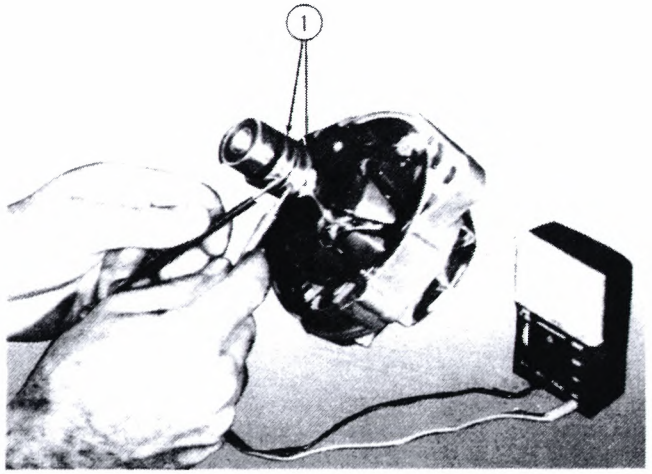
Rotor Open Test

Set ohmmeter to x1 scale.

Hold one test lead on one slip ring and other test lead on other slip ring. Reading should be 3.0 to 3.7 ohms. If not, rotor is open.

Replace rotor.

1. Slip rings



Stator Short to Ground Test

Remove stator leads (1) from rectifier board.

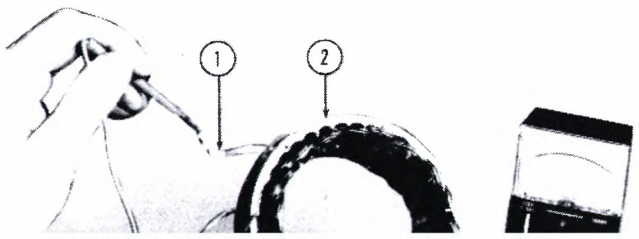
Set ohmmeter to x1000 scale.

Touch one test lead to stator core (2) bare metal and other test lead to any stator lead.

Reading should be infinite (no needle movement). If any needle movement is shown, stator is grounded.

Replace stator.

1. Stator lead 2. Stator core



Touch one test lead to any stator lead (1). Touch other test lead to any other stator lead. Note reading. Repeat at all pairs of test leads.

Equal readings should be obtained at each pair of stator leads. A reading of infinity indicates poor connection at neutral junction.

Repair connection or replace stator.

1. Stator lead

Diode Test

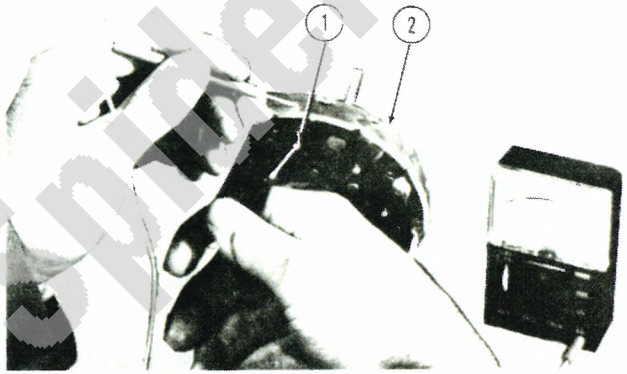
Remove stator leads from rectifier board.

Set ohmmeter to x1 scale.

Touch one test lead to a diode junction (1). Touch other test lead to heat sink (2). Note reading. Reverse test lead positions and note reading. Repeat for remaining diodes.

One high and one low reading should be obtained for each diode. If proper readings are not obtained, replace diode plate.

1. Diode junction 2. Heat sink

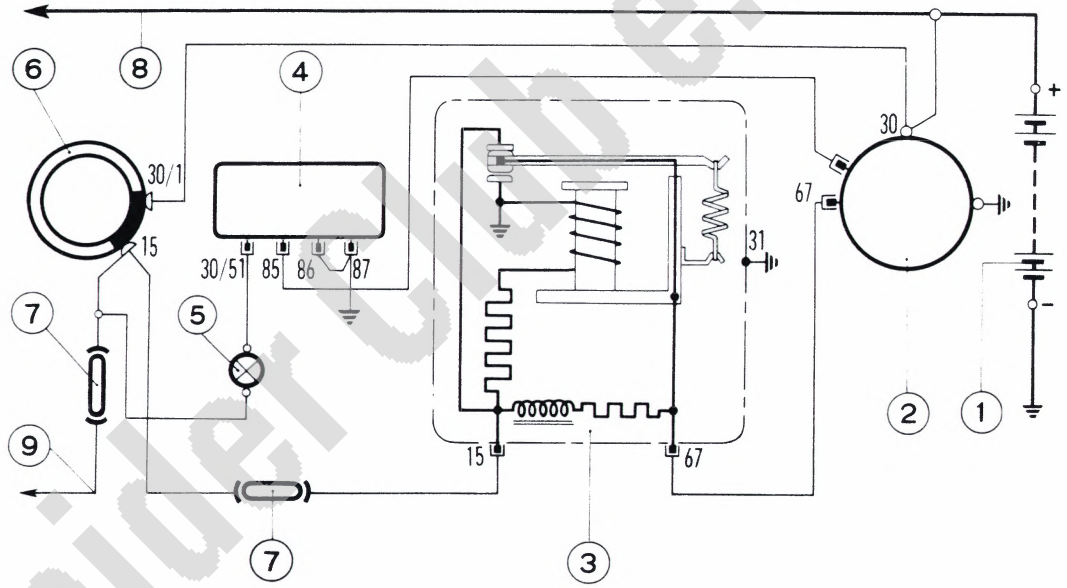


SERVICE PROCEDURES

Corrective repairs on faulty voltage regulators should only be attempted if a replacement regulator is not available. In general, it is safer to replace a defective regulator rather than attempt repairs or adjustments. Only the following repairs are recommended:

- replacing cover and gasket
- soldering open electrical connections
- cleaning contacts and other regulator components.

CAUTION: Open connections should be soldered using smallest possible amount of rosin-core solder and taking care not to overheat insulating material. After soldering, remove excess rosin.



1. Battery
2. Alternator
3. Voltage regulator
4. Charge indicator relay
5. Charge indicator relay light
6. Slip ring
7. 8A fuses
8. Lights and instruments
9. Signaling equipment

CHARGING SYSTEM WIRING WITH DETAILED VOLTAGE REGULATOR

ADJUSTMENTS

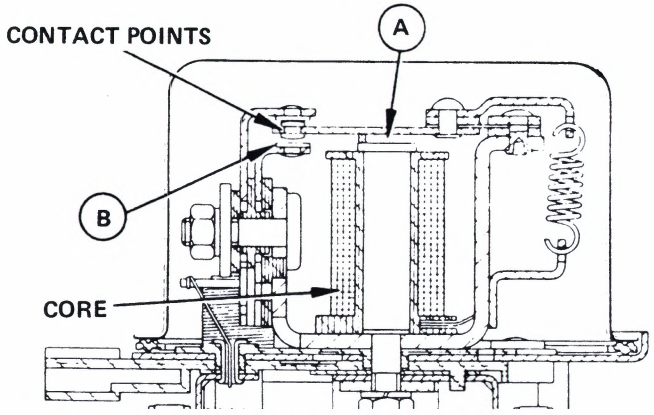
Disconnect positive battery cable. Remove two screws holding dust cover on voltage regulator.

Inspect contact points for pitting and burn marks. Clean minor pitting and burn marks. Extreme damage to points necessitates voltage regulator replacement.

Check core for damage and broken wires. With use of a clean feeler gauge, check following measurements:

(A) 0.055 to 0.063" (B) 0.014 to 0.022"

If measurements are incorrect, remove voltage regulator from vehicle.

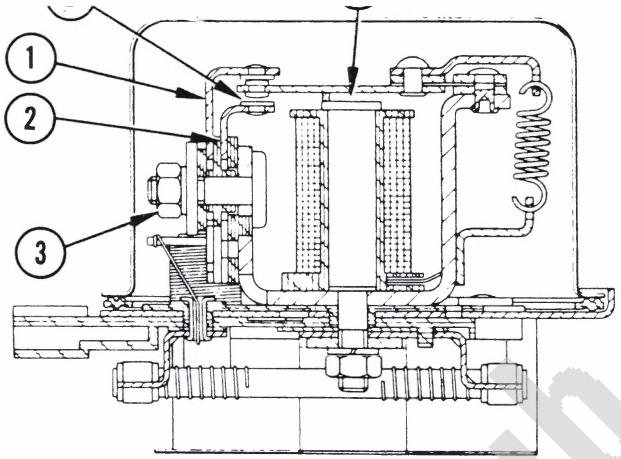


To adjust gap A, move slotted arm (1) until gap is 0.055 to 0.063". To adjust gap B, move slotted arm (2) until gap is 0.014 to 0.022". After adjustments are completed, retighten 8 mm nut (3). Recheck gaps.

Install regulator in vehicle. Reconnect battery cable.

NOTE: Check that battery is fully charged.

Run engine until normal operating temperature is reached. Connect voltmeter positive lead to positive battery pole. Connect negative lead to a ground.



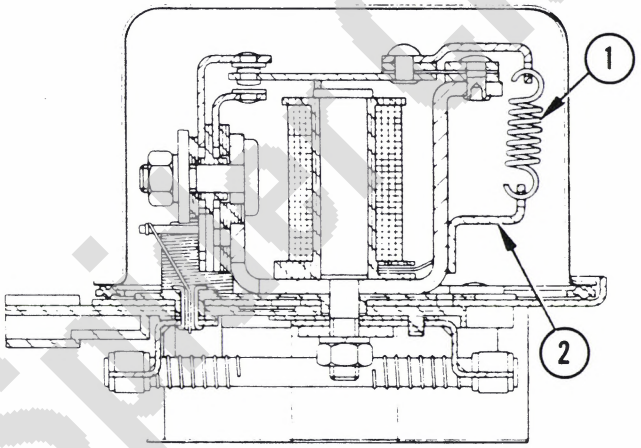
1. Slotted arm 2. Slotted arm 3. Nut

CAUTION: In next step, do not ground spring bracket with pliers while making adjustment.

Voltmeter should read 13.9 to 14.5 VDC at 2500 engine RPM with all electrical components off.

If this reading is incorrect, *carefully apply slight pressure* to lower spring bracket (2) in either direction to get desired reading. Bend bracket down to add volts and vice versa. Disconnect voltmeter. Reinstall regulator dust cover. Recheck charging system.

NOTE: Bending bracket changes tension on spring (1). A slight change in tension changes voltage. Bend bracket very slightly to increase or decrease voltage.



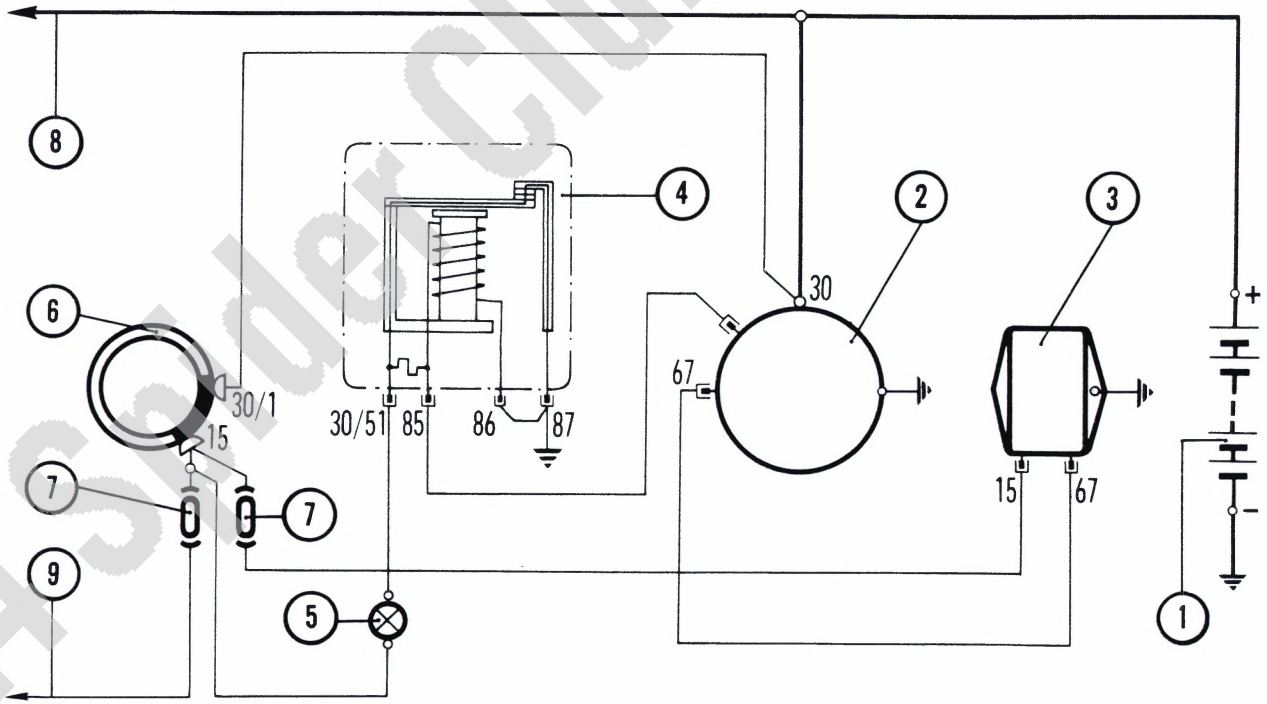
1. Spring 2. Spring bracket

DESCRIPTION

The charge indicator relay serves the purpose of signaling any malfunction in alternator charging system by turning on a red light in the instrument panel.

Data shown in specifications table can be used to check relay. If test readings fail to meet specifications, replace charge indicator relay.

Field winding resistance	29 ± 2 ohm
Desensitizing resistor	220 ± 22 ohm
Contact opening voltage	5.3 ± 0.4 V
Contact closing voltage	0.2 to 0.9 V



1. Battery
2. Alternator
3. Voltage regulator
4. Charge indicator relay
5. Charge indicator relay light
6. Slip ring
7. 8A fuses
8. Lights and instruments
9. Signaling equipment

CHARGING SYSTEM WIRING WITH DETAILED CHARGE INDICATOR RELAY

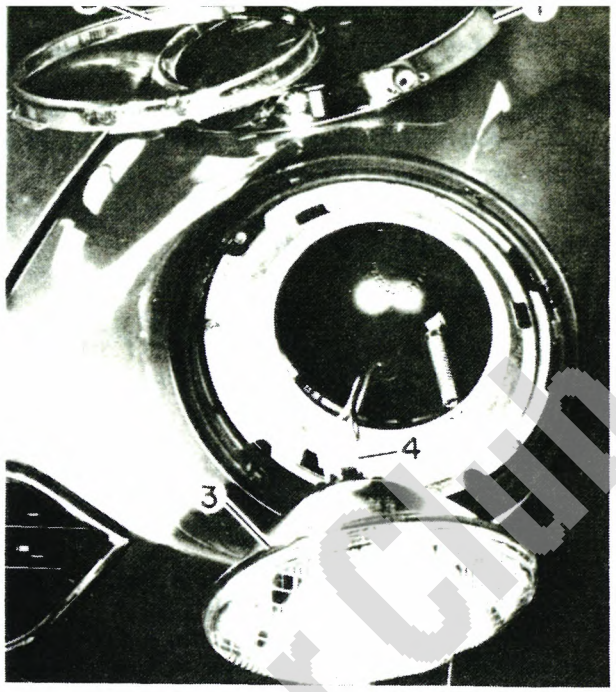
Remove screw on bottom of trim ring (1) to remove ring.

Loosen three screws on inner ring (2) and twist ring off.

Withdraw headlight (3) and disconnect electrical connector (4).

Installation is reverse of removal.

1. Trim ring 2. Inner ring 3. Headlight 4. Electrical connector

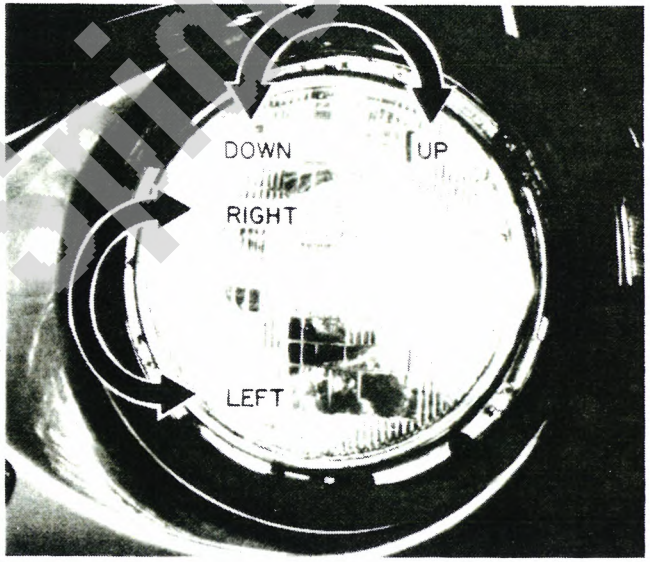


ADJUSTMENT

Remove trim ring.

Turn upper adjustment screw clockwise to raise light beam and counterclockwise to lower it.

Turn side adjustment screw clockwise to move beam to right and counterclockwise to move it to left.

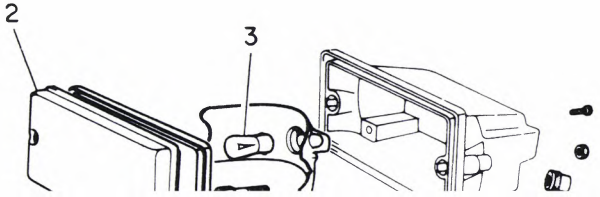


FRONT PARKING/DIRECTIONAL/HAZARD LIGHT

REMOVAL AND INSTALLATION

Remove two screws (1) to remove lens (2). Remove bulb by twisting it out.

Installation is reverse of removal.



REMOVAL AND INSTALLATION

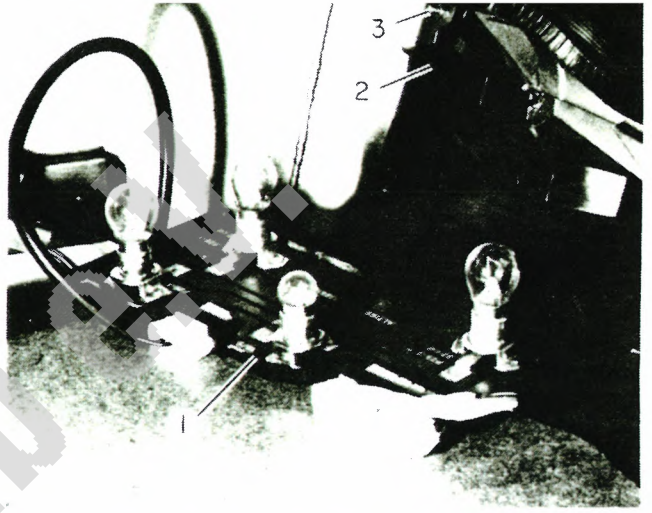
Open trunk. Place floor covering near light assembly out of way.

Unclip four clips holding light assembly (1) to lens assembly (2). Withdraw light assembly. Remove bulbs by twisting out.

To remove lens assembly, remove four nuts (3) securing it to body.

Installation is reverse of removal.

1. Light assembly 2. Lens assembly 3. Nut



LICENSE PLATE LIGHT

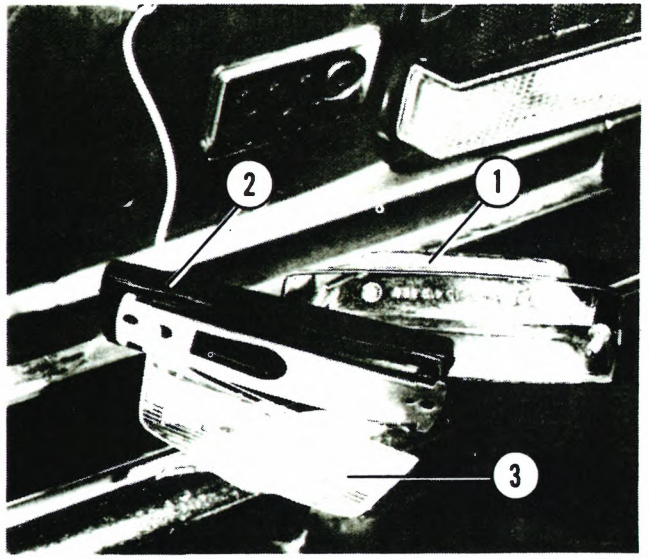
REMOVAL AND INSTALLATION

Open trunk. Place floor covering near light assembly out of way.

Remove two nuts securing light assembly to body. Withdraw light assembly and separate cover (1) from light base (2). Remove bulb by twisting out.

Installation is reverse of removal.

1. Light cover 2. Light base 3. Lens



SIDE MARKER LIGHTS

REMOVAL AND INSTALLATION

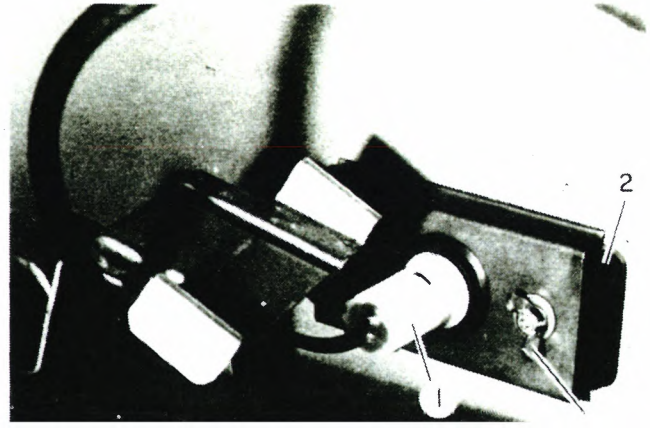
For rear fender light, open trunk and place floor covering out of way.

Twist connector (1) to remove light. Remove bulb by pulling it straight out.

To remove lens assembly from fender, remove two wingnuts (3).

For front fender light, first remove wheel well splash shield to gain access to rear of light. Removal is same as for rear light.

Installation is reverse of removal.



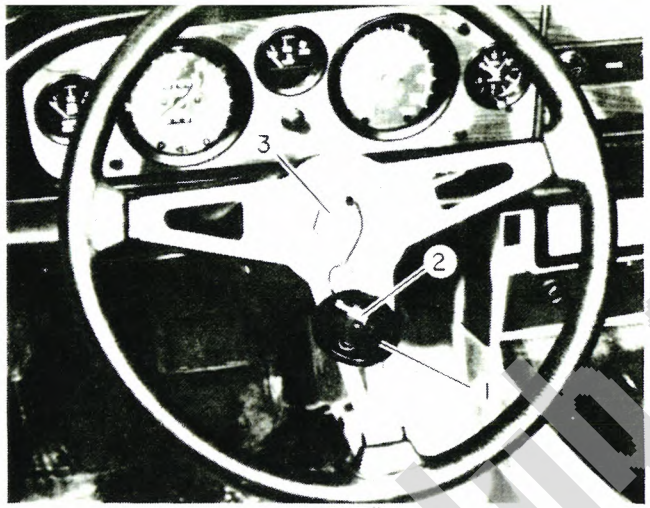
REMOVAL AND INSTALLATION

Disconnect battery ground lead located in trunk.

Remove horn button (1) by pulling it straight out. Disconnect horn electrical connector (2).

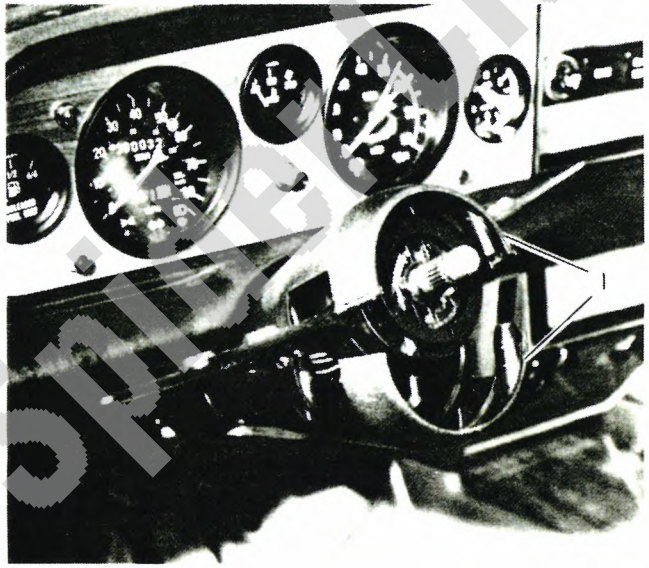
Remove steering shaft nut (3). Mark shaft and steering wheel for reinstallation in same position. Pull steering wheel off.

1. Horn button 2. Electrical connector 3. Steering shaft nut



Remove five screws securing upper and lower cover halfs (1) together.

1. Cover halfs



Loosen clamp bolt (1) holding switch assembly (2) to steering column.

Remove four knobs holding instrument group (3) to dash panel. Carefully pull instruments out far enough to gain access to signaling wire harnesses.

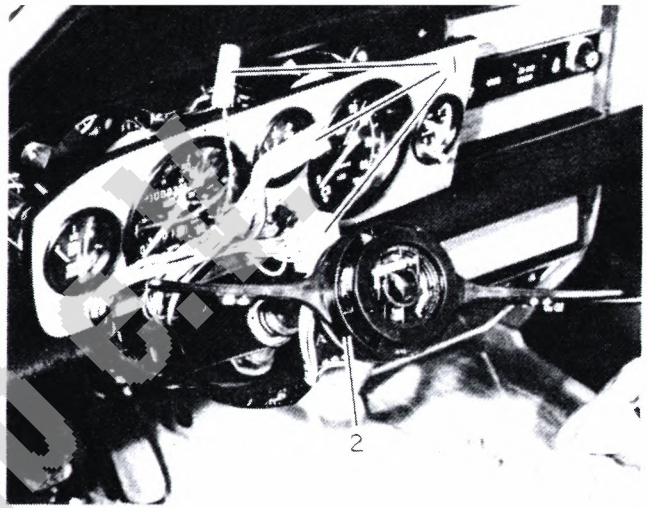
1. Steering column clamp bolt 2. Switch assembly 3. Instrument group

Remove switch assembly (2) while carefully pulling wire harnesses and connectors through dash panel.

Installation is reverse of removal.

Torque steering column shaft nut to 36 ft. lb. (5 kgm).

1. Electrical connectors 2. Switch assembly



HORNS

REMOVAL AND INSTALLATION

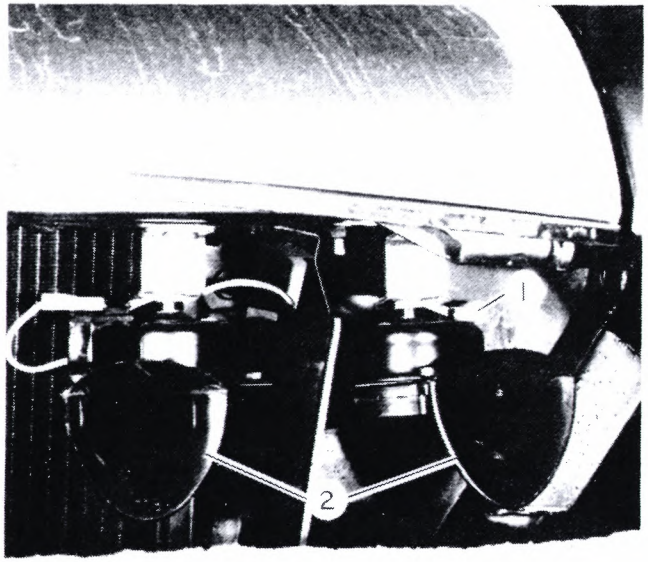
Remove six screws holding radiator trim and grill.

Disconnect electrical connectors (1) on horns (2).

Remove two nuts securing horn assembly to body. Remove horns through front grill opening.

Installation is reverse of removal.

1. Electrical connector 2. Horn assembly



REMOVAL AND INSTALLATION

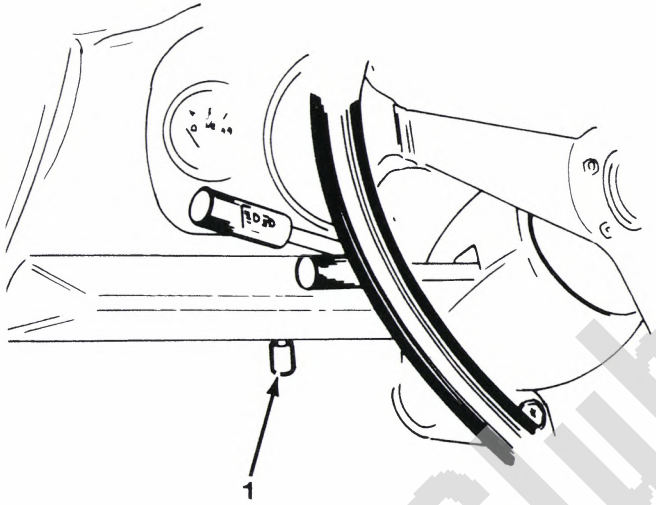
Disconnect battery ground cable.

Remove steering column covers.

Locate trip recorder zeroing knob under left side of dash panel.

Remove knurled nut holding the trip recorder zeroing knob to the dash panel.

Remove four bolts holding instrument cluster in dash panel.

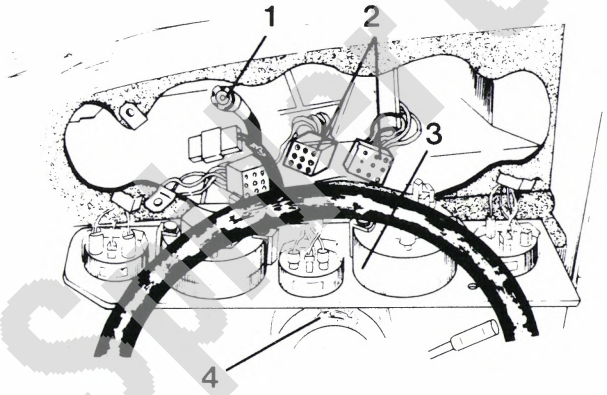


1. Trip recorder zeroing knob

Carefully pull instrument cluster (3) out and disconnect speedometer cable (1) and two large connectors (2).

Slide instrument cluster to left between steering wheel and dash panel to remove cluster. Be careful of the parking light switch (4) on top of the steering column.

When reinstalling, feed cable for trip recorder zeroing knob down behind dash panel. Installation is reverse of removal.



1. Speedometer cable 2. Electrical connectors 3. Instrument cluster
4. Parking light switch

WINDSHIELD WIPER ASSEMBLY

REMOVAL AND INSTALLATION

NOTE: Wiper blades should be in Park position.

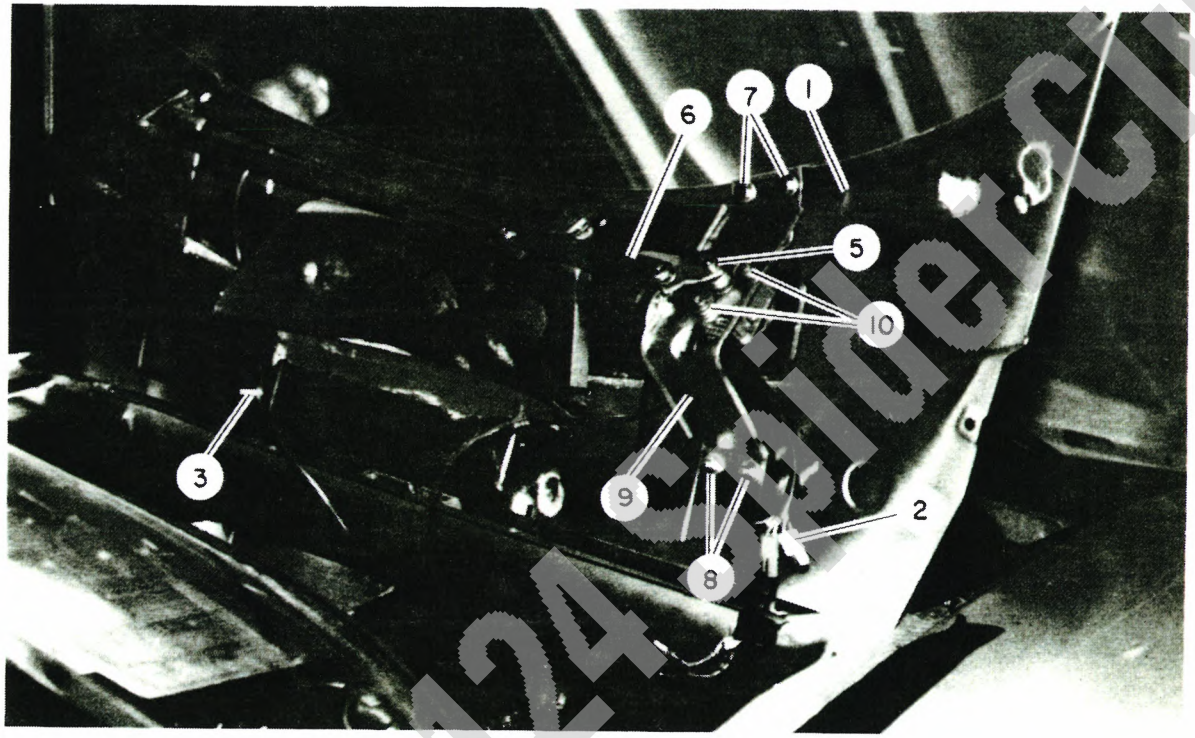
Pivot wiper arms up away from windshield and pull them off drive shafts.

Raise hood. Remove six screws securing cowl (1) to body. Lift cowl up on body as shown, being careful not to damage finish. Disconnect electrical connectors (2), first noting to which connectors they are attached, for reinstallation. Disconnect windshield washer line at "T" fitting (3).

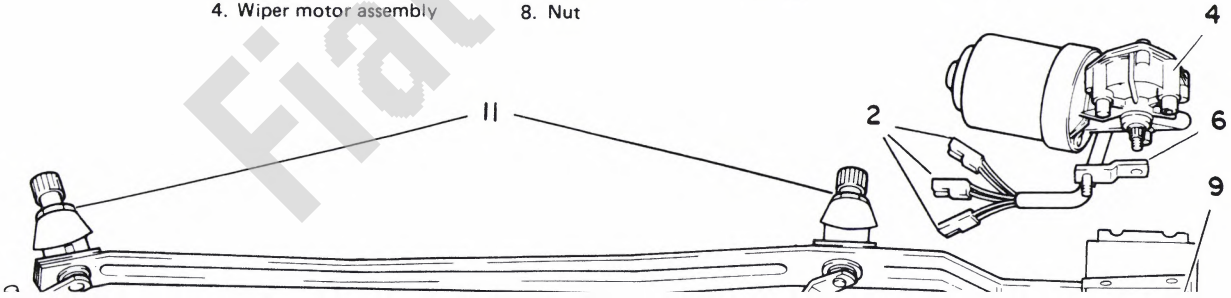
Place cowl on bench. Remove two nuts (11) on drive shafts. Remove two bolts (7) and two nuts (8) holding motor mount bracket (9) to cowl. Remove entire wiper assembly from cowl.

Remove motor drive shaft nut (5) holding linkage (6) to shaft. Pull link end off. Remove three bolts (10) holding motor assembly (4) to bracket.

Installation is reverse of removal.



1. Cowl
2. Electrical connectors
3. "T" fitting
4. Wiper motor assembly
5. Nut
6. Drive linkage
7. Bolt
8. Nut
9. Mounting bracket assembly
10. Bolt
11. Nut



BODY - 70

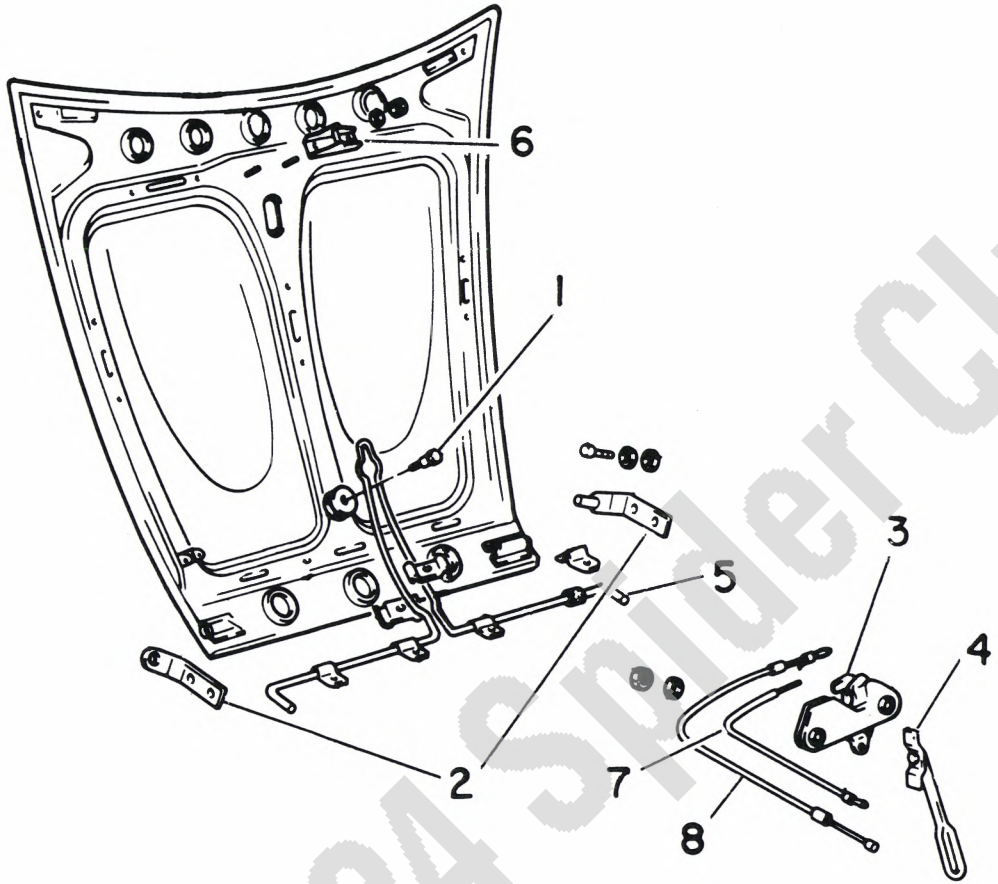
BODY - 70

PARTS CATALOG, SERVICE MANUAL & SERVICE TIME SCHEDULE CODE		PAGE
701.01	Hood	70-1
701.02	Instrument Panel	70-3
701.17	External Bodywork	70-5
701.23	Folding Top	70-7
701.28	Doors – Door Glass – Lock Mechanism	70-15
701.55	Windshield	70-23
701.60	Trunk Lid	70-25
703.02	Radiator Grill	70-27
703.06	Front Bumper	70-29
703.07	Rear Bumper	70-31
706.01	Seats	70-33
706.13	Package Shelf	70-35
706.23	Interior Trim	70-37
70A	Service Tools	70-43

NOTE: Have an assistant help with hood removal to prevent damage to body.

Pivot brackets (2) are elongated for hood adjustment. Latch assembly (3) and striker plate (6) positions can be shifted for adjustment by loosening mounting nuts.

NOTE: An emergency hood release cable (8) is provided in the event that normal hood release becomes inoperative. Emergency release cable is located near hood release handle (4).



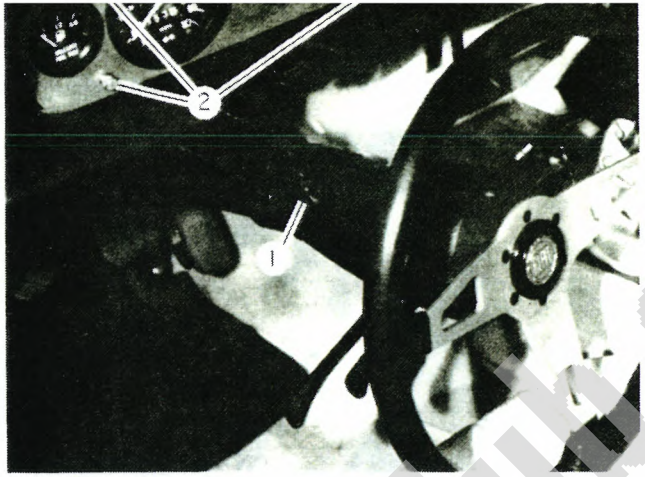
1. Bolt
2. Pivot bracket
3. Hood latch assembly
4. Hood release handle
5. Hood support bar
6. Striker plate
7. Hood release cable
8. Emergency release cable

Remove four bolts holding steering column assembly (1) to dash and lower column as shown.

1982 and Prior

Unscrew four chrome retainer screws (2) and pull instrument cluster out far enough to gain access to connectors.

1. Steering column assembly 2. Chrome screw



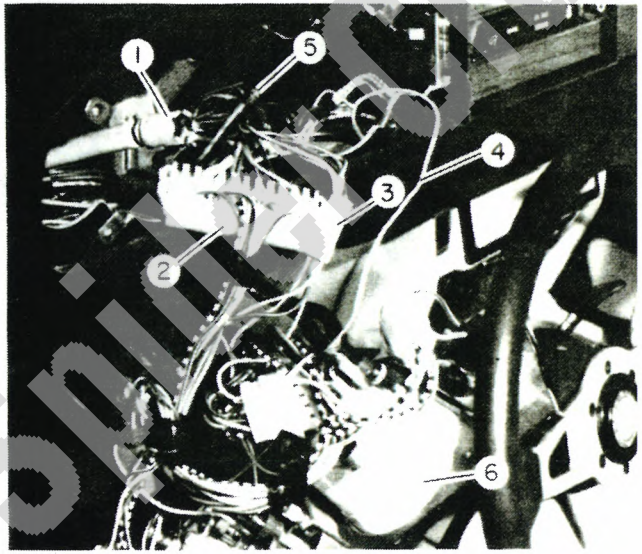
Disconnect speedometer drive (1), large electrical connector (2) and small electrical connector (3).

On fuel injected vehicles only, cut wire (4) in half (upon re-installation, splice this wire together).

If engine is turbo-charged, disconnect pressure line (5) and electrical connector to turbo gage.

On 1983 and subsequent, remove instrument cluster as directed in Section 555.10.

1. Speedometer drive 2. Electrical connector 3. Electrical connector 4. Lambda sensor warning wire 5. Turbo pressure line 6. Instrument cluster



1982 and Prior

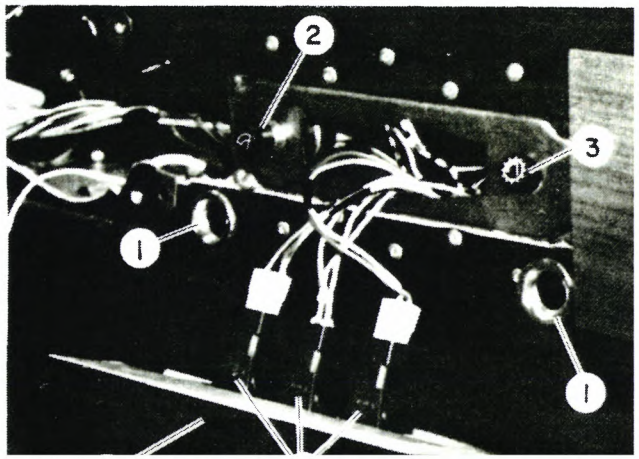
Unscrew chrome nuts (1) holding windshield wiper sweep rate control (2) and dash lights rheostat control (3).

Pull center panel (4) out. Remove light bulbs from sockets (5), first marking their positions.

Remove retaining nut from outer lighting switch on left side of panel and push switch thru panel.

On 1983 and subsequent, remove center console as directed in Section 706.23.

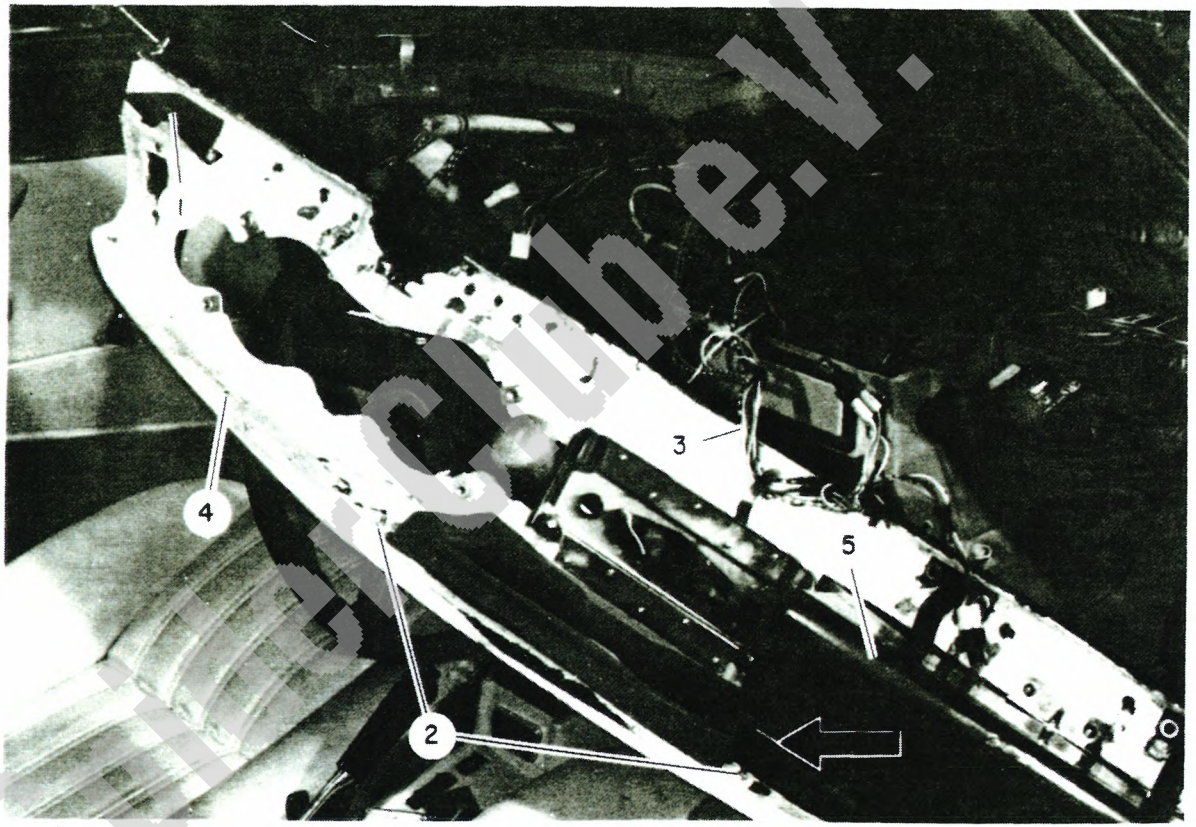
1. Chrome nut 2. Windshield wiper sweep rate control 3. Dash lights rheostat control 4. Center panel 5. Light socket



the two nuts are located centrally (2) next to windshield on either side of defroster duct.

Access to nut on right side is thru glove box (glove box liner (5) has an opening (arrow) in upper left portion for access to this nut).

Carefully pull instrument panel away from body and unclip wire harness (3) from panel.

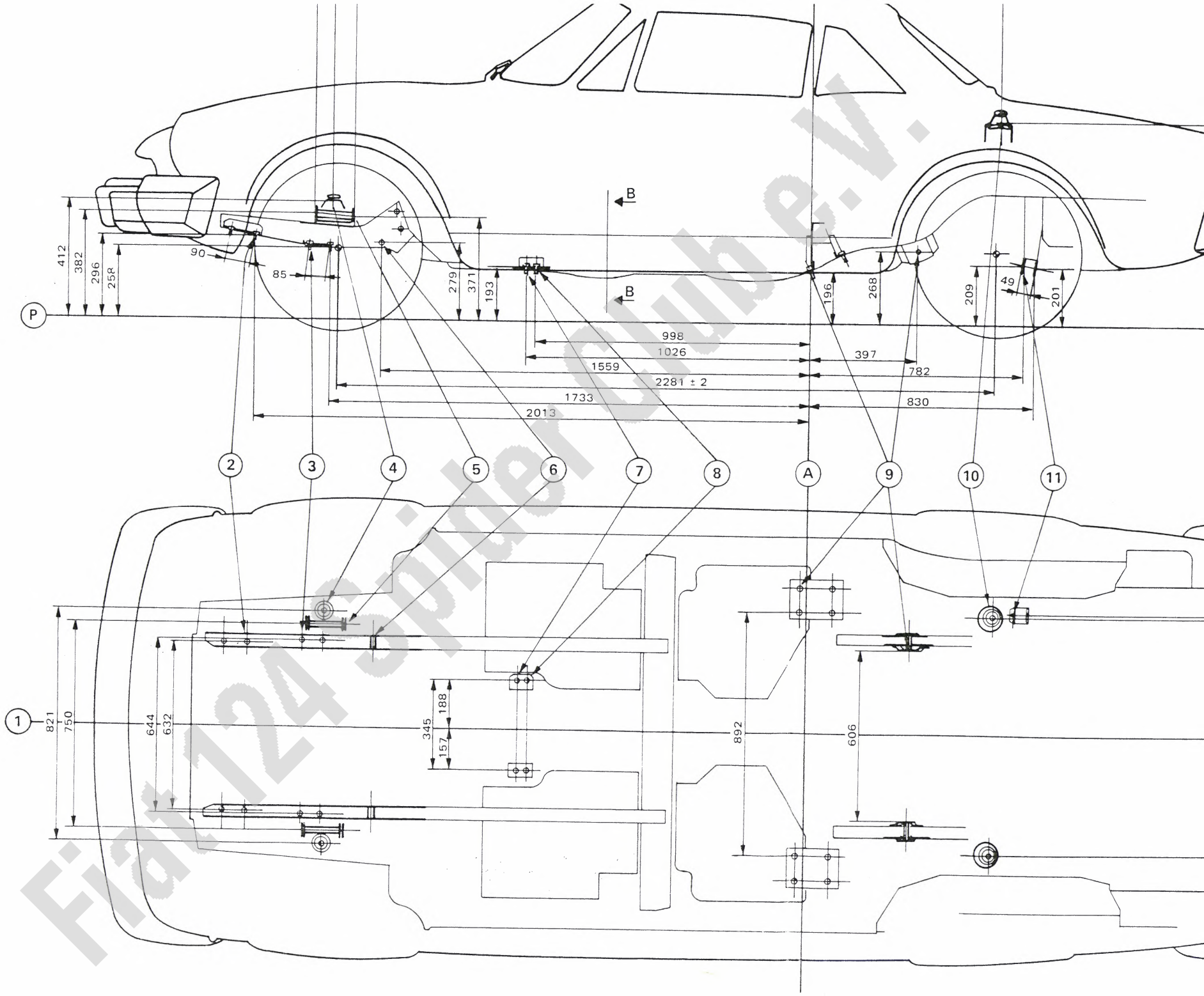


1 & 2. Fastener points for instrument panel 3. Wire harness 4. Instrument panel 5. Glove box liner

INSTALLATION

Installation is reverse of removal.

NOTE: Make certain that wire on fuel injected vehicles, cut in half during removal, is spliced together with a male and female connector so that it can be easily disconnected during next removal.



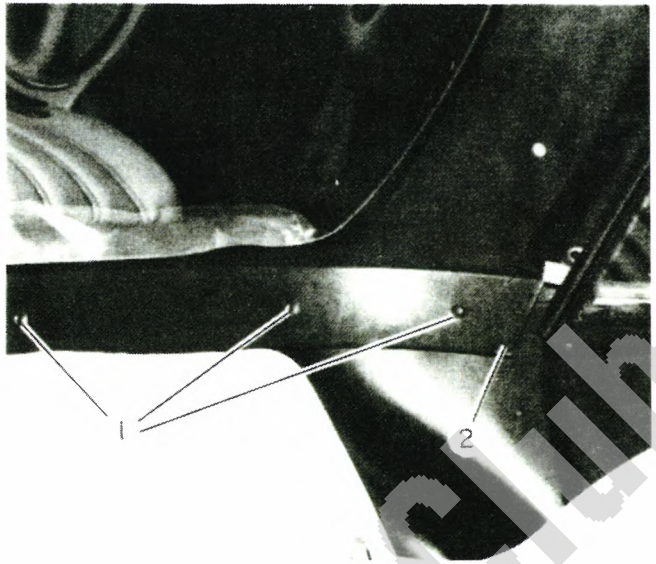
FOLDING TOP FABRIC

REMOVAL

NOTE: If frame and fabric are to be removed together, refer to procedure in this section.

Remove screws (1) holding rear molding (2) around inside of rear well. Lift molding out.

1. Screw 2. Rear molding



Unhook both windshield latches.

Loosen screws holding rear anchor bar (1) down. Lift bar up and pull top out from under bar as shown.

1. Rear anchor bar

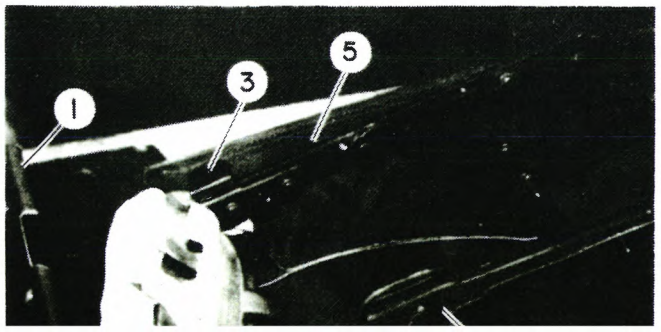
Remove screws holding rubber molding cover (1) in place.

Remove two screws holding each plastic frame guard (2).

Using a 1/8 in. (.125) drill, drill out rivets (3) on front part of window flaps (5) (one on each side).

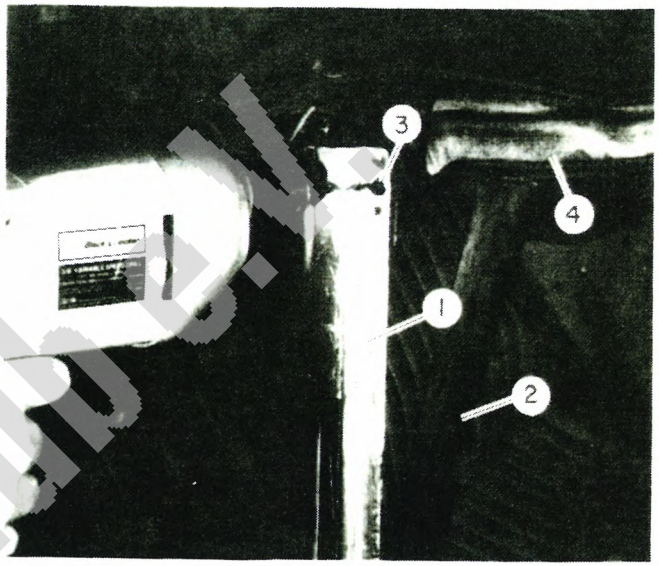
Remove rubber molding (4) and remove glue strip from front bow, being careful not to tear bow covering.

1. Molding cover 2. Plastic guard 3. Rivet 4. Rubber molding
5. Window flap



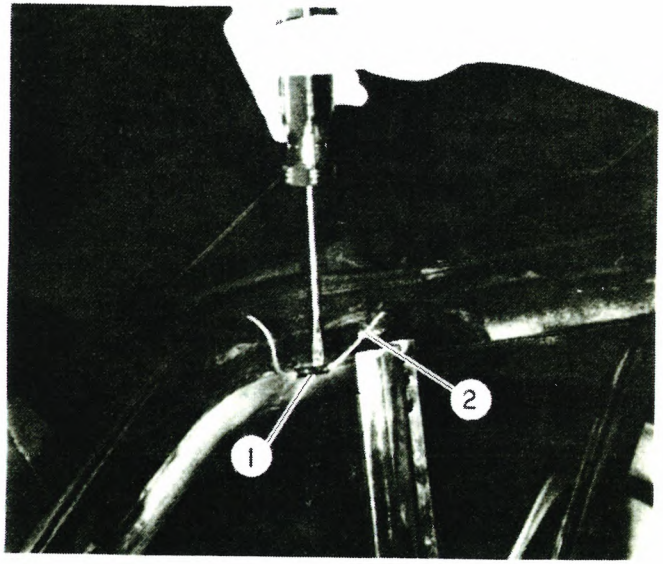
Using a 1/8 in. (.125) drill, drill out two rivets on top of quarter window frame (1) [one holds weatherstrip (2), and underneath weatherstrip is rivet (3) holding window flap (4)].

1. Quarter window frame 2. Weatherstrip 3. Rivet
4. Window flap



On each side, pry cable retainer guide (1) away from cable (2).

1. Cable retainer guide 2. Cable

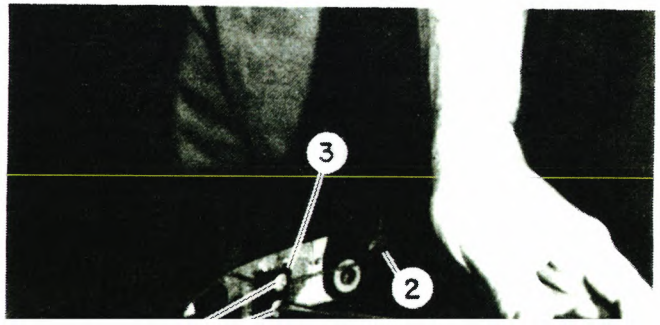


At rear well, loosen screws (1) holding cable (2).

From front bow anchor point, pull cables from old top.

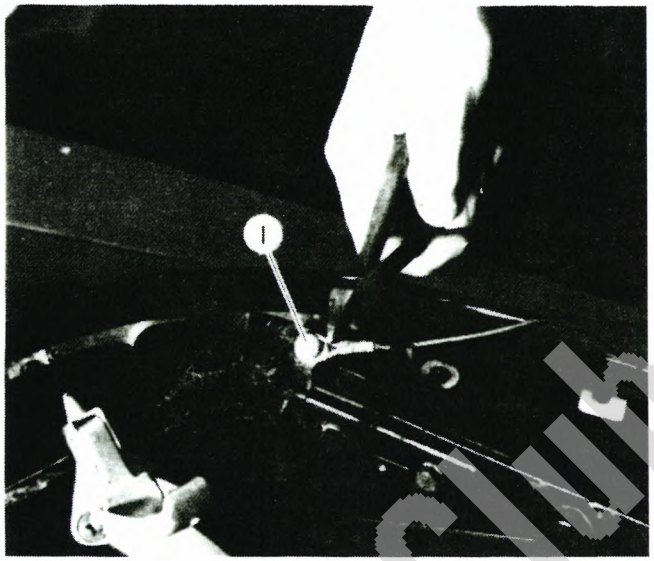
Remove top by pulling material away from bows (material is glued to bows).

1. Screw 2. Cable 3. Cable adjustment and rear anchor point



If cable is not serviceable, replace it by cutting cable at anchor pin (1). Install new cable assembly over anchor pin.

1. Cable anchor pin



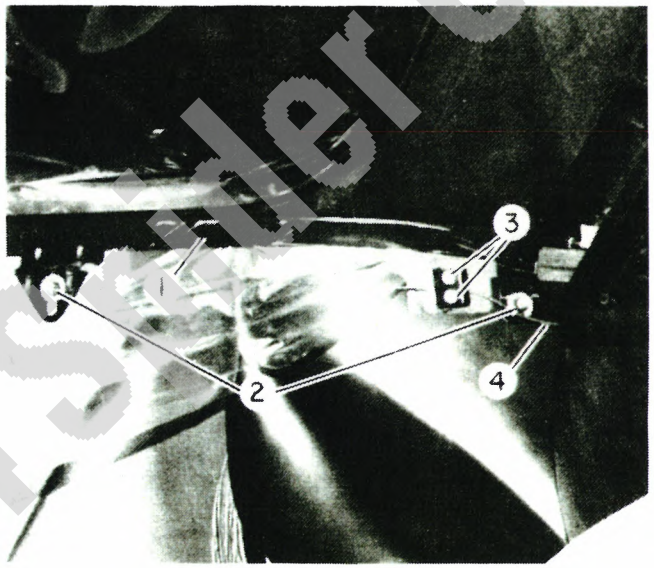
INSTALLATION

Lay new top over bows and slide top rear stiffeners under rear anchor bar (1), pulling top taut from side to side.

NOTE: It may be easier to remove rear anchor bar and install top to bar; then install bar along with top to body.

Push bar down as far as possible and tighten screws (2), starting from center and working out.

1. Rear anchor bar 2. Screw 3. Adjusting screws 4. Cable



Fold frame full back and place top in position over front bow. Lift top up and forward, but do not latch top to windshield.

To pull cables thru top, first tie string (provided in new top) to cable at forward end of top. Fold cable back double and tightly tape electrical tape (3) around cable/string.

Carefully pull string (1) and cable (2) thru top. Allow cable end to hang loose at this time.

1. String 2. Cable 3. Electrical tape

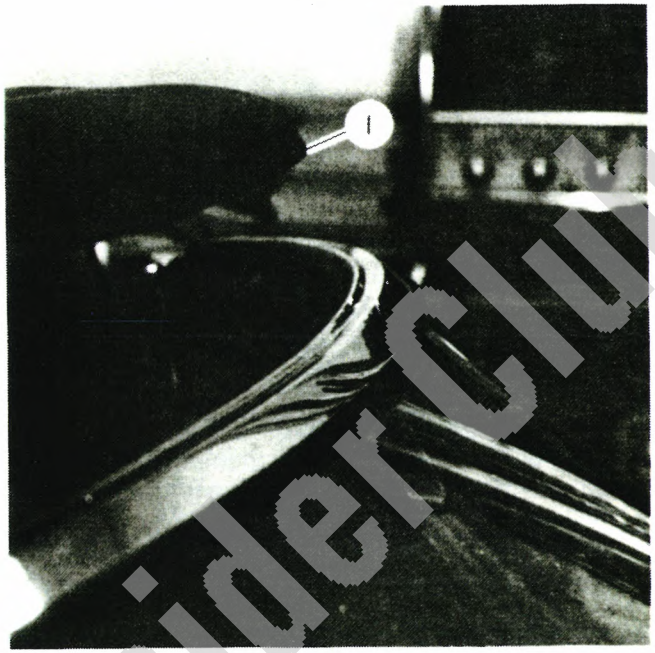
Fold top assembly full back and remove top from front bow. Thoroughly clean old adhesive from bow with adhesive remover.

Place top into position over front bow. Coat bow and top material with adhesive such as contact cement (Clear Bond, as shown is recommended since drying time is longer and position of top can be adjusted).

Position front lip (1) forward and down to provide a good fit between lip and windshield frame.

Place rubber molding in position on bow. Center molding with awl or scribe inserted thru screw holes. Secure in place with screws and molding cover.

1. Top, front lip

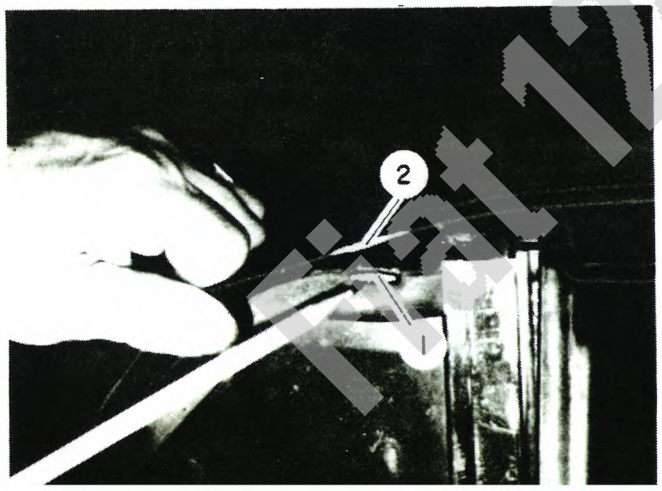


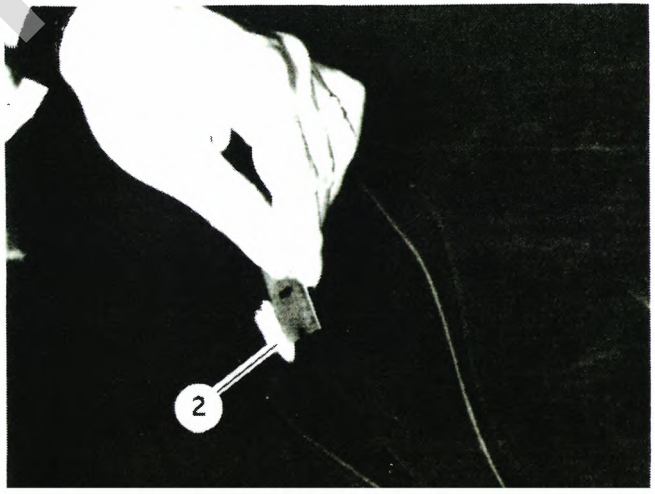
Place top into full up position. Locate cable retainer guide (1) and with chalk, mark position (2) of retainer on top.

Lower top and cut slit in inner liner of top at this position.

CAUTION: Gather inner liner up away from outer material so as not to cut thru to outer material.

1. Cable retainer guide 2. Chalk marked position



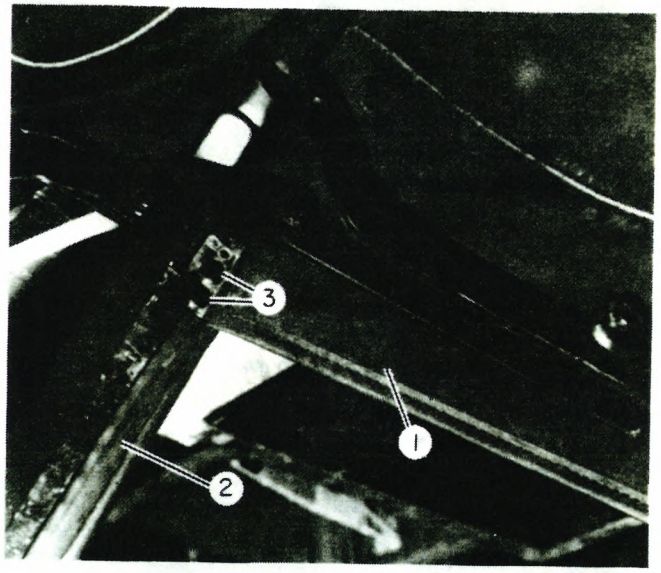


Pull cable (1) thru slit into loop as shown. Place top into full up position. Install cable into retainer/guide and with mallet lightly tap guide around cable. Cable must be able to move back and forth freely in guide.

1. Cable

Place window flaps (1) and weather strips (2) in position and install pop-rivets (3), or screws and nuts (supplied with new top), in holes where rivets were removed. Fasten flap at both front and rear (shown).

1. Window flap 2. Weather strip 3. Rivets



Latch top into position on windshield.

Run cable thru eyelet just in front of rear anchor/adjustment point. Insert cable under adjustment bracket. Gradually pull back on cable 1/8 to 1/4 in. at a time until tension is such that about 1/2 in. play is obtained on side of top. Tighten adjustment screws once adjustment of cable is correct.

Finally, line up bows correctly in relation to top material, and glue loose material to bows. On vehicles so equipped, install protective plastic covers over bows.

FOLDING TOP FRAME/FABRIC

REMOVAL, INSTALLATION AND ADJUSTMENT

NOTE: If fabric only is to be removed, refer to preceding procedure.

Unhook windshield latches.

Remove both rear side panels, each held by two screws.

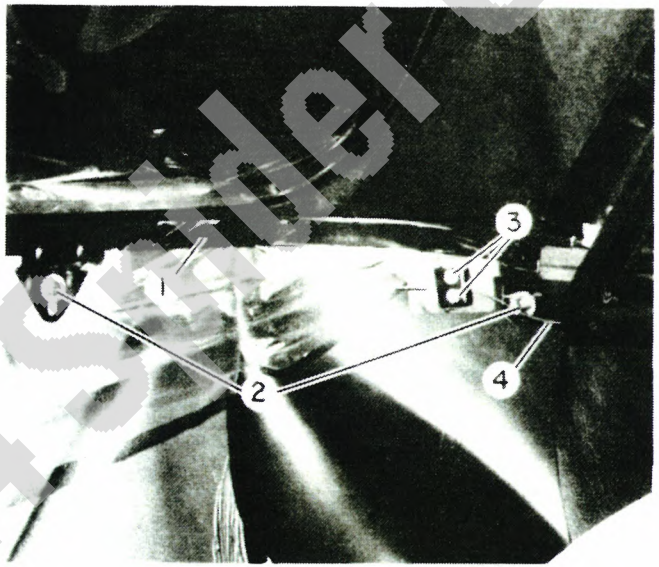
Remove rear molding (2) held by six screws (1).

1. Screw 2. Rear molding

Remove three screws (2) holding rear anchor bar (1).

Loosen two screws (3) holding each cable rear adjuster/retainer and pull cable (4) free.

1. Rear anchor bar 2. Screw 3. Screw 4. Cable

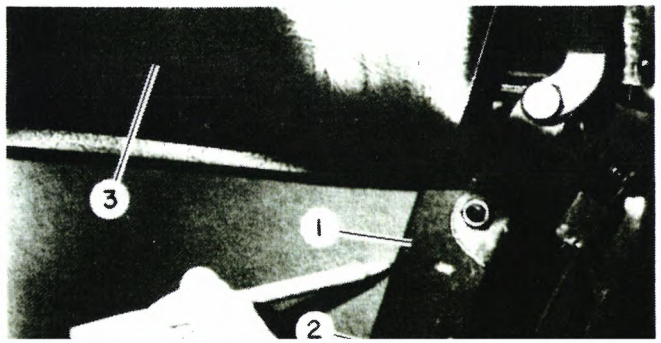


Lift flap (3) out of way.

Mark position of frame mount bracket (1) for reinstallation. Remove two allen head bolts (2) on each frame mount.

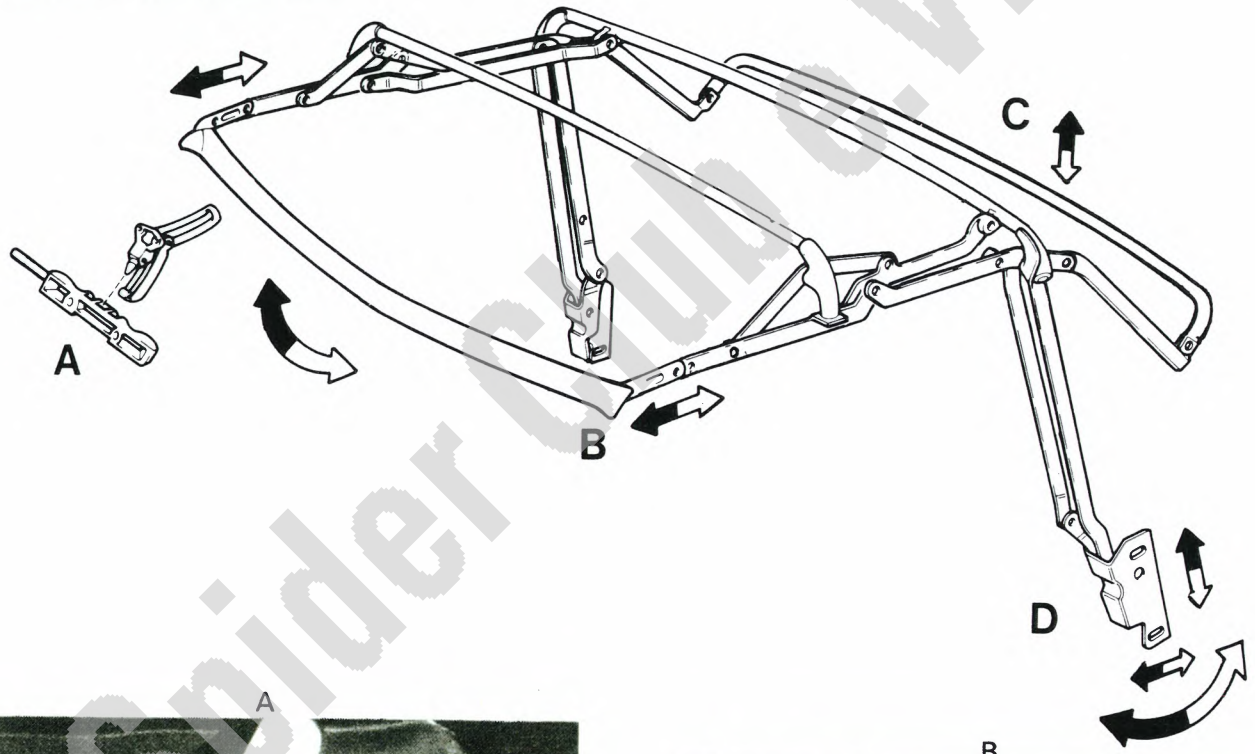
Remove entire top assembly by lifting up at rear bars. Note location and number of spacers behind frame mounts.

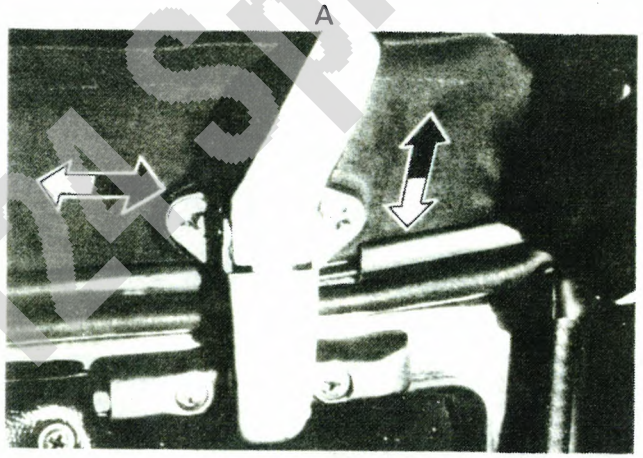
1. Frame mount bracket 2. Allen head bolt 3. Protective flap

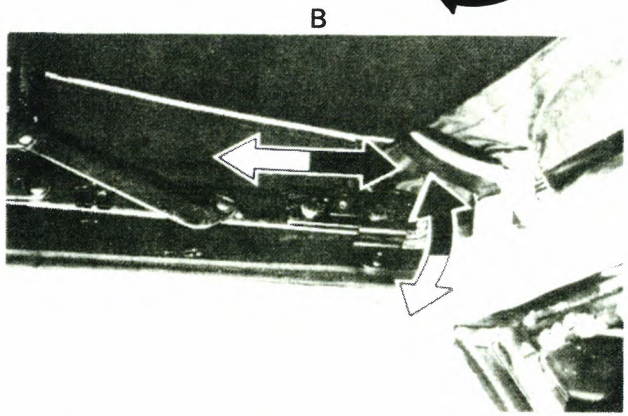


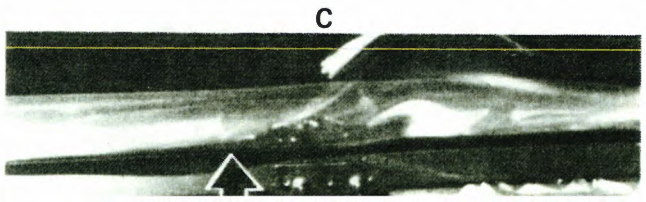
Installation is reverse of removal. Adjustments are provided at:

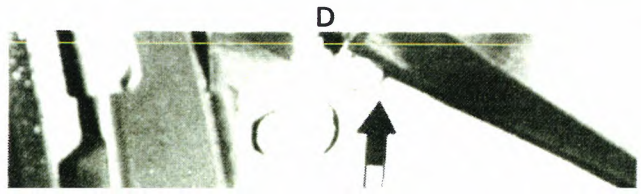
- Rear bow (up/down)
- Frame mounts (up/down, fore/aft, and pivot)
- Front latches (up/down, and left/right)
- Front bow (up/down, and fore/aft)











DOOR

REMOVAL AND INSTALLATION

If equipped with door radio speakers, remove speaker cover and four screws holding speaker. Disconnect speaker leads.

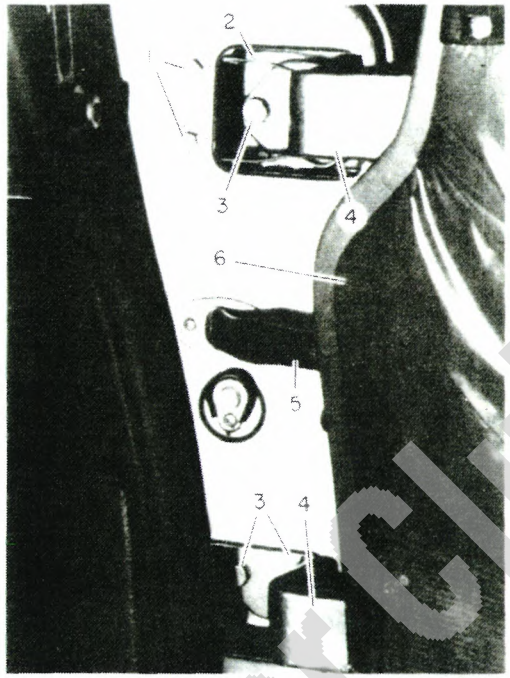
If equipped with power windows remove door trim panel (refer to Door Disassembly) and disconnect electrical leads.

Remove door check spring (2) by removing two bolts (1).

NOTE: Scribe position of door hinges for reinstallation.

Remove three bolts (3) on each hinge (4). Remove door, carefully feeding wire harness (5) thru door.

1. Bolt 2. Door check spring 3. Bolt 4. Hinge 5. Wire harness 6. Door



ADJUSTMENT

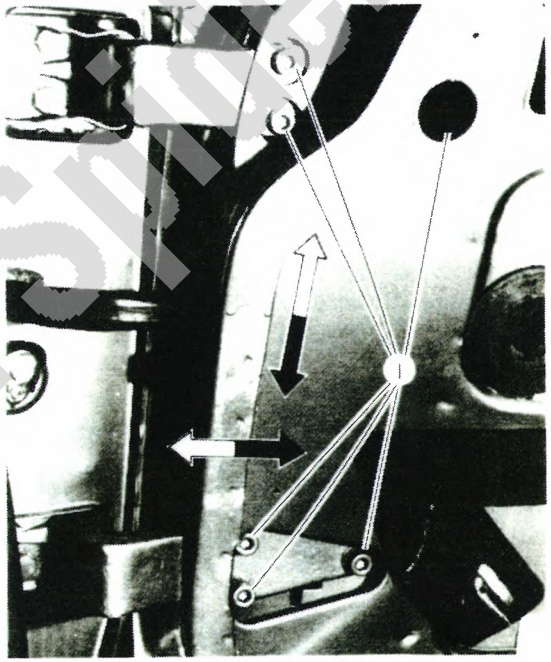
Fore/Aft and Up/Down

Remove door trim panel (refer to Door Disassembly).

Loosen three Allen head bolts (1) on each hinge and move door in desired direction.

If necessary, correct striker and door guide positions.

1. Allen head bolt



In/Out

Loosen three bolts (1) on each hinge (2) and move door in or out in desired direction.

If necessary, correct striker and door guide positions.

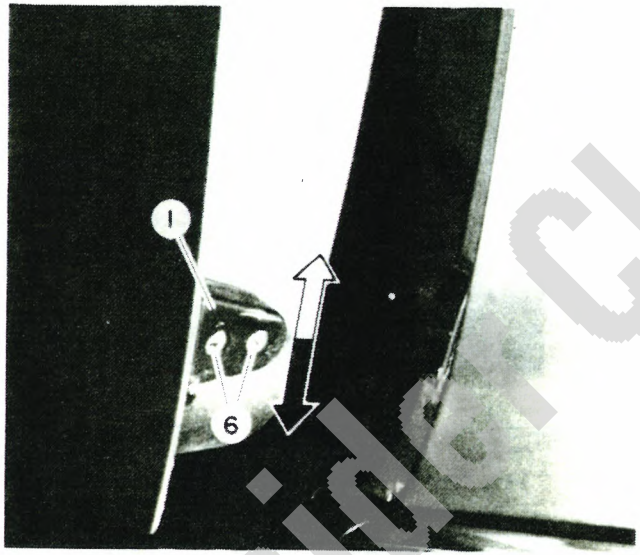
ADJUSTMENT

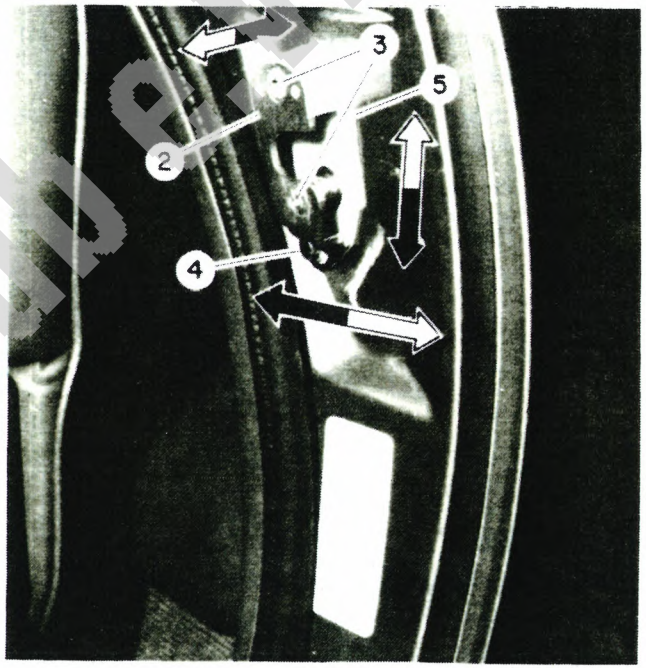
Striker Assembly and Door Guide

To adjust striker assembly (2) loosen two screws (3) and bolt (4) to adjust striker position up/down or in/out. Remove striker assembly and add or remove shims (5) to adjust fore/aft position.

If door rattles or is hard to open or close, with all other adjustments set, adjustment of door guide (1) will correct it. Loosen screws (6) and position guide up or down as needed.

1. Door guide 2. Striker assembly 3. Screw 4. Bolt 5. Shim 6. Screw





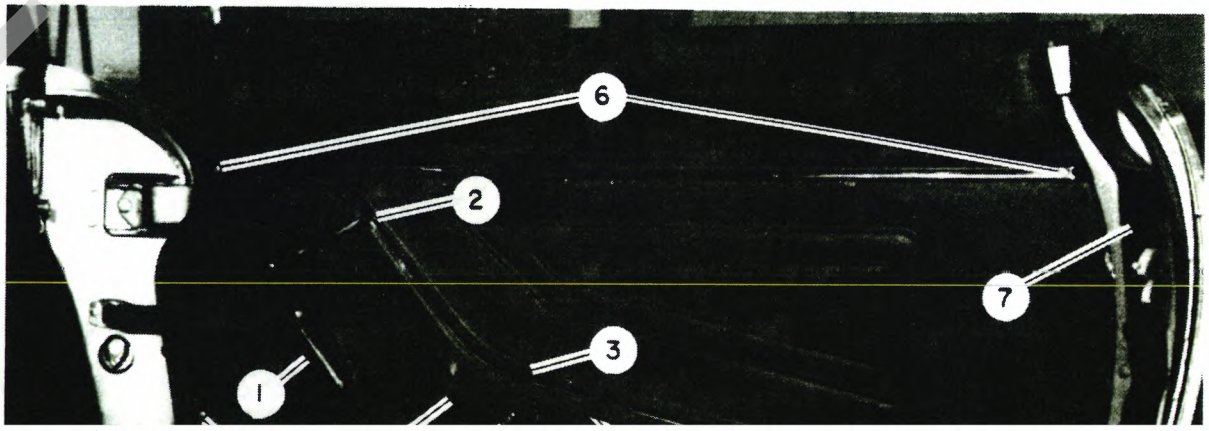
DISASSEMBLY AND REASSEMBLY

Door Trim Panel Removal and Installation

Remove window regulator handle (1) using tool A.78034. Remove three screws (2) holding arm rests (3). Remove screw (4) holding door latch handle (5). Remove five screws (6) holding door trim panel (7) and lift panel off.

Installation is reverse of removal.

1. Window regulator handle 2. Screw 3. Arm rest 4. Screw 5. Door latch handle 6. Screw 7. Door trim panel

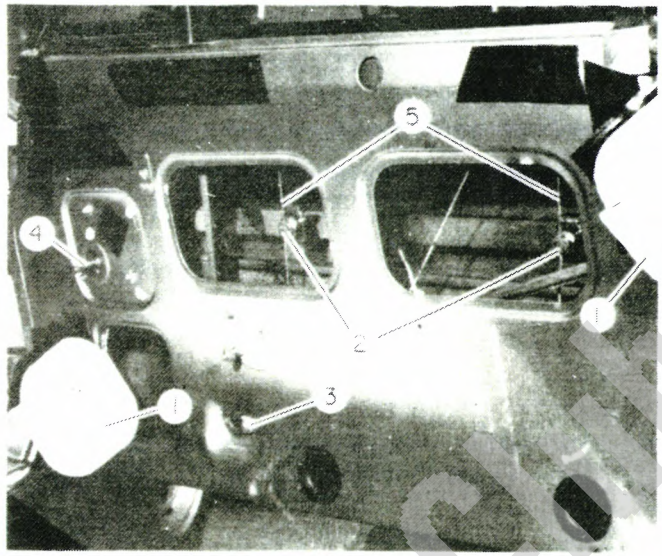


Window Regulator Removal (Power and Manual)

Untape and place protection shields (1) out of way.

Lower window until window cable retaining screws (2) are accessible. While providing support for window, loosen screws only enough to allow cable (5) to be withdrawn. Lower window in guides.

1. Protection shield 2. Screw 3. Tensioner bolt
4. Window regulator 5. Regulator cable



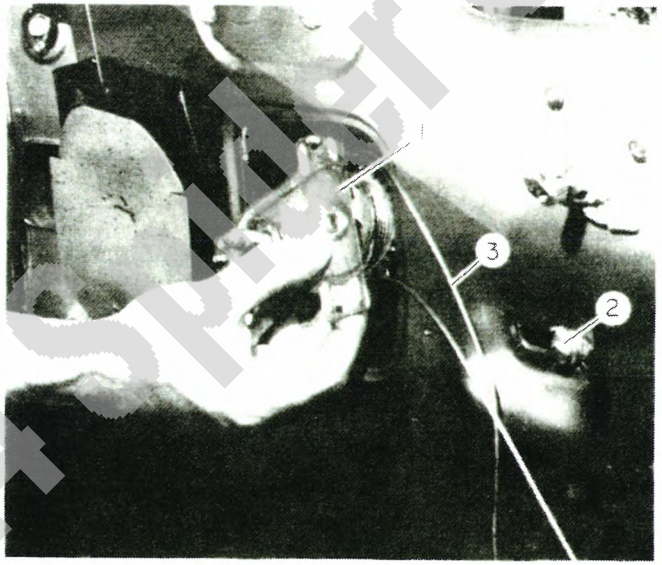
Loosen cable tensioner bolt (2).

Remove three nuts holding window regulator (1) to door.

CAUTION: If same regulator/cable assembly is to be reinstalled, first wrap cables together at regulator drum to prevent it from unraveling (refer to Installation below).

Remove cable (3) from pulleys and withdraw regulator assembly from door.

1. Window regulator 2. Tensioner bolt 3. Cable



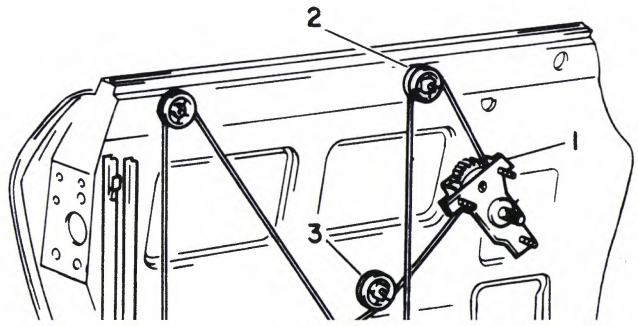
Window Regulator Installation (Power and Manual)

NOTE: Window regulators are interchangeable for either side.

CAUTION: Do not remove metal clip securing cable tightly against drum on new regulator until it is installed and has been strung on all pulleys. To do so will cause cable to unravel from drum.

Secure window regulator (1) to door with three nuts.

Start cable on top front pulley (2), then following diagram, over each pulley in turn. String cable on adjustable pulley (3)



Tighten lower pulley support (if loose). Slightly tension adjustable pulley.

At this point remove metal cable clip from regulator.

With adjustable pulley, tighten cable until all slack is removed.

Lubricate cable and pulleys with light grease.

Attach window to cables, checking to see that it has full travel in both directions and is positioned in guides correctly. Check for free operation of both window and regulator.

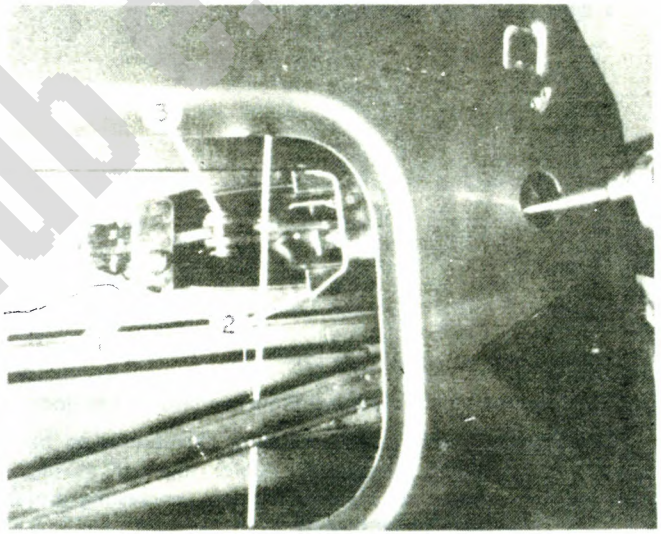
Outside Door Handle Removal and Installation

Place window in full up position.

From inside door, pry off plastic ball and socket door lock link.

Remove three nuts (1) and brackets (2) securing handle assembly (3) to door (gain access to two nuts thru hole as shown). Remove handle from outside.

Installation is reverse of removal.



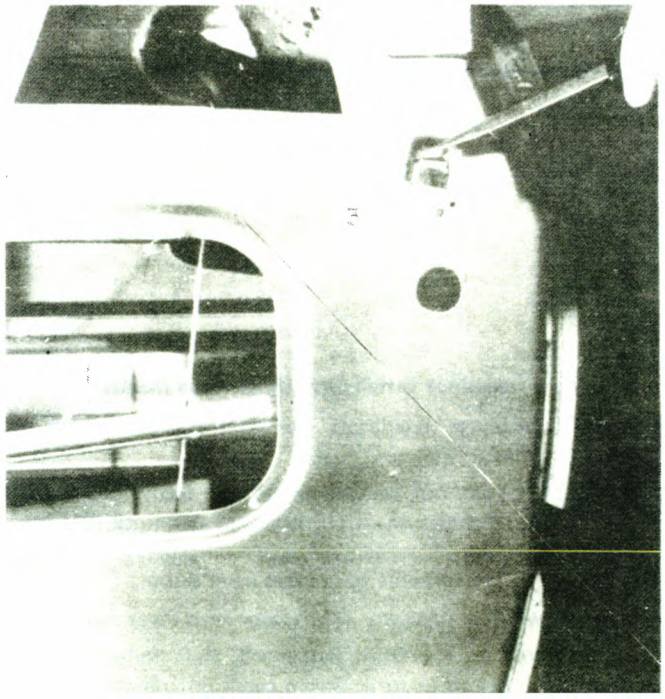
1. Nut 2. Bracket 3. Door handle assembly

Door Lock Mechanism Removal and Installation

Place window in full up position.

Remove plastic band from link arm (1) between door lock and door handle.

Remove nut holding window rear guide, thru lower access (2). With screwdriver at guide (3) upper anchor point, move guide down and out of way.



1. Link arm 2. Lower access to guide 3. Window guide upper anchor point

Remove three screws holding door handle mechanism (1) to door.

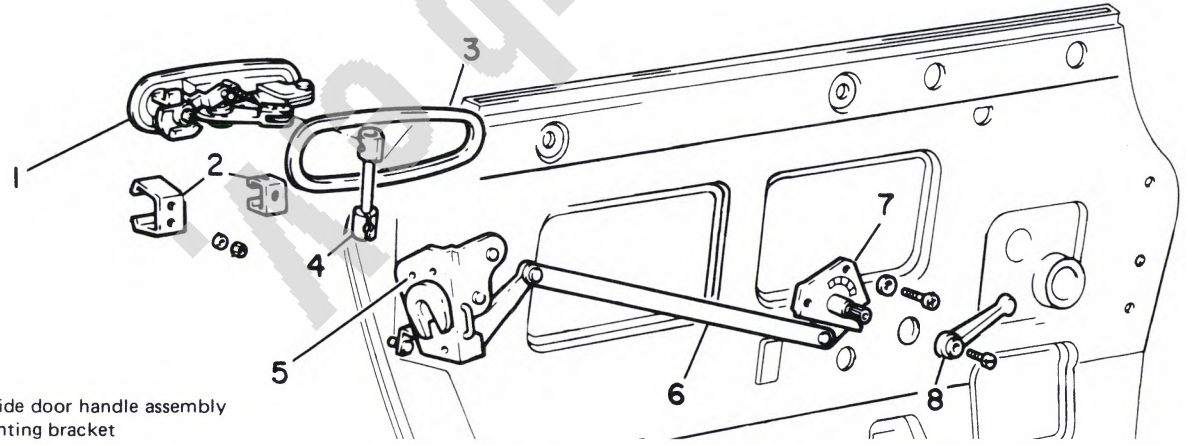
Remove three screws holding lock mechanism (2).

With window guide out of way, remove entire door handle/lock assembly thru door opening as shown.

Installation is reverse of removal.

NOTE: Make certain that plastic band is reinstalled on link arm (3).

1. Door handle mechanism 2. Latch/lock mechanism 3. Link arm



1. Outside door handle assembly
2. Mounting bracket

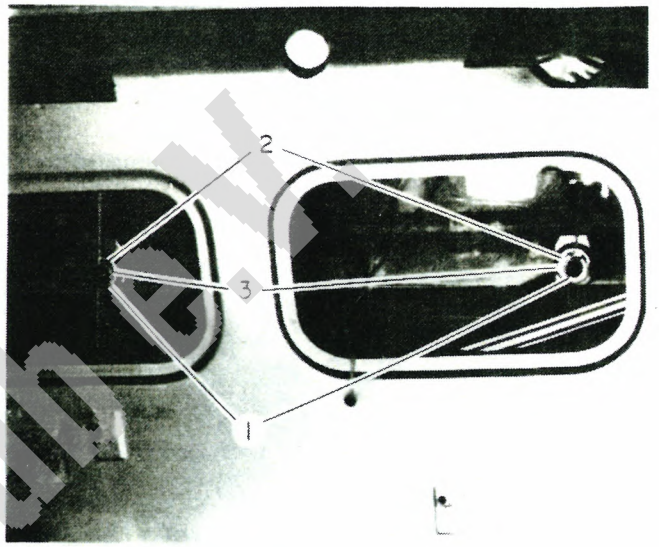
Sliding Window Removal and Installation

NOTE: Window can be removed without removing vent window frame.

Remove outer trim molding by pulling up off door, it is clipped to door.

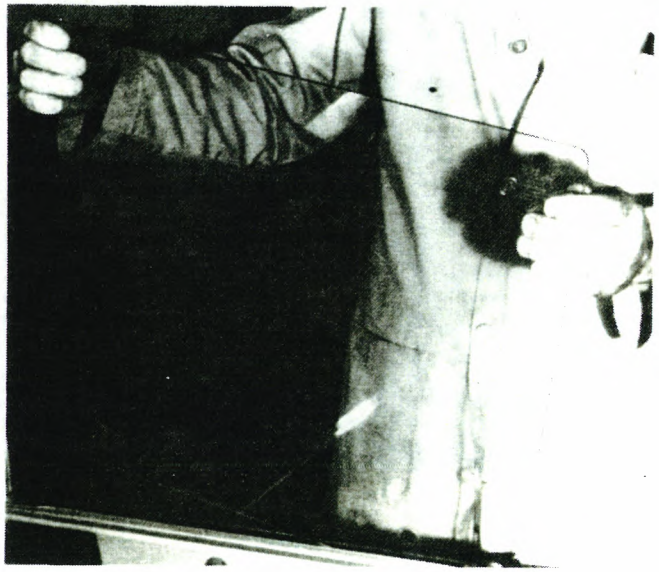
Raise or lower window until window cable retaining screws (1) are accessible. Mark position of cable (2) in relation to screws for installation.

From this point on provide support for window. Remove screws, bushings, upper stops, grommets and washers.



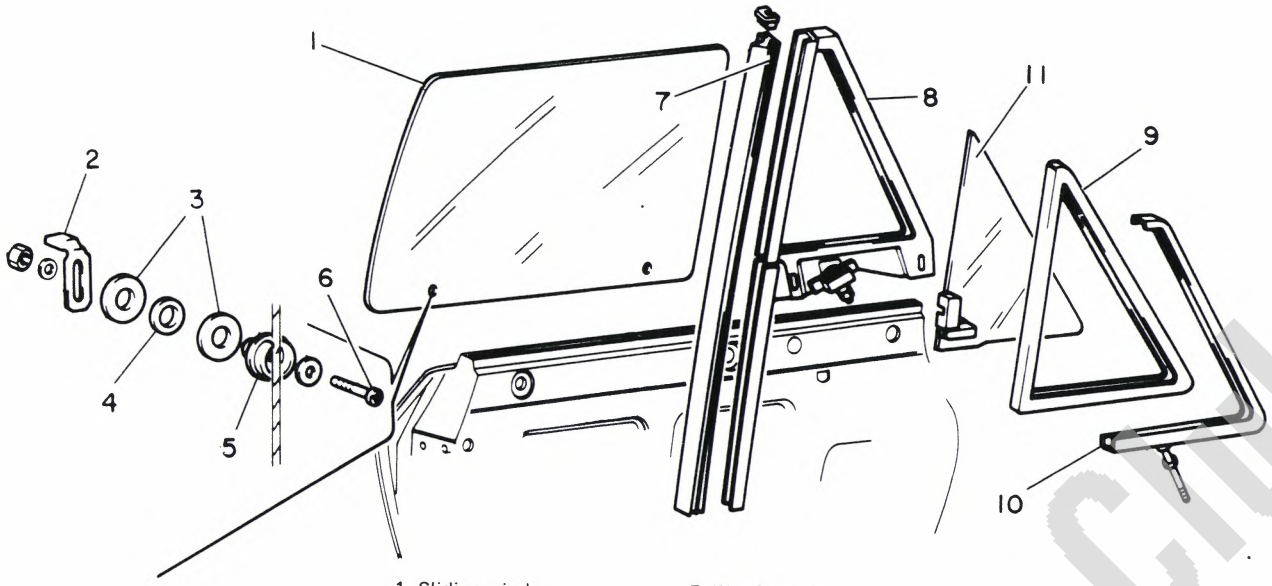
1. Screw 2. Regulator cable 3. Cable bushing

Lift window up and out as shown.



Installation is reverse of removal.

Adjust top and bottom stops if necessary. Upper stops are slotted for adjustment. Bottom rubber stop must be removed and shimmed to raise window, or rubber shaved off to lower it.



1. Sliding window
2. Upper stop
3. Grommet
4. Bushing
5. Cable bushing
6. Screw
7. Weatherstrip
8. Frame/guide
9. Weatherseal
10. Frame
11. Vent window

SLIDING WINDOW AND VENT WINDOW ASSEMBLY

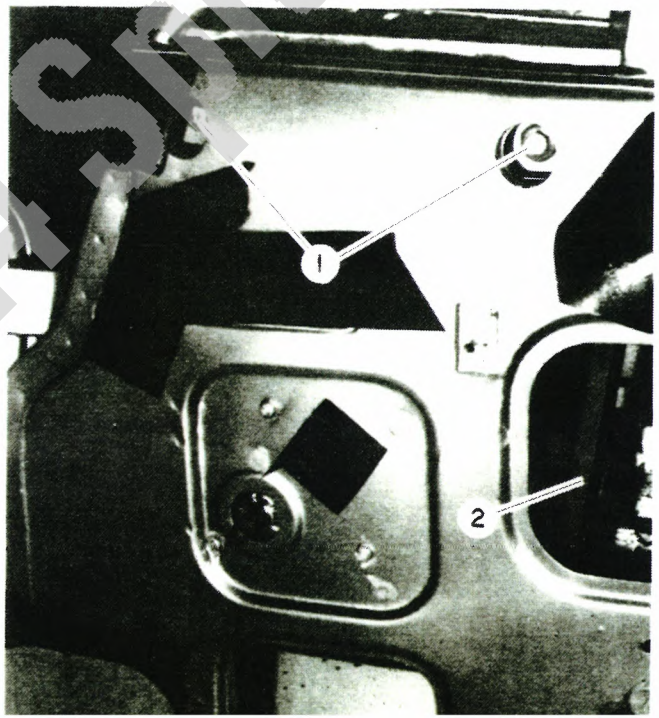
Vent Window Assembly Removal and Installation

NOTE: Vent window can be removed without removing sliding window.

Remove outer molding by pulling up off door, it is clipped to door.

Lower sliding window. Remove two bolts (1) and one nut on lower portion (arrow) of window guide (2).

1. Bolt 2. Window guide

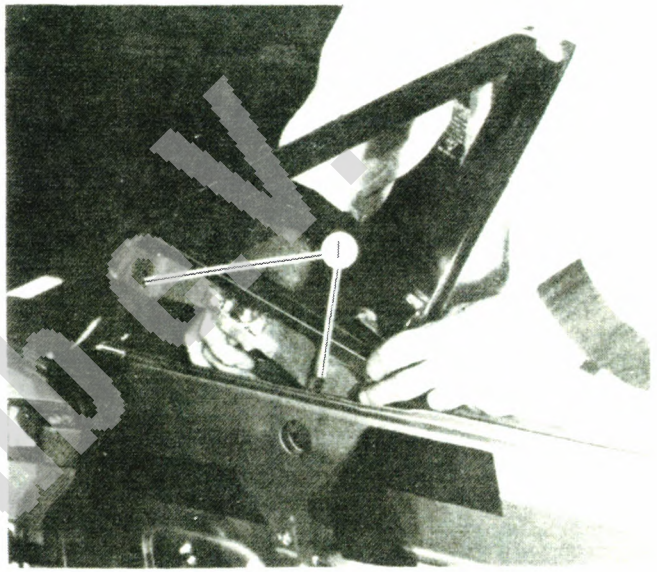


Carefully lift vent assembly out of door as shown.

Installation is reverse of removal.

Adjust to fit windshield frame. Adjustment is provided by two slots (1) for upper mounting bolts.

1. Adjustment slots

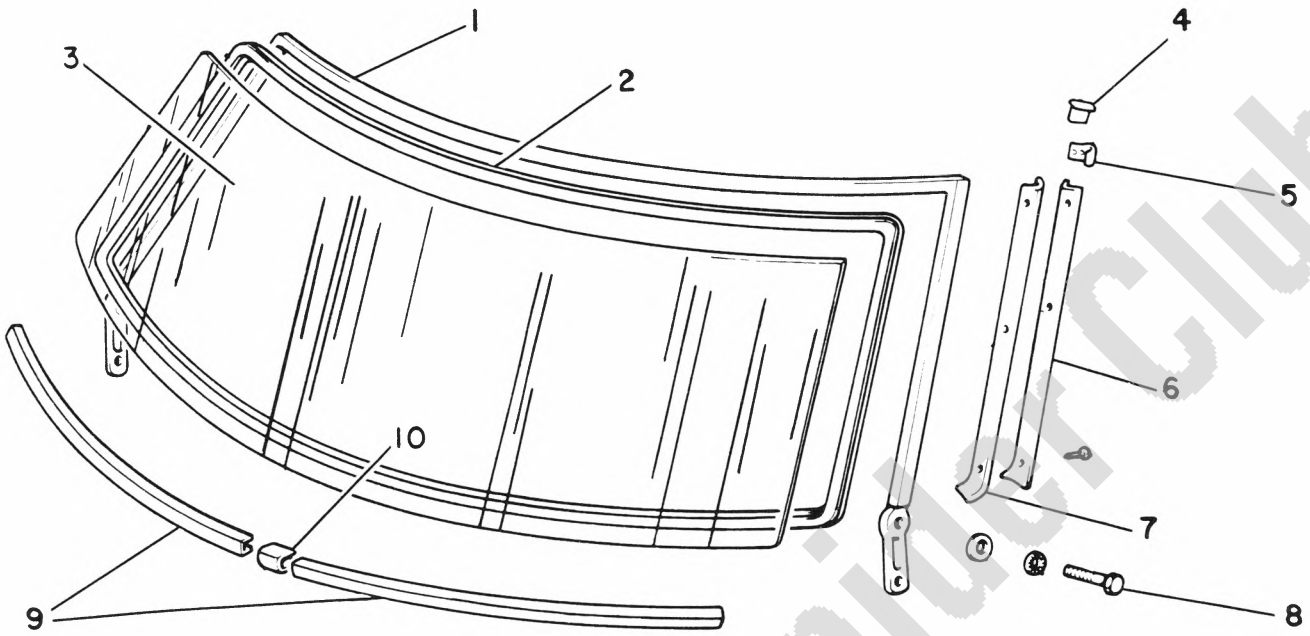


WINDSHIELD ASSEMBLY

REMOVAL AND INSTALLATION

Pull door to windshield weatherstrip away from windshield. Remove one screw holding each filet at instrument panel end. Remove two Allen head bolts on each side of windshield. Carefully lift windshield assembly off.

Installation is reverse of removal. Adjustment is provided by elongated mounting holes on frame.



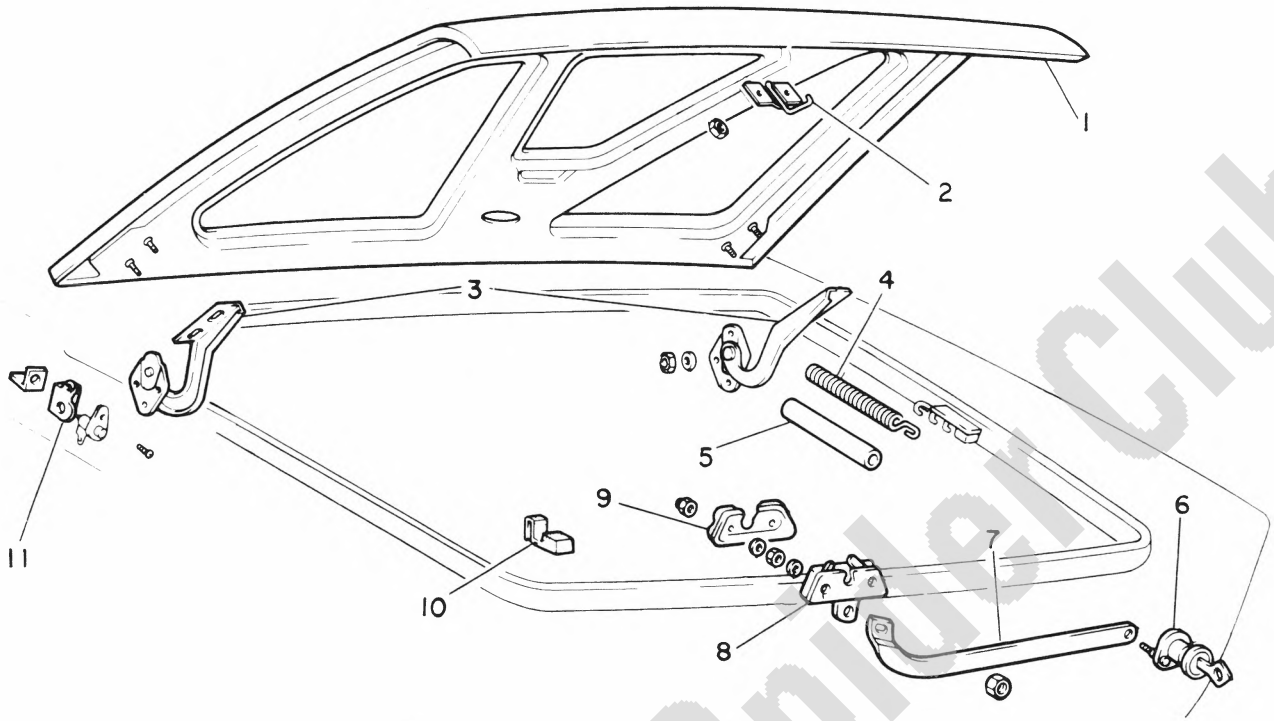
1. Windshield frame
2. Weatherstrip
3. Windshield
4. Boot
5. Retainer
6. Channel
7. Weatherstrip
8. Allen head bolt
9. Channel
10. Plate

WINDSHIELD ASSEMBLY

REMOVAL, INSTALLATION AND ADJUSTMENT

Remove four nuts holding trunk lid to hinges and remove lid. Installation is reverse of removal.

Lift tension of lid can be adjusted by moving spring (4) forward or aft in adjustment slots. Position of lid can be adjusted thru slots in hinges (3). Trunk lock (8) and striker (2) can both be adjusted to change closing and opening tension.



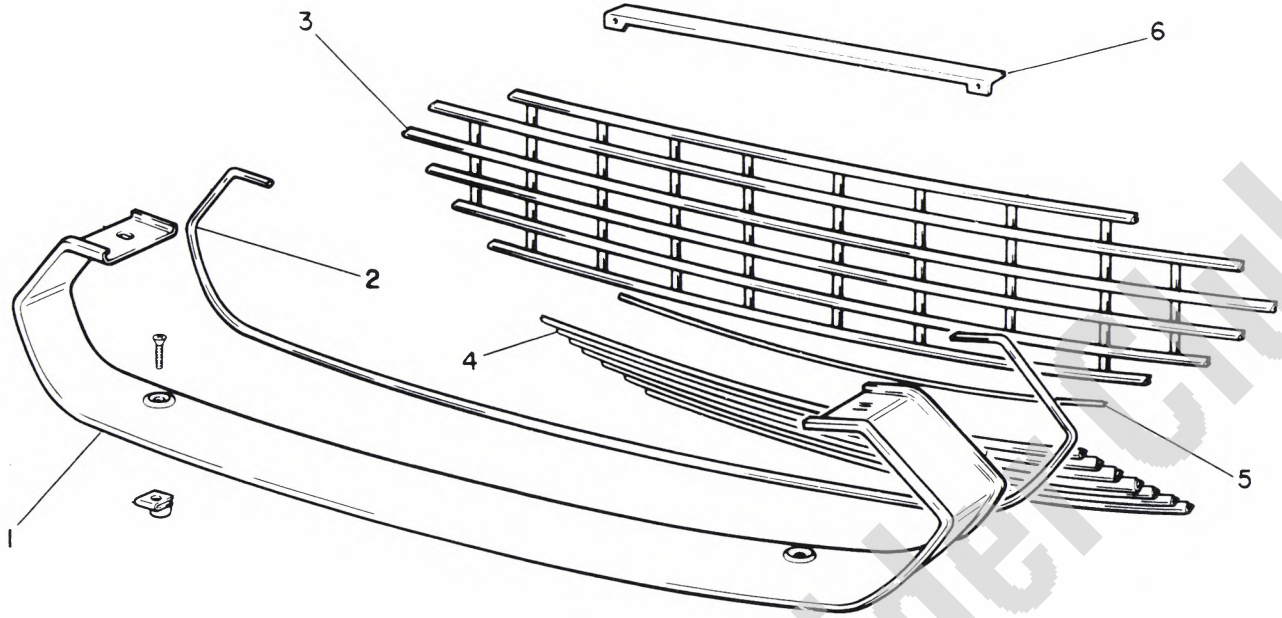
1. Trunk lid
2. Striker plate
3. Hinge
4. Lift spring
5. Spring cover
6. Lock cylinder
7. Tie rod
8. Lock
9. Cover
10. Rubber pad
11. Bracket

TRUNK LID ASSEMBLY

REMOVAL AND INSTALLATION

Remove four screws securing frame and grill to body. Withdraw frame and grill. To remove lower grill, remove two screws.

Installation is reverse of removal.



1. Grill frame
2. Weatherstrip
3. Upper grill
4. Lower grill
5. Gasket
6. Bracket

RADIATOR GRILL ASSEMBLY

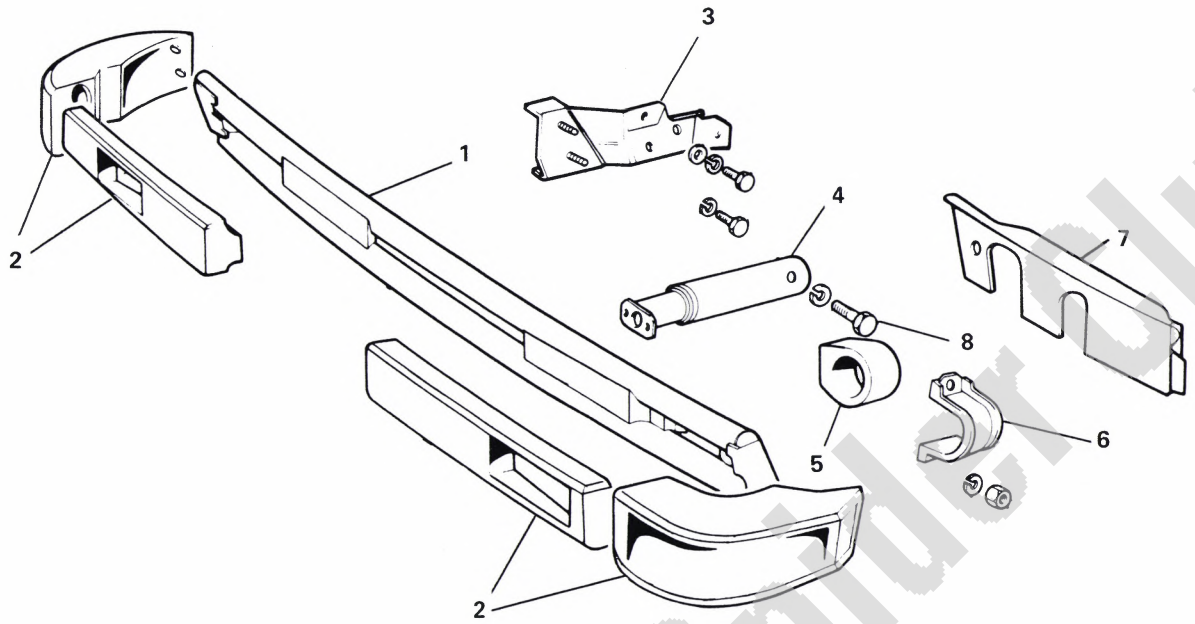
REMOVAL AND INSTALLATION

Remove screw and nut holding both plastic covers (7) to bumper (1). Remove two nuts holding each signal light assembly. Place light assembly behind bumper.

Remove two nuts holding bumper to each shock absorber (4) and remove bumper.

Remove bumper shock absorbers by removing one bolt (8) on each and withdrawing shock absorber.

Installation is reverse of removal.



1. Bumper
2. Protective pads
3. Mounting bracket
4. Shock absorber
5. Pad
6. Bracket
7. Plastic cover
8. Mounting bolt

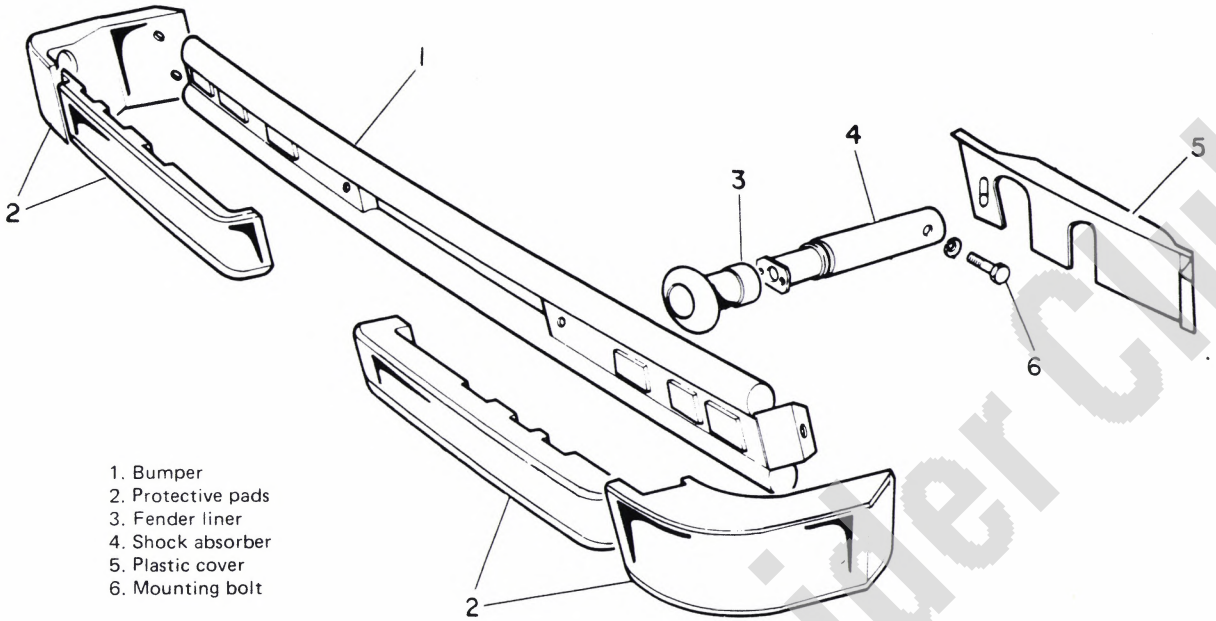
FRONT BUMPER ASSEMBLY

REMOVAL AND INSTALLATION

Remove two nuts holding bumper to each shock absorber (4) and remove bumper.

To remove bumper shock absorbers, first open trunk and remove covers to spare tire and fuel tank. Remove one bolt (6) on each side holding shock absorber. Withdraw shock absorber.

Installation is reverse of removal.



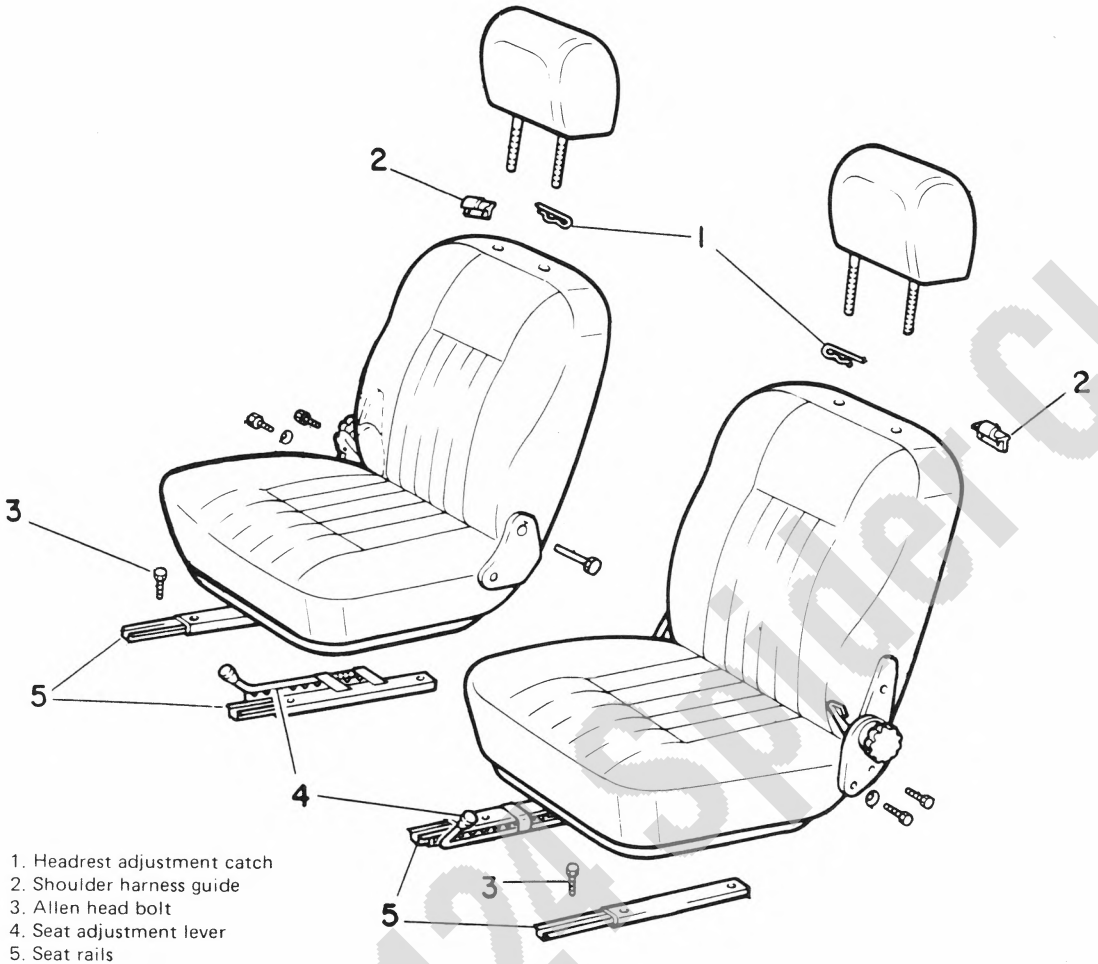
1. Bumper
2. Protective pads
3. Fender liner
4. Shock absorber
5. Plastic cover
6. Mounting bolt

REAR BUMPER ASSEMBLY

REMOVAL AND INSTALLATION

Place seat in full rear position. Remove two Allen head bolts, one on each rail. Place seat in full forward position. Remove two Allen head bolts, one on each rail. Remove seat.

Installation is reverse of removal.



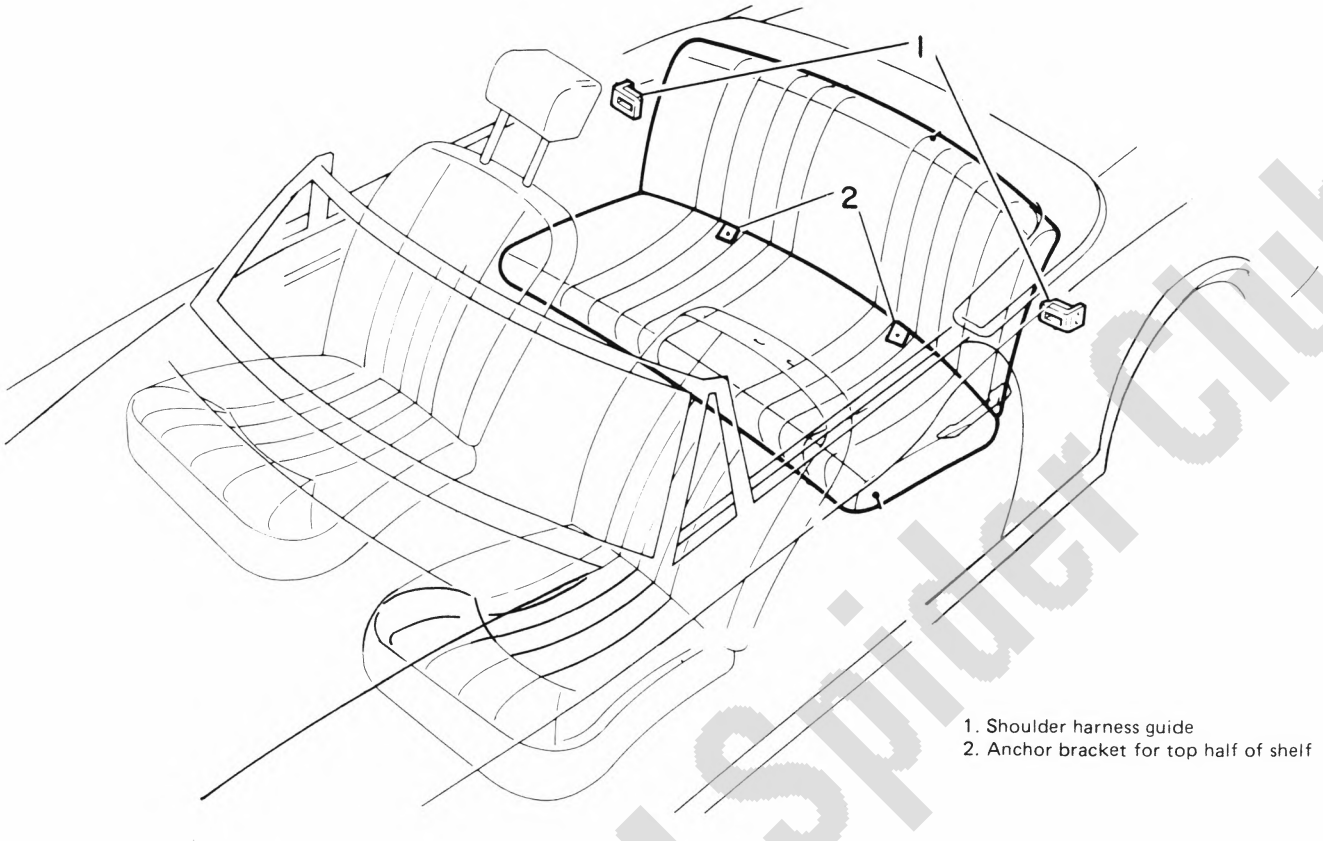
1. Headrest adjustment catch
2. Shoulder harness guide
3. Allen head bolt
4. Seat adjustment lever
5. Seat rails

FRONT SEATS

REMOVAL AND INSTALLATION

To remove bottom half of shelf, lift up and out. To remove top half of shelf, remove two screws on bottom brackets and pull shelf down and out.

Installation is reverse of removal.



1. Shoulder harness guide
2. Anchor bracket for top half of shelf

PACKAGE SHELF

CENTER CONSOLE (1982 and Prior)

REMOVAL AND INSTALLATION

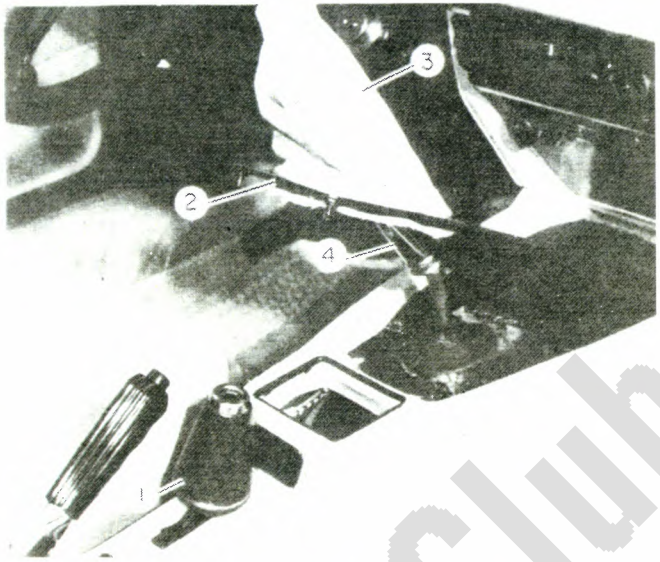
NOTE: On vehicles with leather interior the upper and lower halves of the center console must be removed together.

On manual transmission vehicles, unscrew gearshift knob (1).

On vehicles with A.C. swing evaporator down and remove A.C. control panel.

Using your fingers, reach through boot and pry up on rear of console cover (2) to unsnap fasteners. Lift cover up, along with boot (3), over gearshift lever (4).

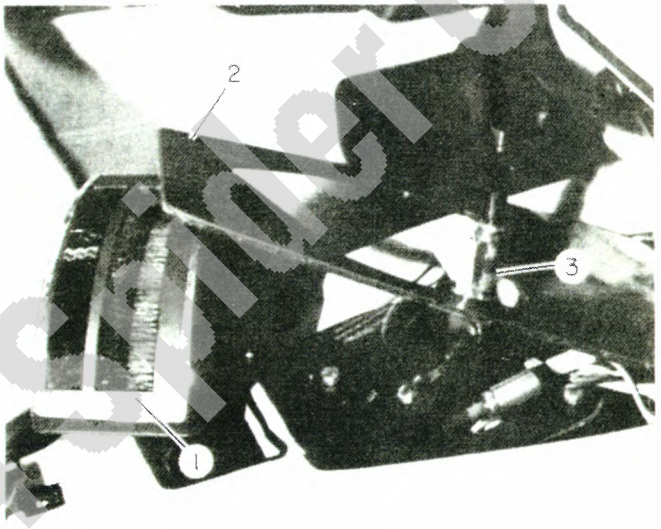
Remove radio from upper half of center console.



1. Gearshift knob 2. Console cover 3. Gearshift boot 4. Gearshift lever

On automatic transmission vehicles, remove two screws holding selector lever cover (1).

Unsnap rear of console cover (2) and lift out and up to remove.



1. Selector lever cover 2. Console cover 3. Selector lever

Slack off emergency brake cable adjustment from underside of vehicle (refer to Brake Section). Brake handle must be raised high enough for console removal clearance.

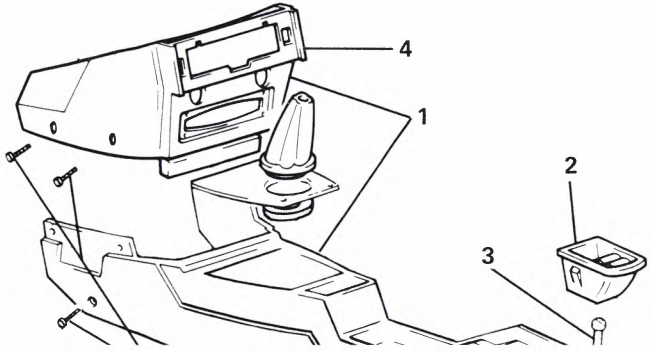
On vehicles with vinyl interior, remove lower half of center console as follows:

Remove screws (3) at front of console (1).

Remove coin holder (2) at rear of console to remove rear screw.

Lift console up and carefully pull back to remove it.

Installation is reverse of removal.



On vehicles with leater interior, remove both halves of center console (1) together as follows:

Remove radio (if installed) or radio blanking plate. Reaching through radio opening, disconnect wires to items in upper half of center console.

Remove attaching plug (4) at front of center console (1).

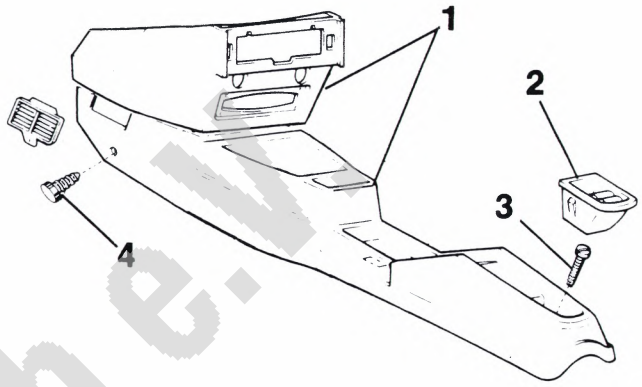
Remove coin holder (2) at rear of console.

Remove rear screw (3).

Lift console up and carefully pull back to remove it.

Installation is reverse of removal.

1. Center console 2. Coin holder 3. Screw 4. Attaching plug



CENTER CONSOLE (1983 and ON)

REMOVAL AND INSTALLATION

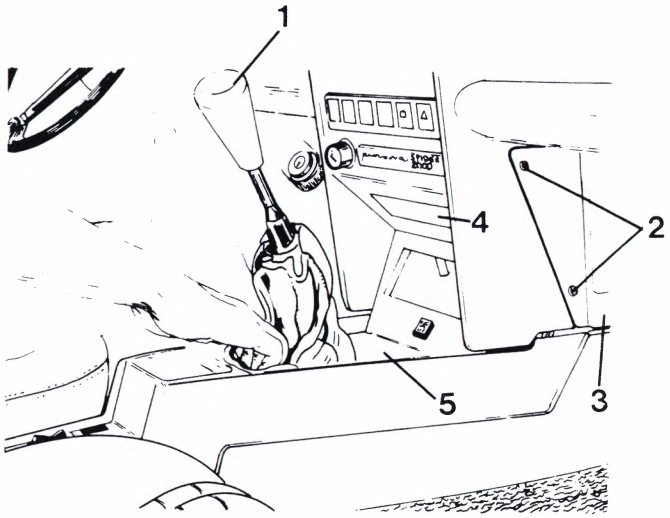
Remove instrument cluster as directed in ELECTRICAL SECTION. Remove radio. Remove ash tray. Remove gearshift knob (1).

Remove gearshift cover (5) by carefully pulling up cover through gearshift boot as shown.

Carefully pry interior light assembly out of console. Disconnect wires from light assembly.

Remove two screws (2) holding left and right side panels (3) to the console. Remove panels.

1. Gearshift knob 2. Screw 3. Side panel 4. Interior light
5. Gearshift cover

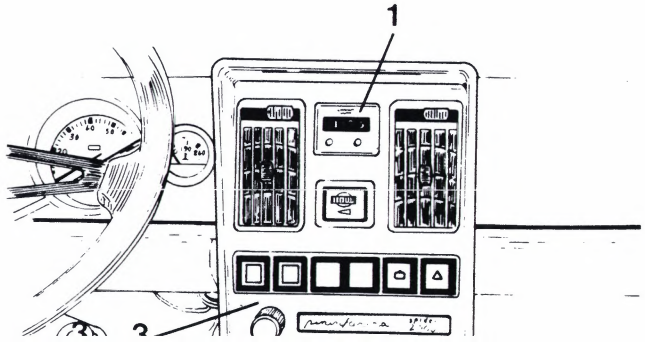


Carefully pry digital clock (1) out of console. Disconnect clock and remove it.

Remove screw located in the upper rear of the clock opening.

Remove two screws (2) located in the interior light opening, holding the center switch panel (3).

1. Digital clock 2. Screw 3. Switch panel



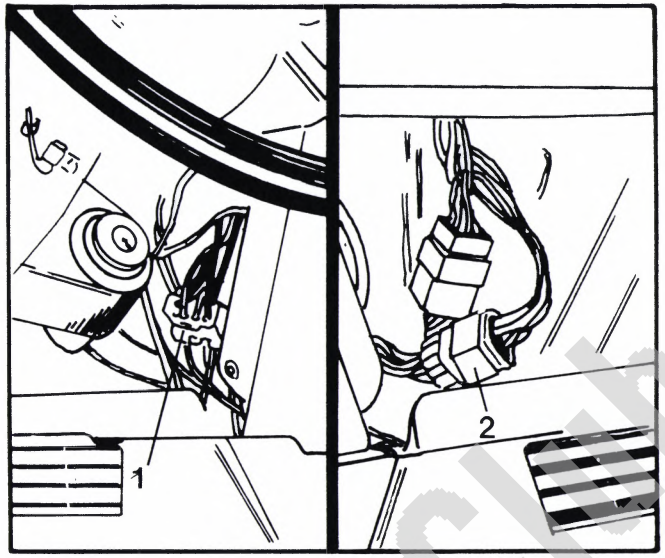
Reaching through right side of center console, disconnect large main connector (1) (C35).

Reaching through left side of center console, disconnect large main connector (2) (C36).

Carefully pull the center switch panel out enough to disconnect the instrument cluster dimmer connector.

Remove center switch panel, complete with switches and air louvers.

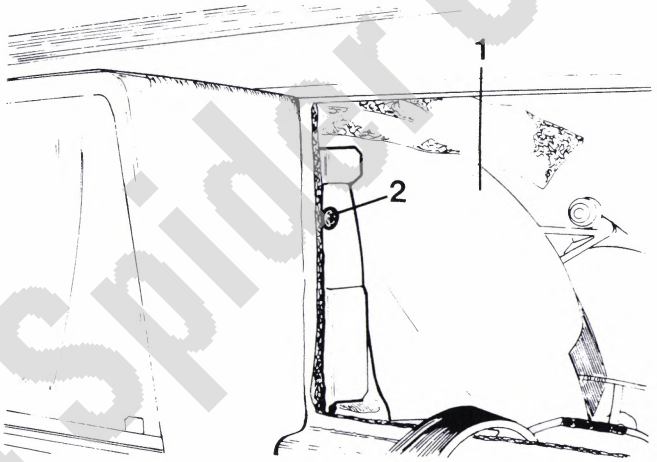
1. Main connector (C35) 2. Main connector (C36)



Open glove box door. Remove two bolts holding latch in glove box. Remove bolt in lower center of glove box. Remove glove box.

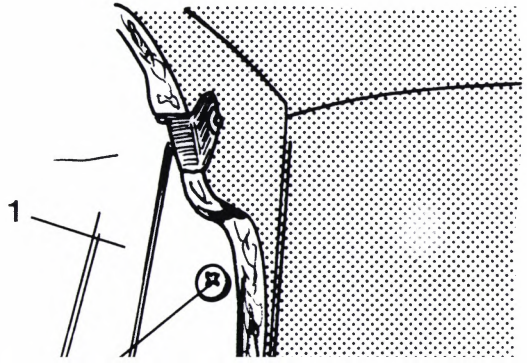
Remove screw (2) through glove box opening (1) securing center console to dash panel.

1. Glove box opening 2. Screw



Remove screw (2) through instrument cluster opening (1), holding upper part of center console to dash panel.

1. Instrument cluster opening 2. Screw



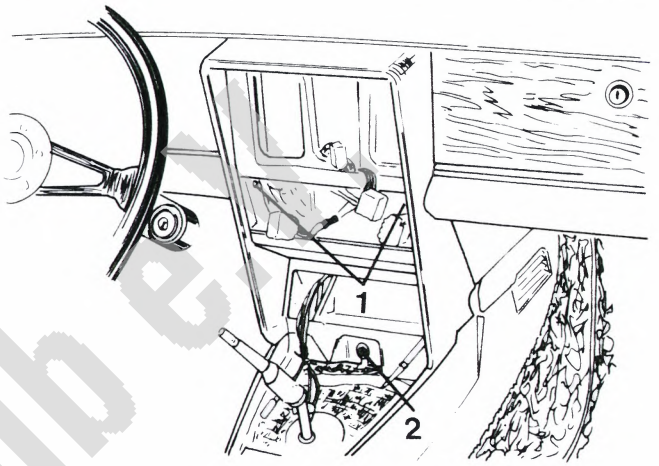
Remove two screws (1) (left and right side) located through center opening of console holding sides of console to dash panel.

Remove hex head nuts located at the base of the center console.

Remove center console from dash panel.

Installation is reverse of removal.

1. Screw 2. Nut



TUNNEL CONSOLE

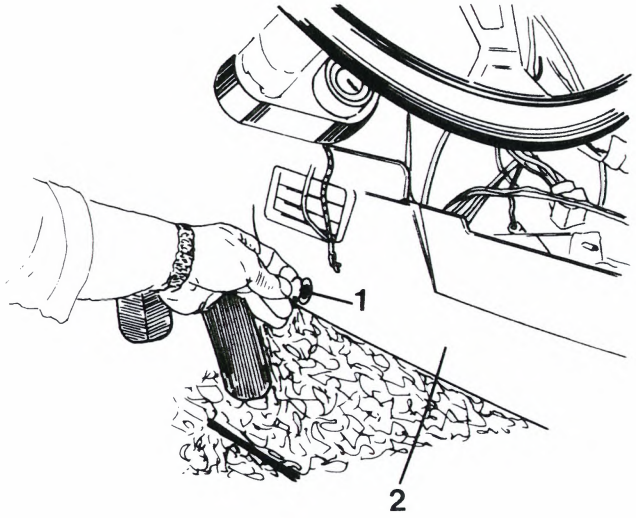
REMOVAL AND INSTALLATION

Remove center console as directed above.

Remove plastic plugs (1) located at the front left and right sides of the tunnel console (2).

Remove plastic coin cup at the rear of the tunnel console and remove the screw in the cup opening.

1. Plastic plug 2. Tunnel console



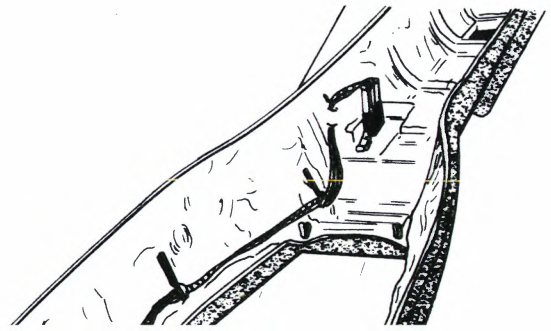
Disconnect three heater fan switch connectors (1) located at the front of the tunnel console.

Pull the hand brake lever all the way up.

Pull up on rear of console and remove console from car.

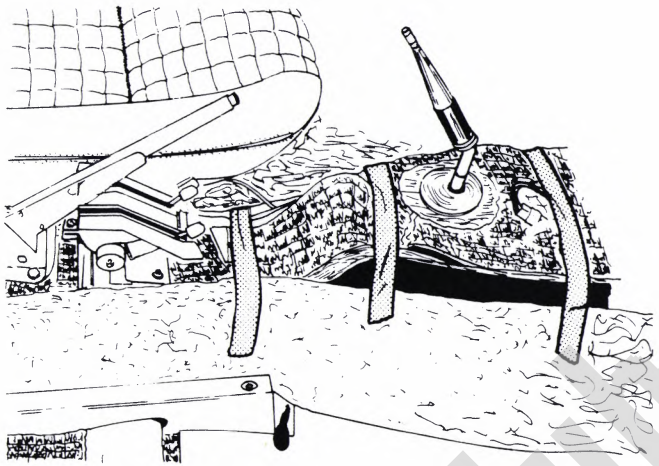
NOTE: It may be necessary to loosen the hand brake tension so lever can be raised to clear console.

1. Heater fan switch connectors



Before installing the tunnel console, run tape along the top of the floor pump to the top edges of the carpet at the front, center, and rear of the tunnel console area. This will keep the carpet from falling when you reinstall the console.

Installation is reverse of removal.

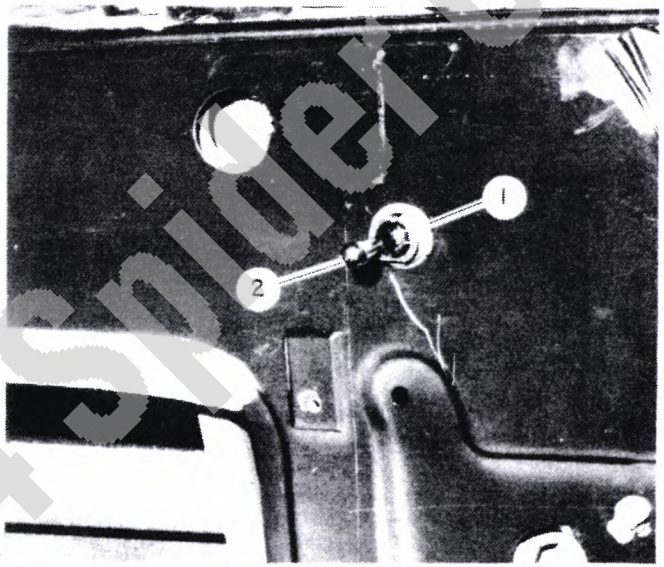


REMOTE CONTROL SIDE-VIEW MIRROR (1982 and Prior)

REMOVAL AND INSTALLATION

Remove door trim panel (refer to procedure in this section).

Remove circlip (1) holding mirror actuator (2) to door.



1. Circlip 2. Mirror actuator

Remove two bolts (1) holding mirror assembly to door. Remove mirror and actuating control cable (2) thru door.

Installation is reverse of removal.

1. Bolt 2. Control cable

INSIDE REAR VIEW MIRROR

REMOVAL AND INSTALLATION

Inside rear view mirror is of the safety break-away type and is clipped on to windshield mount. To remove, pull it away from windshield. To install, position mirror in place and push it firmly home.

SEAT BELT ASSEMBLY

REMOVAL AND INSTALLATION

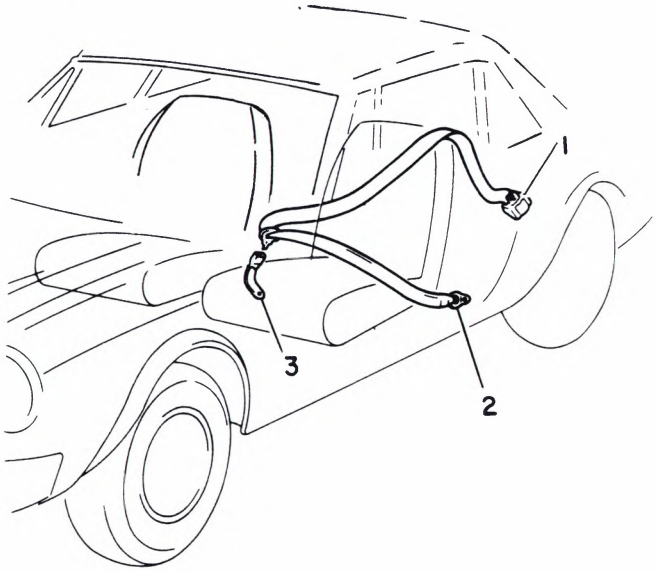
Remove rear shelf back by removing two screws at bottom of shelf back. Pull shelf back down and out.

Remove two bolts holding reel assembly (1) to body.

Remove bolt holding belt bracket (2) to body.

Remove bolt holding belt buckle assembly (3) to body.

Installation is reverse of removal.



1. Reel assembly 2. Belt bracket 3. Belt buckle assembly

A.78034 Door handle retaining clip removal tool