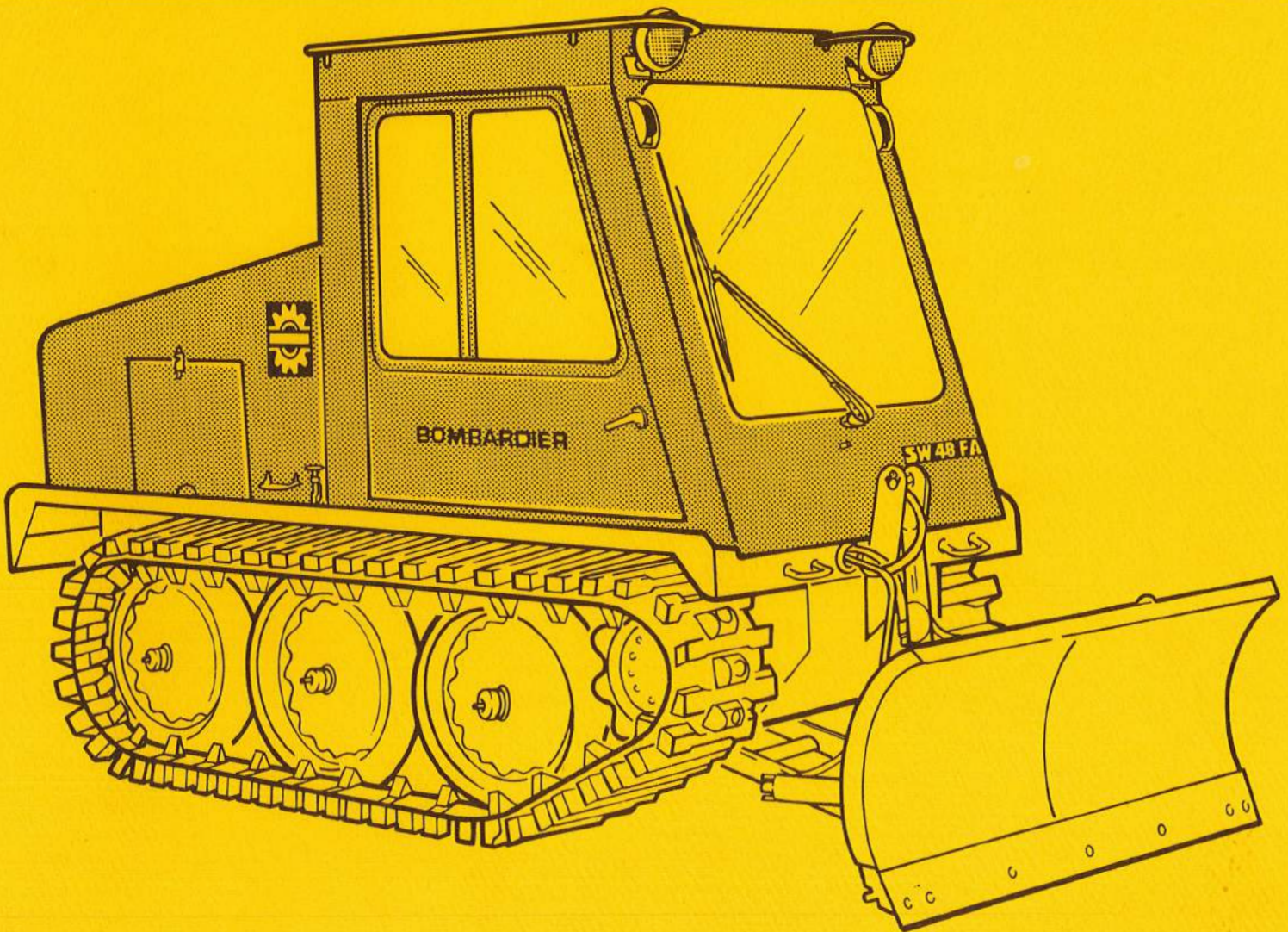


# SW-48 FA DA

## SHOP MANUAL









# **SW-48 FA DA**

## **SHOP MANUAL**

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# FOREWORD

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This Bombardier Shop Manual has been prepared as a guide to correctly service and repair the SW-48 FA/DA. The content of this manual depicts parts and procedures applicable to this particular product at its time of manufacture. It does not includes dealer modifications, whether authorized or not by Bombardier, after the product manufacture.

This edition was primarily published to be used by mechanics who are already familiar with Bombardier industrial vehicles.







# SAFETY NOTICE

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This manual emphasizes particular information denoted by the wording and symbols;

◆ **WARNING:** Identifies an instruction which, if not followed, could cause personal injury.

▼ **CAUTION:** Denotes an instruction which, if not followed, could severely damage vehicle components.

○ **NOTE:** Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use.

◆ **WARNING:** This information relates to repairing and servicing this Bombardier SW-48 FA/DA industrial vehicle and has been utilized safely and effectively by Bombardier Inc.. However, Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

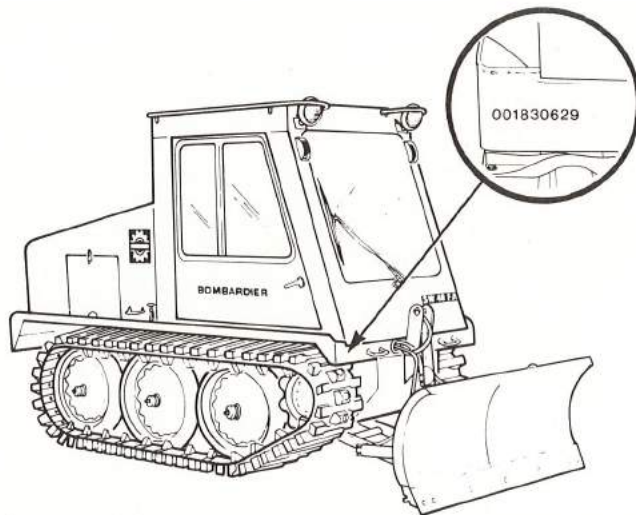




# INTRODUCTION

This Shop Manual covers the Bombardier SW-48 FA/DA industrial vehicle.

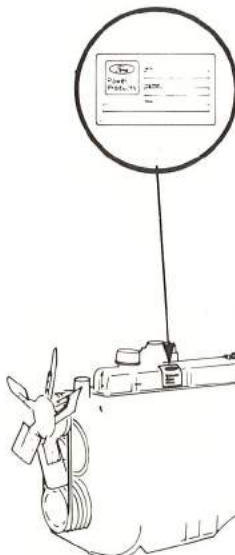
Each vehicle has its particular serial number.



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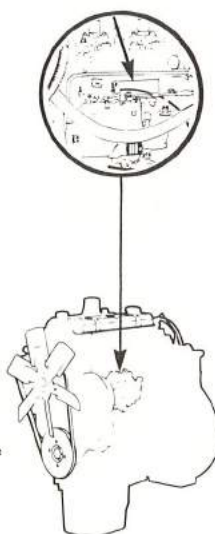
The engine has also a serial number.

SW-48 FA



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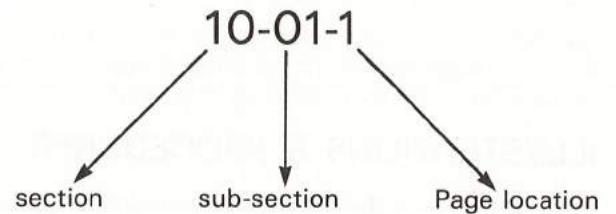
SW-48 DA



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## DEFINITION OF NUMBERING SYSTEMS

The manual makes use of a 3-part digital numbering system (i.e. 10-01-1), in which the first digit represents the section, the second digit the sub-section and the last digit the page location.



## ARRANGEMENT OF THE MANUAL

The manual is divided into fourteen (14) major sections:

- 10 Engine
- 20 Transmission
- 60 Differential
- 70 Final drive
- 80 Brake
- 90 Suspension
- 110 Track
- 130 Steering
- 140 Electrical
- 150 Cab, controls & frame
- 160 Hydraulic system
- 170 Scraper & push frame
- 310 Technical data
- 320 General trouble shooting
- 330 Service products
- 340 Tools

Each section is divided in various sub-sections.



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## GENERAL

The information, illustrations and components/system descriptions contained in this manual are correct at time of publication. Bombardier Inc. however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Bombardier Inc. reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

## ILLUSTRATIONS & PROCEDURES

Exploded views in this manual are provided to assist the user in identifying parts and components.

This shop Manual uses technical terms which may be slightly different from the ones of the parts catalog.

When ordering parts always refer to the parts catalog.

The illustrations show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, **you read and thoroughly understand the entire section or subsection in which the procedure is contained.**

A number of procedures throughout the book require the use of special tools. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

This manual is published by the

Technical Publications

Bombardier Inc.

Valcourt, Quebec, Canada

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# WARRANTY

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## LIMITED WARRANTY "SW"® SERIES

### 1 - PERIOD

BOMBARDIER® INC., as manufacturer, warrants FROM THE DATE OF FIRST SALE OR RENTAL TO USER/OWNER every "SW"® industrial vehicle sold or rented as new and unused by an authorized Industrial Equipment distributor for a period of:

- 12 consecutive months or
- 1000 hours

whichever first occurs, excluding the specific components mentioned in paragraph 6.

### 2 - WHAT BOMBARDIER WILL DO

BOMBARDIER will repair and/or replace, at its option, components defective in material and/or workmanship (under normal use and service) with a genuine BOMBARDIER component without charge for parts, through any authorized BOMBARDIER industrial distributor during said warranty period.

Bombardier reserves the option to periodically visit end users to evaluate vehicle, distributor and company performance.

### 3 - CONDITION TO HAVE WARRANTY WORK PERFORMED

Present to the servicing distributor, your copy of the BOMBARDIER Warranty Registration card received from the selling distributor at time of purchase.

**NOTE:** In instances where discrepancies relating to date of sale, date of first demo. or date of rental occur, BOMBARDIER reserves the right to deny and/or charge back any warranty cost occurred outside the original warranty period.

### 4 - WARRANTY TRANSFER

This warranty is transferable to subsequent owner(s) for remainder of warranty period from original date of sale or rental.

### 5 - EXCLUSIONS - ARE NOT WARRANTED

- Normal wear on all items such as, but not limited to:
  - bulbs
  - tires
  - sprockets
  - windshield
  - glasses
  - mirrors
  - wipers



- 
- Replacement parts and/or accessories which are not genuine BOMBARDIER parts and/or accessories.
  - Damage resulting from installation of parts other than genuine BOMBARDIER parts.
  - Damage caused by failure to provide proper maintenance as detailed in the Operator's Manual. The labour, parts and lubricants costs of all maintenance services, including tune-ups and adjustments will be charged to the owner.
  - All optional accessories installed on the vehicle by the distributor and/or a private contractor.
  - Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
  - Damage resulting from operation of the vehicle on terrain and/or conditions not intended for by vehicle design.
  - Damage resulting from modification to the vehicle not approved in writing by BOMBARDIER.
  - Damaged caused by a failure from a specific component mentioned in paragraph 6.
  - Losses incurred by the vehicle owner such as, but not limited to, transportation, labour, towing, telephone calls, taxis, rental of substitute vehicle, cost of service calls or any other incidental or consequential damages.
  - Consequential damage or breakdown resulting from improper or inadequate storage by distributor and/or user/owner.

## **6 - SPECIFIC COMPONENTS WARRANTY:**

Battery: 90 consecutive days starting on the date of sale.

Engines: Refer to the supplier's warranty included in the owner's material.

Radio: Refer to the supplier's warranty included in the owner's material.

**NOTE:** Your vehicle could be equipped with optional equipment which carry its own respective warranty. Refer to owner's manual and other literature received at time of purchase.

## **7 - EXPRESSED OR IMPLIED WARRANTIES**

**This warranty gives you specific rights, and you may also have other legal rights which may vary from state to state, or province to province. Where applicable, this warranty is expressly in lieu of all other expressed or implied warranties of BOMBARDIER, its distributors and the selling dealer, including any warranty of merchantability of fitness for any particular purpose; otherwise the implied warranty is limited to the duration of this warranty. However, some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.**

**Neither the distributor, the selling dealer, or any other person has been authorized to make any affirmation, representation or warranty other than those contained in this warranty, and if made, such affirmation, representation or warranty shall not be enforceable against BOMBARDIER or any other person.**

**Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply.**

**BOMBARDIER INC. reserves the right to modify its warranty policy at any time, being understood that such modification will not alter the warranty conditions applicable to vehicles sold while the above warranty is in effect.**

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## 8 - CONSUMER ASSISTANCE

If a servicing problem or other difficulty relating to the vehicle occurs, we suggest the following:

1. Try to resolve the problem at the distributorship with the Service Manager or Owner.
2. Then if your grievance still remains unsolved, you may write to us:

Bombardier Inc.  
Service Department  
Industrial Equipment  
Valcourt, Quebec, Canada, JOE 2LO

3. For the specific components, please refer to the information contained in the owner's material.

SEPTEMBER 1984  
BOMBARDIER INC.  
VALCOURT, QUEBEC, CANADA, JOE 2LO

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# ENGINE

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### **"PERKINS" 4.236 (SW-48 DA)**

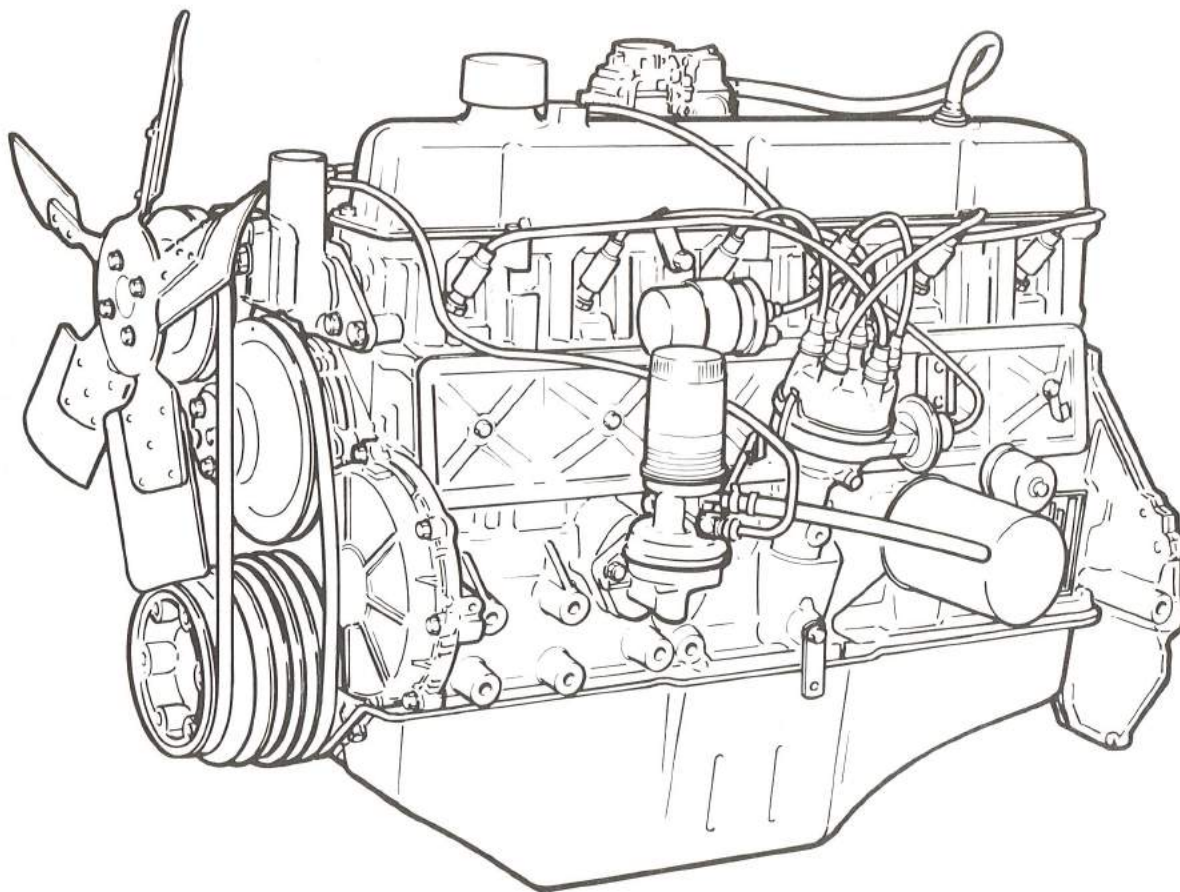
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## Section 10 ENGINE

Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

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### "FORD" 4.9 L (300 CID) (SW-48 FA)



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## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

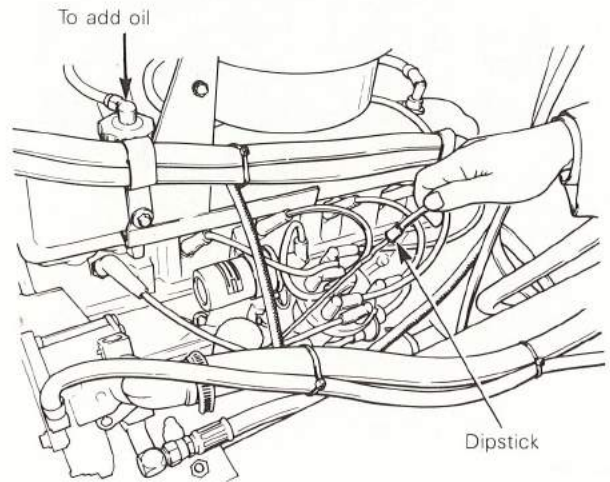
## SPECIFICATIONS

Make:	"Ford"
Model:	4.9 L (300 cid)
Type:	Gasoline in line
No. of cylinders:	6
Power at RPM (without fan):	88 kW (118 H.P.) at 2800 RPM
Torque at RPM (without fan):	327 N•m (241 lbf•ft) at 2000 RPM
Idle speed:	600 RPM (transmission on "D")
Maximum operating RPM:	2800 RPM
Firing order:	1-5-3-6-2-4
Stroboscopic timing at RPM:	6° BTDC at 600 RPM
Breaker point:	
-set adjustment	.61 - .66 mm (.024" - .026")
-spring tension	4.7 - 5.8 N (17 - 21 ounces)
Spark plug:	
-make	"Autolite"
-model	Resister BTF - 42
-spark plug gap	.81 mm (.032")
-torque	20-27 N.m (15-20 lbf•ft)
Engine oil:	
-oil type	Multi-viscosity SAE 10W30 or SAE 10W40 API service CC/SF
-liquid capacity	6.6 L (5.5 imp. quarts, 7 U.S. quarts)
Oil filter:	Full flow (replaceable cartridge)
Cooling system:	
-type	Liquid cooling/radiator/fan
-antifreeze/water mixture	60/40
-antifreeze	Ethylene glycol
-thermostat	Opening at 71°C (160°F)
-radiator cap pressure	90 kPa (13 PSI)
Fuel type:	Gasoline, 83m/91R octane
Exhaust type:	"Bombardier"

## SERVICING

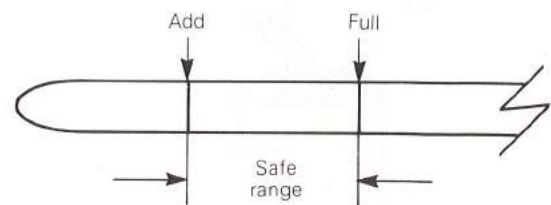
### Oil level

Check: Every 10 hours or daily.



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**NOTE:** Check the engine oil level with the vehicle on a flat and level surface.



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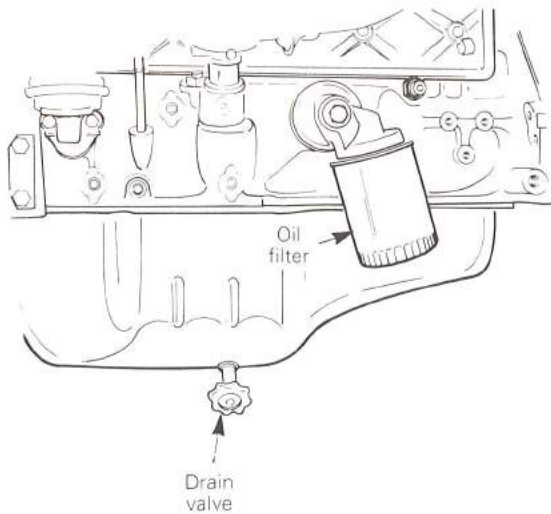
— When the engine is cold, the oil level should be within the safe range of the dipstick.

## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

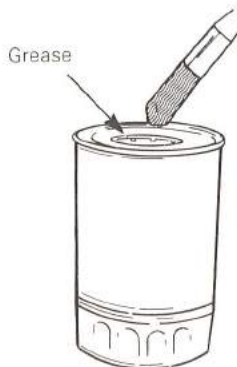
#### Engine oil and filter change

Interval: After 25 hours and at every 100 hours.



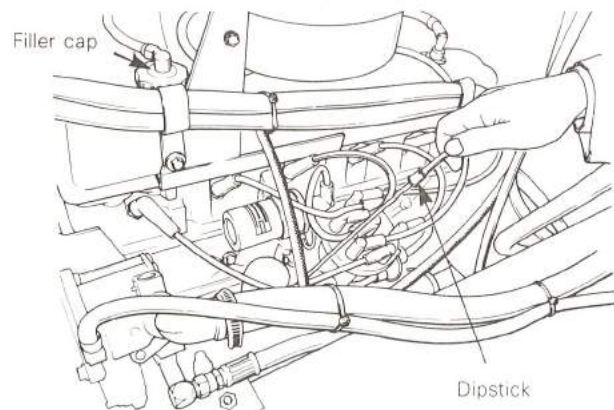
B002020004

- Drain oil with the vehicle on a flat and level surface by opening the drain valve located on the side of the oil pan.
- Replace the oil filter with a new one.



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○ **NOTE:** When replacing the filter element, coat the rubber seal lightly with grease to ensure a good sealing and an easy removal.

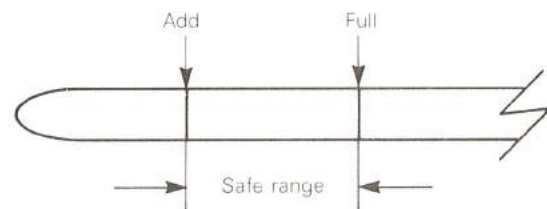


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- To refill, remove the filler cap from the valve cover and fill with multi-viscosity oil, SAE 10W30 or SAE 10W40 API service CC/SF.

▼ **CAUTION:** Using inferior or incorrect oil type will handicap the engine. Use only specified quality lubricants at specified intervals.

▼ **CAUTION:** Make sure to close the drain valve before refilling.



B002020003

## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

- With the engine cold, the oil level should be within the safe range of the dipstick.

#### Fuel filter change

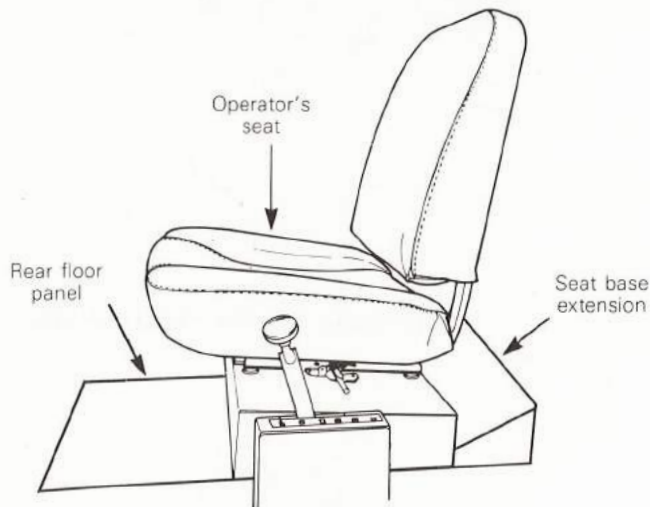
Interval: every 1000 hours or seasonally.

#### Air filter change

Interval: Every 1000 hours, seasonally or before if necessary.

#### REMOVAL

○ **NOTE:** This procedure consists in removing the engine from the vehicle without disassembling the transmission.



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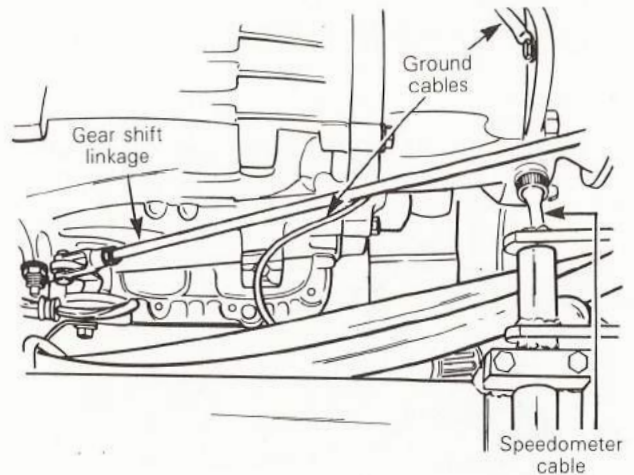
- Remove the rear floor panel, the operator's seat and the seat base extension from the vehicle.
- Remove the battery from the vehicle.

◆ **WARNING:** Sparks could cause battery to explode. Always disconnect the battery ground cable first, then disconnect the positive battery cable.

- Disconnect and remove the following components from the transmission:

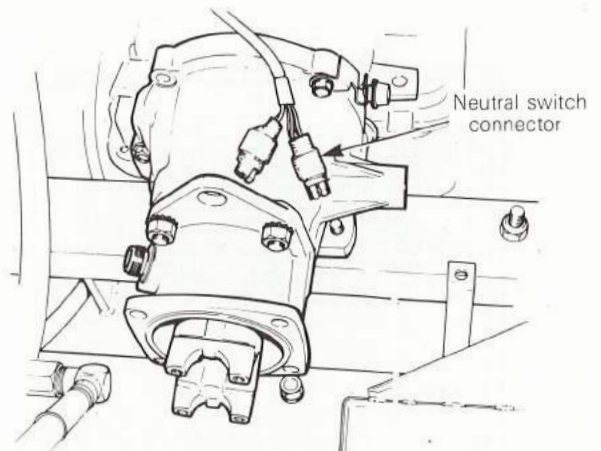
- Propeller shaft
- Oil cooler hoses and support

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.



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- Gear shift linkage
- Speedometer cable
- Ground cables



B002020006

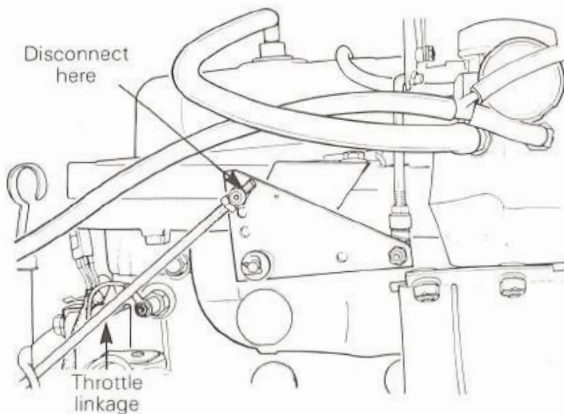
- Neutral switch connector



## Section 10 ENGINE

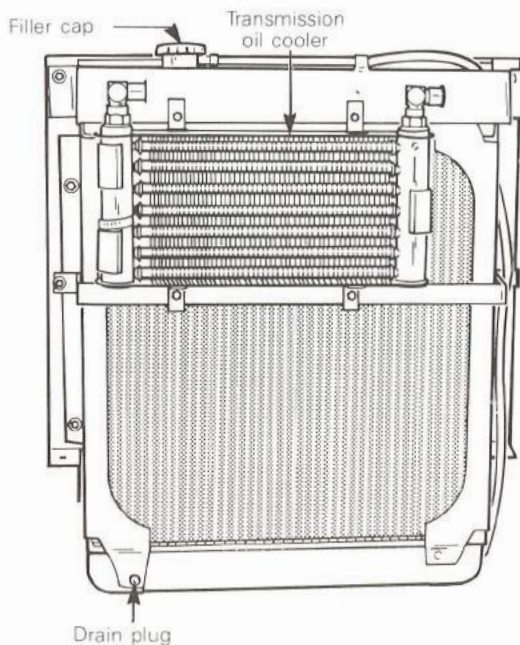
### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

- Remove the engine hood from the vehicle.



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- Disconnect the throttle linkage from the carburetor and remove its support from the transmission. Pull the throttle linkage away from the transmission.



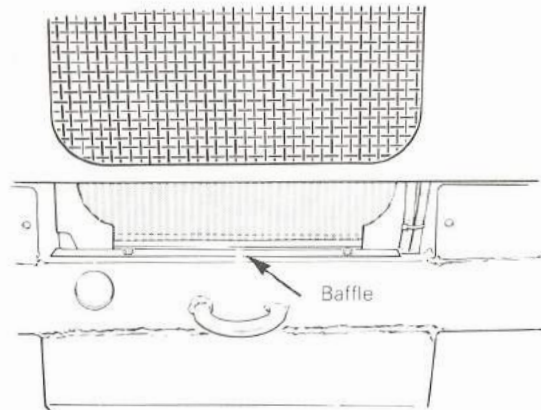
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- Disconnect oil lines from the transmission oil cooler. Remove the fixing clamp and pull hoses away from the radiator.

**CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

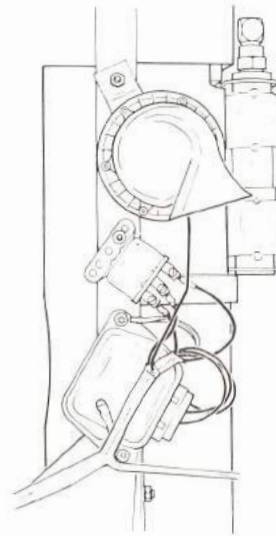
- Drain the radiator by loosening the filler cap and removing the drain plug.
- Disconnect cooling hoses from the radiator.

**NOTE:** Install plugs on hose connectors and on hoses when these have been disconnected.



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- Remove the radiator guard and then the baffle from the vehicle.



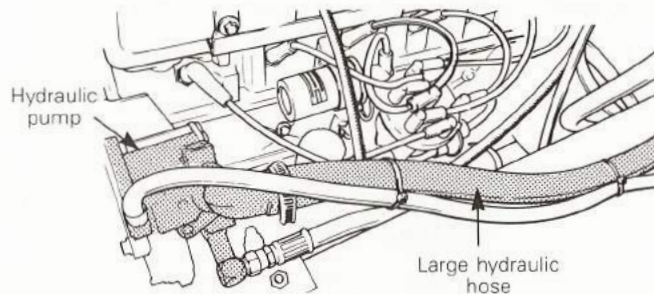
B002020009

- Disconnect wires from the components which are installed on the radiator support.

## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

- Remove the radiator and support assembly from the vehicle.

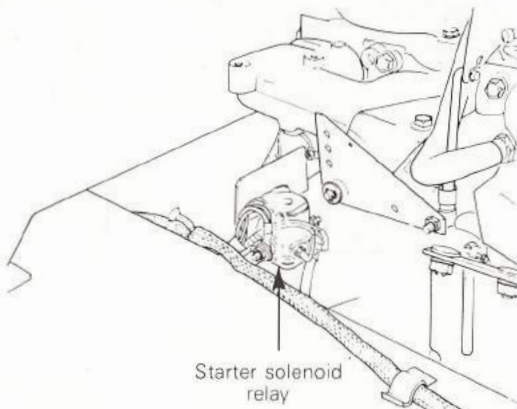


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- Drain the hydraulic tank by disconnecting the large hose from the hydraulic pump.
- Once the hydraulic tank is empty, disconnect the remaining hydraulic hoses from the pump.

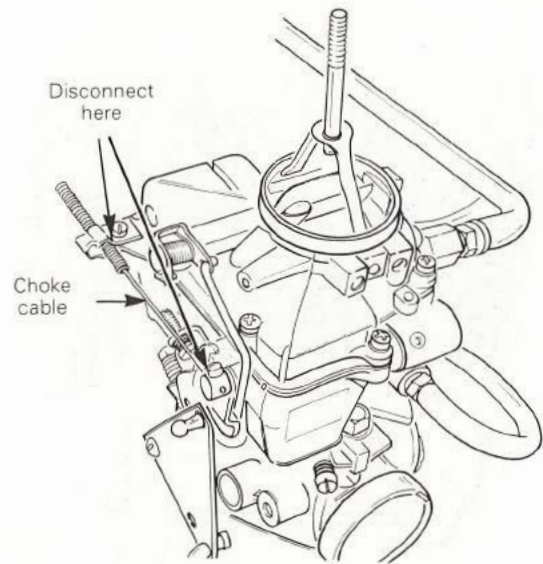
▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

- Disconnect wires connecting the engine to the vehicle.
  - Low oil pressure sender
  - Coolant temperature sender
  - Coil
  - Unit resistor
  - Alternator



B002020018

- Disconnect the positive cable from the starter, and then remove the starter solenoid relay from the engine.
- Free the fuel level sender wire from the tank by removing tie raps.



B002160006

- Remove the air filter housing. Disconnect the choke cable and remove it from the carburetor.

▼ **CAUTION:** Using a clean cloth, cover the carburetor opening to prevent any dirt from entering into the engine.

- Disconnect both heater hoses and remove their supports from the engine.

○ **NOTE:** Install plugs on hose connectors and on heater hoses when these have been disconnected.

- Disconnect the gas line from the fuel tank. Release both retaining clamp to free the line from the tank.

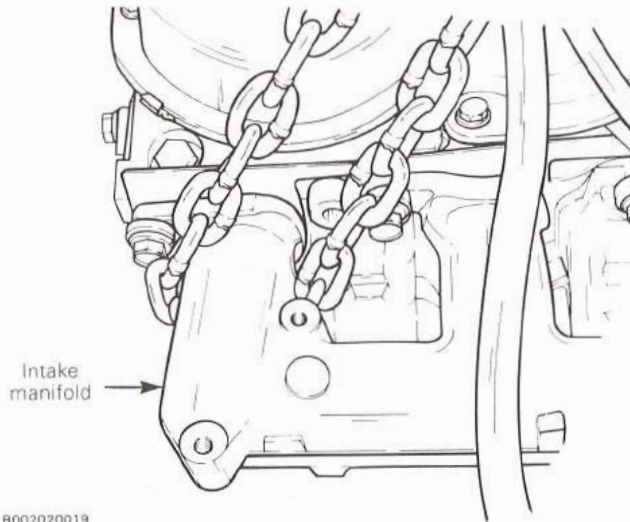
## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))

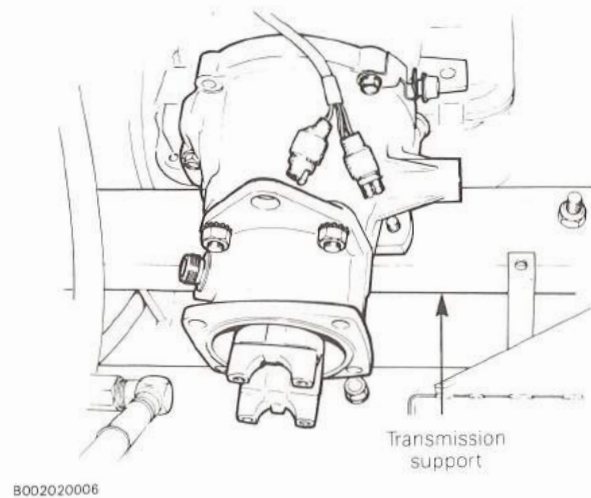
◆ **WARNING:** Install plugs on the line connector and on the gas line when it has been disconnected.

◆ **WARNING:** Gas is flammable and explosive. Do not smoke or allow open flames or sparks in the vicinity.

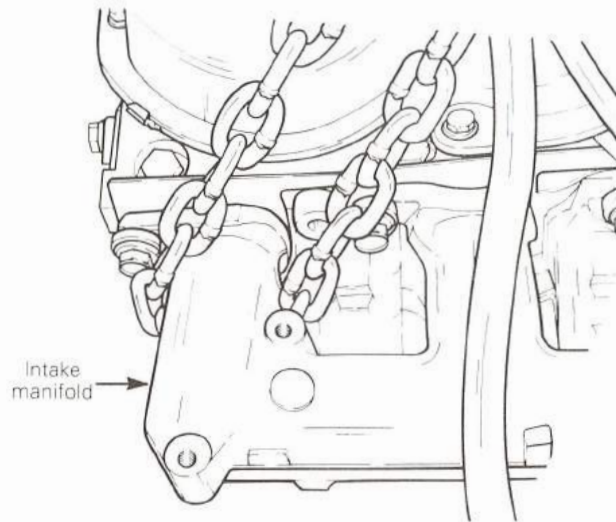
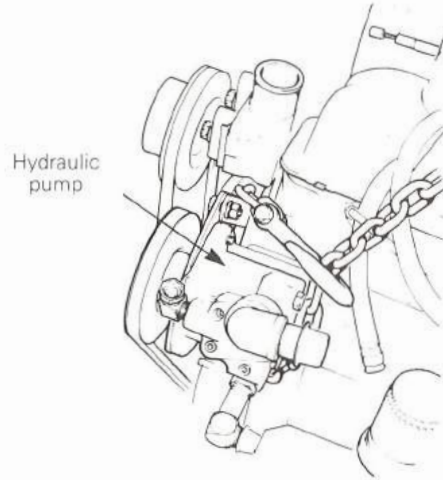
- Remove the transmission support from the vehicle.
- Place a wood block between the transmission tail and the frame, then lower the engine and transmission assembly until the transmission tail sits on the wood block.



- Attach a chain to the rear part of the intake manifold and fix the other end to a hoist. Tighten the chain lightly.



- Remove the two (2) screws fixing the transmission to its support.
- Using the hoist, lift the engine and transmission assembly until the transmission tail frees the support.

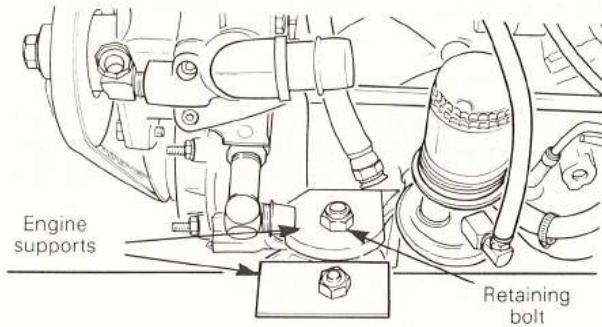


- Fix again the engine to the hoist using chains. One chain must surround the hydraulic pump attachment and the other must be fixed to the rear part of the intake manifold.



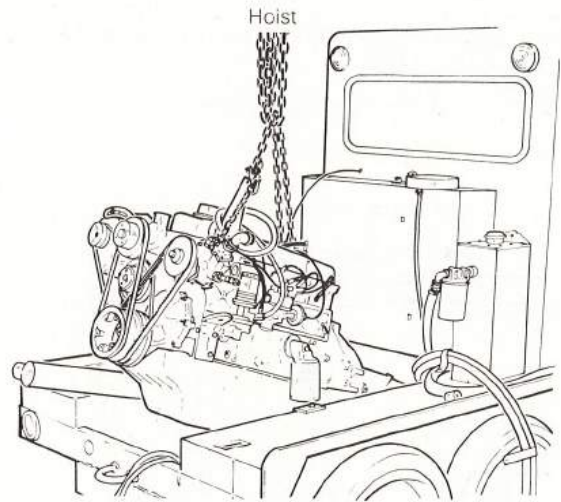
## Section 10 ENGINE

### Sub-section 01 ("FORD 4.9 L (300 CID) (SW-48 FA))



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- Lightly tighten chains using the hoist, and then remove the engine support bolts.



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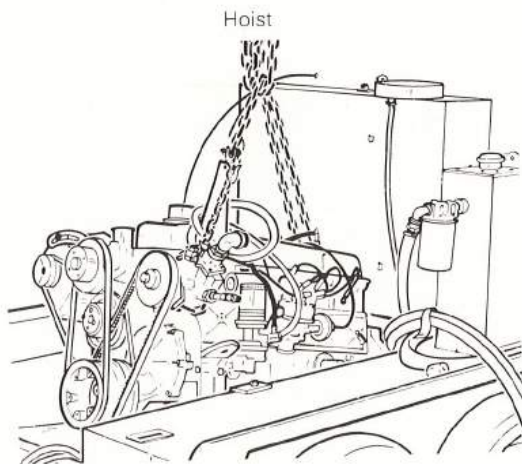
- Using a series of short and careful lifts, guide the assembly out of the frame.

◆ **WARNING:** Avoid putting hands under a weight which is solely attached to a lifting device.

## INSTALLATION

▼ **CAUTION:** Before installing the engine and transmission assembly, check the engine supports for cracks, bends, misalignment and deterioration of rubber parts. Replace if necessary.

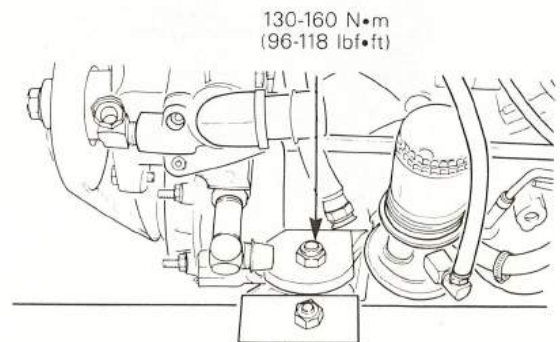
For the installation, proceed in the reverse order of the removal paying particular notice to the following:



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- Carefully hoist the assembly.

▼ **CAUTION:** Make sure that all disconnections have been made and that hoses are clear of the engine.

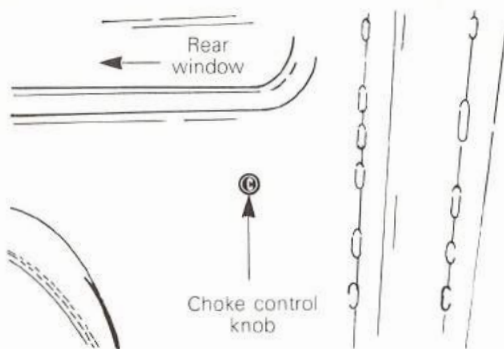


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## Section 10 ENGINE

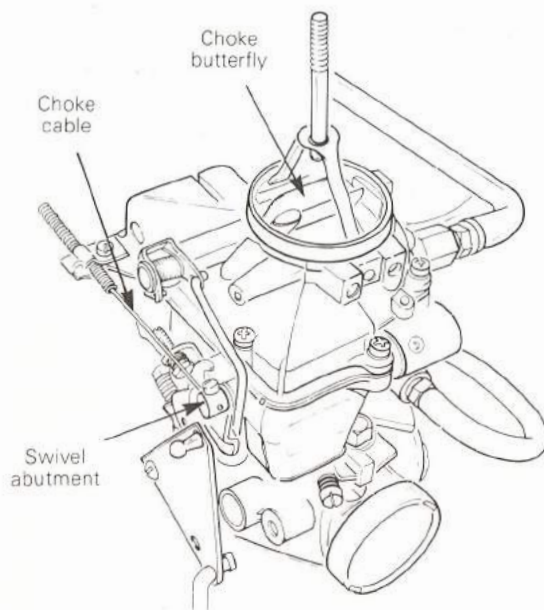
### Sub-section 01 (FORD 4.9 L (300 CID) (SW-48 FA))

- Tighten engine support bolts and nuts to 130-160 N•m (96-118 lbf•ft).
- Adjust the choke cable as follows:



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- Push the choke control knob all the way in.



B002160006

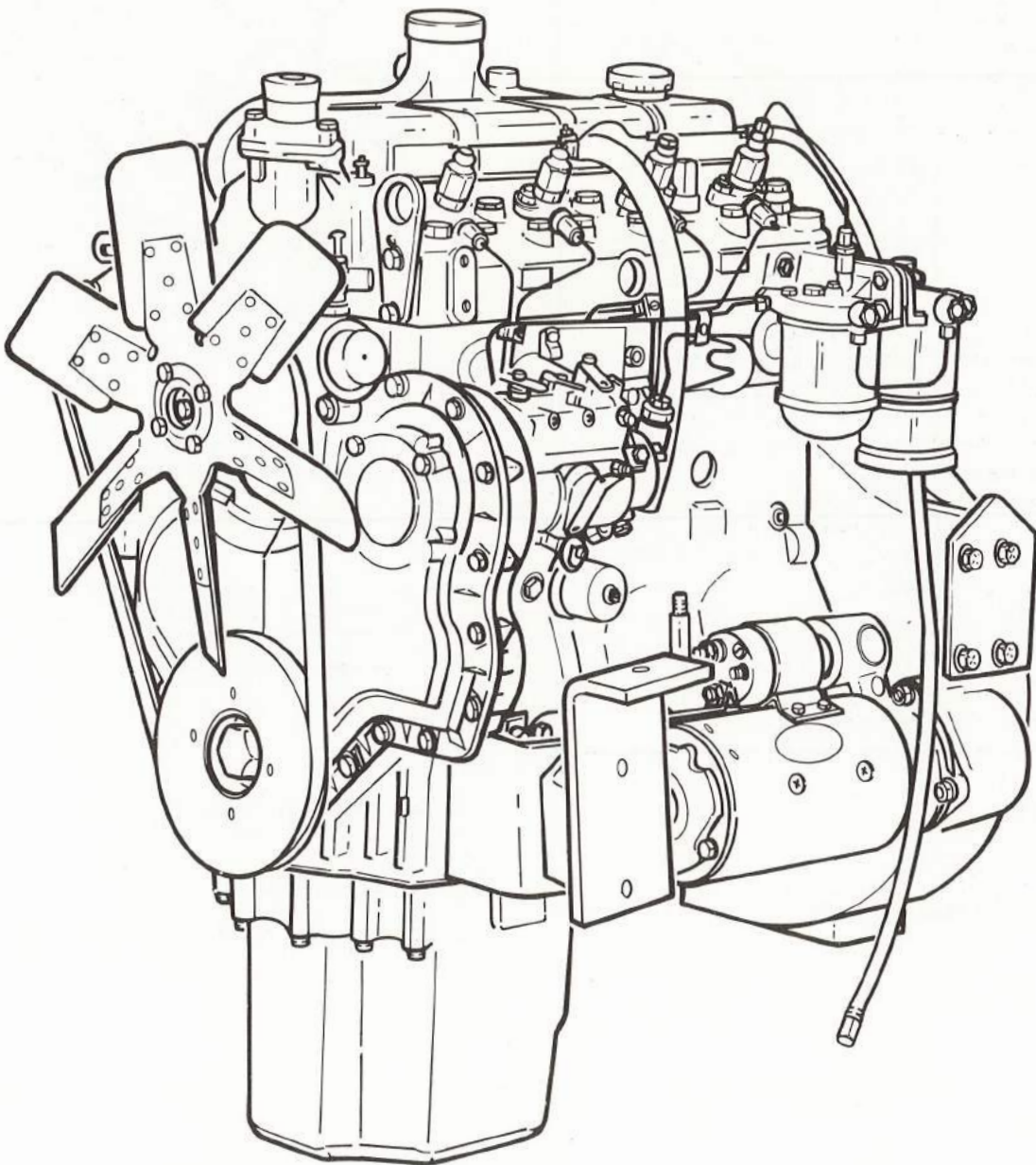
- With the choke butterfly fully open, secure the choke cable to the swivel abutment and its housing to the cable retainer.
- Check for free movement of the choke control knob.

**WARNING:** Sparks could cause battery to explode. When reinstalling the battery, always connect the positive battery cable first, then connect the battery ground cable.

**Section 10 ENGINE**  
Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

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**"PERKINS" 4.236 (SW-48 DA)**



B002020015



## Section 10 ENGINE

### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

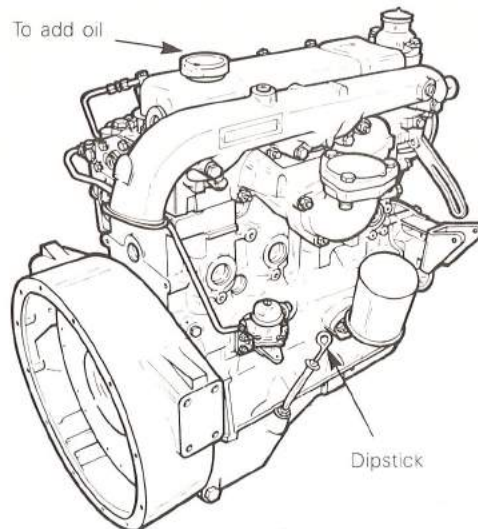
## SPECIFICATIONS

Make:	"Perkins"
Model:	4.236
Type:	In-line diesel
No. of cylinders:	4
Output at RPM (without fan):	58 kW (78 H.P.) at 2500 R.P.M.
Torque at RPM (without fan):	260 N•m (192 lbf•ft) at 1300 R.P.M
Idle speed:	600 RPM (no load)
Maximum RPM:	2650-2700 RPM (no load)
Firing order:	1-3-4-2
Engine oil: -oil type	SAE 10W40 or SAE 20W50 above 0°C (32°F) and SAE 10W40 or SAE 5W20 below 0°C (32°F) API service CC/SF Full flow (replaceable cartridge)
Liquid capacity:	
Oil filter:	
Cooling system: -type	Liquid cooling/radiator/fan
-antifreeze/water mixture	60/40
-antifreeze	Ethylene glycol
-thermostat	Opening at 80-84°C (175- 182°F)
-radiator cap pressure	90 kPa (13 PSI)
Fuel type:	Diesel, A.S.T.M./D.975-66T gr.1D or 2D
Exhaust type:	"Bombardier"

## SERVICING

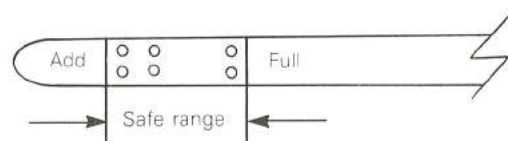
### Oil level

Check: Every 10 hours or daily.



B003020002

 **NOTE:** Check the engine oil level with the vehicle on a flat and level surface.



B003020009

— When the engine is cold, the oil level should be within the safe range of the dipstick.

### Engine oil and filter change

Interval: After 25 hours and at every 100 hours.

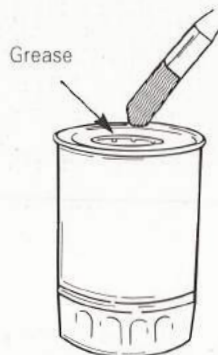
## Section 10 ENGINE

### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))



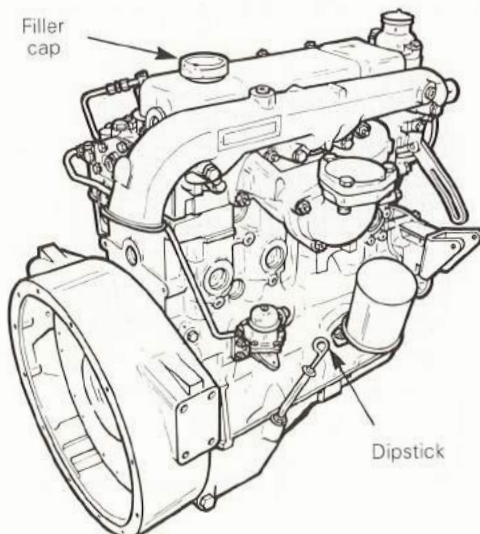
B002020016

- Drain oil with the vehicle on a flat and level surface by opening the drain valve located on the side of the oil pan.
- Replace the oil filter with a new one.



B001020050

**NOTE:** When replacing the filter element, coat the rubber seal lightly with grease to ensure a good sealing and an easy removal.

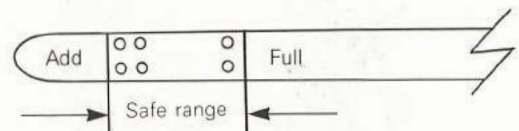


B003020002

- To refill, remove the filler cap from the valve cover and fill with multi-viscosity oil, SAE 10W40 or SAE 20W50 above 0°C (32°F) and SAE 10W40 or SAE 5W20 below 0°C (32°F) API service CC/SF.

**CAUTION:** Using inferior or incorrect oil type will handicap the engine. Use only specified quality lubricants at specified intervals.

**CAUTION:** Make sure to close the drain valve before refilling.



B003020009

- With the engine cold, the oil level should be within the safe range of the dipstick.

#### Fuel filter change

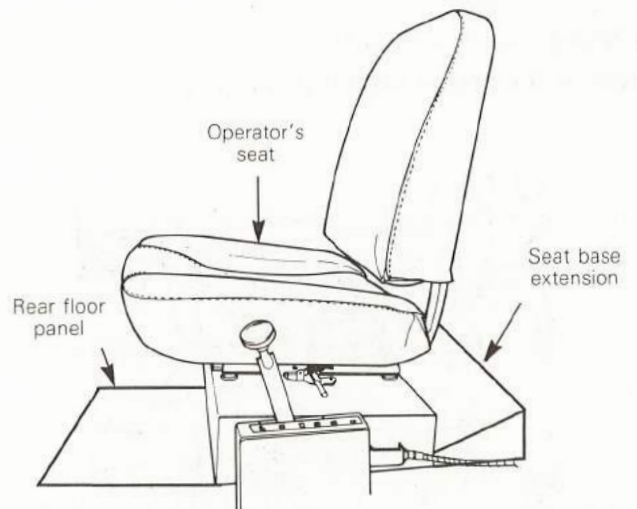
Interval: every 500 hours.

#### Air filter change

Interval: Every 500 hours or before if necessary.

#### REMOVAL

**NOTE:** This procedure consists in removing the engine from the vehicle without disassembling the transmission.



B002080006

## Section 10 ENGINE

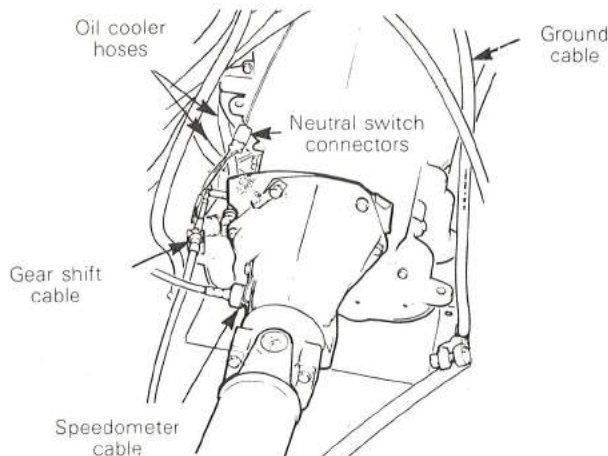
### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

— Remove the rear floor panel, the operator's seat and the seat base extension from the vehicle.

— Remove the battery from the vehicle.

◆ **WARNING:** Sparks could cause battery to explode. Always disconnect the battery ground cable first, then disconnect the positive battery cable.

— Disconnect and remove the following components from the transmission:



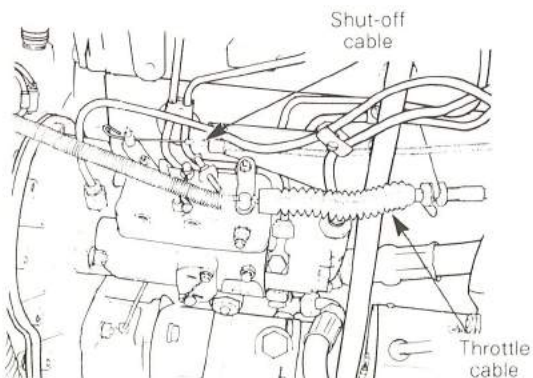
B002020017

- Propeller shaft
- Oil cooler hoses

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

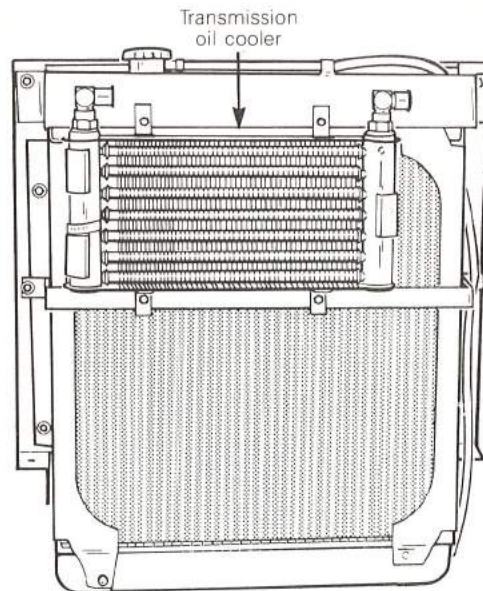
- Gear shift cable
- Speedometer cable
- Ground cable
- Neutral switch connectors

Remove the engine hood from the vehicle.



B002020020

— Disconnect the throttle cable and the shut-off cable from the injection pump. Free the cables from the attachments and pull them away from the engine.



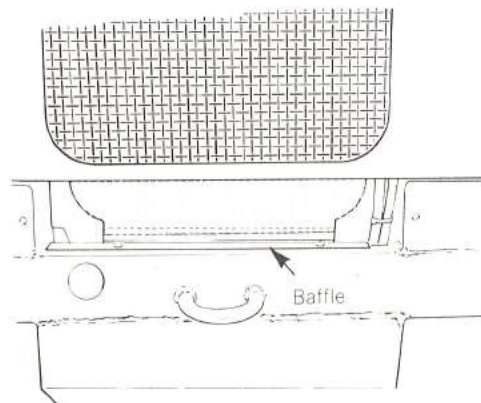
B002080015

— Disconnect oil lines from the transmission oil cooler. Remove the fixing clamp and pull hoses away from the radiator.

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

— Drain the radiator by loosening the filler cap and removing the drain plug.

○ **NOTE:** Install plugs on hose connectors and on hoses when these have been disconnected.



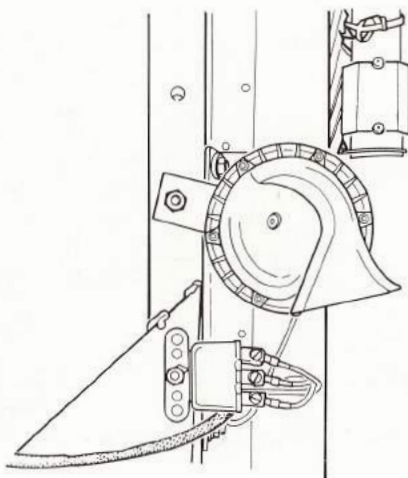
B002020008



## Section 10 ENGINE

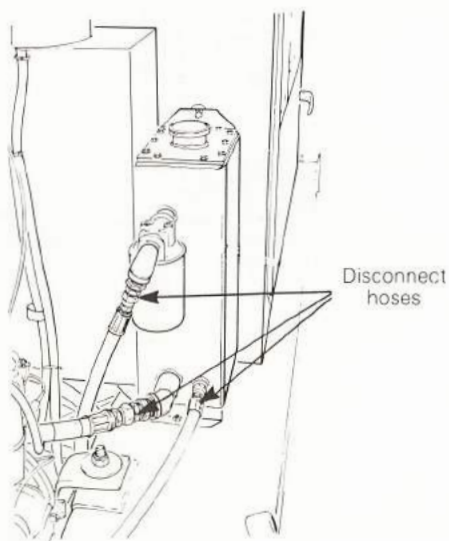
### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

- Remove the radiator guard and then the baffle from the vehicle.



B002020021

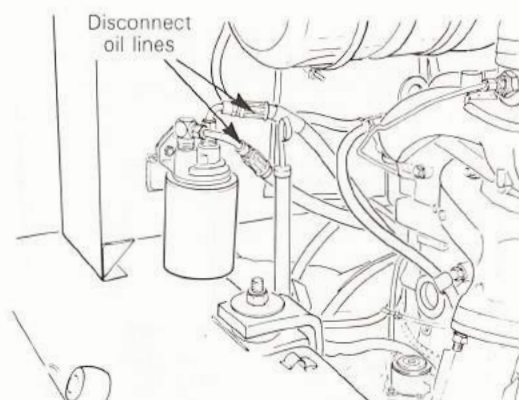
- Disconnect wires from the components which are installed on the radiator support.
- Remove the radiator and support assembly from the vehicle.



B002020022

- Drain the hydraulic tank, and then disconnect hoses from the tank.

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

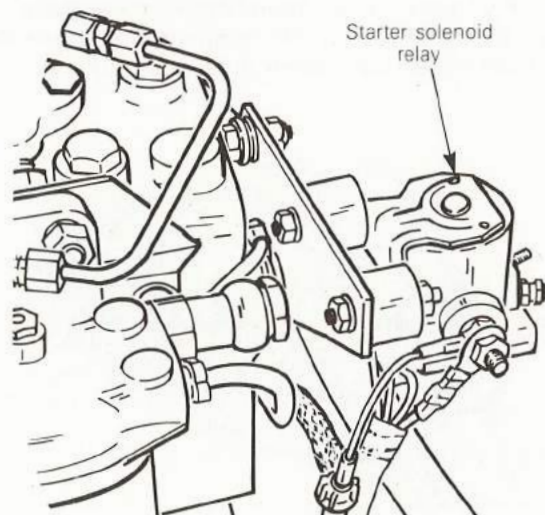


B002020023

- Disconnect both oil lines from the engine oil filter mount.

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

- Disconnect wires connecting the engine to the vehicle.
  - Low oil pressure sender
  - Coolant temperature sender
  - Starter solenoid
  - Heating device "Thermostart"
  - Alternator

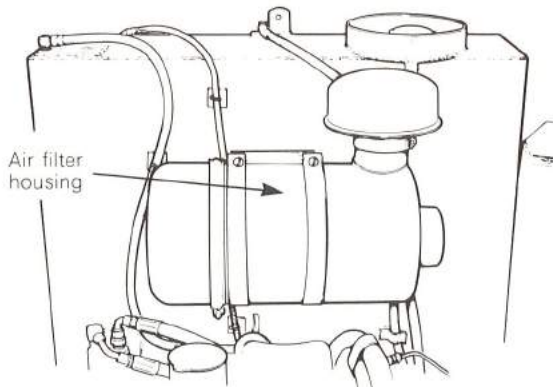


B002020024

## Section 10 ENGINE

### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

- Remove the starter solenoid relay from the engine.
- Free the fuel level sender wire from the tank by removing tie raps.
- Remove the exhaust pipe and its flexible tubing from the vehicle.



B002020025

- Remove the air intake pipe and then the air filter housing from the vehicle.

▼ **CAUTION:** Using a clean cloth, cover the intake manifold opening to prevent any dirt from entering into the engine.

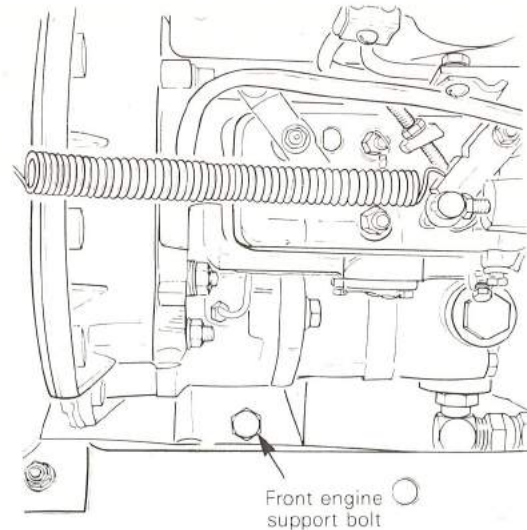
- Disconnect both heater hoses and remove their supports from the engine.

○ **NOTE:** Install plugs on hose connectors and on heater hoses when these have been disconnected.

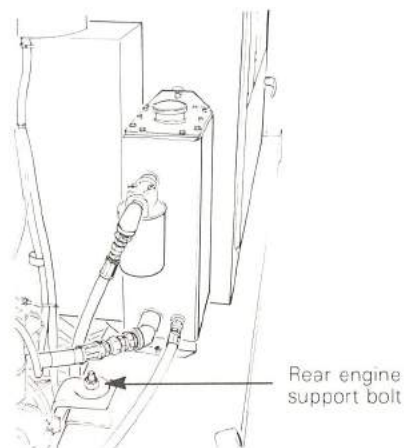
- Disconnect both fuel lines from the fuel tank. Remove tie raps and release both retaining clamps to free the lines from the tank.

◆ **WARNING:** Gas is flammable and explosive. Do not smoke or allow open flames or sparks in the vicinity. Install plugs on line connectors and on fuel lines when these have been disconnected.

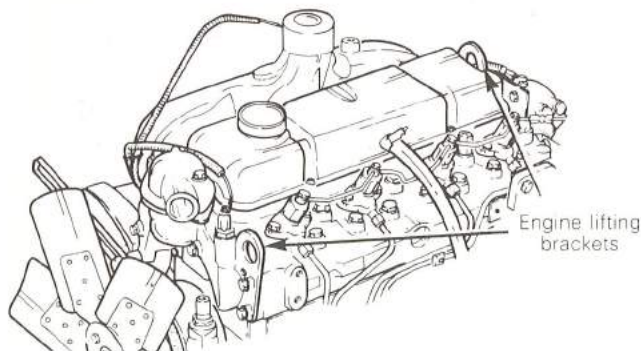
- Attach chains to the engine lifting brackets and fix them to a hoist.



B002020027



B002020022

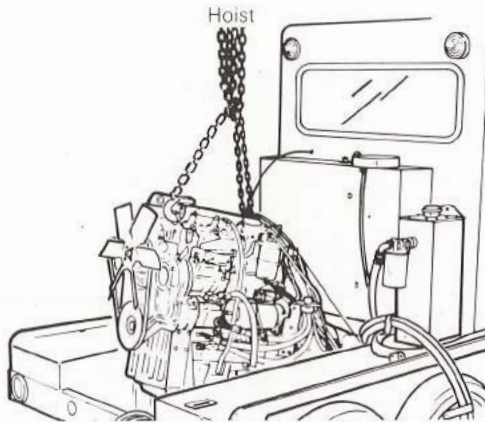


B002020026

## Section 10 ENGINE

### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

- Lightly tighten chains using the hoist, and then remove the engine support bolts.



B002020035

- Carefully hoist the assembly, making sure that all disconnections have been made. Using a series of short and careful lifts, guide the assembly out of the frame.

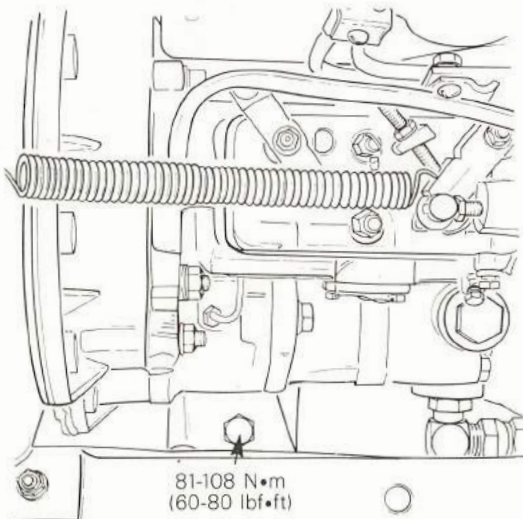
▼ **CAUTION:** Make sure that all disconnections have been made and that hoses are clear of the engine.

◆ **WARNING:** Avoid putting hands under a weight which is solely attached to a lifting device.

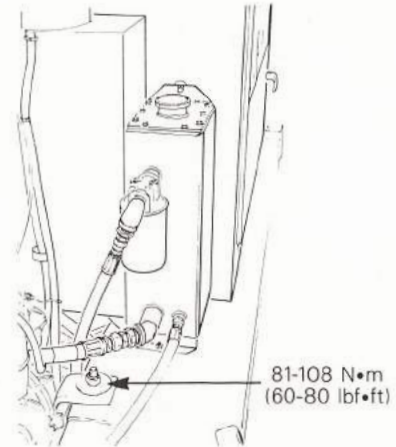
## INSTALLATION

▼ **CAUTION:** Before installing the engine and transmission assembly, check the engine supports for cracks, bends, misalignment and deterioration of rubber parts. Replace if necessary.

For the installation, proceed in the reverse order of the removal paying particular notice to the following:

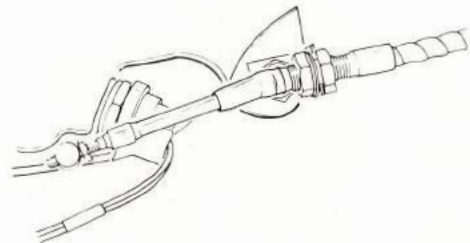


B002020027



B002020022

- Tighten engine support bolts and nuts to 81-108 N•m (60-80 lbf•ft).
- Adjust the gear shift cable as follows:



B002020028

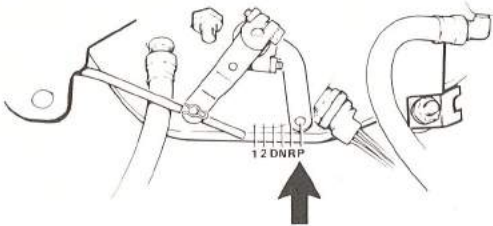
- Fix the gear shift cable to its retainer on the transmission.

○ **NOTE:** The cable retainer should be located half way on the threaded portion of the cable main sleeve.

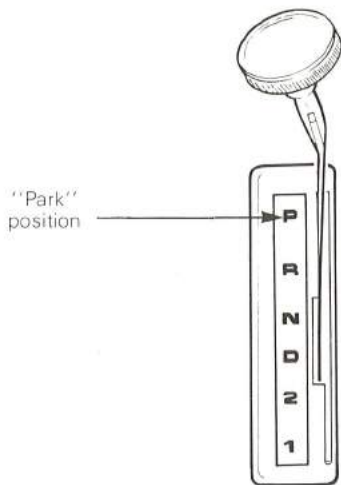


## Section 10 ENGINE

### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))

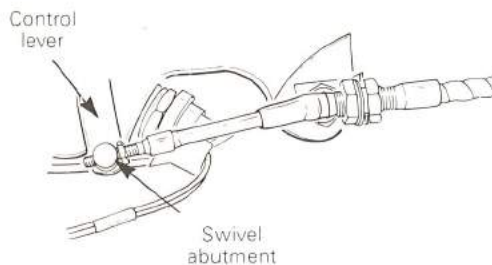


B002020029



B002160011

- Bring the control lever and the gear shift lever to the "Park (P)" position.



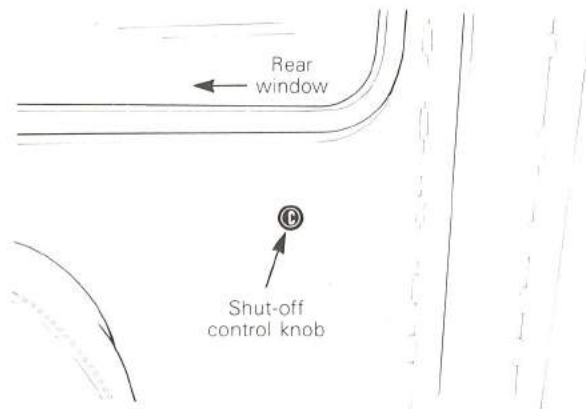
B002020028

- Loosen the jam nut, and then turn the swivel abutment to align it with the fixing hole on the control lever.

- Tighten the jam nut, insert the swivel abutment into the control lever, then secure it in position using a new cotter pin.

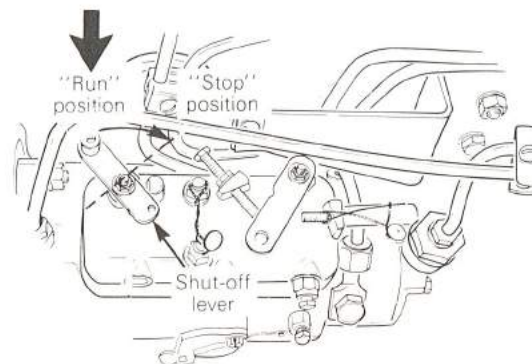
▼ **CAUTION:** Always replace the cotter pin by a new one.

— Adjust the shut-off cable as follows:



B002020014

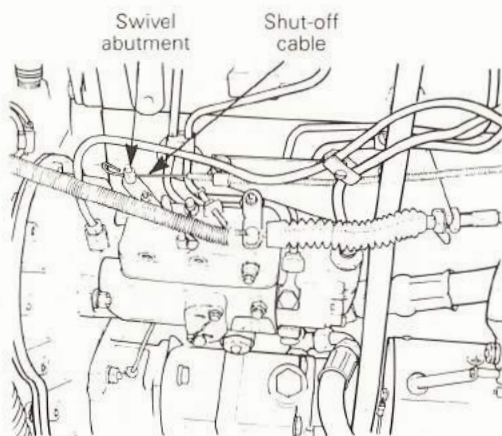
- Push the control knob all the way in.



B002020030

## Section 10 ENGINE

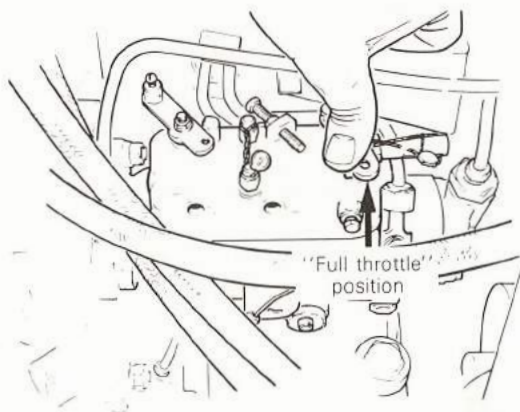
### Sub-section 02 ("PERKINS" 4.236 (SW-48 DA))



B002020020

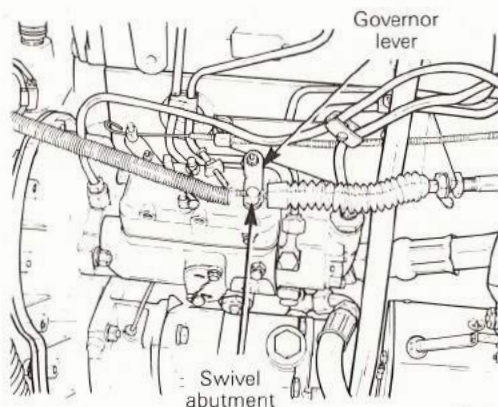
- With the shut off lever in the "Run" position, secure the cable to the swivel abutment and its housing to the cable retainer.
- Check for free movement of the shut-off control knob.  
— Adjust the throttle cable as follows:
- Fix the throttle cable to its retainer on the engine.

○ **NOTE:** The cable retainer should be located half way on the threaded portion of the cable main sleeve.



B002020031

- Bring the throttle pedal and the governor lever to the "Full throttle" position.



B002020020

- Loosen the jam nut, and then turn the swivel abutment to align it with the fixing hole on the governor lever.
- Tighten the jam nut, insert the swivel abutment into the governor lever, then secure it in position using a new cotter pin.

▼ **CAUTION:** Always replace the cotter pin by a new one.

- Install the idle return spring.

◆ **WARNING:** Sparks could cause battery to explode. When reinstalling the batteries, always connect the positive battery cable first, then connect the battery ground cable.





# TRANSMISSION

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### **"FORD" C-6 (SW-48 FA)**

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### **"CHRYSLER" A-727 (SW-48 DA)**

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### **PROPELLER SHAFT**

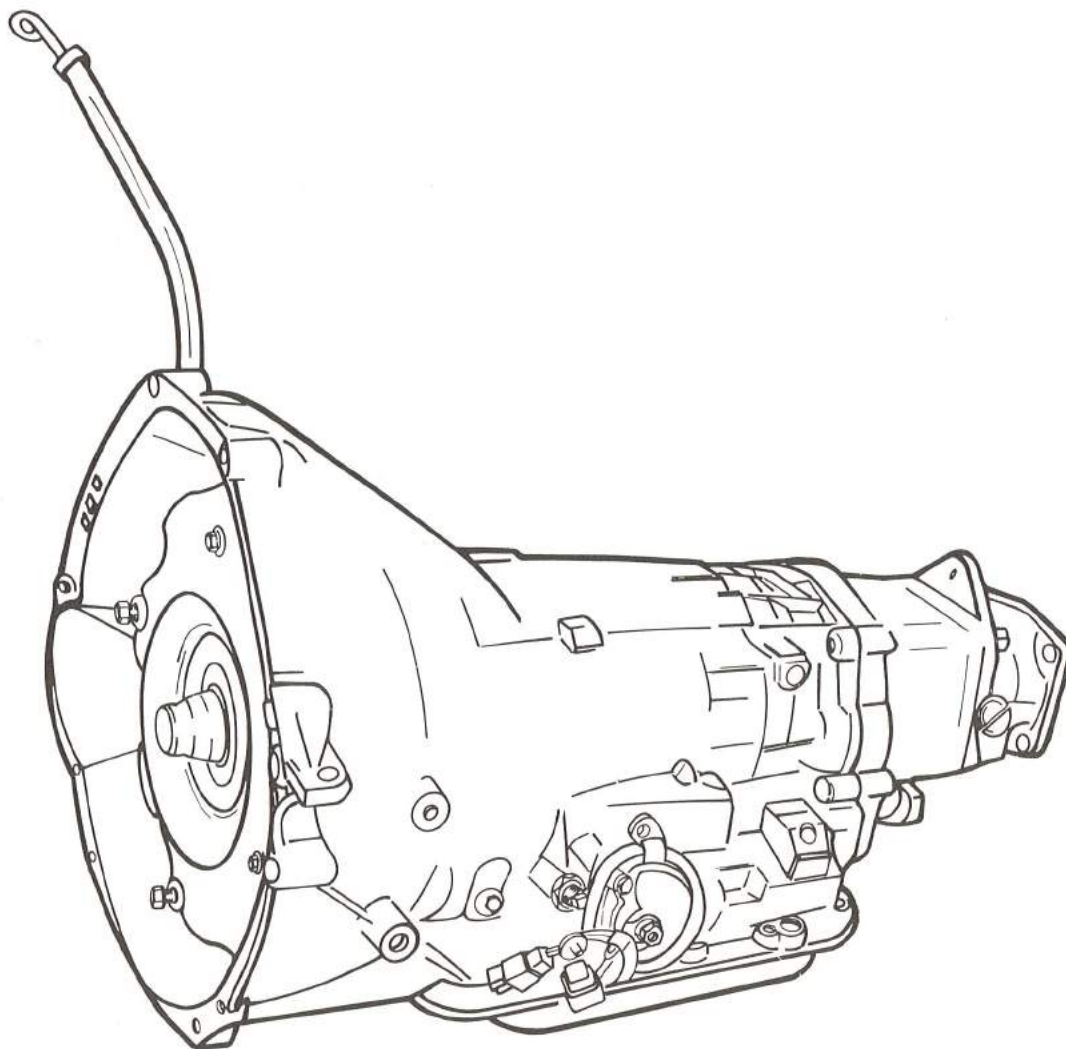
Specifications .....	20-03-1
Servicing .....	20-03-1

## Section 20 TRANSMISSION

Sub-section 01 ("FORD" C-6 (SW-48FA))

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### "FORD" C-6 (SW-48 FA)



B002040001

## Section 20 TRANSMISSION

### Sub-section 01 ("FORD" C-6 (SW-48FA))

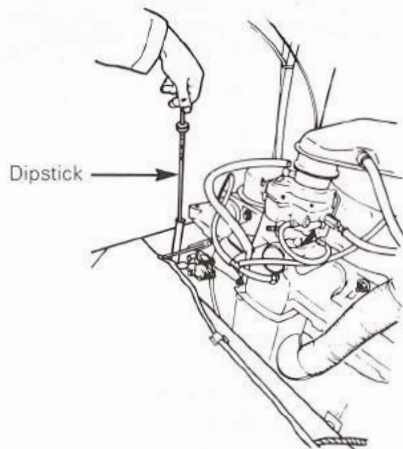
## SPECIFICATIONS

Make:	"Ford"
Model:	C-6
Gear ratio:	1st - 2.46 to 1 2nd - 1.46 to 1 3rd - 1.00 to 1 reverse - 2.18 to 1
Oil type:	Automatic transmission fluid (Type F) meeting Ford specifications M2C33F
Liquid capacity: (including torque converter)	9.1 l (8 imp. qts., 9.6 U.S. qts)

## SERVICING

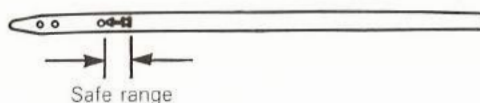
### Oil level

Check: Every 10 hours or daily.



B002040002

NOTE: Check the transmission oil level with the vehicle on a flat and level surface. With the engine idling and the parking brake on, move the gear shift lever momentarily to each position, ending in the park ("P") position.



B002040003

— When the transmission oil is at normal operating temperature, the oil level should be within the safe range of the dipstick.

CAUTION: To prevent any dirt from entering into the transmission, make certain that the dipstick cap is fully seated onto the filler tube.

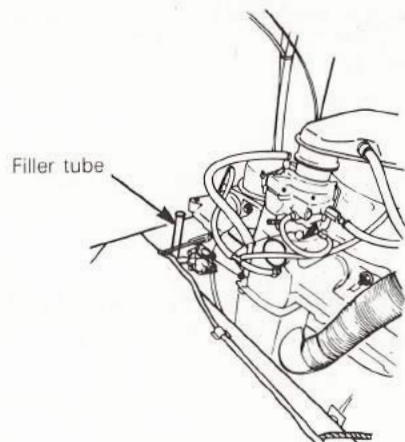
### Transmission oil and filter change

Interval: Every 600 hours or once a year.

NOTE: Drain oil with the vehicle on a flat and level surface by removing the oil pan from the transmission.

— Install a new filter on bottom of the valve body.

CAUTION: Clean the oil pan, and reinstall it using a new gasket.



B002004004

— Pour 4 l (4 imp. qts., 4 U.S. qts.) of type F oil through the filler tube.

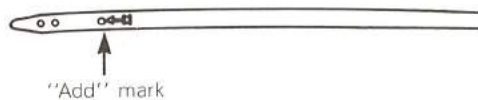


## Section 20 TRANSMISSION

### Sub-section 01 ("FORD" C-6 (SW-48FA))

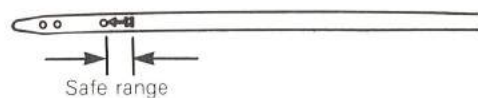
▼ **CAUTION:** Using inferior or incorrect oil type will handicap the transmission. Use only specified quality lubricants at specified intervals.

- Start the engine and let it idle for about two (2) minutes. Then with the parking brake on, move the gear shift lever momentarily to each position, ending in the park ("P") position.



B002040003

- Add sufficient oil to bring the level to the "ADD" mark of the dipstick.

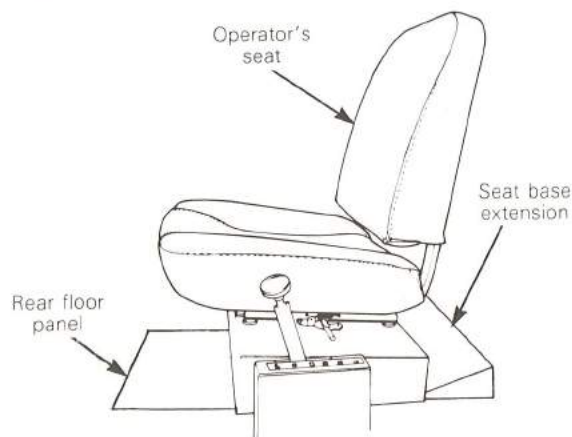


B002040003

- Recheck the oil level once the transmission is at normal operating temperature. The oil level should be within the safe range of the dipstick.

▼ **CAUTION:** To prevent any dirt from entering into the transmission, make certain that the dipstick cap is fully seated onto the filler tube.

## REMOVAL



B002080006

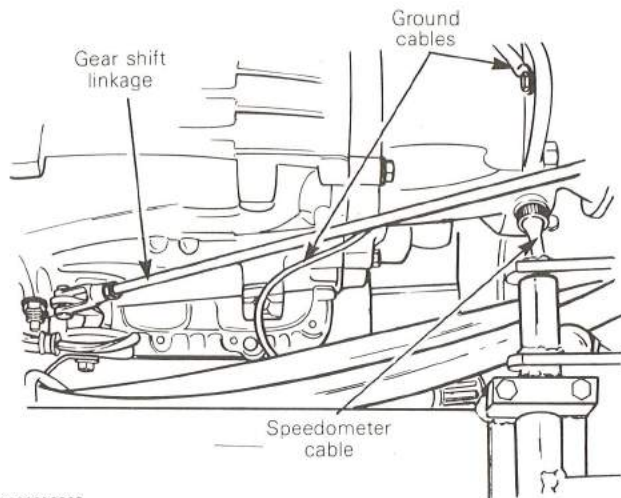
- Remove the rear floor panel, the operator's seat and the seat base extension from the vehicle.
- Remove the battery from the vehicle.

◆ **WARNING:** Sparks could cause battery to explode. Always disconnect the battery ground cable first, then disconnect the positive battery cable.

- Disconnect and remove the following components from the transmission.

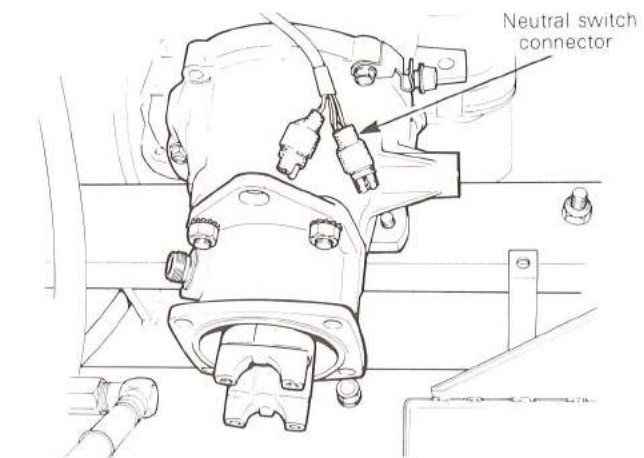
- Propeller shaft
- Oil cooler hoses and support

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.



B002020005

- Gear shift linkage
- Speedometer cable
- Ground cables

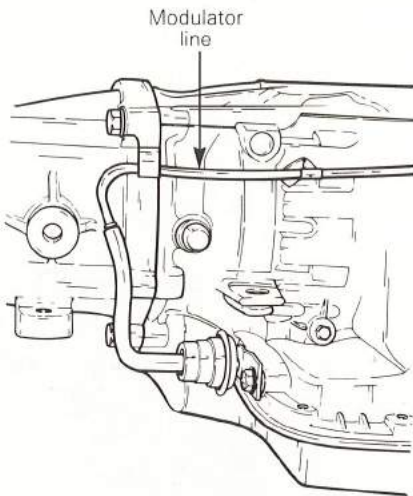


B002020006

- Neutral switch connectors

## Section 20 TRANSMISSION

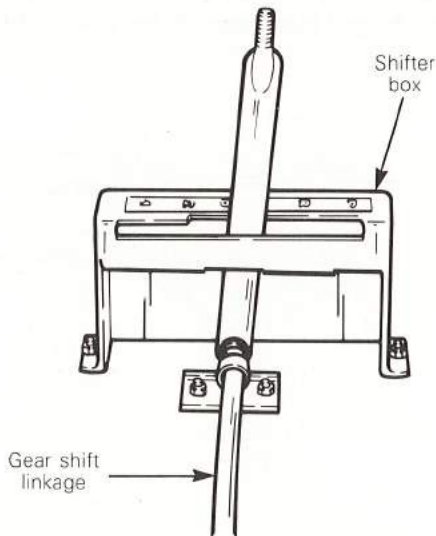
### Sub-section 01 ("FORD" C-6 (SW-48FA))



B002040006

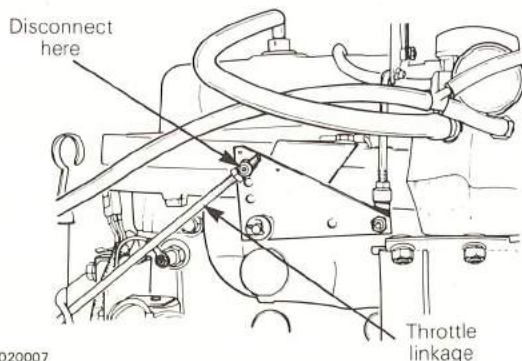
- Modulator line

- Remove the handle from the gear shift lever.



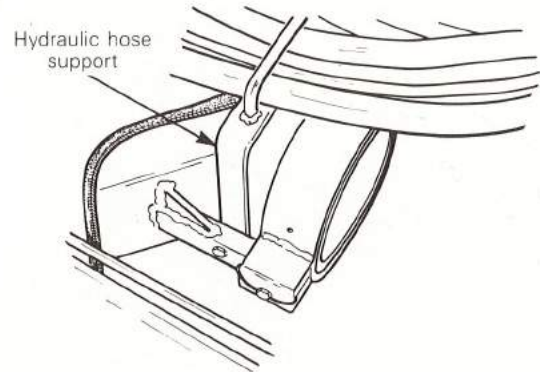
B002040007

- Remove both the shifter box and the gear shift linkage from the vehicle.



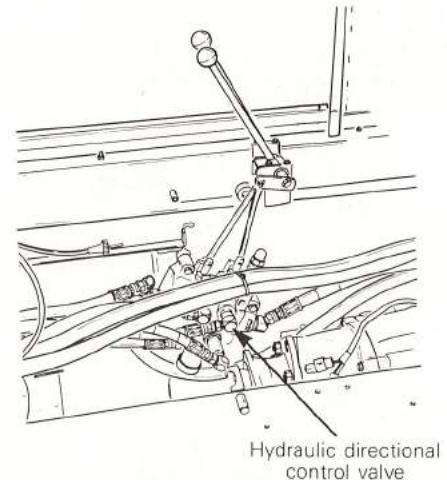
B002020007

- Disconnect the throttle linkage from the carburetor and remove its support from the transmission. Pull the throttle linkage away from the transmission.



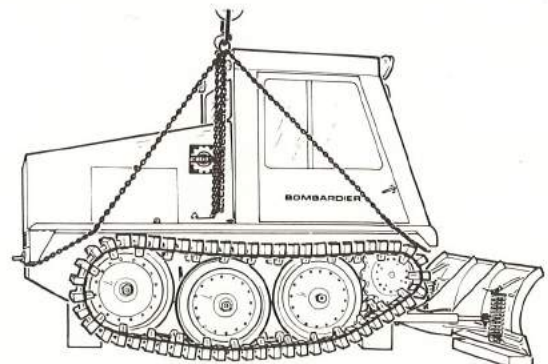
B002040008

- Free the hydraulic hose support by removing both fixing bolts and disconnecting the brake linkage return spring.



B002040009

- Free the hydraulic directional control valve by removing the retaining bolts, then place the valve onto the vehicle floor.
- Raise the vehicle using a jack or a hoist.

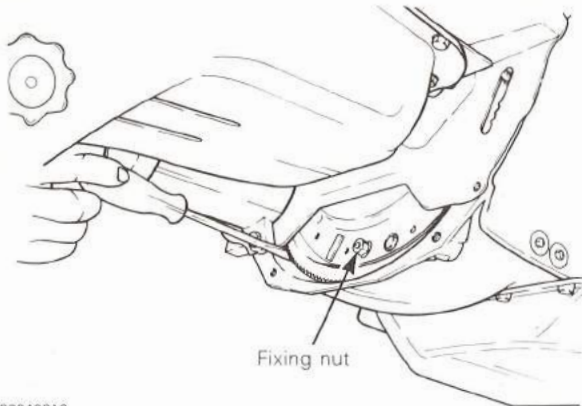


B002080005

## Section 20 TRANSMISSION

### Sub-section 01 ("FORD" C-6 (SW-48FA))

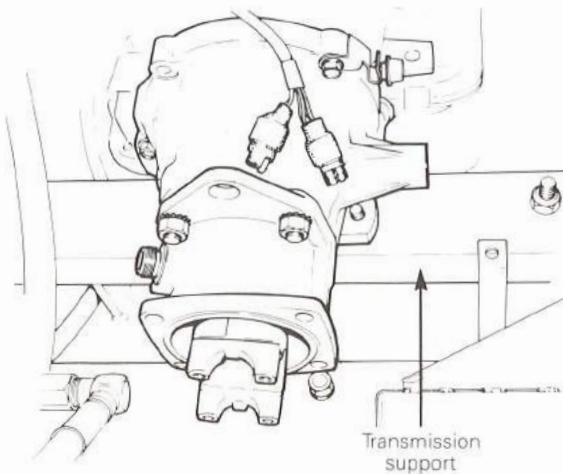
◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.



B002040010

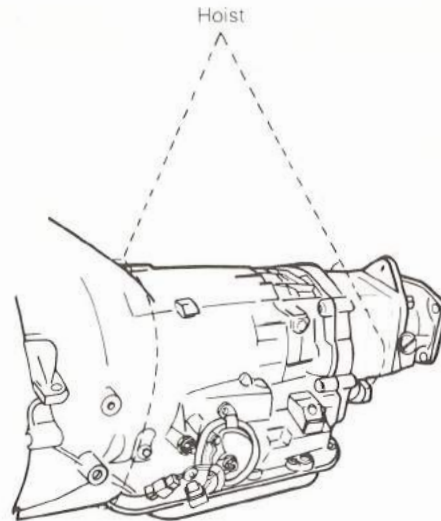
- Remove the access cover from the transmission and then the four (4) nuts fixing the torque converter to the drive plate.

○ **NOTE:** To gain access to the fixing nuts, turn the flywheel using a screwdriver.



B002040006

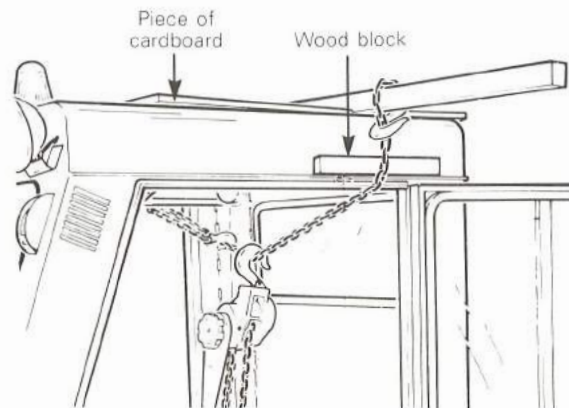
- Remove the two (2) screws fixing the transmission to its support.



B002040011

- Fix the transmission to a hoist using chains.

▼ **CAUTION:** Make sure not to place the chain underneath the oil pan. Surround the transmission with the chain, taking care to place it in front of the oil pan.



B002040012

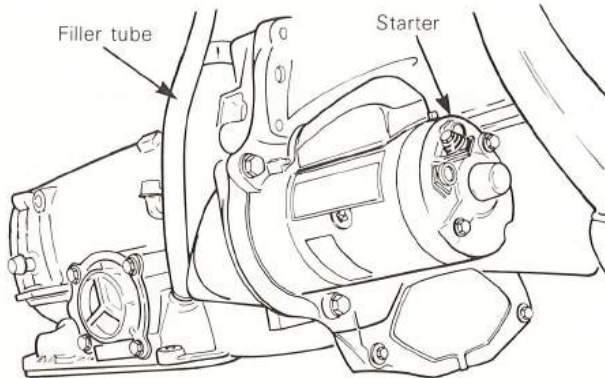
▼ **CAUTION:** Place wood blocks above the gutters and a piece of cardboard onto the cab. This will protect the cab and its gutters when lifting the transmission.

- Hoist the transmission carefully until it frees the support of about 5 cm (2").
- Place a wood block (15 cm (6") square x 25 cm (10") long) between the rear part of the engine oil pan and the frame.
- Lower the engine and transmission assembly until the engine oil pan contacts the wood block.



## Section 20 TRANSMISSION

### Sub-section 01 ("FORD" C-6 (SW-48FA))

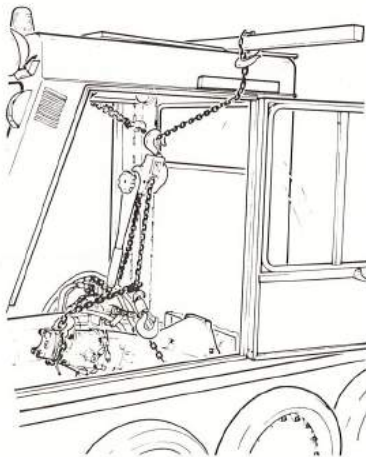


B002040013

- Remove the starter from the vehicle.
- Remove the filler tube from the transmission.

▼ **CAUTION:** Install a plug into the filler tube hole in the transmission.

- Lightly tauten chains using the hoist, and then remove the screws fixing the transmission to the engine.
- Pull the transmission straight to free it from the dowel pins of the bell housing.



B002040012

- Hoist the transmission and remove it from the vehicle.

## INSTALLATION

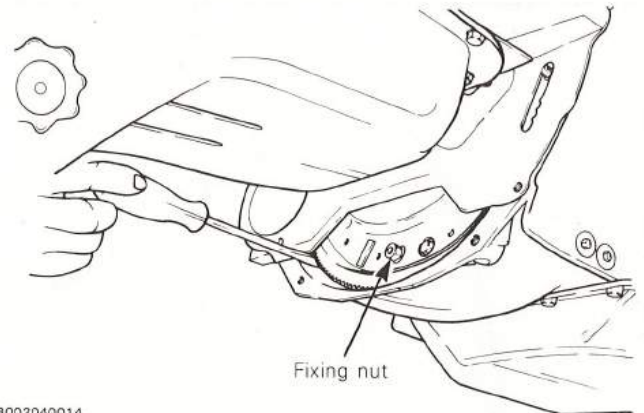
To install the transmission, reverse the removal procedure paying particular notice to the following:

- Fix the transmission to the engine as follows:

- Put the transmission in position.

○ **NOTE:** Align holes on the transmission with dowel pins on the bell housing.

- Install temporarily the two (2) upper screws, and then the remaining screws fixing the transmission to the engine.



B002040014

- Install the four (4) nuts fixing the torque converter to the drive plate.

○ **NOTE:** To gain access to the studs, turn the fly-wheel using a screwdriver.

- Tighten the screws fixing the transmission to the engine.

- Tighten the screws fixing the transmission to its support to 54-61 N•m (40-45 lbf•ft).

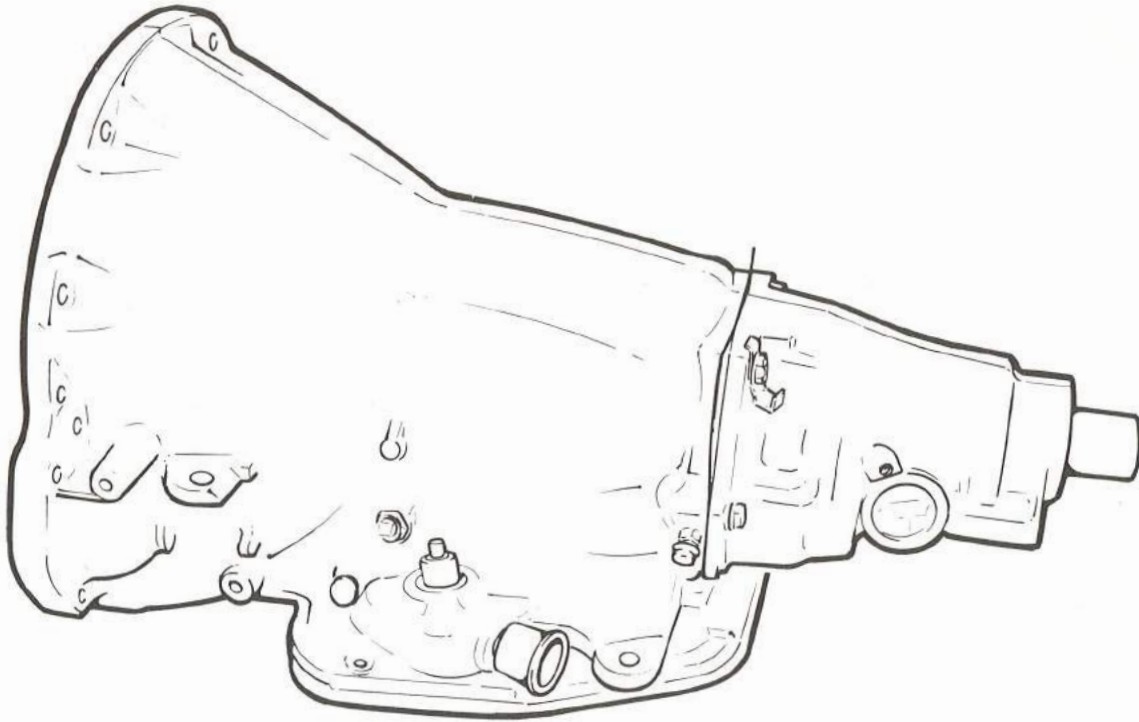
◆ **WARNING:** Sparks could cause battery to explode. When reinstalling the battery, always connect the positive battery cable first, then connect the battery ground cable.

## Section 20 TRANSMISSION

Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))

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### "CHRYSLER" A-727 (SW-48 DA)



B002040015

## Section 20 TRANSMISSION

### Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))

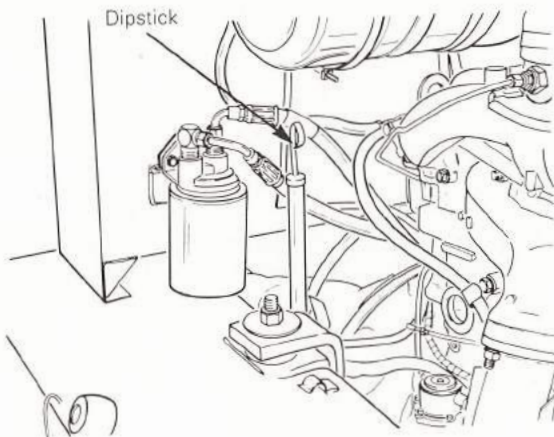
## SPECIFICATIONS

Make:	"Chrysler"
Model:	A-727
Gear ratio:	1st - 2.45 to 1 2nd - 1.45 to 1 3rd - 1.00 to 1 reverse - 2.40 to 1
Oil type:	Dexron II
Liquid capacity: (including torque converter)	7.8 l (6.9 imp. qts., 8.4 U.S. qts)

## SERVICING

### Oil level

Check: Every 10 hours or daily.



B002020023

NOTE: Check the transmission oil level with the vehicle on a flat and level surface. With the engine idling and the parking brake on, move the gear shift lever momentarily to each position, ending in the neutral ("N") position.



B002040016

— When the transmission oil is at normal operating temperature, the oil level should be within the safe range of the dipstick.

CAUTION: To prevent any dirt from entering into the transmission, make certain that the dipstick cap is fully seated onto the filler tube.

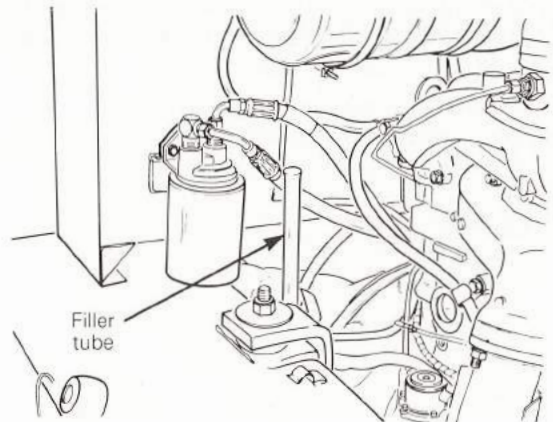
### Transmission oil and filter change

Interval: Every 600 hours or once a year.

NOTE: Drain oil with the vehicle on a flat and level surface by removing the oil pan from the transmission.

— Install a new filter on bottom of the valve body.

CAUTION: Clean the oil pan, and reinstall it using a new gasket.



B002020023

— Pour 4 l (4 imp. qts., 4 U.S. qts.) of "Dexron II" oil through the filler tube.



## Section 20 TRANSMISSION

### Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))

**CAUTION:** Using inferior or incorrect oil type will handicap the transmission. Use only specified quality lubricants at specified intervals.

- Start the engine and let it idle for about two (2) minutes. Then with the parking brake on, move the gear shift lever momentarily to each position, ending in the neutral ("N") position.



B002040016

- Add sufficient oil to bring the lever to the "ADD 1 pint" mark of the dipstick.

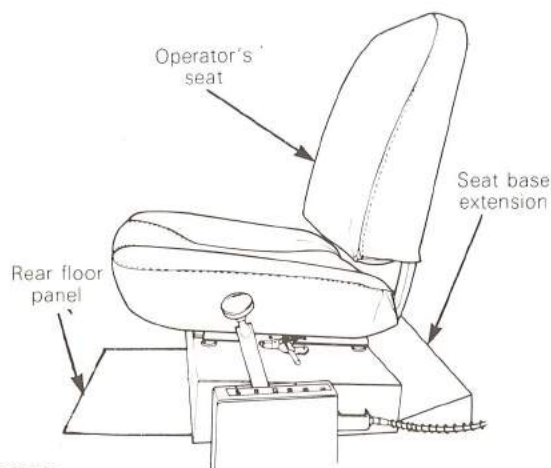


B002040016

- Recheck the oil level once the transmission is at normal operating temperature. The oil level should be within the safe range of the dipstick.

**CAUTION:** To prevent any dirt from entering into the transmission, make certain that the dipstick cap is fully seated onto the filler tube.

## REMOVAL

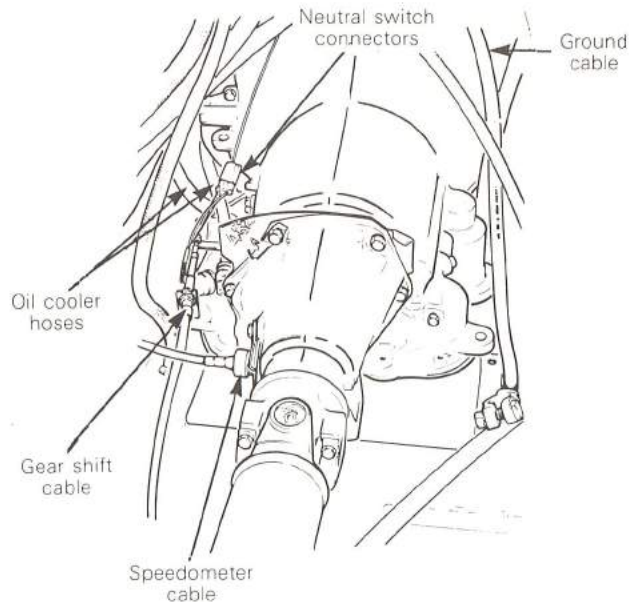


B002080006

- Remove the rear floor panel, the operator's seat and the seat base extension from the vehicle.
- Remove the batteries from the vehicle.

**WARNING:** Sparks could cause battery to explode. Always disconnect the battery ground cable first, then disconnect the positive battery cable.

- Disconnect and remove the following components from the transmission.

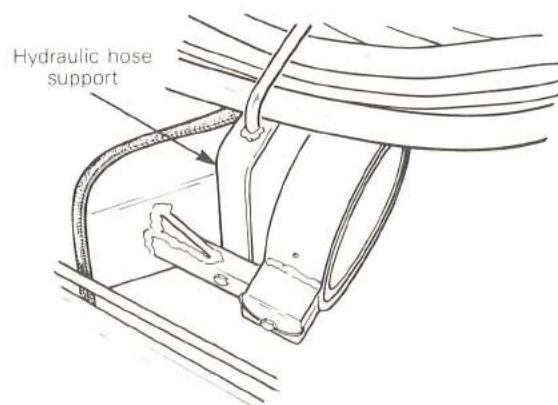


B002020017

- Propeller shaft
- Oil cooler hoses

**CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

- Gear shift cable
- Speedometer cable
- Neutral switch connectors

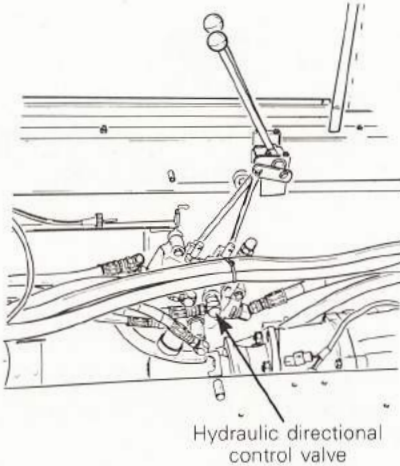


B002040008

- Free the hydraulic hose support by removing both fixing bolts and disconnecting the brake linkage return spring.

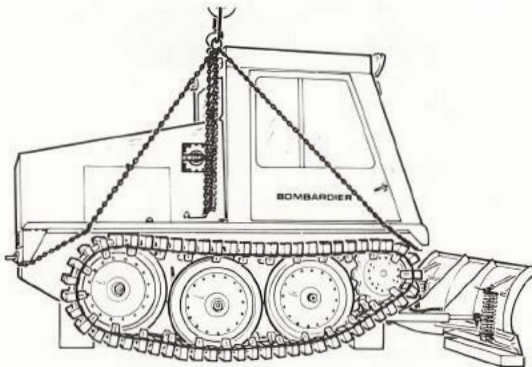
## Section 20 TRANSMISSION

### Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))



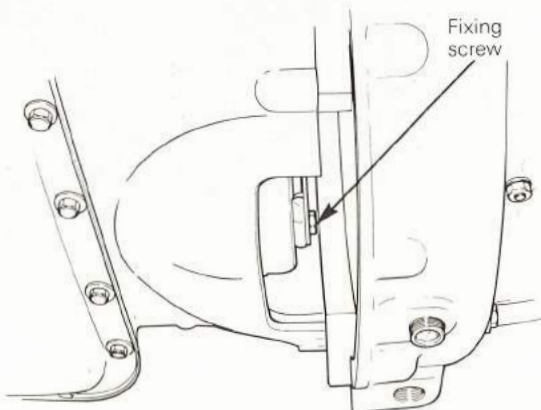
B002040009

- Free the hydraulic directional control valve by removing the retaining bolts, then place the valve onto the vehicle floor.
- Raise the vehicle using a jack or a hoist.



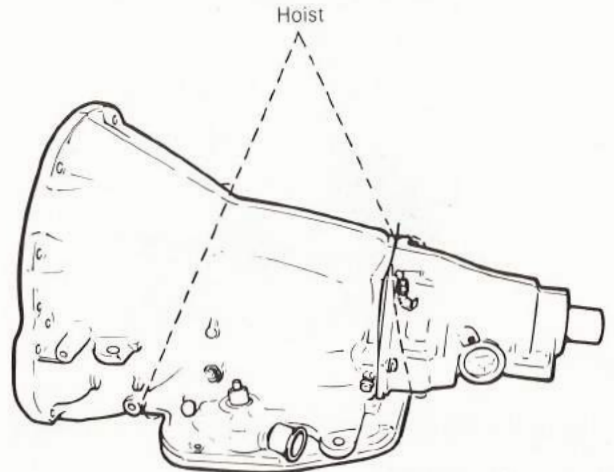
B002080005

◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.



B002040017

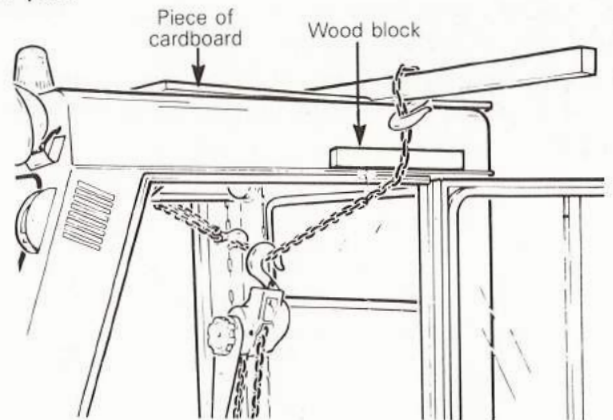
- Completely unscrew the four (4) screws fixing the torque converter to the drive plate.



B002040018

- Fix the transmission to a hoist using chains.

▼ **CAUTION:** Make sure not to place the chain underneath the oil pan. Surround the transmission with the chain, taking care to place it in front of the oil pan.



B002040012

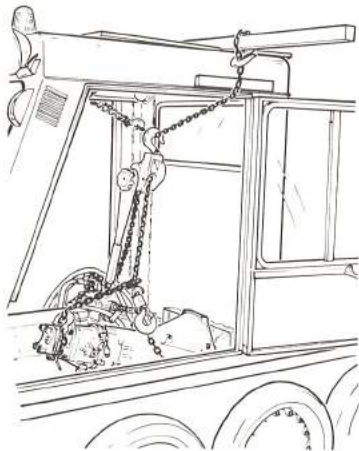
▼ **CAUTION:** Place wood blocks above the gutters and a piece of cardboard onto the cab. This will protect the cab and its gutters when lifting the transmission.

- Remove the filler tube from the transmission.
- ▼ **CAUTION:** Install a plug into the filler tube hole in the transmission.
- Lightly tauten chains using the hoist, and then remove the screws fixing the transmission to the engine.
- Pull the transmission straight to free it from the dowel pins of the bell housing.



## Section 20 TRANSMISSION

### Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))



B002040012

— Hoist the transmission and remove it from the vehicle.

## INSTALLATION

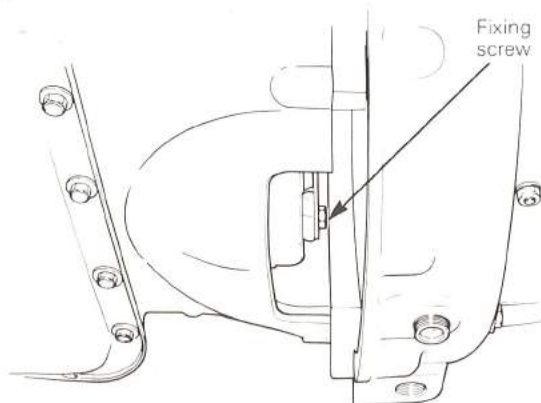
To install the transmission, reverse the removal procedure paying particular notice to the following:

— Fix the transmission to the engine as follows:

- Put the transmission in position.

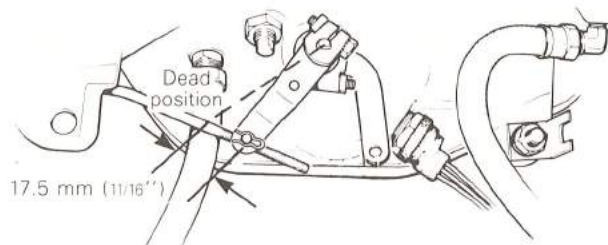
○ **NOTE:** Align holes on the transmission with dowel pins on the bell housing.

- Install temporarily the two (2) upper screws, and then the remaining screws fixing the transmission to the engine.



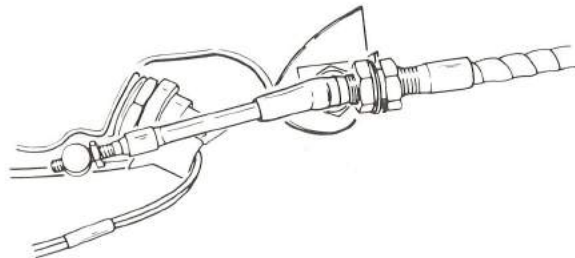
B002040017

- Install the four (4) screws fixing the torque converter to the drive plate.
  - Tighten the screws fixing the transmission to the engine.
- If the kick-down lever has to be adjusted, proceed as follows:



B002040019

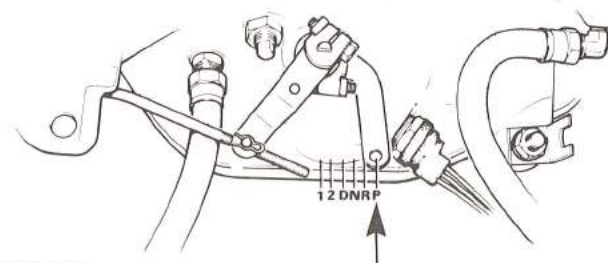
- Starting from the "dead" position of the kick-down lever, move the lever rearward of 17.5 mm (11/16").
  - Loosen the jam nut, and then align the swivel abutment of the kick-down rod with the fixing hole on the kick-down lever.
  - Tighten the jam nut, insert the swivel abutment into the kick-down lever, then secure it in position using the spring clip.
- Adjust the gear shift cable as follows:



B002020028

- Fix the gear shift cable to its retainer on the transmission.

○ **NOTE:** The cable retainer should be located half way on the threaded portion of the cable main sleeve.

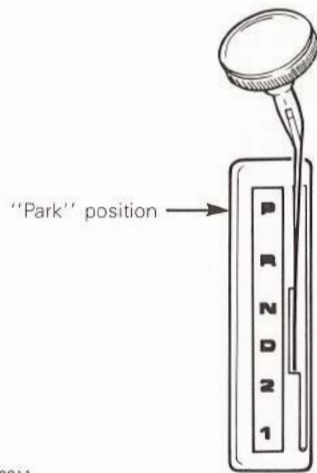


B002020029



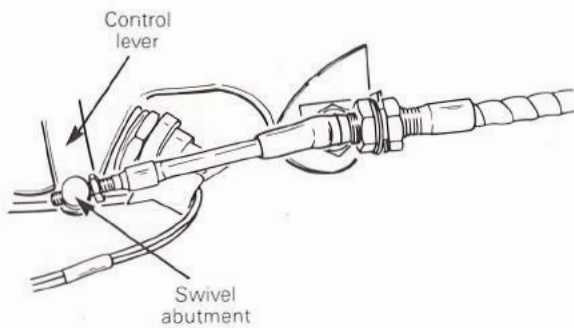
## Section 20 TRANSMISSION

### Sub-section 02 ("CHRYSLER" A-727 (SW-48DA))



B002160011

- Bring the control lever and the gear shift lever to the park ("P") position.



B002020028

- Loosen the jam nut, and then turn the swivel abutment to align it with the fixing hole on the control lever.
- Tighten the jam nut, insert the swivel abutment into the control lever, then secure it in position using a new cotter pin.

▼ **CAUTION:** Always replace the cotter pin by a new one.

◆ **WARNING:** Sparks could cause battery to explode. When reinstalling the batteries, always connect the positive battery cable first, then connect the battery ground cable.

## Section 20 TRANSMISSION

### Sub-section 03 (PROPELLER SHAFT)

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## PROPELLER SHAFT

### SPECIFICATIONS

#### SW-48 FA:

Make: "Spicer"  
Model: 1350 serie  
Length: 288 mm (11.323")

#### SW-48 DA:

Make: "Spicer"  
Model: 1350 serie  
Length: 476 mm (18.75")

#### Universal joints:

Make: "Spicer"  
Model: 1350 serie

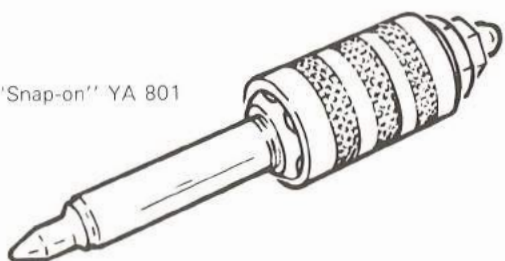
Lubricant: Multi-purpose high quality grease resistant to water and which will remains fluid under cold temperatures (P/N 413 7044 00).

## SERVICING

### Lubrication

Interval: After 25 hours and at every 100 hours.

"Snap-on" YA 801



B002040020

NOTE: To reach the grease fitting of the universal joints, it could be necessary to use a special tool, such as the "Snap-on" type needle adapter No: YA 801.

# DIFFERENTIAL

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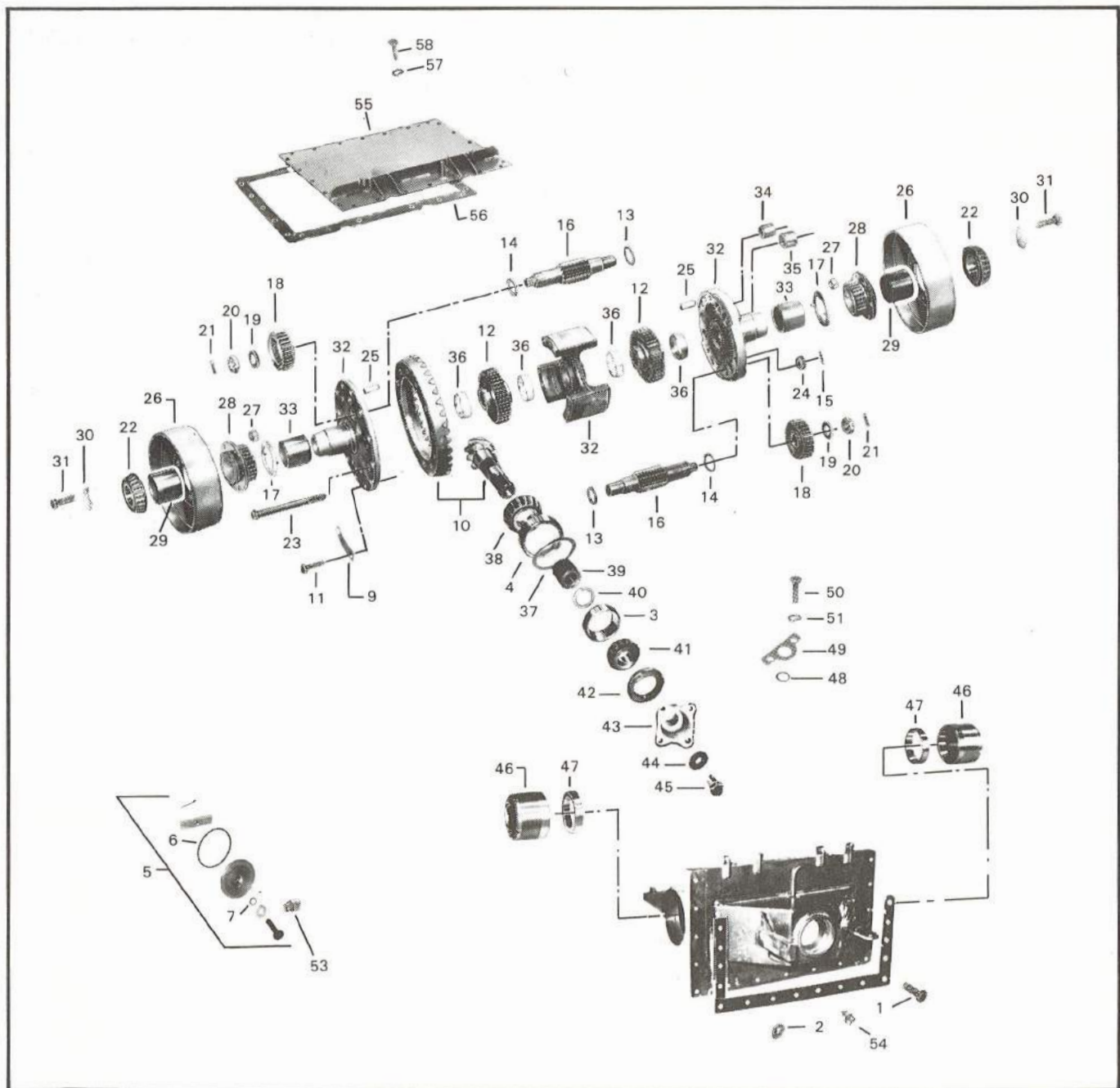
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**Section 60 DIFFERENTIAL**  
Sub-section 01 (DIFFERENTIAL)

**DIFFERENTIAL**



## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

1. Bolt
2. V-gasket
3. Bearing cup
4. Bearing cup
5. Inspection hole plug ass'y
6. O-ring
7. O-ring
9. Tab lock
10. Crown gear & pinion gear
11. Screw
12. Axle gear
13. Thrust washer
14. Thrust washer
15. Cotter pin
16. Pinion gear
17. Thrust washer
18. Planet gear
19. Washer
20. Nut
21. Cotter pin
22. Cone bearing
23. Bolt
24. Nut
25. Dowel pin
26. Steering brake drum
27. Nut
28. Sun gear
29. Bushing
30. Tab lock
31. Screw
32. Differential center & side cases ass'y
33. Sleeve
34. Bushing
35. Bushing
36. Bushing
37. Shim
38. Cone bearing
39. Pinion sleeve
40. Shim
41. Cone bearing
42. Oil seal
43. Companion flange
44. Washer
45. Screw
46. Bearing adjuster
47. Bearing cup
48. O-ring
49. O-ring retainer
50. Screw
51. Lock washer
53. Drain plug
54. Magnetic drain plug
55. Differential cover
56. Gasket
57. Lock washer
58. Screw

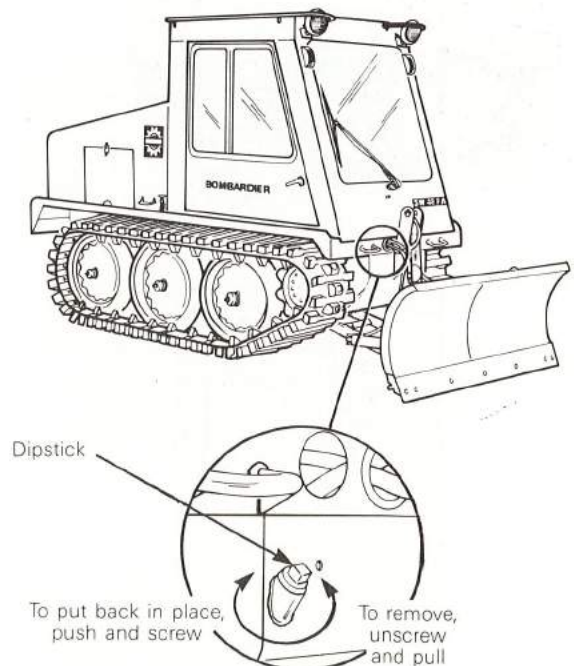
## SPECIFICATIONS

Make:	"Bombardier"
Model:	Planetary-type controlled
Gear ratio:	5.83 to 1
Liquid capacity:	18.2 L 4 Imp. gal. 4.8 U.S. gal.
Oil type:	- Esso torque fluid #56 - Dexron II

## SERVICING

### Oil level

Check: Every 10 hours or daily.



B002080002

— Check the differential oil level with the vehicle on a flat and level surface.

## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

- At room temperature (21°C - 70°F approx.) the oil level should be within the safe range.

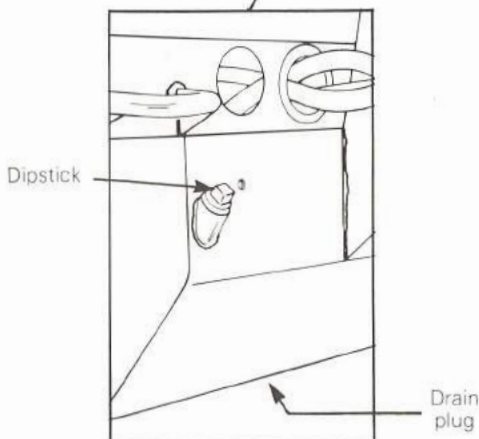
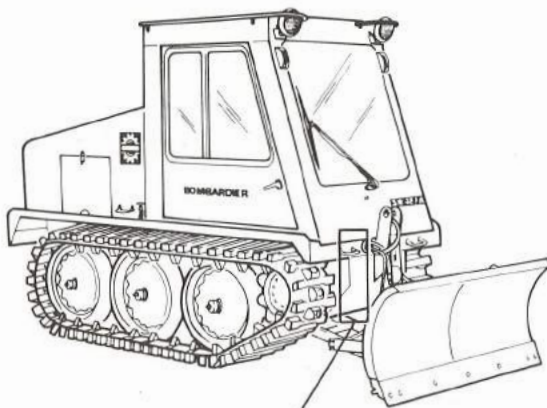


B002080003

#### Oil change

Interval: Every 200 hours.

- Drain the differential oil with the vehicle on a flat and level surface by removing the drain plug from underneath the differential housing.

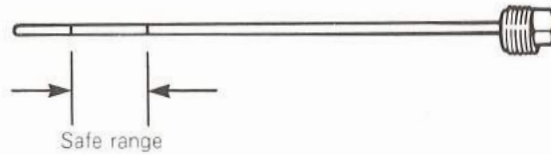


B002080004

- Refill through the gauge hole with Esso torque fluid #56 or Dexron II oil.

**CAUTION:** Reinstall the drain plug before refilling the differential.

- At room temperature (21°C - 70°F approx.) the oil level should be within the safe range.

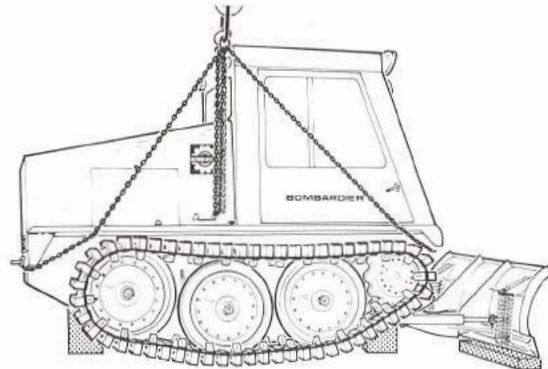


B002080003

#### REMOVAL

- Raise the vehicle using a jack or a hoist.

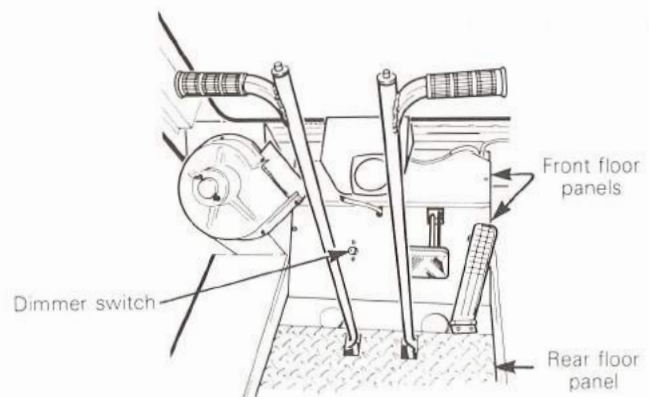
**WARNING:** To prevent any movement of the vehicle, perform this operation on a flat and level surface.



B002080005

**WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.

- Drain differential oil (refer to "Servicing" item in this section).



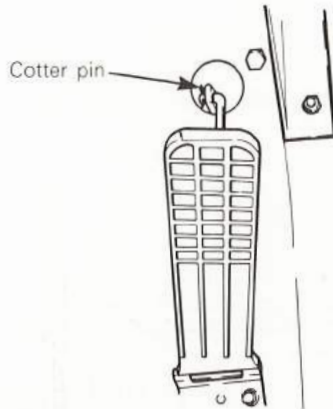
B002080007

- Remove the rear floor panel and then disconnect the ground cable from the battery.



## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)



B002080008

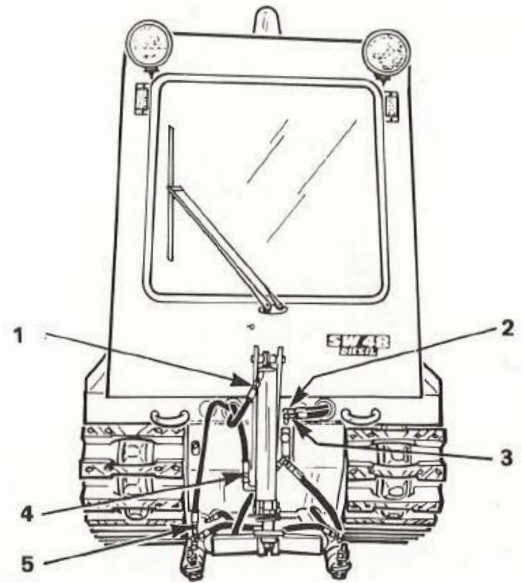
- Remove the cotter pin and disconnect the throttle linkage.
- Remove both front floor panels.

▼ **CAUTION:** Disconnect wires from dimmer switch when removing the lower panel.



B002080009

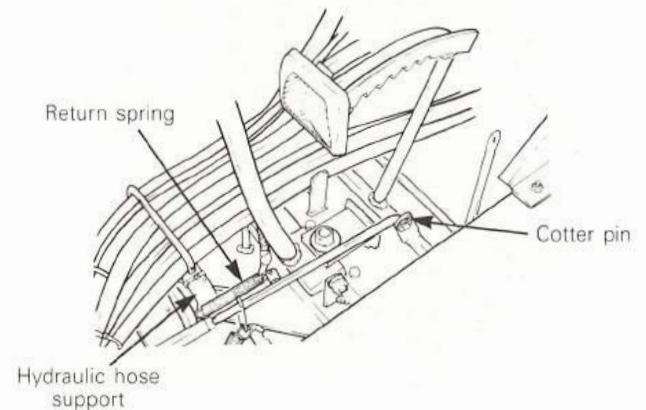
- Remove safety pin, cotter pins and pivot pins in order to remove the operator's seat from the vehicle.



B002080010

- Disconnect the five (5) hydraulic hoses from push frame. Identify their respective positions.

▼ **CAUTION:** Install plugs on line connectors and on oil lines when these have been disconnected.

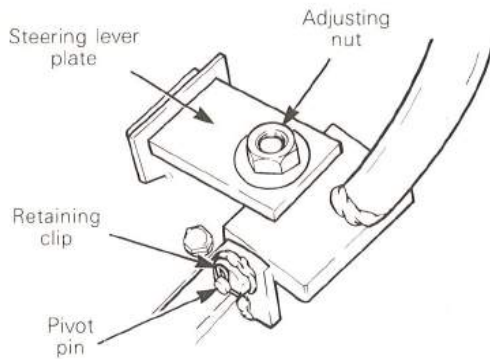


B002080011

- Remove the cotter pin and disconnect the brake linkage.
- Free the hydraulic hose support by removing both fixing bolts and disconnecting the brake linkage return spring.
- Remove tie raps then pull hydraulic hoses into the cab.

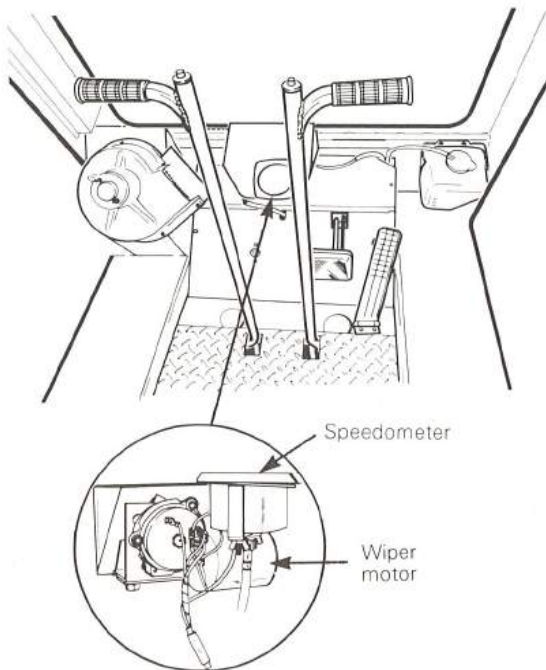
## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)



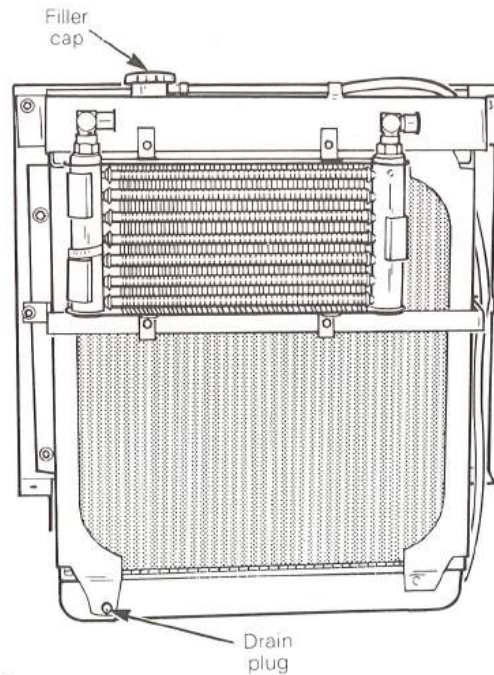
B002080012

- Remove the steering lever plates by unscrewing the steering brake band adjusting nut.
- Remove the steering levers by removing the retaining clip, the pivot pin, and disconnecting the electrical wires.



B002080014

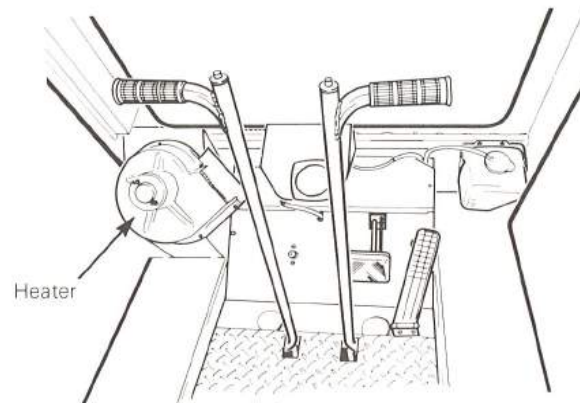
- Remove the wiper motor and speedometer support.
- Disconnect wires from windshield washer motor.



B002080015

- Loosen the filler cap and remove the radiator drain plug to drain radiator.

◆ **WARNING:** Never drain the cooling system when engine is hot.

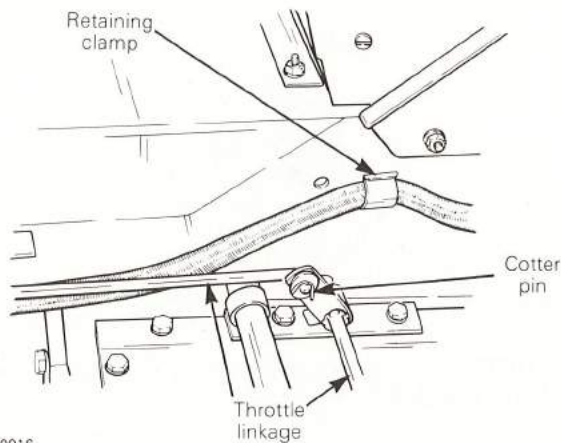


B002080007

- Remove the heater from the vehicle.

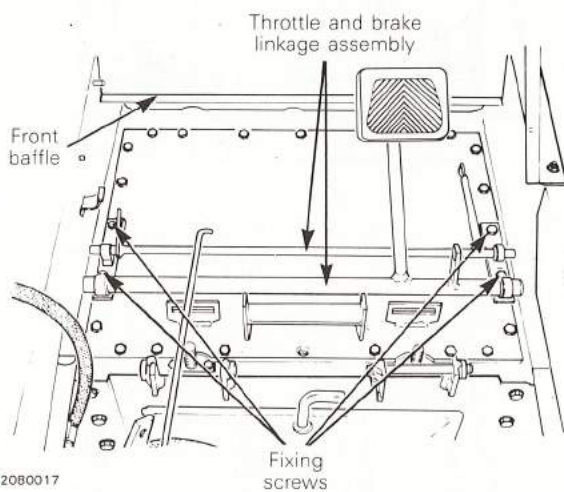
## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)



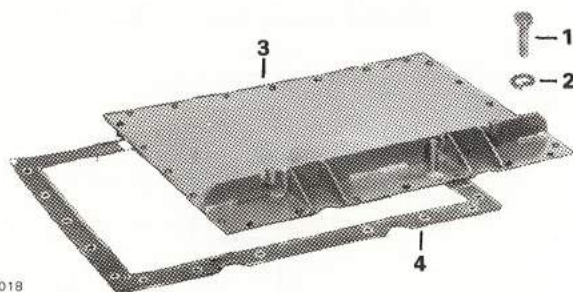
B002080016

- Slightly open the wiring harness retaining clamp and pull the wiring harness away from the differential cover.
- Remove the cotter pin and disconnect throttle linkage.



B002080017

- Remove the throttle and brake linkage assembly from the differential cover.
- Remove the front baffle from the vehicle.

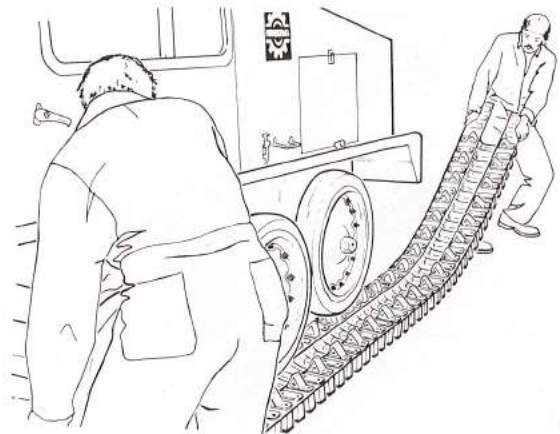


B002080018

- 1- Screw
- 2- Lock washer

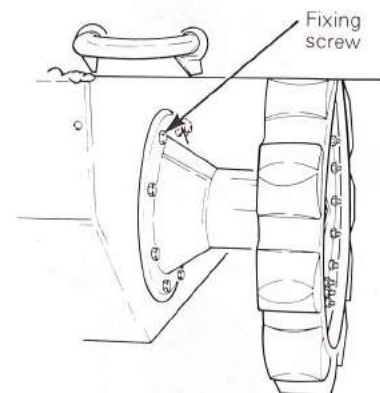
- 3- Differential cover
- 4- Gasket

Remove the differential cover and its gasket from the vehicle.

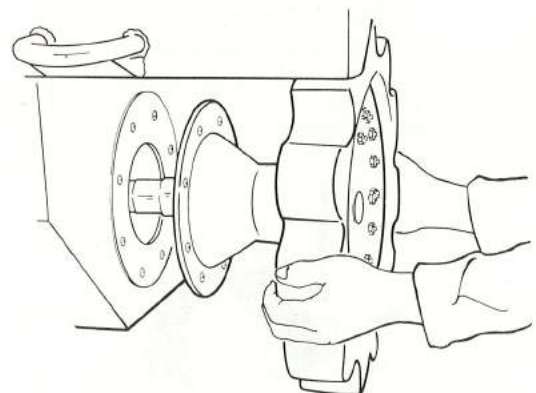


B002080019

- Remove both tracks from the vehicle (refer to "Track" section).



B002080020



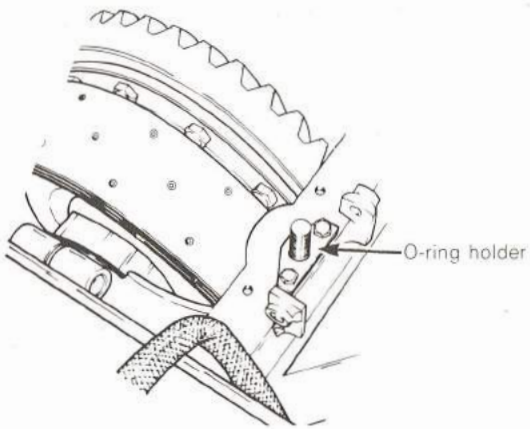
B002080021

- Unscrew the drive axle housing screws then pull both housings straight from the vehicle.



## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

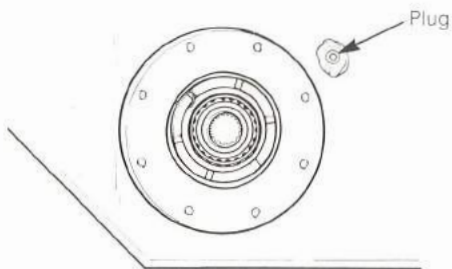


B002080022



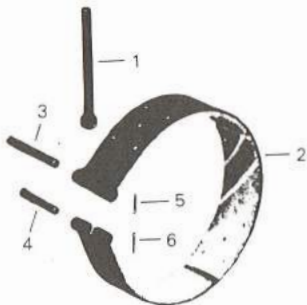
B002080023

— Remove both O-ring holders then remove O-rings.



B002080024

— Remove the plugs from each side of the frame in order to remove the brake band pins.



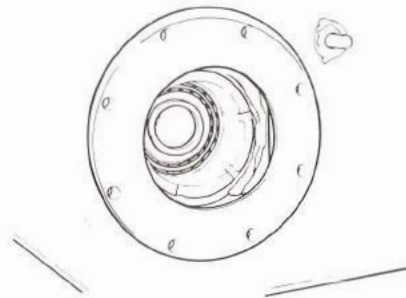
B002080025

1- Rod  
2- Brake band  
3- Long pin

4- Short pin  
5- Cotter pin  
6- Cotter pin

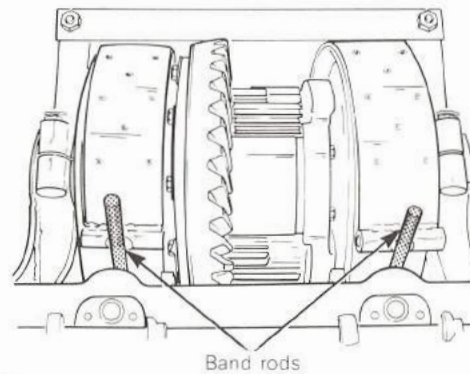
— Remove the cotter pin, and then pull out the long pin from each steering brake band.

60-01-7



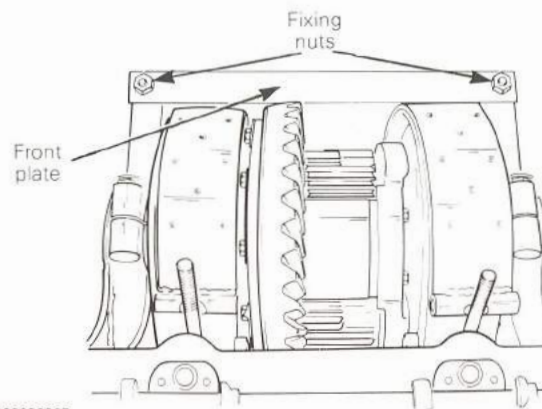
B002080026

NOTE: Remove long pins via the hole on each side of the frame.



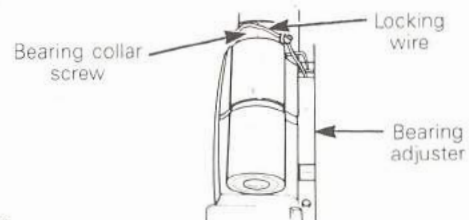
B002080027

— Guide the band rods out from their locations.



B002080027

— Remove the two nuts fixing the front plate to the differential carrier. Remove the front plate.

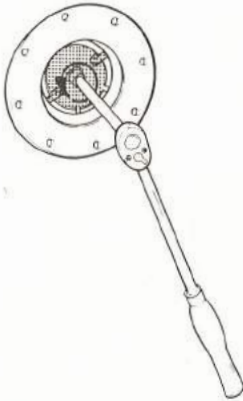


B002080028

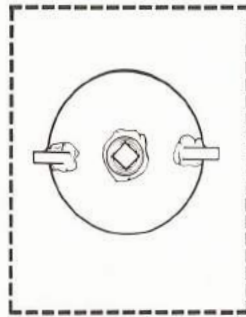
— Remove locking wires, and then the two bearing collar screws.

## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

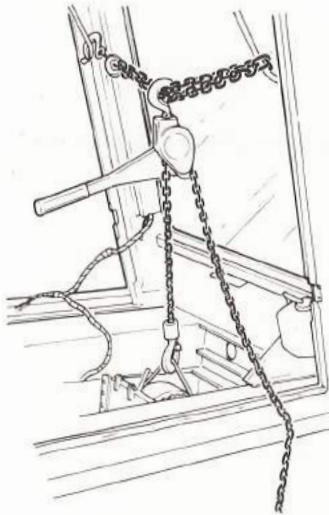


B002080039

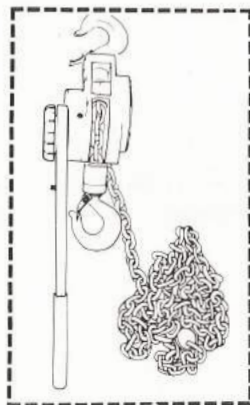


Bearing adjusting tool

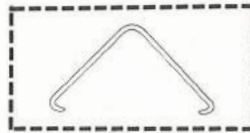
— Loosen both bearing adjusters.



B002080040

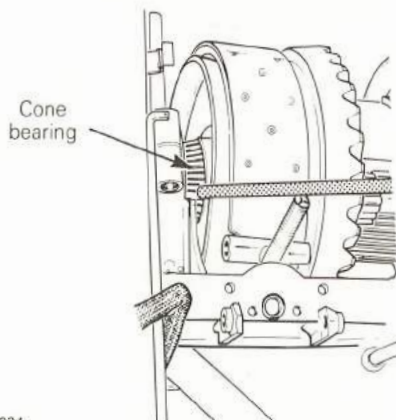


Hoist



Grip

— Hold the differential using a hoist.



B002080034

— Loosen both bearing adjusters to free the bearings completely.



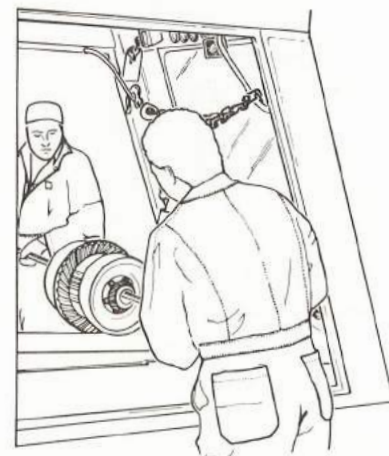
B002080035

— Use a pry bar to free the differential.



B002080036

— Lift the differential using a hoist.



B002080037

— Use a crow bar to carry the differential out of the vehicle.

## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

## INSTALLATION

To install the differential, reverse the removal procedure paying particular notice to the following:



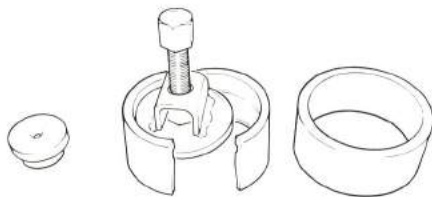
B002080038

▼ **CAUTION:** The differential must be installed with the crown gear on the left side of the pinion gear, otherwise the three (3) forward speeds provided through the transmission will become reverse speeds.

- Adjust differential backlash (refer to "Differential backlash" sub-section in this section).

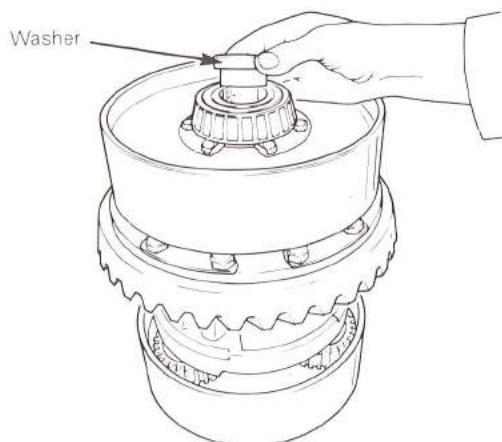
## DISASSEMBLY AND ASSEMBLY

### Disassembly



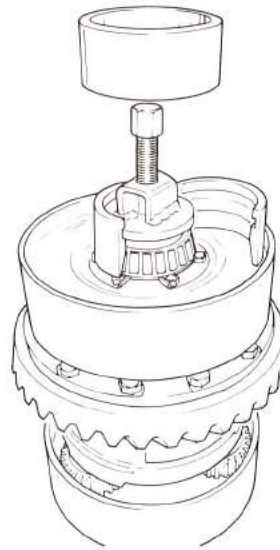
B002080041

- A special puller (P/N 629 0009 00) is to be used to remove the cone bearings from the differential.



B002080042

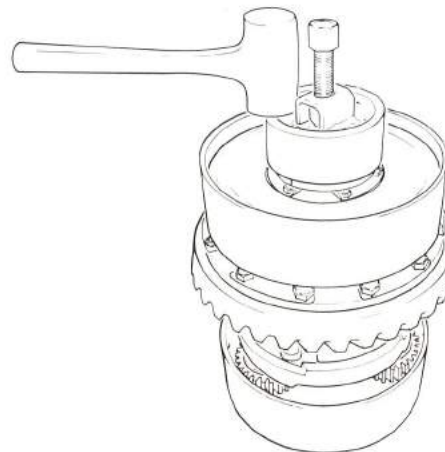
- Place the washer from the puller on the cone bearing.



B002080043

- Put the puller halves with the screw at the same time. The puller must be secured on the cone bearing.

▼ **CAUTION:** Make sure the puller is pulling on the rollers.



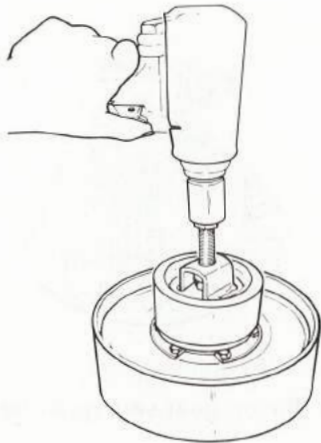
B002080044

- Using a soft hammer, drive the retaining sleeve on puller sides.



## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)



B002080045



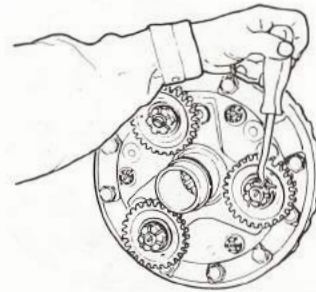
B002080046

- Turn the puller screw clockwise to pull out the cone bearing.

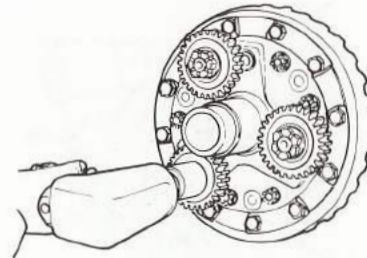


B002080047

- After having removed the cone bearing, pull out the brake drum.

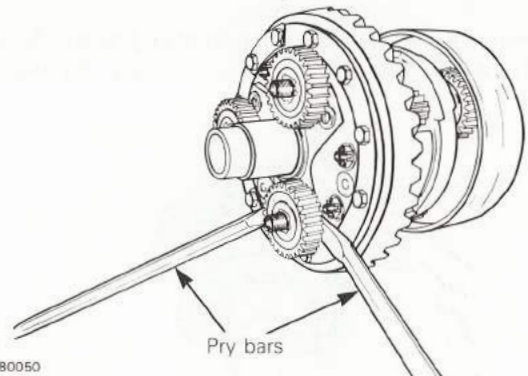


B002080048



B002080049

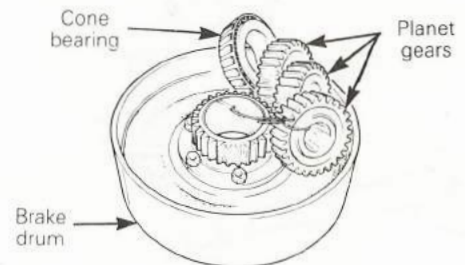
- Remove the cotter pins, unscrew the nuts and remove the washers from planet gears.



B002080050

- Using two (2) pry bars, remove planet gears from the differential.

○ **NOTE:** Repeat the same procedure to remove the planet gears from the other end of the differential.

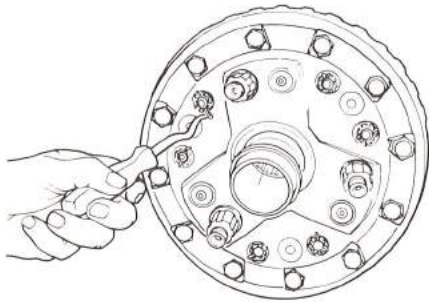


B002080051

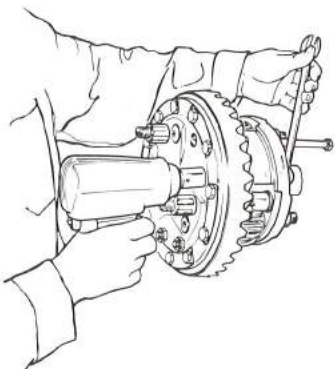
▼ **CAUTION:** Be sure to keep the planet gears of one side together. Using a wire, bind the planet gears to their respective brake drum.

## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

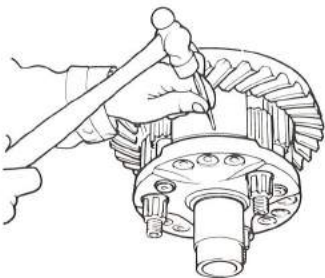


B002080052



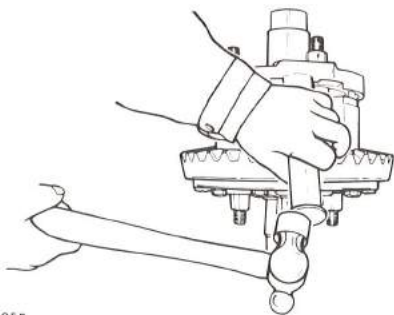
B002080053

- Remove the cotter pins, then remove the six (6) bolts and nuts holding the differential cases together.



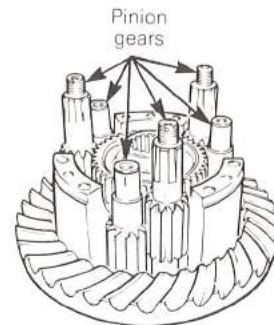
B002080054

- Using a punch, mark the differential cases according to their position.



B002080055

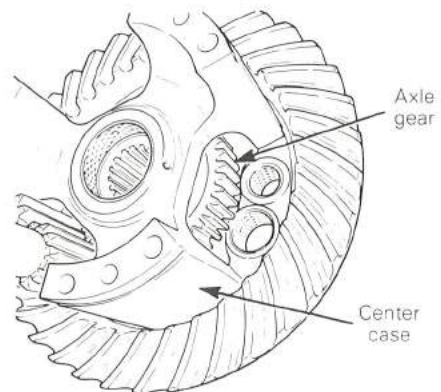
- Using a hammer and a soft punch, remove the side case (opposite side of the crown gear) from the differential.



B002080056

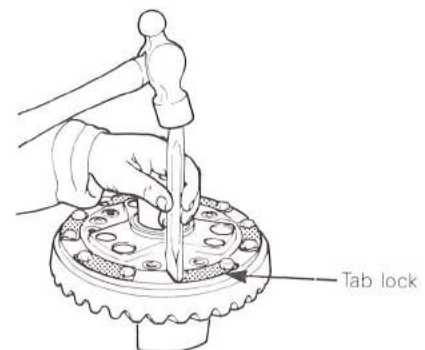
- Remove the six (6) pinion gears.

**CAUTION:** Pinion gear sets must be retained as sets.



B002080057

- Remove the center case and both axle gears.



B002080058

- Release tab locks and remove the screws fixing the crown gear to the side case.

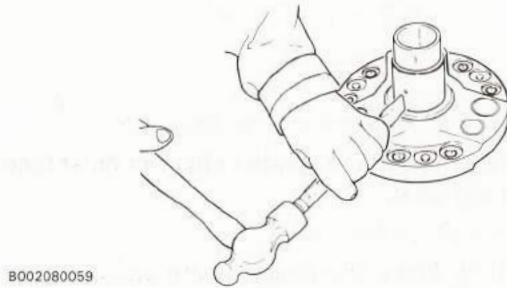
## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

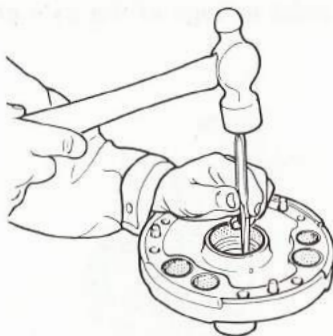
#### Repairing

▼ **CAUTION:** The differential is now completely disassembled. Replace the worn or broken parts. Make sure that all parts are in good condition and clean before reassembly.

#### Bushing removal



B002080059

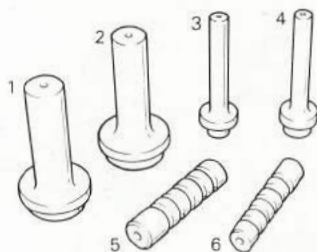


B002080060

- To remove sleeves and/or bushings, cut them using a hammer and a cold-chisel.

#### Bushing installation

Required tools for bushing installation:



B002080061

- 1- Brake drum gear bushing installer (P/N 629 0018 00)
- 2- Center and side case bushing installer (P/N 629 0017 00)
- 3- Pinion gear small bushing installer (P/N 629 0019 00)
- 4- Pinion gear large bushing installer (P/N 629 0020 00)
- 5- Pinion gear large bushing 1 1/4" burnishing bar (P/N 629 0016 00)
- 6- Pinion gear small bushing 1" burnishing bar (P/N 629 0015 00)

- Put a side case on a work bench.
- By hand, start the bushing straight into the housing.



B002080062

- Insert the proper installer into the bushing. Using a hammer, drive the bushing into the housing until the installer flange sits flush with the housing.
- After having installed the bushings, drive the proper burnishing bar through the bushings to remove burrs.

▼ **CAUTION:** The burnishing bars must be used only on pinion gear bushings.



B002080063

- Place the smaller diameter of the burnishing bar into the bushing. Then, drive the burnishing bar through the bushing using a hammer and a soft punch.



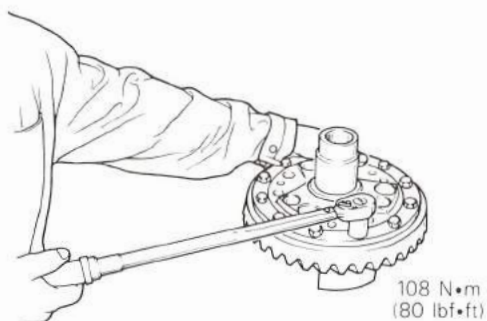
## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

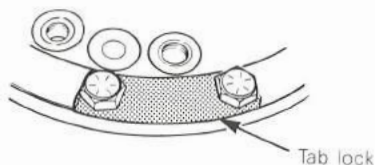
#### Assembly

- Install the crown gear to the side case using tab locks and screws.

▼ **CAUTION:** Always replace the tab locks by new ones.

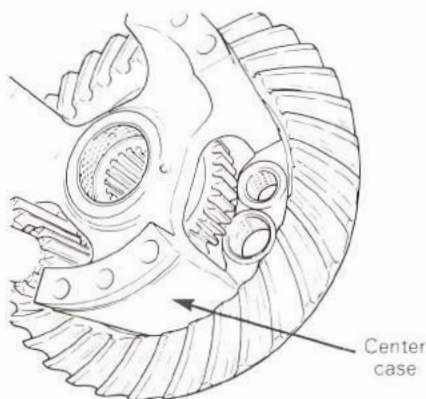


B002080064



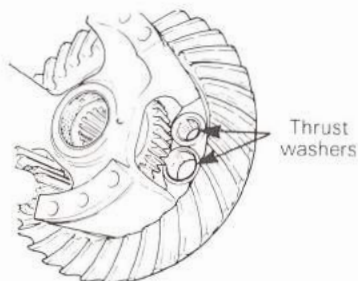
B002080065

- Tighten screws to 108 N•m (80 lbf•ft) and secure them properly using new tab-locks.
- Oil all bushings on center and side cases, and then place the axle gear in position.



B002080066

- Place the differential center case carefully on the three (3) dowel pins and press it into position.



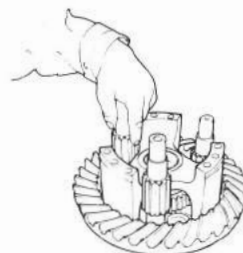
B002080057

- Place the thrust washers on the side case.

▼ **CAUTION:** The thrust washer chamfer must face the pinion gear.

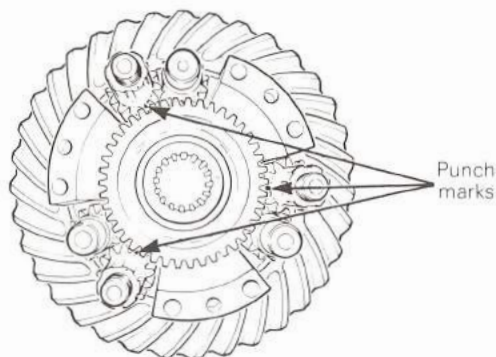
- Install three (3) pinion gears.

▼ **CAUTION:** Place the pinion gears according to the position of the punch mark on the tooth. The marked tooth must engage in the axle gear.



B002080067

○ **NOTE:** When installing the pinion gears, place a finger on the marked tooth to make sure this tooth will engage in the axle gear.



B002080068

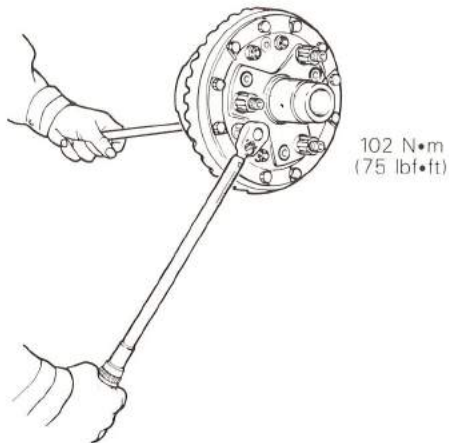
- Proceed in the same way with the remaining pinion gears and the other axle gear.
- Place the thrust washers on the end of the pinion gears.

▼ **CAUTION:** The thrust washer chamfer must face the pinion gear.

- Drive the dowel pins in the side case.

## Section 60 DIFFERENTIAL

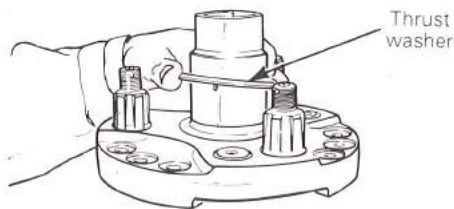
### Sub-section 01 (DIFFERENTIAL)



B002080069

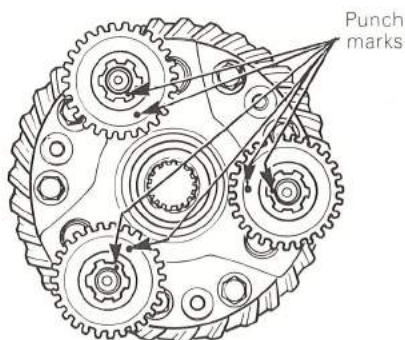
- Place the differential side case on top of the assembly and fix it using the six (6) bolts and nuts. Tighten to 102 N•m (75 lbf•ft). Lock in position using new cotter pins.

▼ **CAUTION:** Always replace cotter pins by new ones.



B002080070

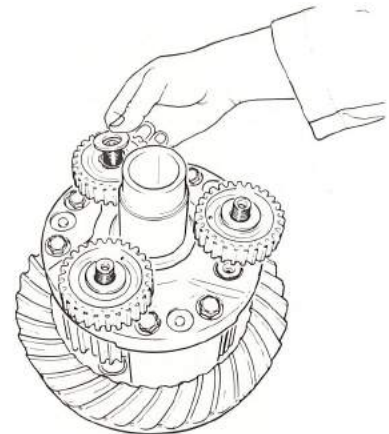
- Install thrust washers on side cases.



B002080071

- Place a synchronized planet gear on the end of each pinion gear.

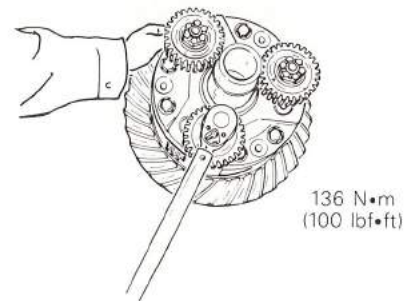
▼ **CAUTION:** Be sure to match punch marks of the planet gears with those of the pinion gears.



B002080072

- Install a washer on each planet gear.

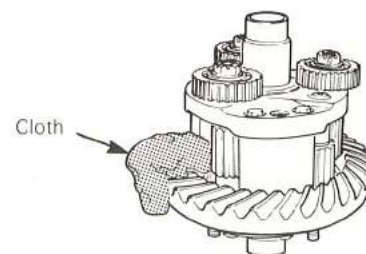
▼ **CAUTION:** The straight surface of the washer must face the planet gear.



B002080073

- Secure each planet gear using a nut and a new cotter pin. Tighten to 136 N•m (100 lbf•ft).

▼ **CAUTION:** Always replace cotter pins by new ones.



B002080074

○ **NOTE:** To prevent the planet gear from turning when tightening the nut, place a clean cloth between the teeth of two (2) pinion gears.

▼ **CAUTION:** The cloth must be very clean to prevent dirt penetration into the differential.

## Section 60 DIFFERENTIAL

### Sub-section 01 (DIFFERENTIAL)

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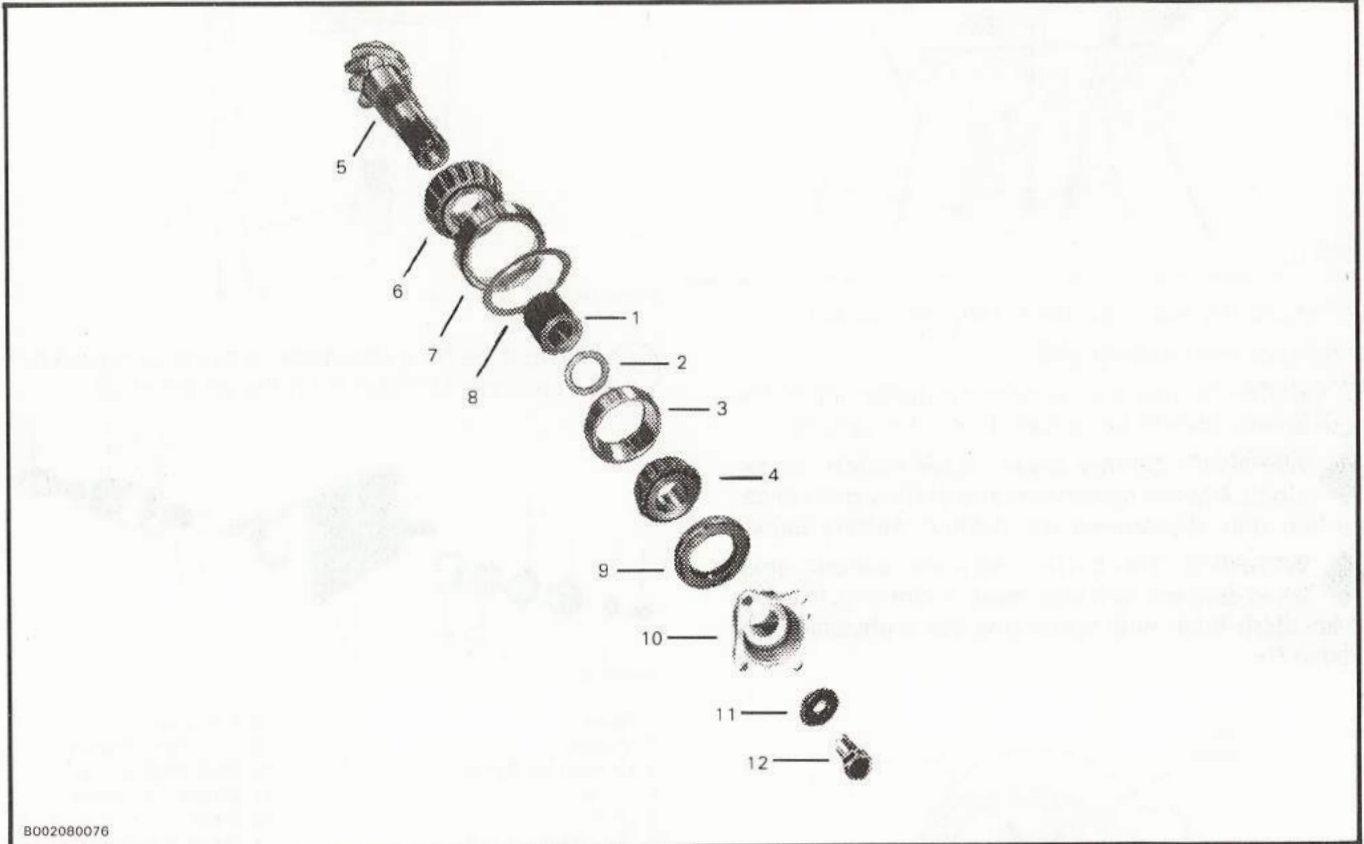


B002080075

- Place a steering brake drum in position and verify if everything turns properly.
- Install the other steering brake drum in the same way on the other side of the differential.
- Using a press, install cone bearings (one on each side of the differential).



**PINION GEAR**



B002080076

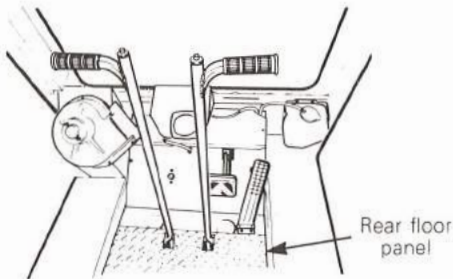
- 1. Pinion sleeve
- 2. Shim
- 3. Bearing cup
- 4. Cone bearing
- 5. Pinion gear
- 6. Cone bearing

- 7. Bearing cup
- 8. Shim
- 9. Oil seal
- 10. Companion flange
- 11. Washer
- 12. Screw

## Section 60 DIFFERENTIAL

### Sub-section 02 (PINION GEAR)

#### REMOVAL



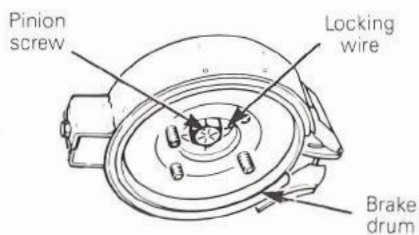
B002080077

- Remove the rear floor panel from the vehicle.
- Remove the propeller shaft.

○ **NOTE:** To gain access to the propeller shaft, the battery should be removed from the vehicle.

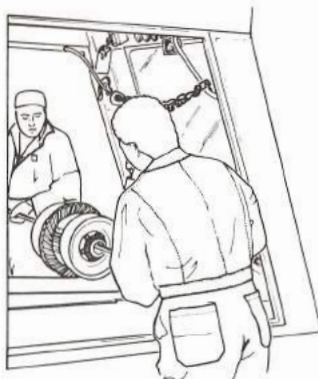
◆ **WARNING:** Sparks could cause battery to explode. Always disconnect the battery ground cable first then disconnect the positive battery cable.

◆ **WARNING:** The battery contains sulfuric acid, avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.



B002080078

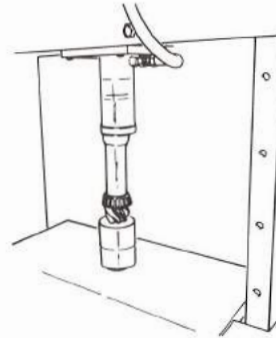
- Remove the brake drum.
- Remove the locking wire then unscrew the pinion screw.



B002080037

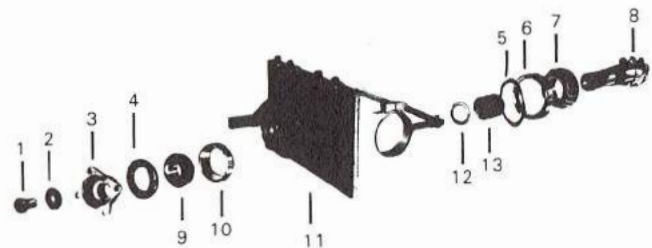
- Remove the differential from the vehicle (refer to "Differential" sub-section in this section).
- Pull out the pinion gear from the differential carrier.

#### INSTALLATION



B002080079

○ **NOTE:** If the front cone bearing has to be replaced, use a press to install it on the pinion shaft.



B002080080

- |                       |                          |
|-----------------------|--------------------------|
| 1. Screw              | 8. Pinion gear           |
| 2. Washer             | 9. Rear cone bearing     |
| 3. Companion flange   | 10. Rear bearing cup     |
| 4. Oil seal           | 11. Differential carrier |
| 5. Shim               | 12. Shim                 |
| 6. Front bearing cup  | 13. Pinion sleeve        |
| 7. Front cone bearing |                          |

#### From the inside of the differential carrier

- Install the proper shim (5).
- Install the front bearing cup.
- Install the proper shim (12) and sleeve on the pinion shaft.
- Install the pinion gear and bearing assembly in the differential carrier.

#### From the outside of the differential carrier

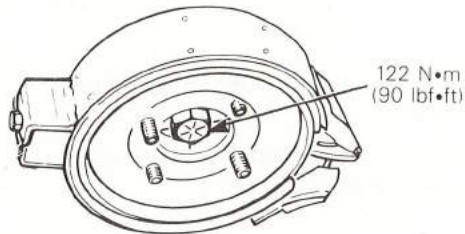
- Install the rear bearing cup.
- Install the rear cone bearing.
- Install a new oil seal.

▼ **CAUTION:** Oil seals must be replaced by new ones.

- Install the companion flange to the pinion shaft using the proper screw.
- Install the differential into the differential carrier (refer to "Differential" sub-section in this section).

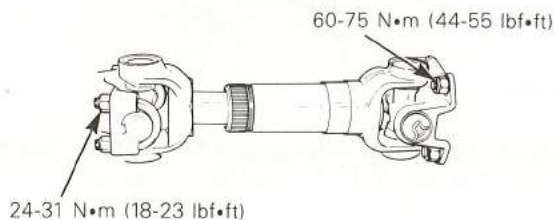
## Section 60 DIFFERENTIAL

### Sub-section 02 (PINION GEAR)



B002080078

- Tighten the screw fixing the companion flange to the pinion shaft to 122 N•m (90 lbf•ft).
- Adjust differential backlash (refer to "Differential backlash" sub-section in this section).
- Lock the pinion screw in position using steel wire.
- Position the brake drum.



B002080081

- Install the propeller shaft. Tighten bolts and nuts.  
7/16"-20 gr.5    60-75 N•m (44-55 lbf•ft).  
"U" bolt 3/8"-24    24-31 N•m (18-23 lbf•ft).

- Install the battery.

◆ **WARNING:** Sparks could cause battery to explode. Always connect the positive battery cable first then connect the battery ground cable.

- Install the rear floor panel.



## Section 60 DIFFERENTIAL

### Sub-section 03 (DIFFERENTIAL BACKLASH)

## DIFFERENTIAL BACKLASH

### ADJUSTMENT

- Apply blue layout fluid sparingly to both sides of the teeth of the crown gear. When the pinion is rotated, the fluid is squeezed away by contact of the teeth, leaving a tooth pattern.

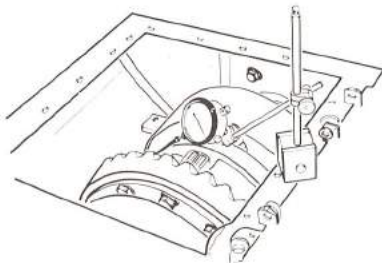
**NOTE:** Two adjustments affect crown gear and pinion tooth contact. They are pinion depth and backlash. Adding or removing shims would move the pinion toward the crown gear or away from it. Increasing or decreasing backlash could move the crown gear toward the pinion or away from it. When replacing a crown gear and a pinion, it should be noted that the original factory installed shim is of the correct thickness. If the original shim pack was lost or if a new carrier housing is being installed, substitute a nominal shim for the original and run a tooth pattern. The tooth pattern will indicate if the shim pack needs to be increased or decreased.



B002080083

- 1- Correct tooth pattern
- 2- Low contact
- 3- High contact

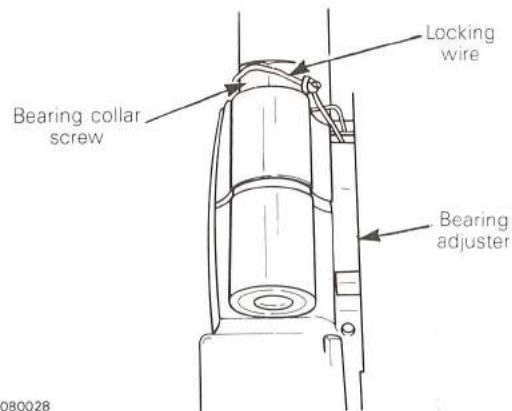
- 4- Contact on the heel
- 5- Contact on the toe



B002080082

- Use a dial indicator to check the backlash to a tolerance of .18 mm (.007"). Should it not be correct, the bearing adjusters should be moved accordingly: 1/4 turn of a bearing adjuster will give approximately a variation of .03 mm (.001").

- Tighten both bearing adjusters to 27-34 N•m (20-25 lbf•ft).
- Tighten the bearing collar screws to 41-54 N•m (30-40 lbf•ft).



B002080028

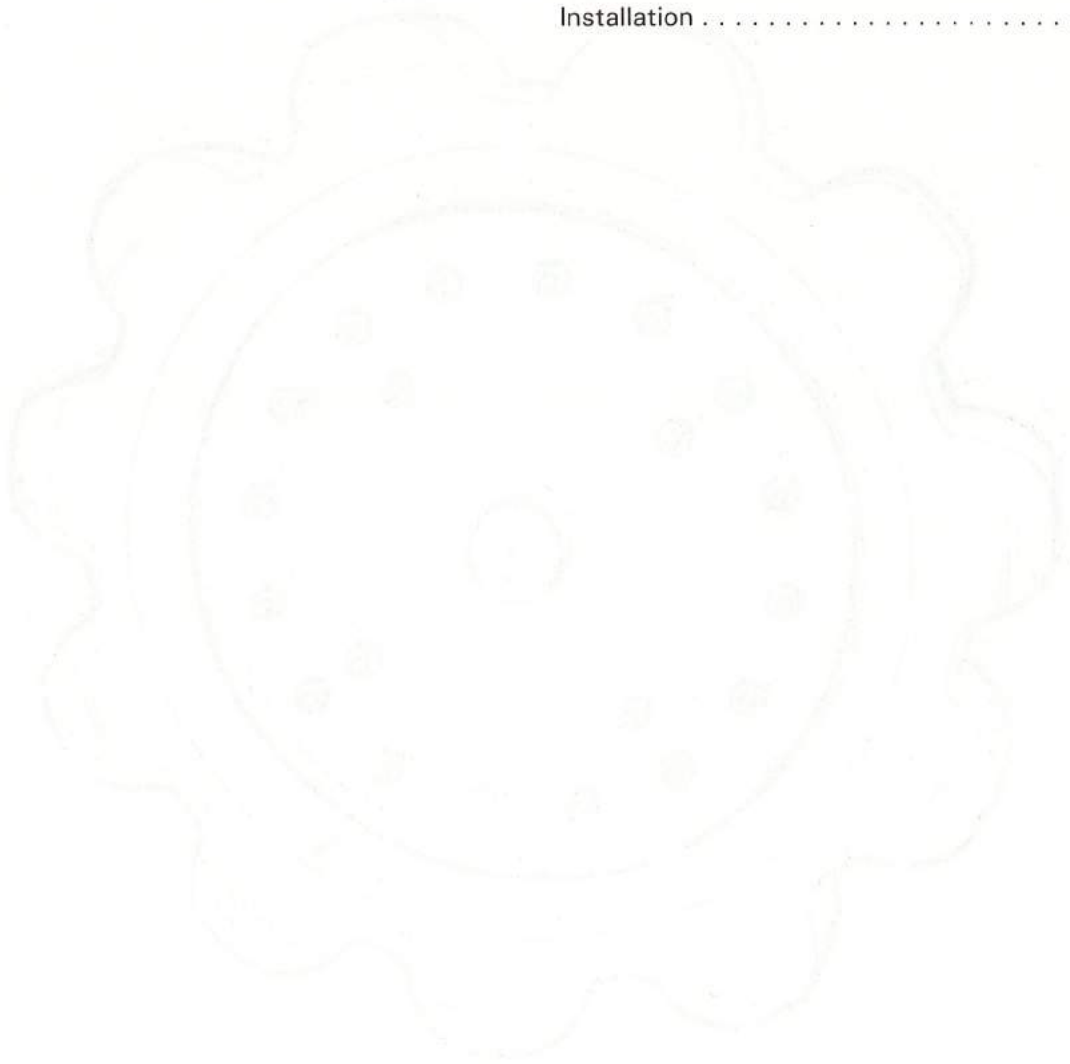
- Lock the bearing adjuster and the bearing collar screw together using 41 gauge steel wire.

# **FINAL DRIVE**

## **TABLE OF CONTENTS**

### **SPROCKET**

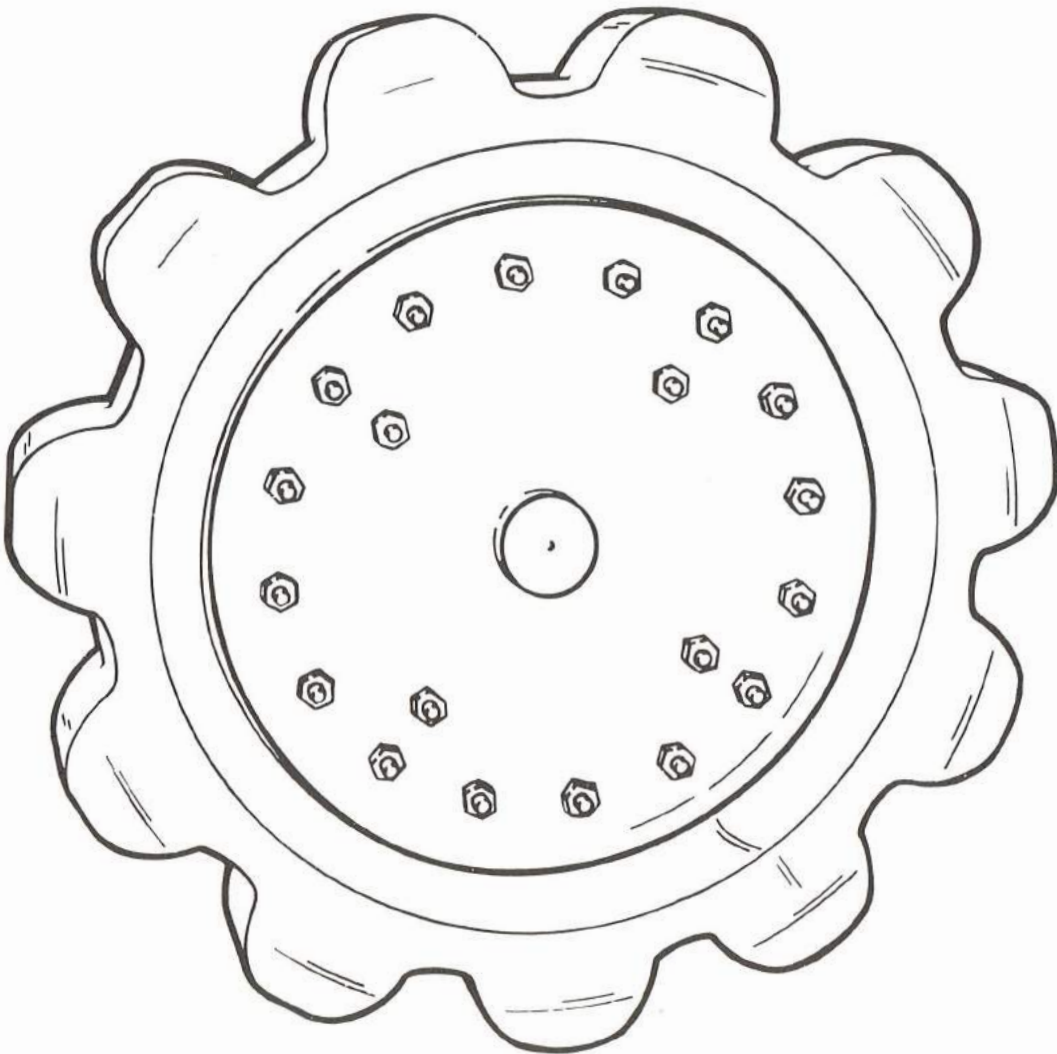
Specifications .....	70-01-2
Removal .....	70-01-2
Installation .....	70-01-3



**Section 70 FINAL DRIVE**  
Sub-section 01 (SPROCKET)

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**SPROCKET**



B002090001



## Section 70 FINAL DRIVE

### Sub-section 01 (SPROCKET)

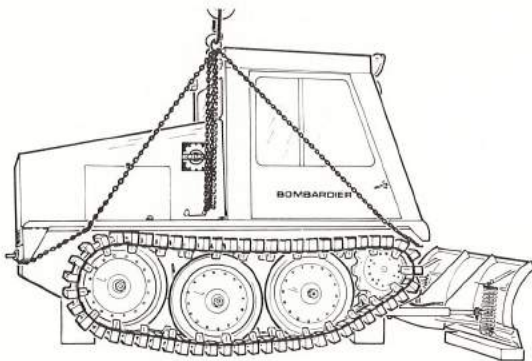
## SPECIFICATIONS

Material:	Rubber
Teeth quantity:	11

## REMOVAL

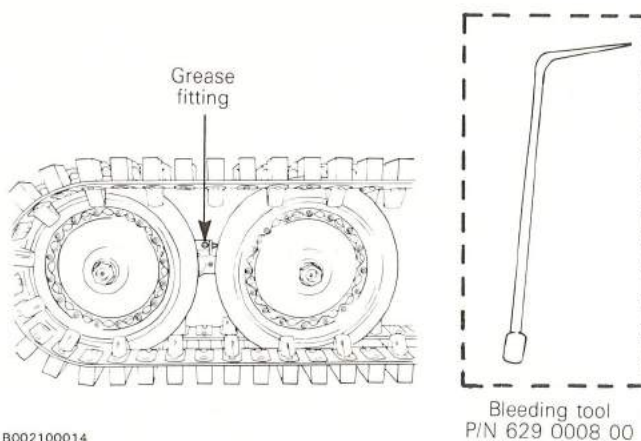
◆ **WARNING:** To prevent any movement of the vehicle, removal and installation should be performed on a flat and level surface.

Raise the vehicle using a jack or a hoist.



B002080005

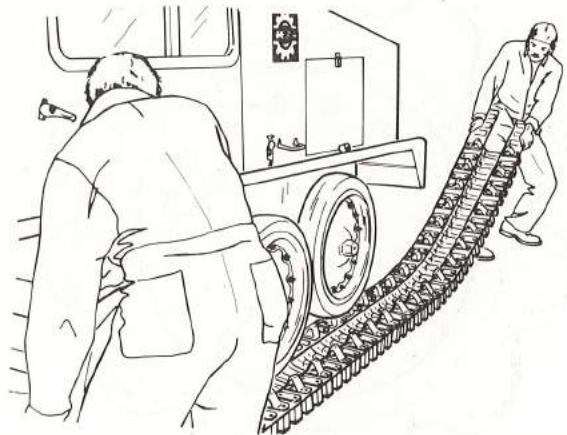
◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.



B002100014

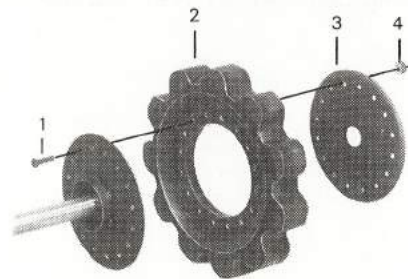
— Loosen the track by bleeding the hydraulic track-tensioner. Use the bleeding tool to release grease through the grease fitting.

◆ **WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.



B002080009

— Uncouple the track and spread it on the ground (refer to "Track" section).



B002090002

1. Bolt  
2. Sprocket

3. Drive flange  
4. Nut

— Unscrew the retaining bolts and nuts, then remove the sprocket.

○ **NOTE:** The drive flange will come off with the sprocket.

## Section 70 FINAL DRIVE

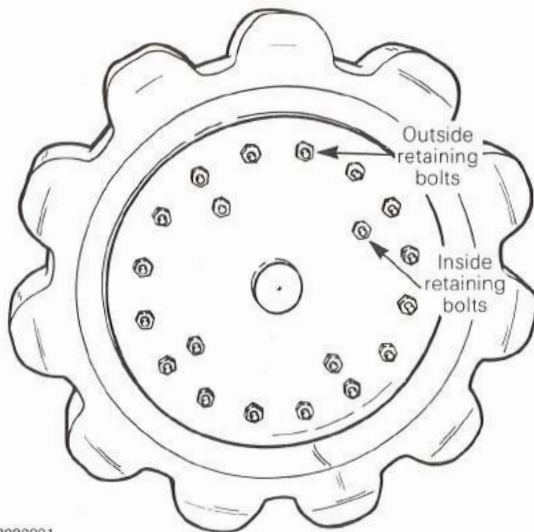
### Sub-section 01 (SPROCKET)

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#### INSTALLATION

To install a sprocket, reverse the procedure for its removal with the following addition.

Recommended torque:



8002090001

- Outside retaining bolts (16): 27 N•m (20 lbf•ft).
- Inside retaining bolts (4): 47 N•m (35 lbf•ft).

# BRAKE

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**EMERGENCY/PARKING BRAKE**

Pedal assembly ..... 80-02-1  
Brake band ..... 80-02-2  
Brake drum ..... 80-02-3  
Adjustment ..... 80-02-3




## **Section 80 BRAKE**

### **Sub-section 01 (SERVICE BRAKE)**

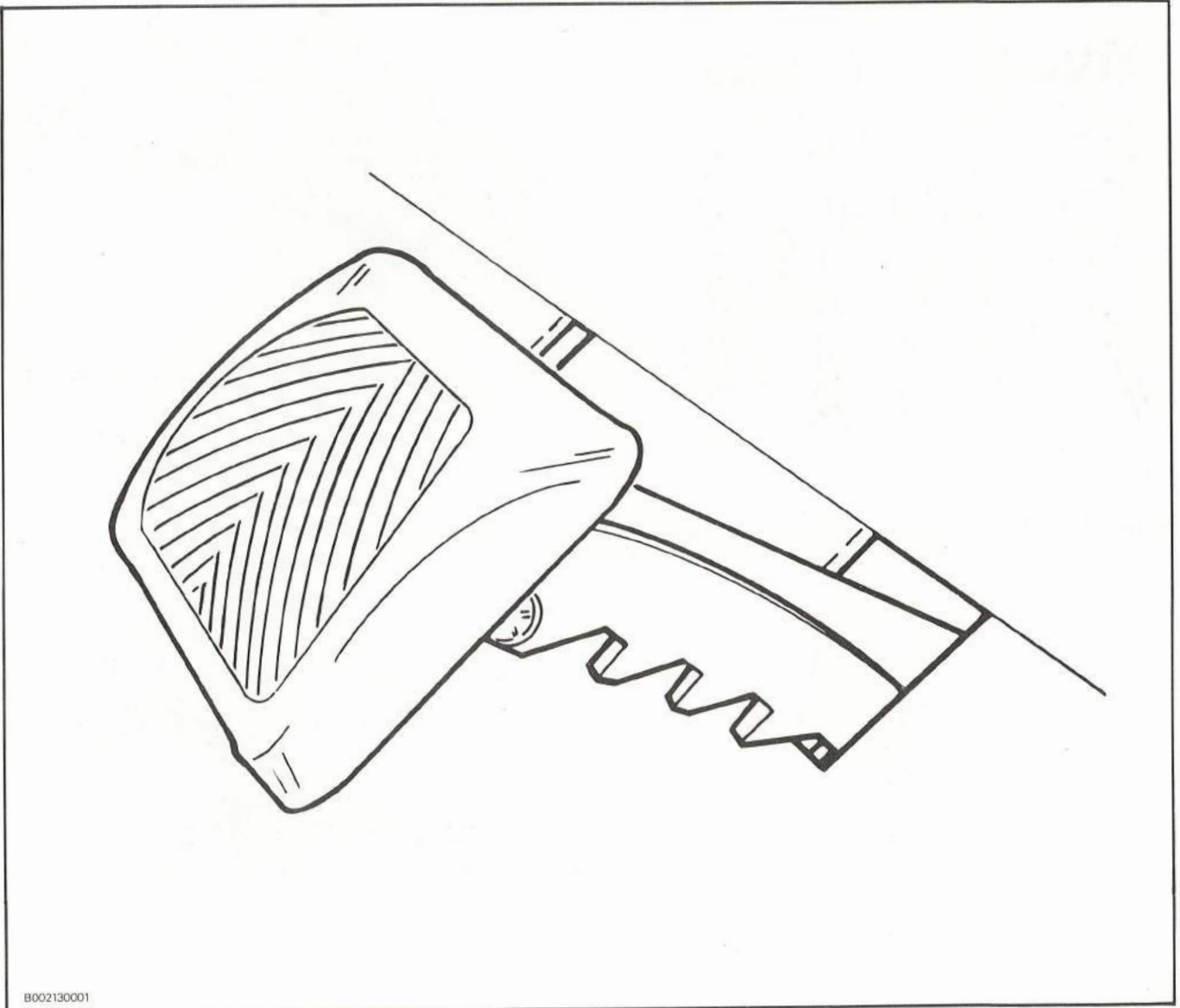
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#### **SERVICE BRAKE**

 **NOTE:** The service brake is applied by pulling simultaneously on both steering levers (refer to the Bombadier SW-48 FA operator's manual).

For more information, see "Steering" section in this manual.

**EMERGENCY/PARKING BRAKE**

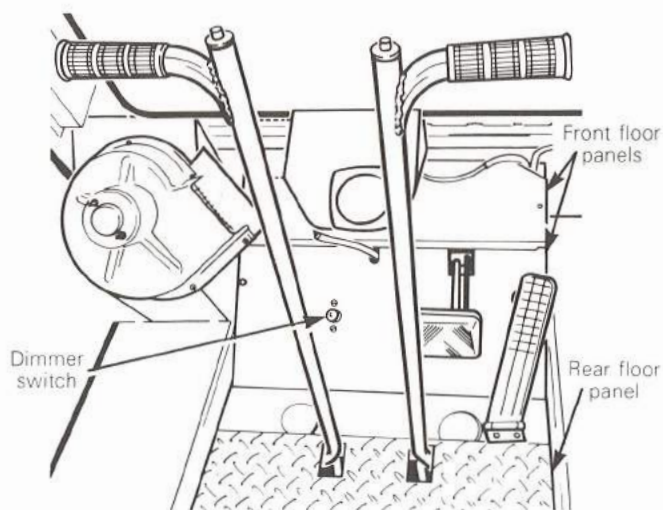


## Section 80 BRAKE

### Sub-section 02 (EMERGENCY/PARKING BRAKE)

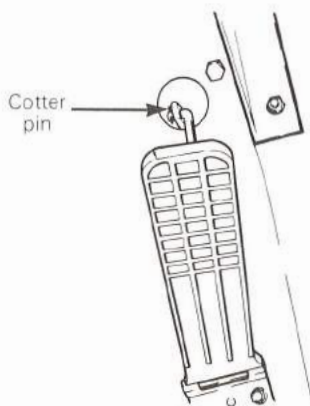
#### PEDAL ASSEMBLY

##### Removal



B002080007

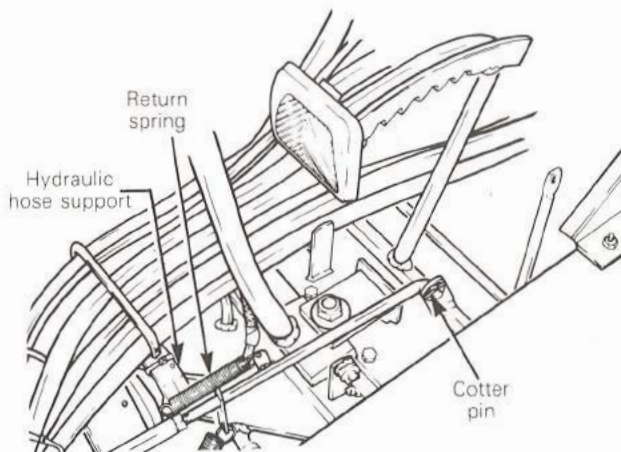
- Remove the rear floor panel and then disconnect the ground cable from the battery.



B002080008

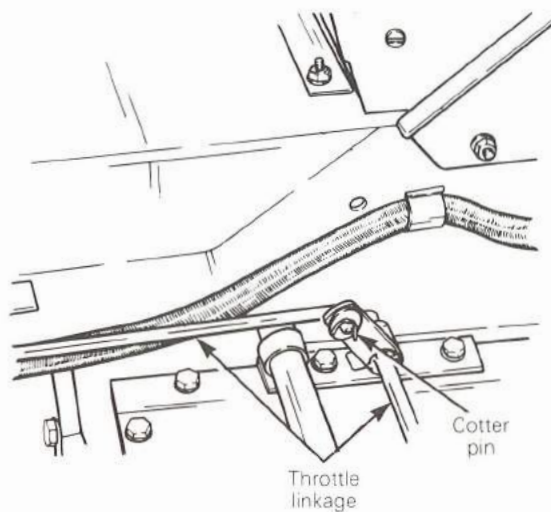
- Remove the cotter pin in order to disconnect the throttle linkage.
- Remove both front floor panels.

▼ **CAUTION:** Never forget to disconnect wires from dimmer switch when removing the lower panel.



B002080011

- Remove the cotter pin in order to disconnect the brake linkage.
- Free the hydraulic hose support by removing both fixing bolts and disconnecting the brake linkage return spring.



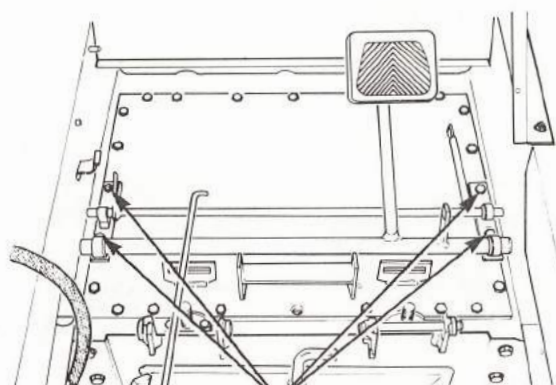
B002080016

- Remove the cotter pin and then disconnect the throttle linkage.



## Section 80 BRAKE

### Sub-section 02 (EMERGENCY/PARKING BRAKE)



B002080084

Fixing  
screw

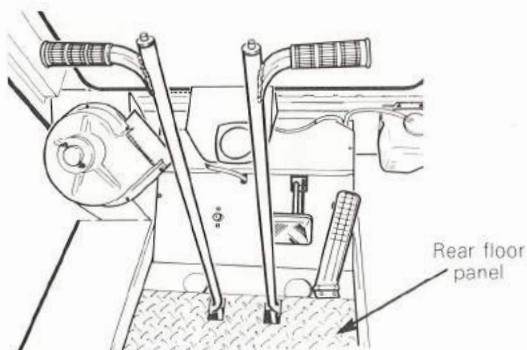
- Remove the brake pedal and linkage assembly from the differential cover.

#### Installation

To install the brake pedal and linkage assembly, reverse the procedure for its removal.

### BRAKE BAND

#### Removal



B002080007

Rear floor  
panel

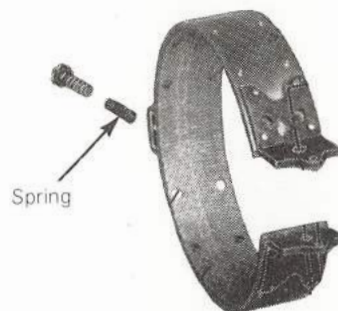
- Remove the rear floor panel from the vehicle.
- Disconnect the ground cable from the battery.



B002130002

Locking  
wire  
  
Horizontal  
adjusting  
screw

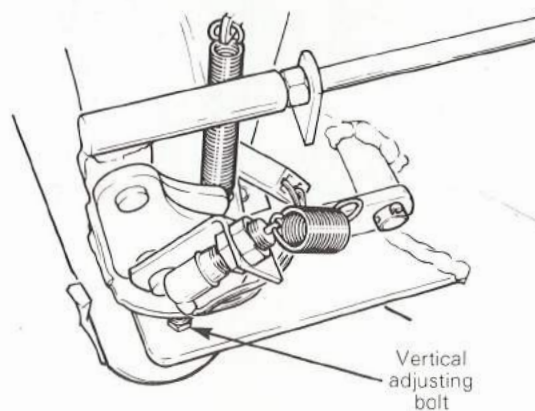
- Remove the locking wire, and then remove the horizontal adjusting screw.



B002130004

Spring

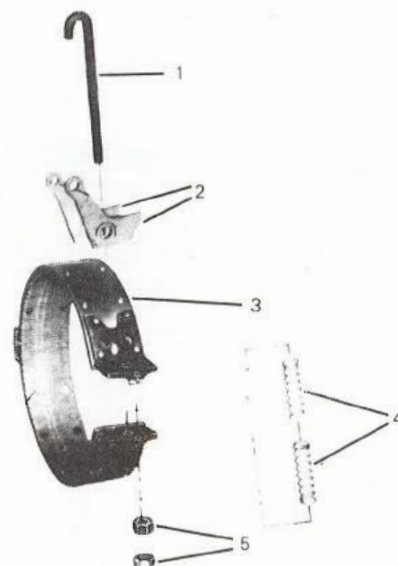
- Remove the spring located between the brake band and its support.



B002130003

Vertical  
adjusting  
bolt

- Remove the vertical adjusting bolt from the assembly.



B002130005

1. Hook bolt  
2. Levers  
3. Brake band

4. Springs  
5. Nuts

## Section 80 BRAKE

### Sub-section 02 (EMERGENCY/PARKING BRAKE)

- Unscrew the two (2) nuts, and then pull out the hook bolt from the assembly. Remove the brake band from the vehicle.

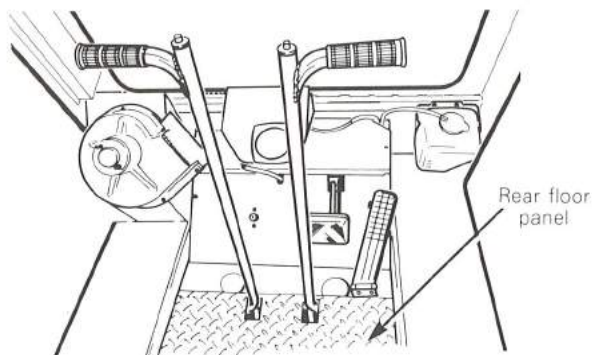
#### Installation

To install a brake band, reverse the procedure for its removal.

- Adjust the brake band (see "Adjustment" item in this sub-section).

## BRAKE DRUM

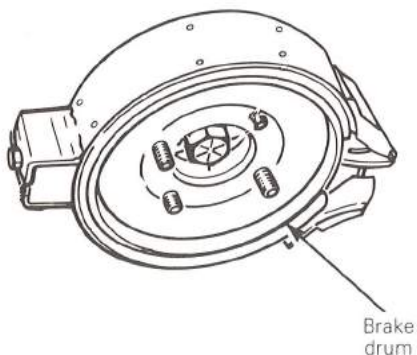
### Removal



B002080007

- Remove the rear floor panel from the vehicle.
- To gain access to the brake drum, the battery can be removed from the vehicle.

◆ **WARNING:** Sparks could cause battery to explode. To prevent any accident, always disconnect the battery ground cable first, then disconnect the positive battery cable.

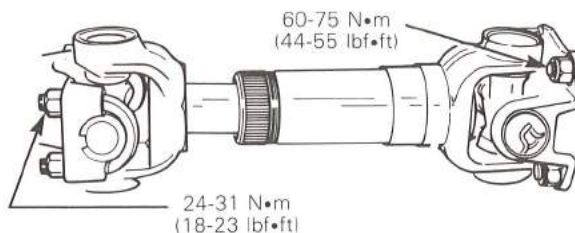


B002080078

- Remove the propeller shaft. Then remove the brake drum from the companion flange.

## INSTALLATION

To install a brake drum, reverse the procedure for its removal with the following addition:



B002080081

- When installing the propeller shaft, tighten bolts and nuts to:

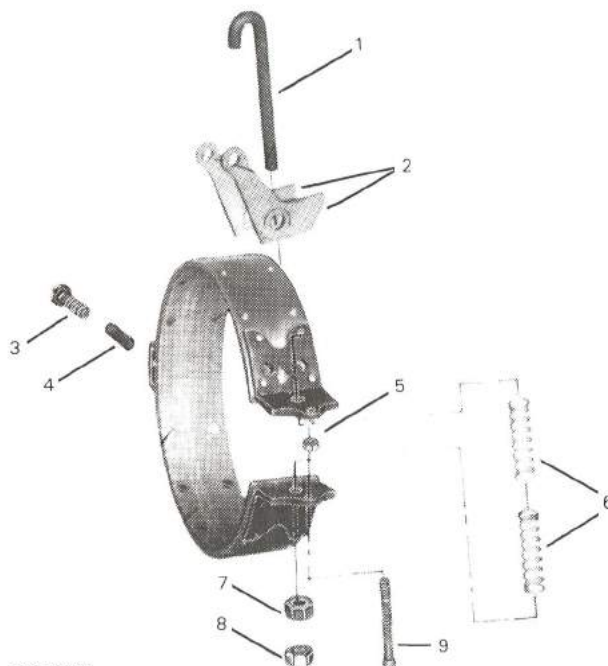
7/16"-20 gr. 5 #60-75 N•m (44-55 lbf•ft)

U-bolt 3/8"-24 #24-31 N•m (18-23 lbf•ft)

◆ **WARNING:** Sparks could cause battery to explode. To prevent any accident when reinstalling the battery, always connect the positive battery cable first, then connect the battery ground cable.

## ADJUSTMENT

To prevent the emergency/parking brake system from dragging and to obtain suitable operation adjust the brake band as follows:



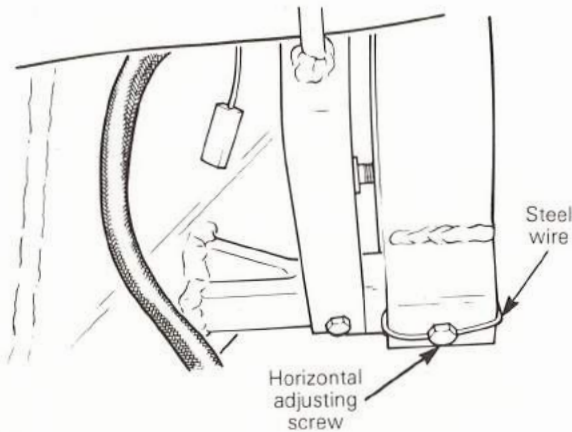
B002130006

- |                               |                            |
|-------------------------------|----------------------------|
| 1. Hook bolt                  | 6. Springs                 |
| 2. Levers                     | 7. Adjusting nut           |
| 3. Horizontal adjusting screw | 8. Jam nut                 |
| 4. Spring                     | 9. Vertical adjusting bolt |
| 5. Nut                        |                            |

**Section 80 Brake**  
**Sub-section 02 (EMERGENCY/PARKING BRAKE)**

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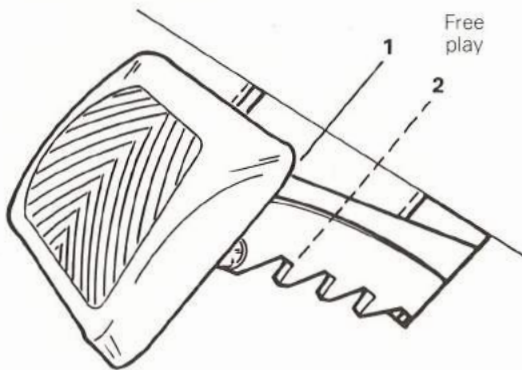
- Using both horizontal adjusting screw and the vertical adjusting bolt, center the brake band with the drum.



B002130002

▼ **CAUTION:** Using steel wire, secure the horizontal adjusting screw in position.

- Loosen the jam nut, and then using the adjusting nut, adjust the brake band in order to get the suitable free play of the brake pedal.



B002130001

1. Released position
2. Brake band applied on the drum

- The free play should be: 38-51 mm (1 1/2" - 2").
- Tighten the jam nut.





# SUSPENSION

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### TANDEM

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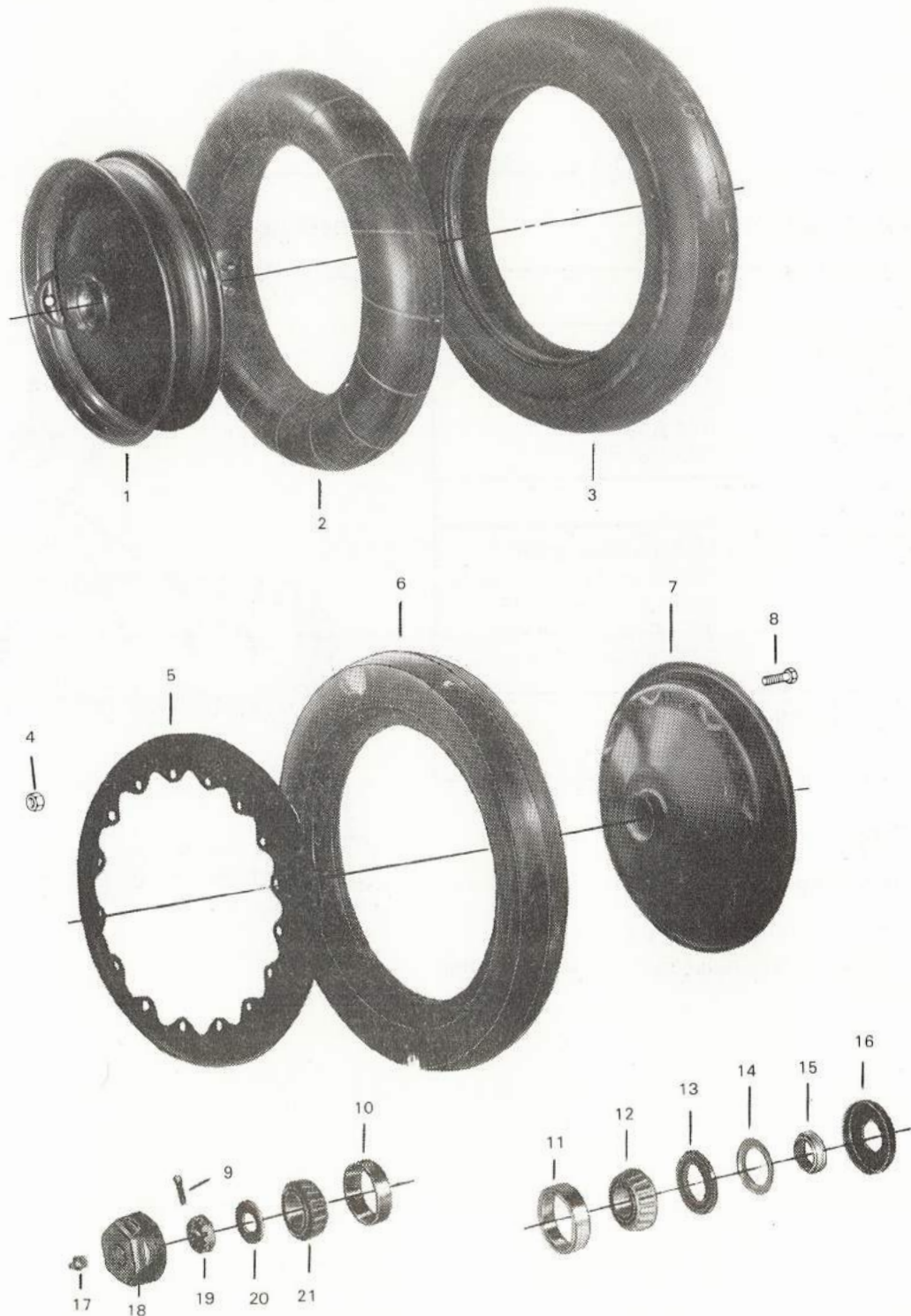
### SUSPENSION

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**WHEEL**



B002100012

## Section 90 SUSPENSION

### Sub-section 01 (WHEEL)

1. Wheel
2. Tube
3. Tire
4. Conical nut
5. Retainer flange
6. Solid tire
7. Wheel
8. Bolt
9. Cotter pin
10. Bearing cup
11. Bearing cup

12. Cone bearing
13. Lip seal
14. Shim
15. Spacer
16. Mud excluder
17. Grease fitting
18. Hub cap
19. Spindle nut
20. Spindle washer
21. Cone bearing

## SPECIFICATIONS

Quantity:	6
Pneumatic tires:	
— Dimension:	4.50 x 16
— Ply rating:	6
— Air pressure:	620-690 kPa (90-100 PSI)
Solid tires:	
Lubricant:	Multi-purpose good quality grease resisting to water and tearing and remaining fluid under cold temperatures
Wheel bearing drag torque:	13 N (3 lbf) at outside diameter of tire

## SERVICING

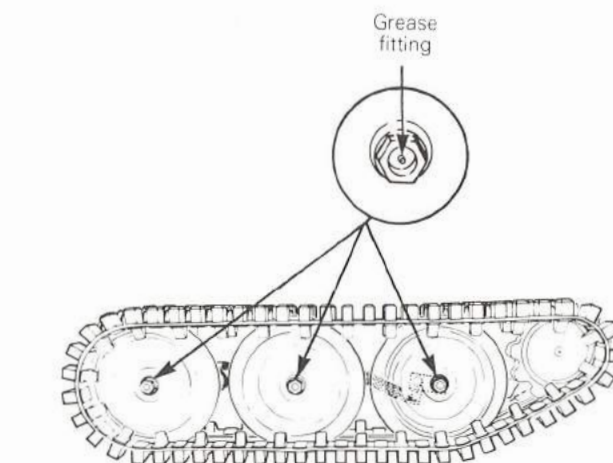
### Tire air pressure check

Interval: Every 10 hours or daily.

▼ **CAUTION:** All tires must have the same inflation pressure.

### Wheel bearing lubrication

Interval: After 25 hours and at every 50 hours.



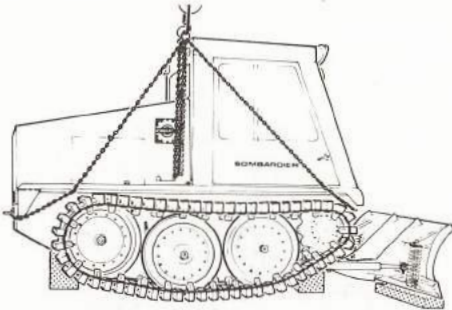
B002100015

— Using a grease gun, inject grease through the grease fitting.

○ **NOTE:** The lip seal is installed with the lip towards the outside. This to allow the grease to flow outside and to prevent water and dirt entry.

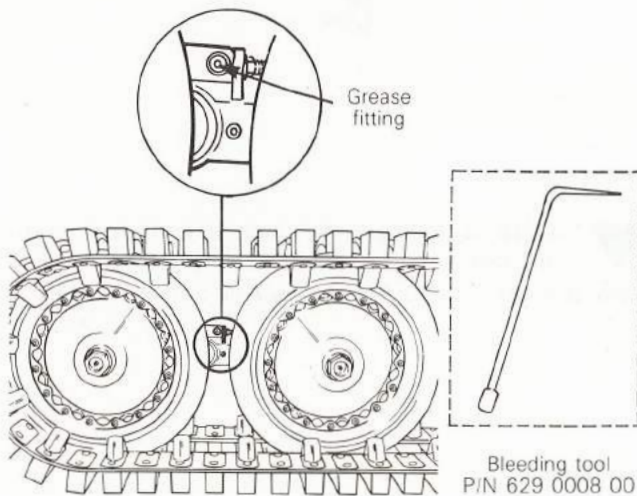
## REMOVAL

- Raise the vehicle using a jack or a hoist.



B002080005

**WARNING:** the vehicle must be supported firmly beneath the frame using wood blocks.



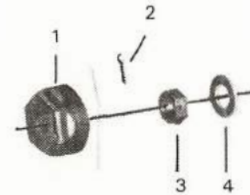
B002100014

- Loosen the track by bleeding the hydraulic track tensioner. Use the bleeding tool to release grease through the grease fitting.

**WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.

## Front wheel and center wheel

- Using a hoist, lift the track right over the wheel which has to be removed. Stop lifting when the track guides free the wheel.



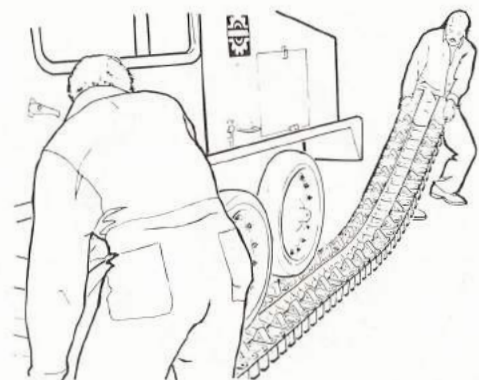
B002100013

1. Hub cap
2. Cotter pin
3. Spindle nut
4. Spindle washer

- Unscrew the hub cap, then remove the cotter pin, the spindle nut and the spindle washer. Pull out the wheel from the spindle.

**NOTE:** The cone bearing will come off with the wheel.

## Rear wheel

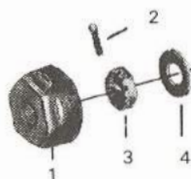


B002080019

- Uncouple the track and spread it on the ground (Refer to "Track" section).

## Section 90 SUSPENSION

### Sub-section 01 (WHEEL)



B002100013

1. Hub cap
2. Cotter pin
3. Spindle nut
4. Spindle washer

— Unscrew the hub cap, then remove the cotter pin, the spindle nut and the spindle washer. Pull out the wheel from the spindle.

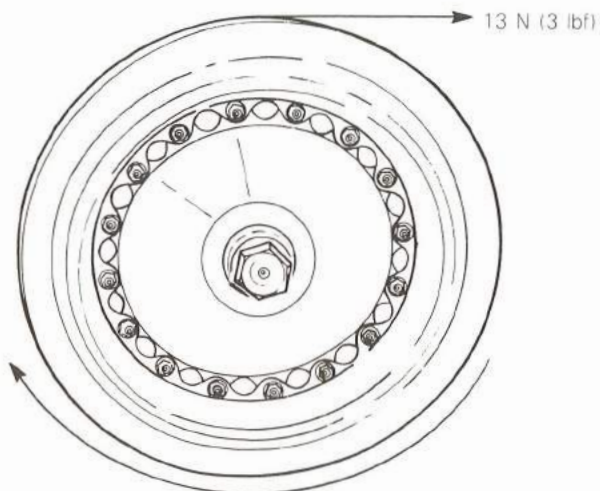
○ **NOTE:** The cone bearing will come off with the wheel.

## INSTALLATION

To install a wheel, reverse the procedure for its removal.

▼ **CAUTION:** Always replace cotter pins by new ones.

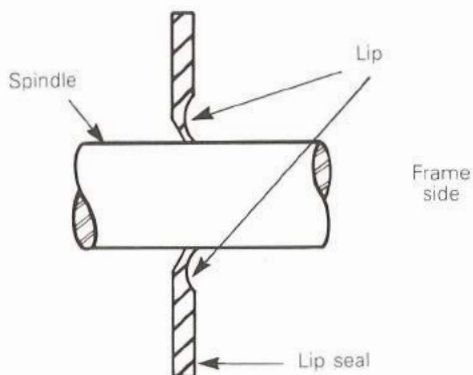
### Wheel bearing adjustment



B002100001

The bearing tension is correct when the wheel begins to rotate with a force of 13 N (3 lbf) applied at outside diameter of tire.

### Lip seal installation

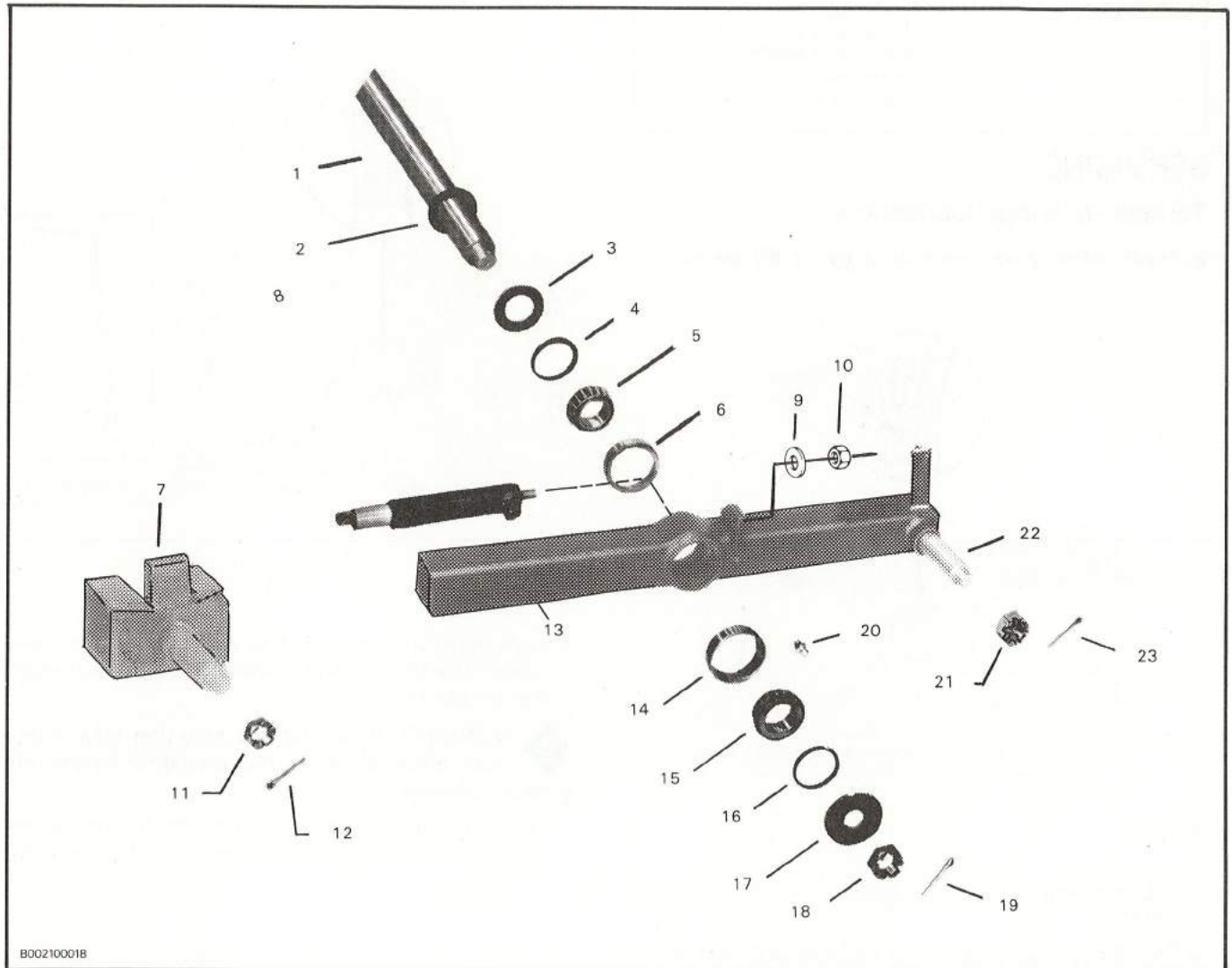


B001100002

▼ **CAUTION:** The lip seal is installed with the lip toward the outside. This to allow the grease to flow outside and to prevent water and dirt entry.



# **TANDEM**



B002100018

1. Cross shaft
2. Shim
3. Inner grease retainer
4. Lip seal
5. Cone bearing
6. Bearing cup
7. Rear spindle
8. Hydraulic track tensioner
9. Washer
10. Nut
11. Spindle nut
12. Cotter pin

13. Tandem beam
14. Bearing cup
15. Cone bearing
16. Lip seal
17. Outer grease retainer
18. Nut
19. Cotter pin
20. Grease fitting
21. Spindle nut
22. Spindle
23. Cotter pin

## Section 90 SUSPENSION

### Sub-section 02 (TANDEM)

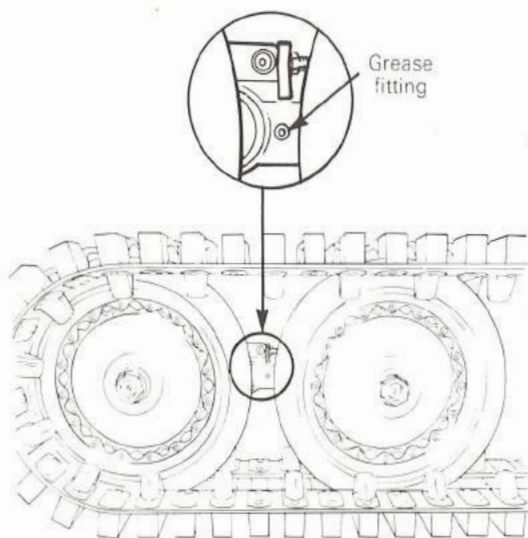
## SPECIFICATIONS

Lubricant:	Multi-purpose good quality grease resisting to water and tearing and remaining fluid under cold temperatures
------------	--

## SERVICING

### Tandem bearings lubrication

Interval: After 25 hours and at every 50 hours.

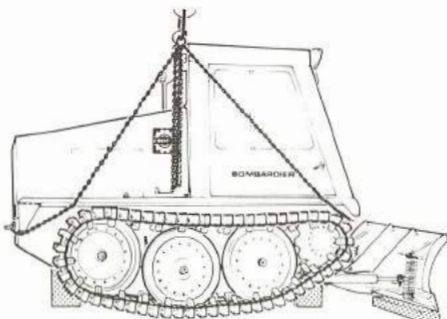


B002120002

— Using a grease gun, inject grease through the grease fitting.

**NOTE:** The lip seals are installed with the lip towards the outside. This to allow the grease to flow outside and to prevent water and dirt entry.

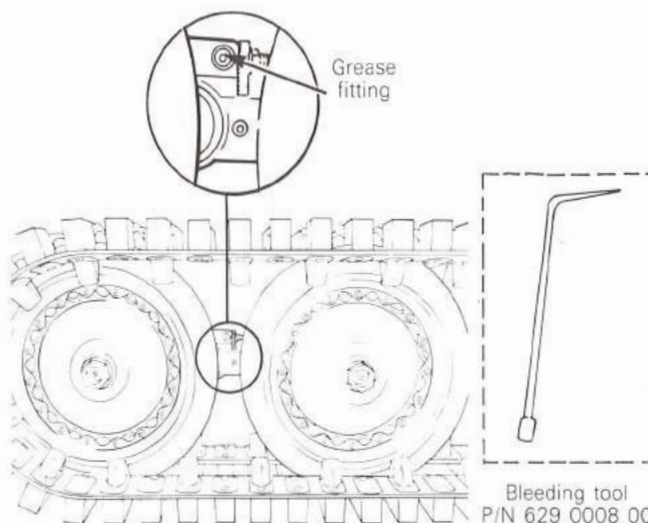
## REMOVAL



B002080005

— Raise the vehicle using a jack or a hoist.

◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.

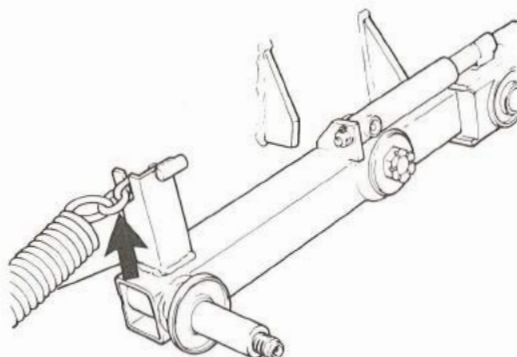


B002100014

— Loosen the track by bleeding the hydraulic track tensioner. Use the bleeding tool to release grease through the grease fitting.

◆ **WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.

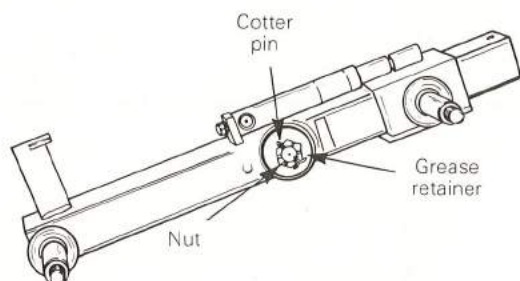
— Remove both the center wheel and the rear wheel from the vehicle (refer to "Wheel" sub-section in this section).



B002100002

— Using a hammer, remove the spring retaining chain from the tandem beam.

◆ **WARNING:** Avoid putting hands close to the retaining chain.



B002100003

- Remove the cotter pin, the nut and the grease retainer. Pull out the tandem beam from the cross shaft.

○ **NOTE:** The cone bearing will come off with the tandem beam.

## INSTALLATION

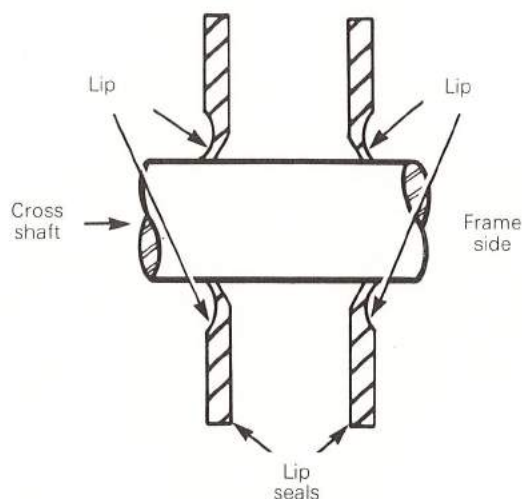
To install a tandem beam, reverse the procedure for its removal.

### Tandem bearing adjustment

- Assemble all components to the cross shaft.
- Install a nut ( 1 1/8" N.F.) on each side of the frame until all threads are meshed with those of the shaft.
- Torque one (1) of the two (2) nuts to 190-203 N•m (140-150 lbf•ft) while making sure that the other nut does not turn.
- Align each nut with the axle hole so that the cotter pin can be inserted, and respect the tightening torque.
- Insert the cotter pin for each nut.

▼ **CAUTION:** Always replace cotter pins by new ones.

### Lip seal installation



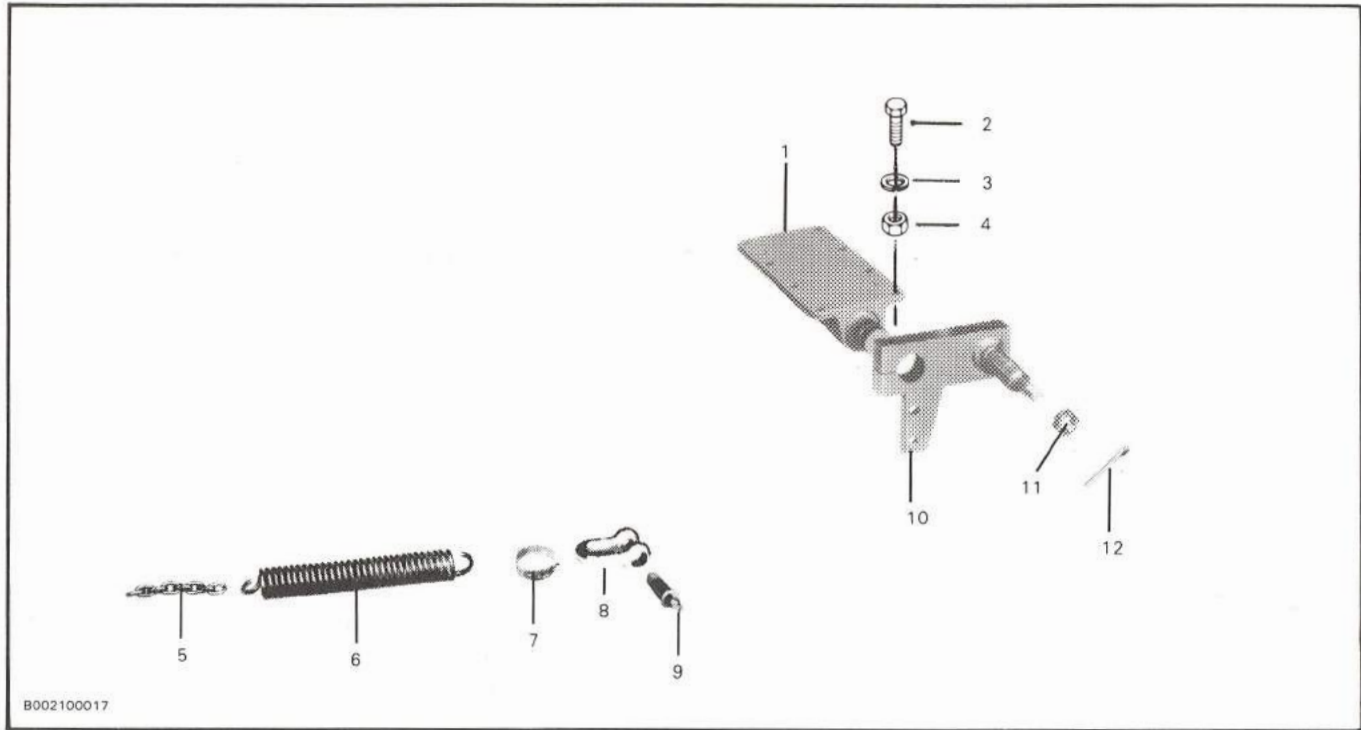
B002100004

▼ **CAUTION:** The lip seals are installed with the lip towards the outside. This to allow the grease to flow outside and to prevent water and dirt entry.

**Section 90 SUSPENSION**  
Sub-section 03 (SUSPENSION)

---

**SUSPENSION**



- 1. Flexitor sheel
- 2. Bolt
- 3. Lock washer
- 4. Nut
- 5. Chain
- 6. Spring

- 7. Spring retainer
- 8. Shackle
- 9. Shackle screw
- 10. Suspension arm
- 11. Spindle nut
- 12. Cotter pin



## SPECIFICATIONS

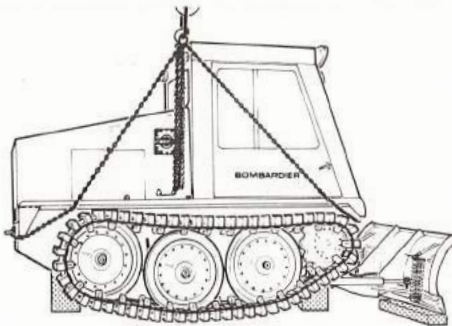
Suspension arm:

- Angle of installation 17°

## SUSPENSION ARM AND SPRING

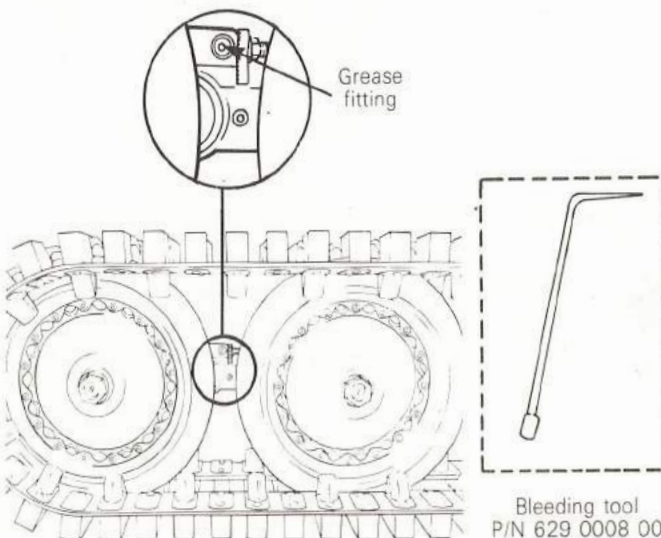
### Removal

- Raise the vehicle using a jack or a hoist.



B002080005

- ◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.

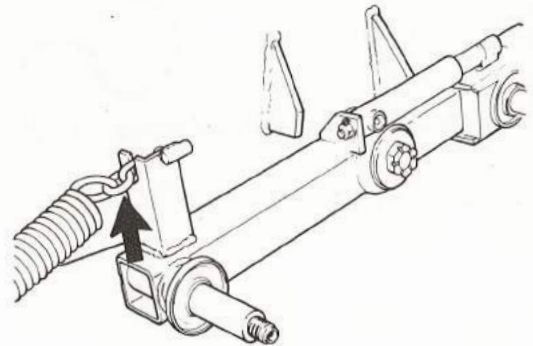


B002100014

- Loosen the track by bleeding the hydraulic track tensioner. Use the bleeding tool to release grease through the grease fitting.

▼ **WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.

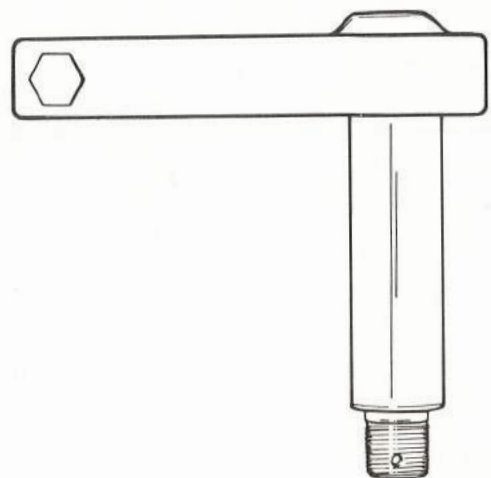
- Remove both the front wheel and the center wheel from the vehicle (refer to "Wheel" sub-section in this section).



B002100002

- Using a hammer, remove the spring retaining chain from the tandem beam.

- ◆ **WARNING:** Avoid putting hands close to the retaining chain.



B001100003

- Remove the retaining bolt, then pull out the suspension arm from the flexitor shell.

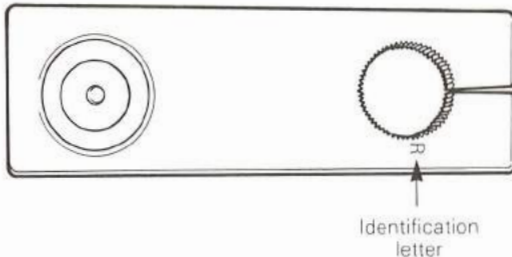
## Section 90 SUSPENSION

### Sub-section 03 (SUSPENSION)

#### Installation

##### Suspension arm

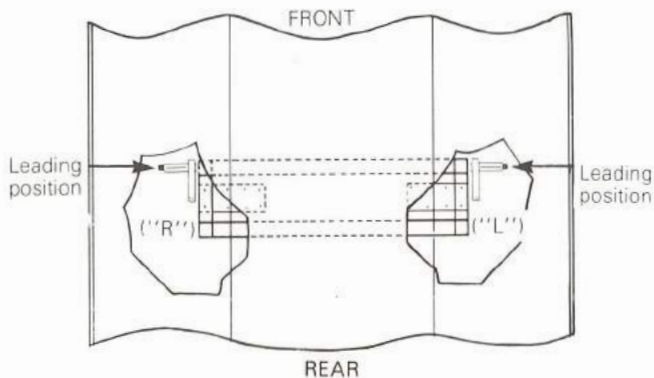
To install a suspension arm, reverse the procedure for its removal with the following additions:



B002100005

- Each suspension arm is identified with the letter "R" or "L".

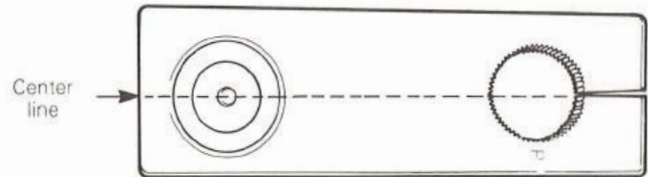
**NOTE:** If a suspension arm stamped "R" is mounted in a trailing position, it must be installed on the right side of the vehicle. If the same arm is mounted, in a leading position, it must be installed on the left side of the vehicle. For the arm stamped "L" inverse the procedure.



B002100006

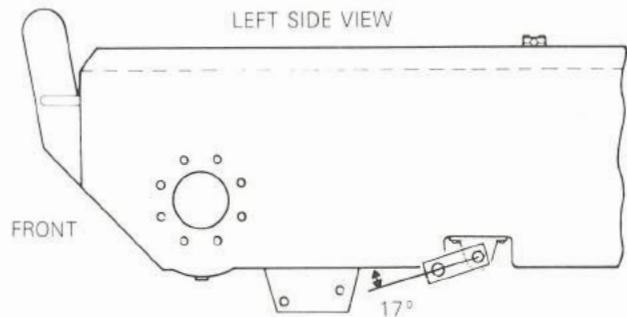
- On the SW-48, the suspension arm are mounted in a leading position. Then the arm stamped "R" must be installed on the left side of the vehicle, and the arm stamped "L" must be installed on the right side of the vehicle.

- NOTE:** The left and right hand side of the vehicle are always determined from the operator's seat.
- Each suspension arm must be installed at a specific angle to the frame.



B002100005

- To do so, trace line to identify the suspension arm center. Use an appropriate angle finder below the frame and using the arm center line as a guide, install the arm to the flexitor shell at its correct angle.

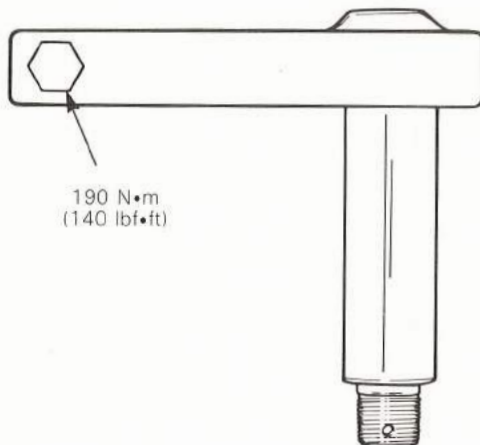


B002100007

- NOTE:** The angle of installation is 17°.

**WARNING:** Suspension components overstress will result and/or the vehicle stability will be affected if this procedure is disregarded.

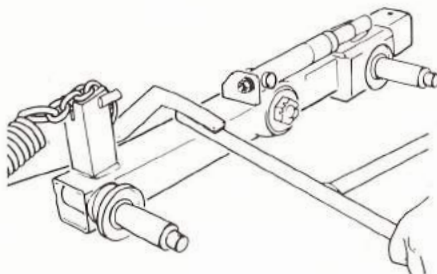
- Tighten the retaining nut to 190 N•m (140 lbf•ft).



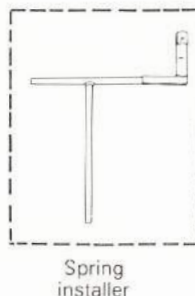
B001100003

### Spring

- To install a spring, reverse the procedure for its removal with the following additions:



B002100008



B002100009

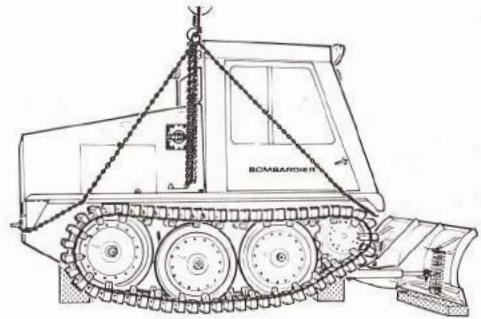
- Using a spring installer, fix the retaining chain to the tandem beam.

◆ **WARNING:** Each spring retaining chain must be installed at the same position, otherwise the vehicle stability will be affected.

### FLEXITOR SHELL

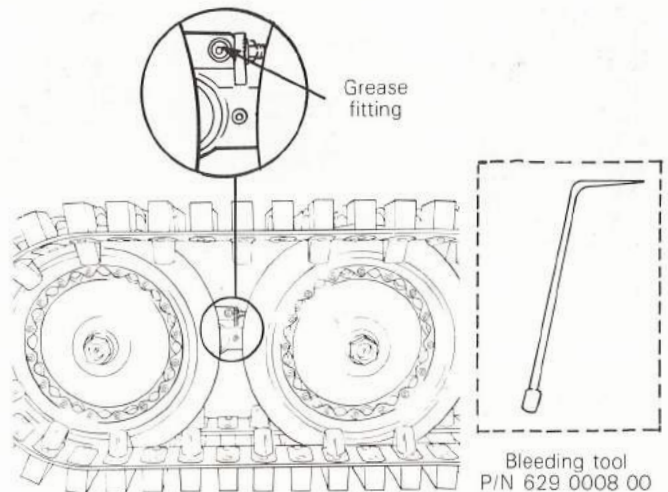
#### Removal

- Raise the vehicle using a jack or a hoist.



B002080005

◆ **WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.



B002100014

- Loosen the track by bleeding the hydraulic track tensioner. Use the bleeding tool to release grease through the grease fitting.

◆ **WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.

- Remove the suspension arm from the vehicle (refer to "Suspension arm and spring" item in this sub-section).

## Section 90 SUSPENSION

### Sub-section 03 (SUSPENSION)

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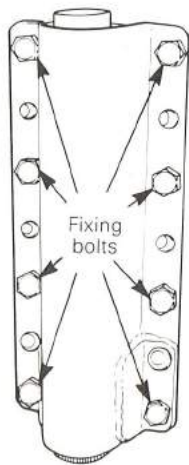


B002100016

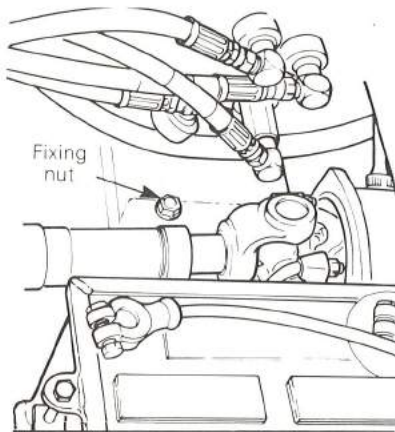
- Remove the flexitor shell from the vehicle.

#### Installation

- To install a flexitor shell, reverse the procedure for its removal.



B002100011



B002100010

- Tighten nuts to 98-122 N•m (72-90 lbf•ft).



# TRACK

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### TRACK

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Installation .....	110-01-3
Adjustment .....	110-01-4

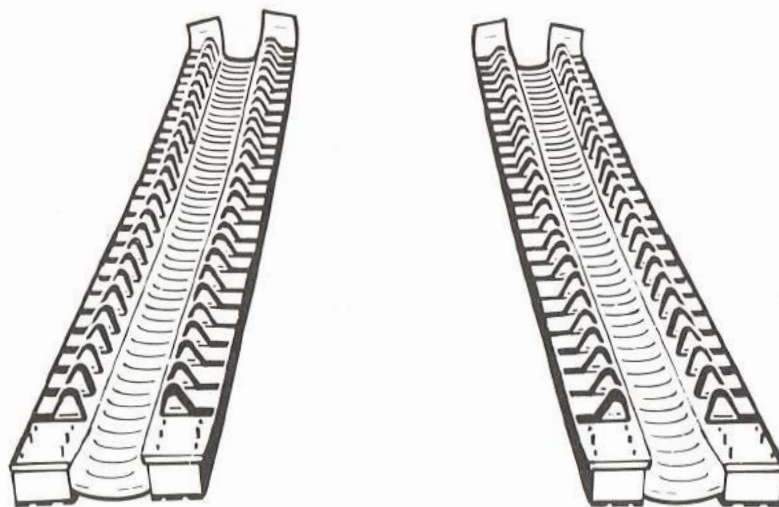
### HYDRAULIC TRACK TENSIONER

Specifications .....	110-02-2
Removal .....	110-02-2
Installation .....	110-02-2
Disassembly and assembly .....	110-02-2

**Section 110 TRACK**  
Sub-section 01 (TRACK)

---

**TRACK**



B002120001

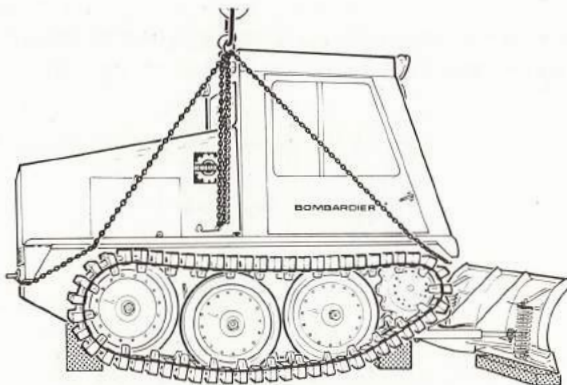
## SPECIFICATIONS

Length:	5.638 m (222'')
Width:	34.29 cm (13 1/2'')
Crosslink:	1
— Material:	Rubber and/or thermally treated steel
— Quantity:	56 (for one track)
— Torque:	3/8" - 24 gr.8 27-34 N•m (20-25 lbf•ft)

## REMOVAL

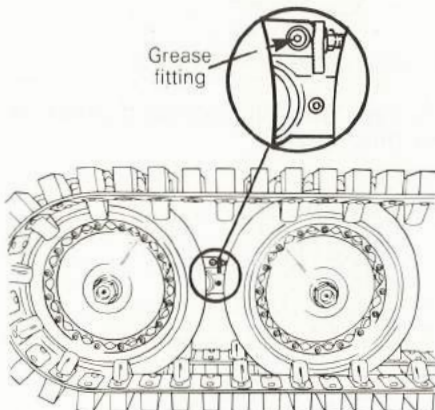
**WARNING:** To prevent any movement of the vehicle, removal and installation should be performed on a flat and level surface.

— Raise the vehicle using jacks or a hoist.



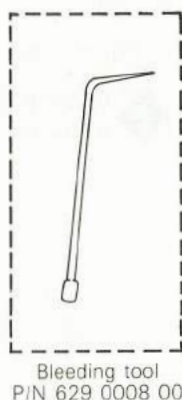
B002080005

**WARNING:** The vehicle must be supported firmly beneath the frame using wood blocks.

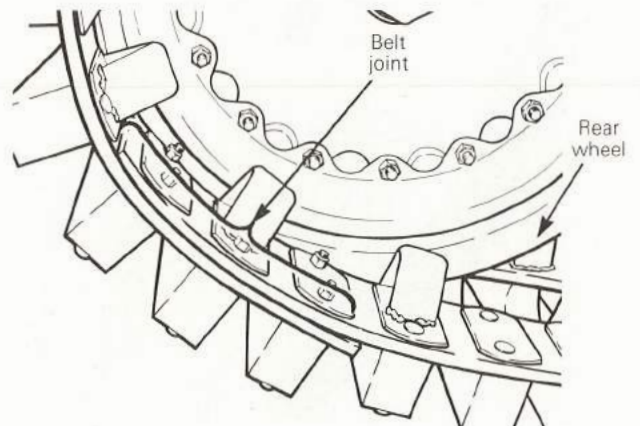


B002100014

— Loosen the track by bleeding the hydraulic track-tensioner. Use the bleeding tool to release grease through the grease fitting.

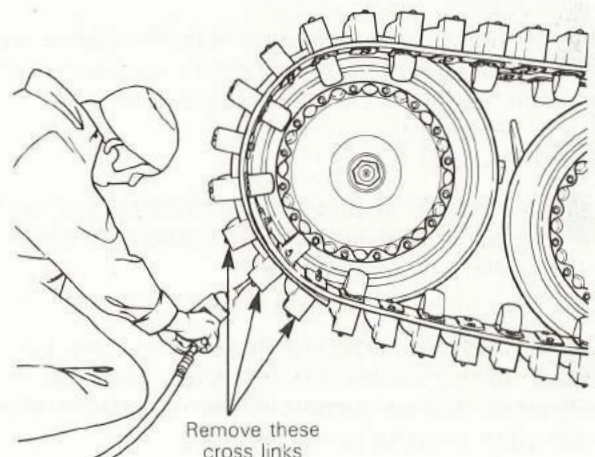


**WARNING:** Surround the bleeding tool with a cloth when bleeding the tensioner to prevent grease splashes.



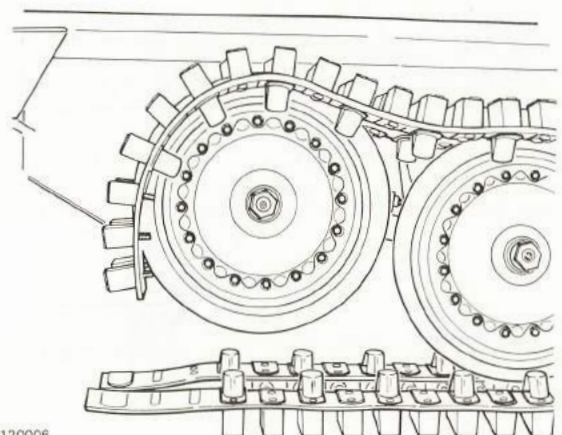
B002120004

— Rotate the track until belt joints reach the lower part of the rear wheel.



B002120005

— Remove the three (3) cross links located at belt joints.



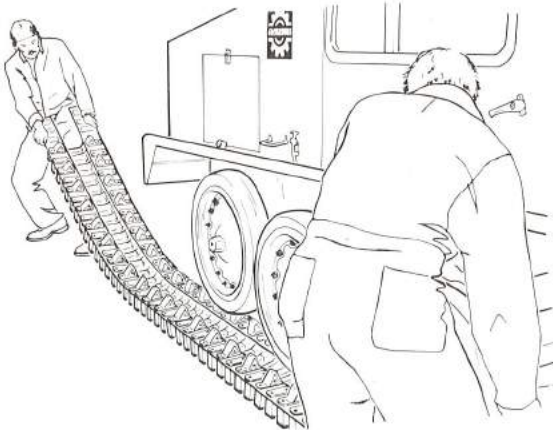
B002120006



## Section 110 TRACK

### Sub-section 01 (TRACK)

- Uncouple the track by hand, and then reinstall the three (3) track cross links.



B002080019

- Draw the track rearward by pulling it from beneath the wheels.

◆ **WARNING:** Always wear suitable gloves while performing this task and ensure no one is in close proximity while tracks are being drawn.

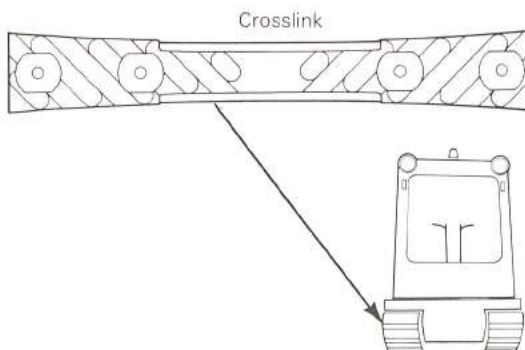
### INSTALLATION

◆ **WARNING:** To prevent any movement of the vehicle, removal and installation should be performed on a flat and level surface.

- Raise the vehicle using jacks or a hoist.

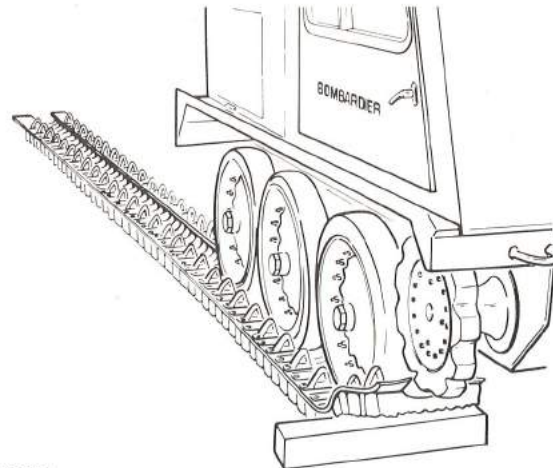
◆ **WARNING:** Avoid working under a weight which is solely attached to a lifting device or supported with jacks. Always support vehicle using wood blocks positioned beneath vehicle frame.

- Spread the track beneath the wheels. Place a wood block under the front part of the track.



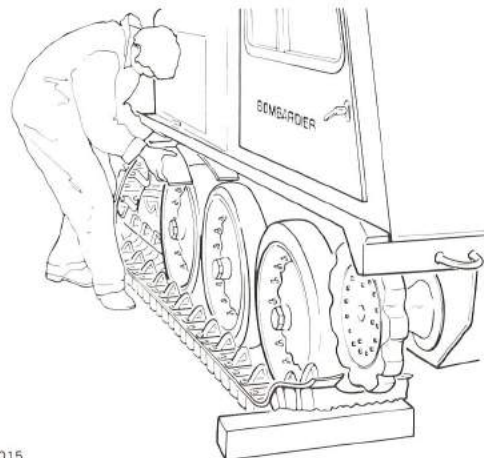
B002120014

- **NOTE:** To determine in which direction the track has to be installed, refer to the figure.



B002120007

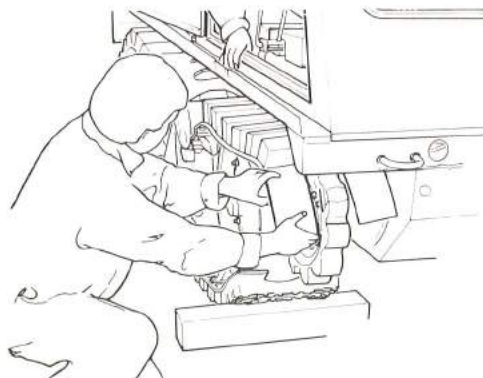
- Adjust the hydraulic track tensioner to its minimum length, and then lower the vehicle on the track.



B002120015

- Pull the track forward over the wheels.

◆ **WARNING:** Always wear appropriate gloves while performing this task.



B002120008



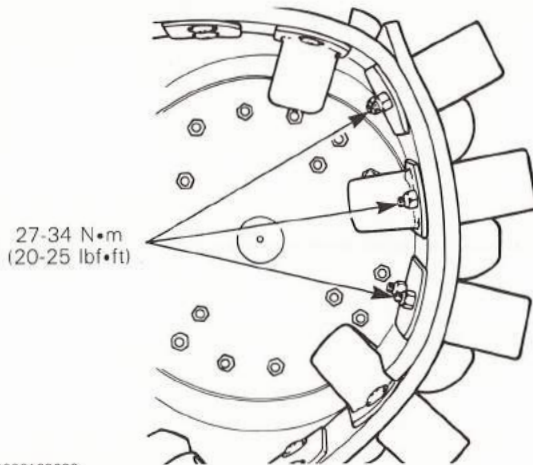
## Section 110 TRACK

### Sub-section 01 (TRACK)

— Engage the track in the sprocket and tighten as follows:

◆ **WARNING:** Proceed slowly and with extreme care.

- Apply the parking brake.
- Start the engine.
- Select a forward speed of the transmission.
- Pull both steering levers.
- Release the parking brake, and then slowly release the steering lever corresponding to the track being installed. This will tighten the track.
- As soon as the track is tight, apply the parking brake. Release both steering levers then stop the engine.

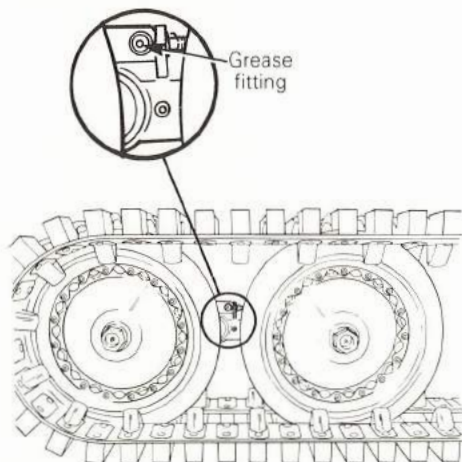


B002120009

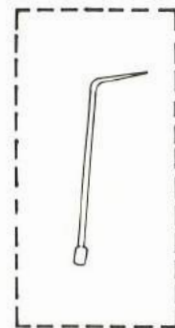
Join both track ends using the proper cleats, track guides, cross links, bolts, washers and nuts. Tighten nuts to 27-34 N·m (20-25 lbf·ft).

— Adjust track tension.

## ADJUSTMENT



B002100014



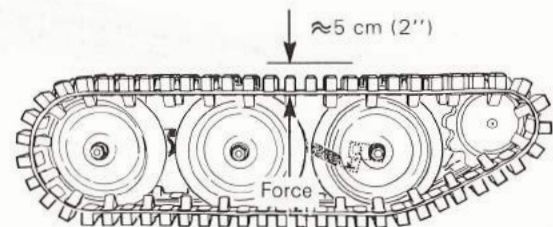
Bleeding tool  
P/N 629 0008 00

B002120003

— To loosen a track, release grease through the grease fitting of the hydraulic track tensioner using the proper tool. To tighten a track, inject grease in the grease fitting using a grease gun.

○ **NOTE:** When adjusting a track, always use high quality multi-purpose grease resistant to water and which will remain fluid under cold temperatures (P/N 413 7044 00).

## Track tension recommendation



B002120010

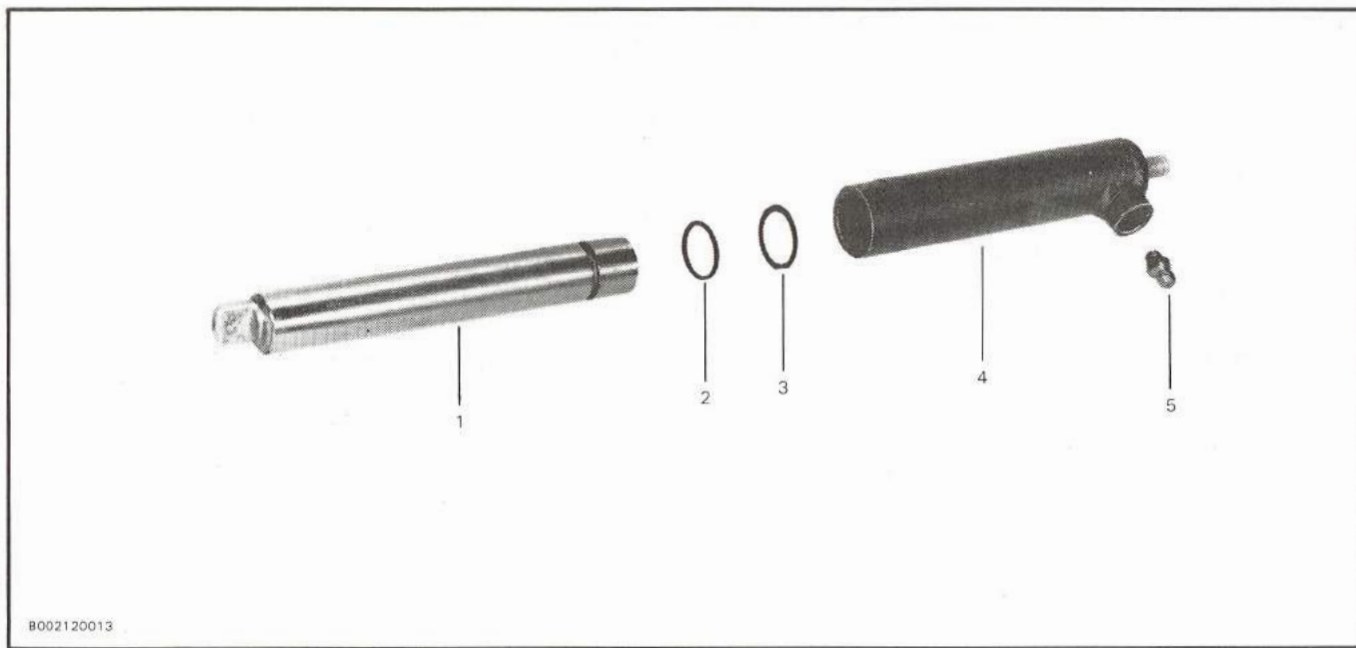
— With a force of 334 N (75 lbf) applied to the upper center part of the track, the deflexion should be approximately 5 cm (2").

▼ **CAUTION:** A loose track will jump over the sprocket teeth and damage them.

## Section 110 TRACK

### Sub-section 02(HYDRAULIC TRACK TENSIONER)

## HYDRAULIC TRACK TENSIONER



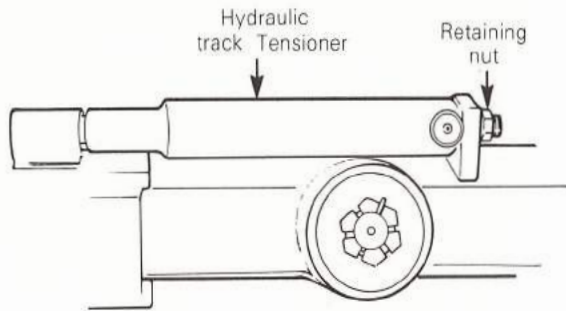
- 1. Piston rod
- 2. O-ring
- 3. O-ring

- 4. Cylinder housing
- 5. Grease fitting

## SPECIFICATIONS

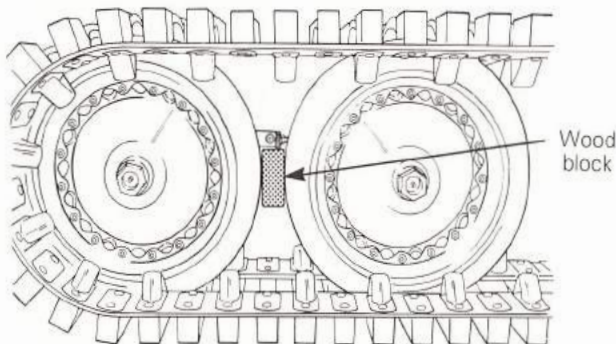
**Grease type:** Multi-purpose high quality grease resistant to water and which will remain fluid under cold temperatures (P/N 413 7044 00).

## REMOVAL



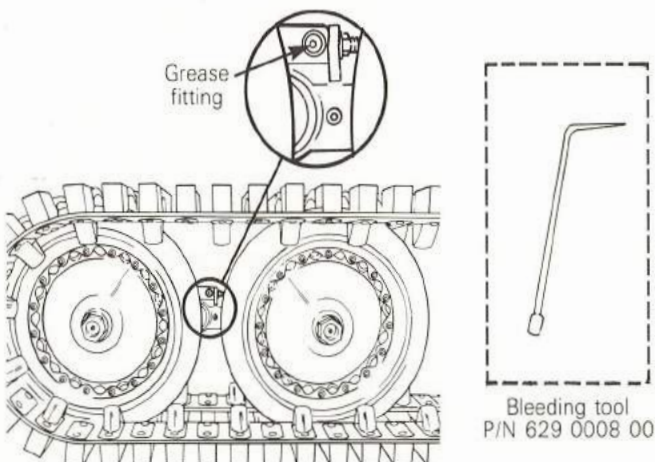
B002120011

- Completely unscrew the hydraulic track tensioner retaining nut.



B002120012

- Insert a wood block between the center wheel and the rear wheel.



B002100014

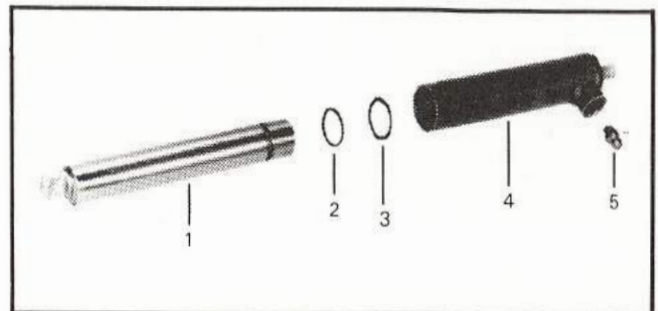
- Loosen the track by releasing grease through the grease fitting of the hydraulic track tensioner using tool P/N 629 0008 00.
- Remove the grease fitting from the hydraulic track tensioner.
- Fully compress the cylinder and remove it from the vehicle.

**WARNING:** Surround the rear part of the cylinder with a cloth when compressing the cylinder to prevent grease splashes.

## INSTALLATION

To install a hydraulic track tensioner, reverse the removal procedure.

## DISASSEMBLY AND ASSEMBLY



B002120013

1. Piston rod
2. O-ring
3. O-ring
4. Cylinder housing
5. Grease fitting

**NOTE:** To disassemble and/or assemble a hydraulic track tensioner, refer to the figure.

**CAUTION:** At assembly install new O-rings.





# STEERING

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### STEERING LEVERS

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Installation . . . . . 130-01-2

### STEERING BRAKE BAND

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Installation . . . . . 130-02-5

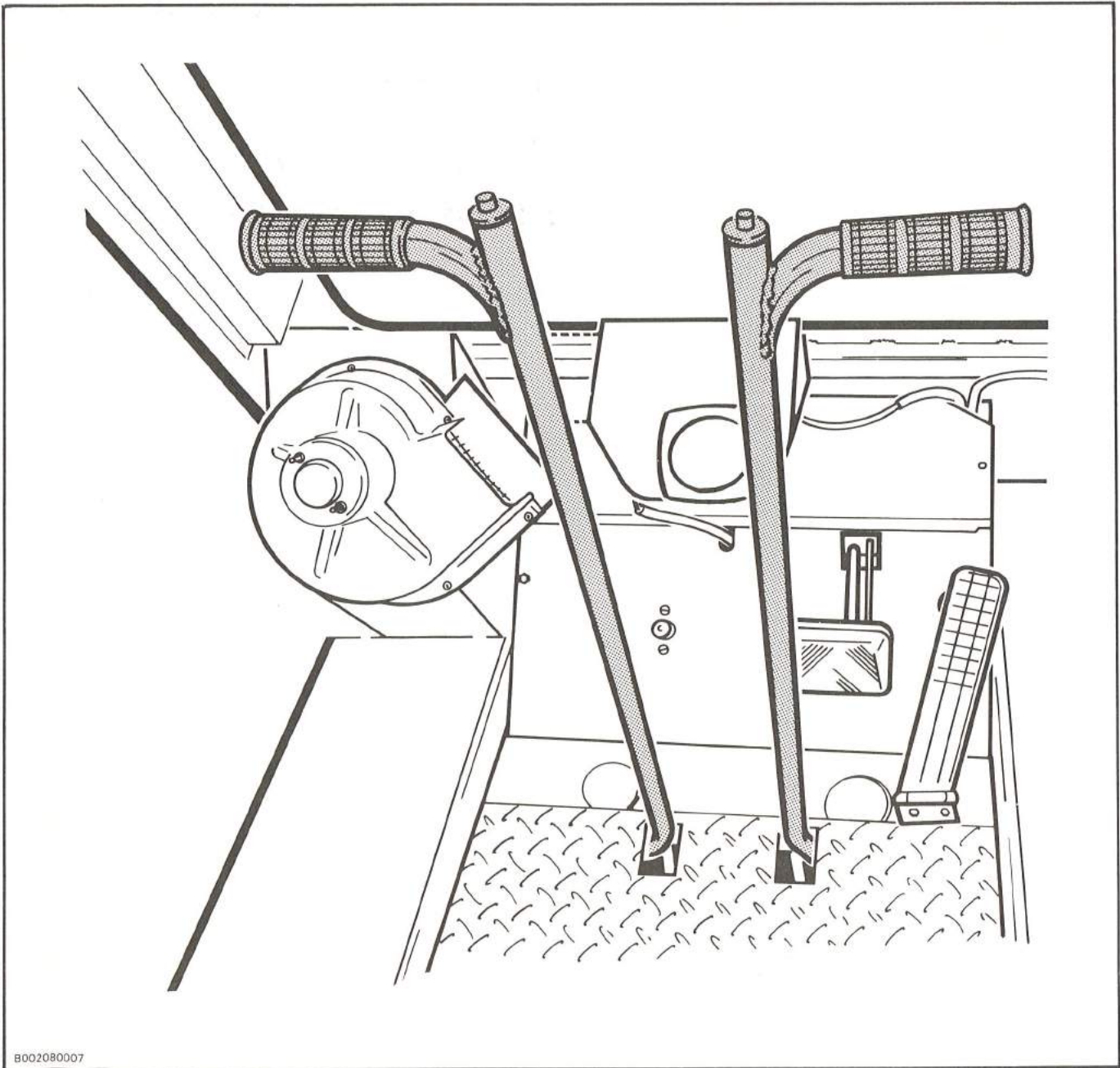
Adjustment . . . . . 130-02-6

## Section 130 STEERING

### Sub-section 01 (STEERING LEVERS)

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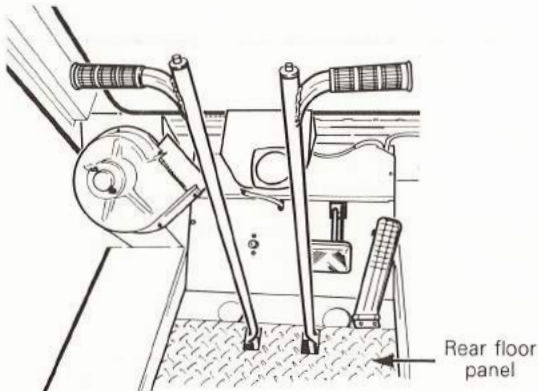
## STEERING LEVERS



## Section 130 STEERING

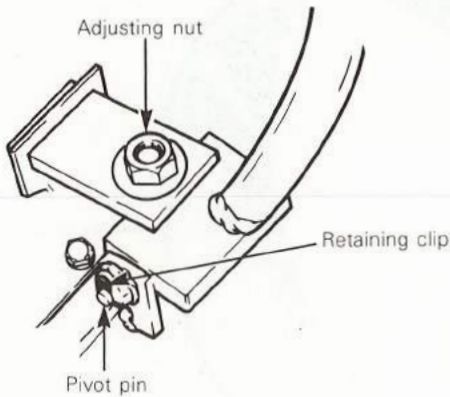
### Sub-section 01 (STEERING LEVERS)

#### REMOVAL



B002080007

- Remove the rear floor panel from the vehicle.
- Disconnect the ground cable from the battery.



B002080012

- Loosen the steering brake band adjusting nut.
- Remove both the retaining clip and the pivot pin from the assembly, then disconnect the steering lever electrical wires.
- Remove the steering lever from the vehicle.

#### INSTALLATION

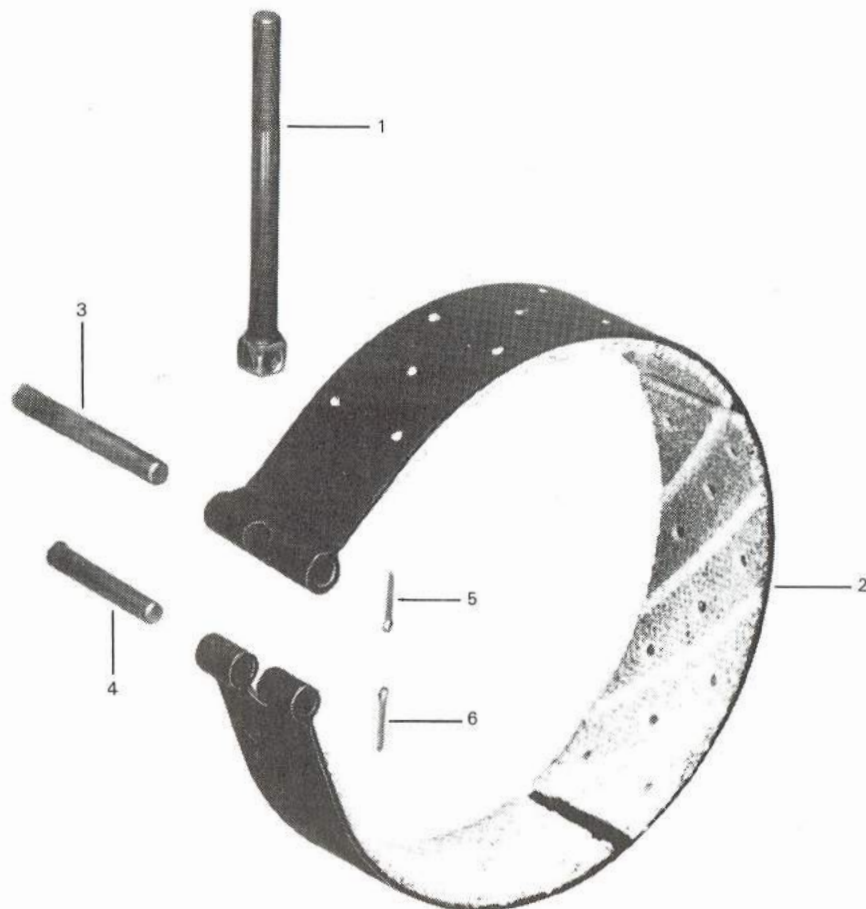
To install a steering lever, reverse the procedure for its removal.

- Adjust the steering brake band (refer to "adjustment" item in "steering brake band" sub-section).

## Section 130 STEERING

### Sub-section 02 (STEERING BRAKE BAND)

## STEERING BRAKE BAND



B002140001

- 1. Rod
- 2. Brake band
- 3. Long pin
- 4. Short pin
- 5. Cotter pin
- 6. Cotter pin

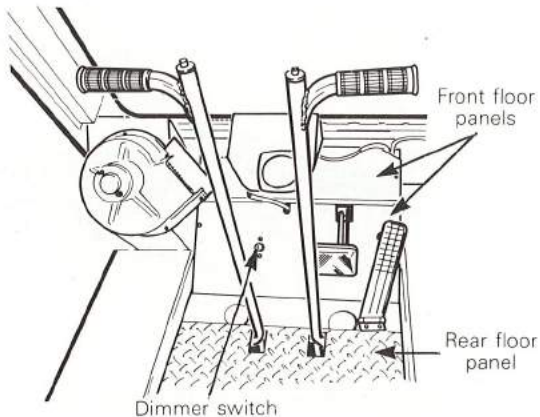


## Section 130 STEERING

### Sub-section 02 (STEERING BRAKE BAND)

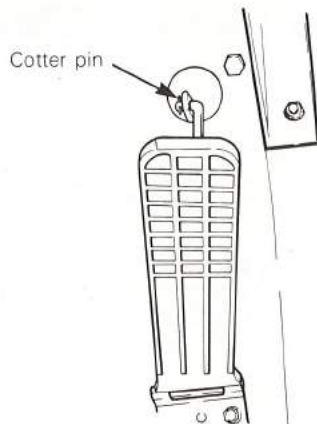
#### REMOVAL

- Drain differential oil (refer to "Differential" section).



B002080007

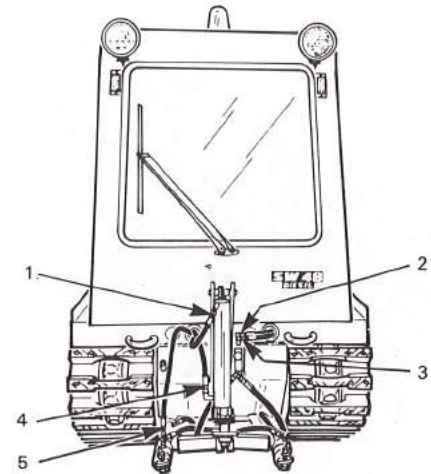
- Remove the rear floor panel, and then disconnect the ground cable from the battery.



B002080009

- Remove the cotter pin in order to disconnect the throttle linkage.
- Remove both front floor panels.

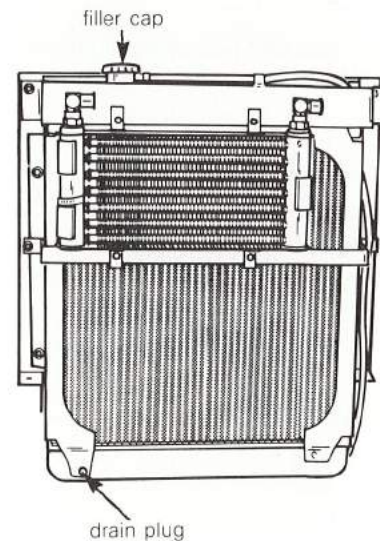
**CAUTION:** Always disconnect wires from dimmer switch when removing the lower panel.



B002080010

- Disconnect the five (5) hydraulic hoses at push frame and identify their respective position.

**NOTE:** Install plugs on line connectors and on oil lines when these have been disconnected.



B002080015

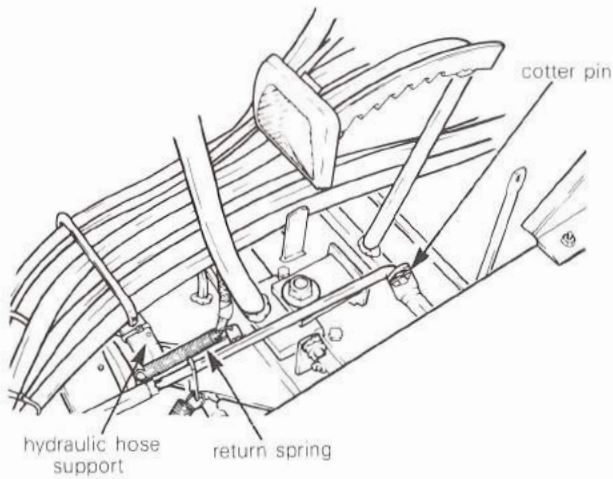
- Drain coolant from radiator by loosening the filler cap and removing the drain plug.

- Disconnect both heater hoses from the heater.

**NOTE:** Install plugs on hose connectors and on heater hoses when these have been disconnected.

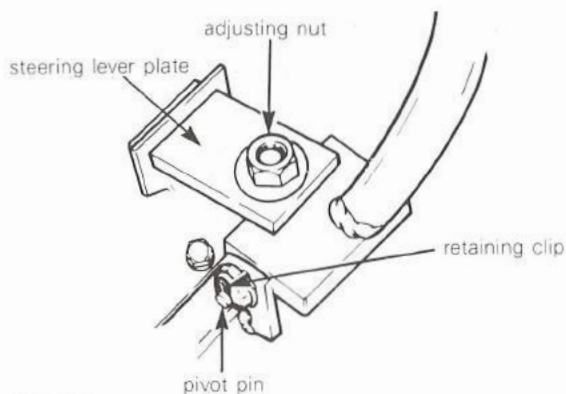
## Section 130 STEERING

### Sub-section 02 (STEERING BRAKE BAND)



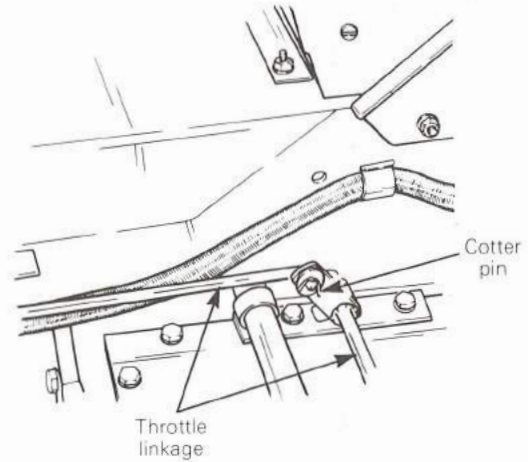
B002080011

- Remove the cotter pin in order to disconnect the brake linkage.
- Free the hydraulic hose support by removing both fixing bolts and disconnecting the brake linkage return spring.
- Remove tie raps and pull hydraulic hoses into the cab.



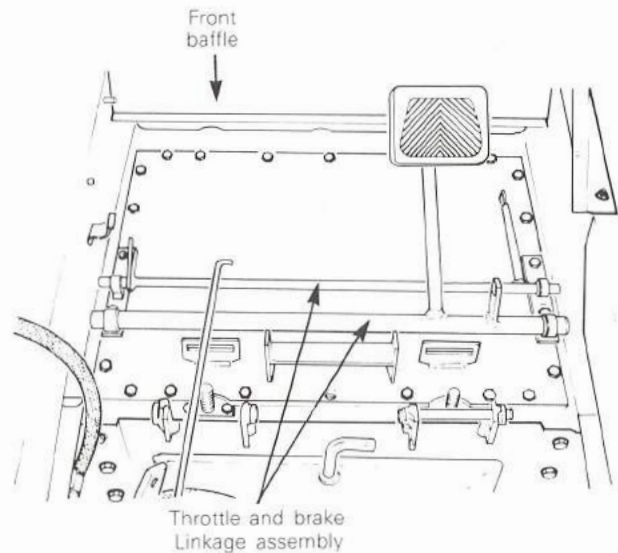
B002080012

- Remove the steering lever plate by unscrewing the steering brake band adjusting nut.
- Remove the steering lever corresponding to the steering brake band which has to be removed. To do so, remove both the retaining clip and the pivot pin from the assembly, then disconnect the steering lever electrical wires.



B002080016

- Remove the cotter pin, and then disconnect the throttle linkage.

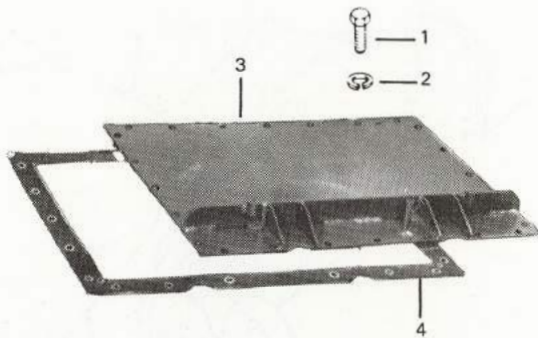


B002080017

- Remove the throttle and brake linkage assembly from the differential cover.
- Remove the front baffle from the vehicle.

## Section 130 STEERING

### Sub-section 02 (STEERING BRAKE BAND)



B002180018

1. Screw
2. Lock washer
3. Differential cover
4. Gasket

— Remove the differential cover and gasket from the vehicle.

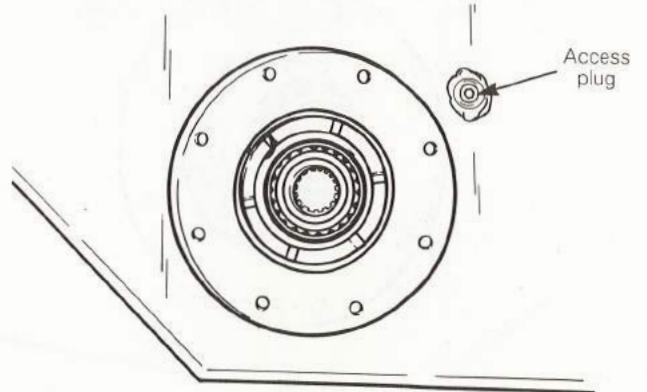


B002080022



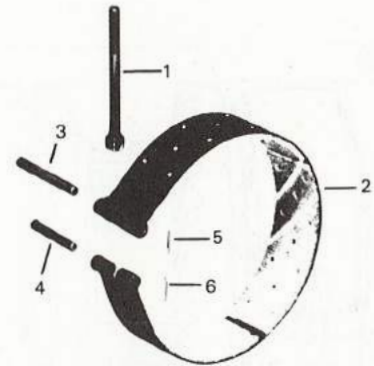
B002080023

— Remove the O-ring holder, and then pull off the O-ring from the brake band rod.



B002080024

— Remove the access plug from the frame.



B002140001

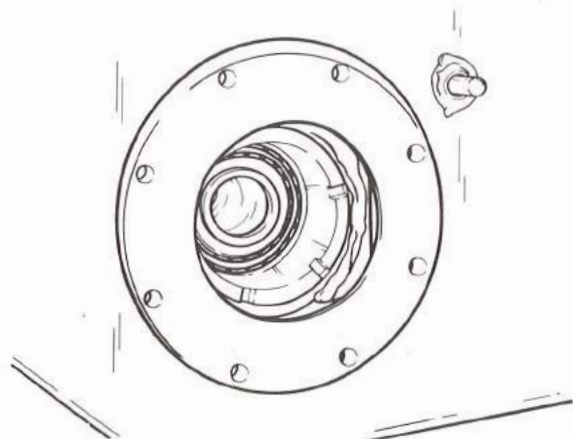
1. Rod
2. Brake band
3. Long pin
4. Short pin
5. Cotter pin
6. Cotter pin

— Remove the cotter pin, and then pull out the long pin from the steering brake band.



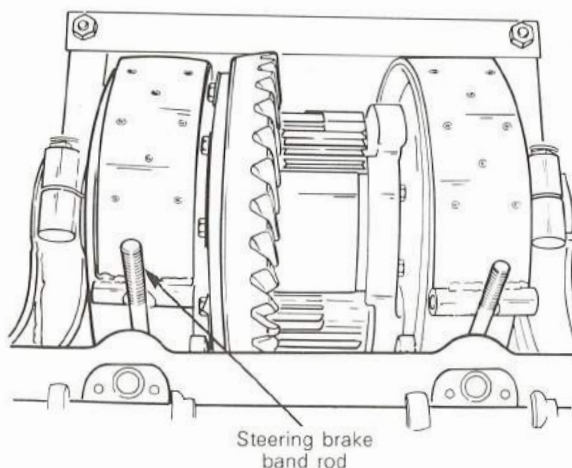
## Section 130 STEERING

### Sub-section 02 (STEERING BRAKE BAND)



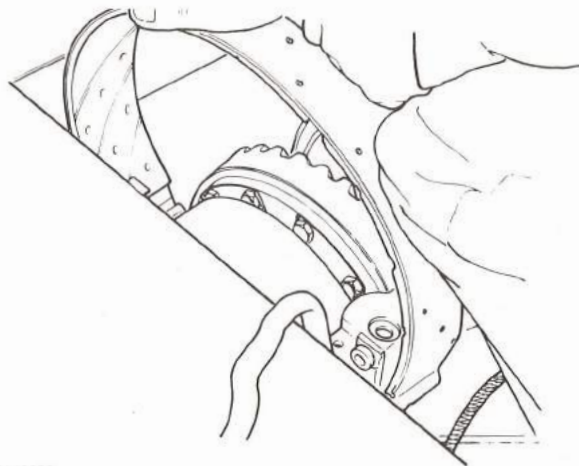
B002080026

NOTE: Remove the long pin through the access hole.

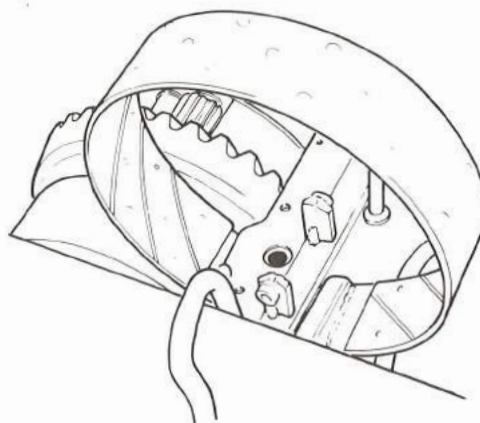


B002080027

- Guide the steering brake band rod out of its hole.
- Remove the cotter pin, and then pull out the short pin from the steering brake band and rod assembly.



B002140002



B002140003

- Remove the steering brake band from the vehicle.

## INSTALLATION

To install a steering brake band, use the reverse of the removal procedure with the following additions:

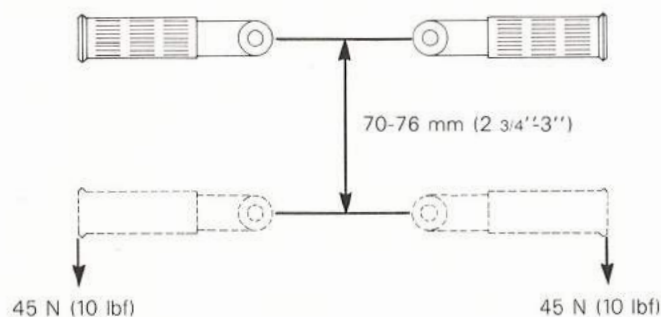
▼ **CAUTION:** When reinstalling the steering brake bands, make sure to install each at their proper locations.

▼ **CAUTION:** Never replace only one (1) steering brake band inside the differential; always make sure to replace both bands.



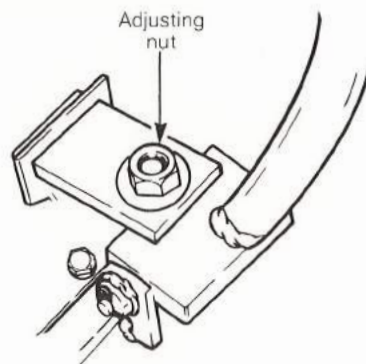
## ADJUSTMENT

○ **NOTE:** The steering brake band adjustment is determined according to the travel of the steering lever, when a force of 45 N (10 lbf) is applied to the steering lever handle.



B002160017

- Adjust the steering brake bands in order to get a displacement of 70-76 mm (2 3/4'' - 3'') of the steering levers, when a force of 45 N (10 lbf) is applied to the lever handles.



B002080012

- To do so, use the adjusting nuts provided for that purpose.

○ **NOTE:** The travel of the steering levers should be the same for both levers.

▼ **CAUTION:** Always use new cotter pins for reassembly.



## ELECTRICAL

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#### **'GAS ENGINE" (SW-48 FA)**

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Alternator . . . . .	140-01-2
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Fuse replacement . . . . .	140-01-5
Engine electrical components . . . . .	140-01-5
Wiring diagram . . . . .	140-01-6

#### **"DIESEL ENGINE" (SW-48 DA)**

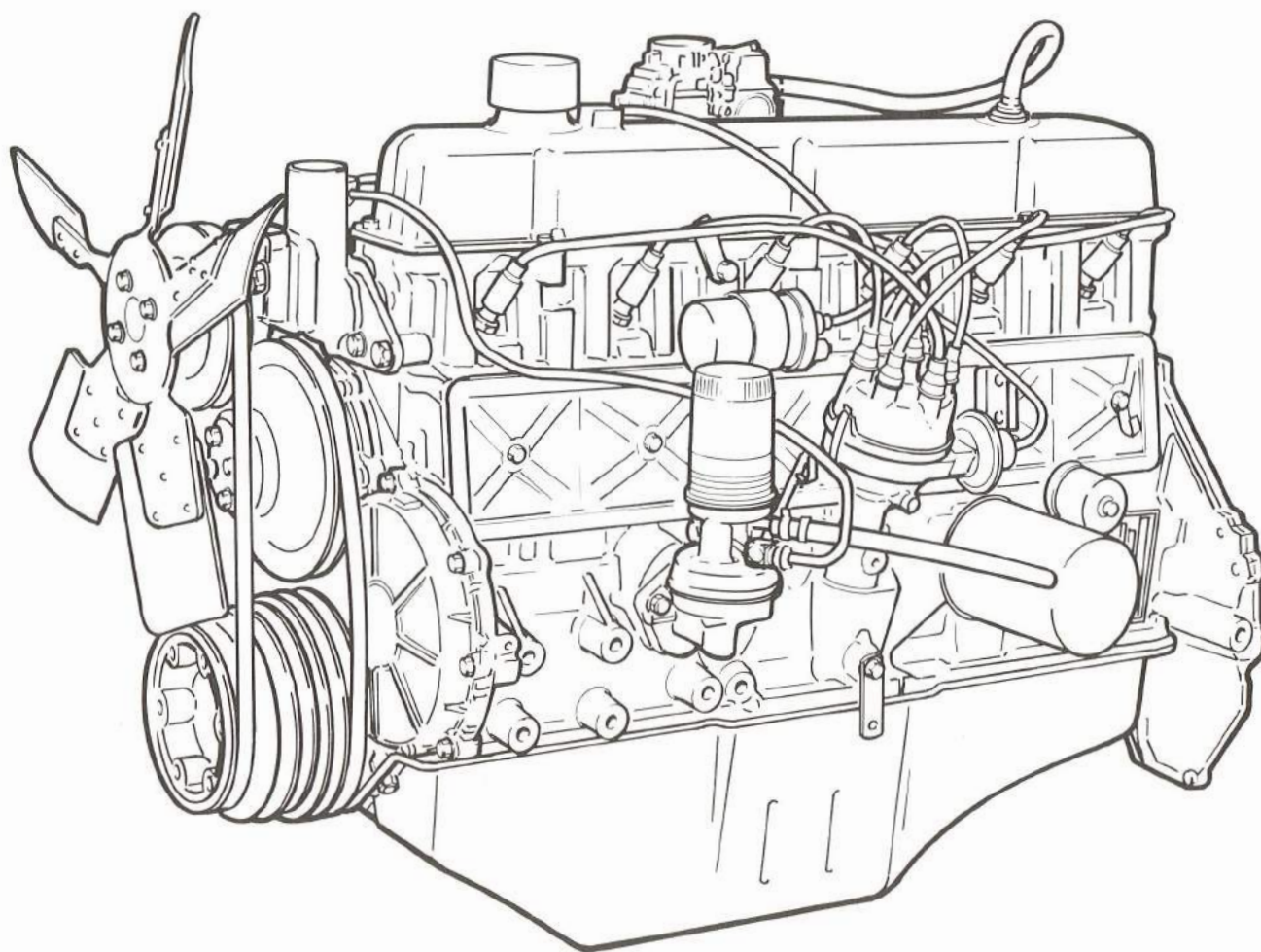
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Batteries . . . . .	140-02-3
Starter . . . . .	140-02-4
Fuse replacement . . . . .	140-02-5
Engine electrical components . . . . .	140-02-5
Wiring diagram . . . . .	140-02-6

## Section 140 ELECTRICAL

### Sub-section 01 ("GAS ENGINE" (SW-48 FA))

---

#### "GAS ENGINE" (SW-48 FA)



B002020001



## SPECIFICATIONS

<b>Alternator:</b>	
-Make:	Motorcraft
-Model:	ELBF - 10346 A
-Output:	12 volts - 60 A
<b>Voltage regulator:</b>	
-Make:	Autolite
-Model:	GR-540
<b>Battery:</b>	
-Voltage:	12 volts
-Quantity:	1
-Make:	Cegeler or Prestolite
- *Cranking performance	500 A      455 A
- **Reserve capacity:	120 min.    140 min.
<b>Starter:</b>	
-Make:	Ford
-Model:	SA-737
<b>Fuses:</b>	
Circuit:	Rating (A)
-Directional	15
-Windshield washer	15
-Heater	15
-Dome lamp	15
-Back-up	15
-Headlamp	15
Circuit breaker	2 x 30

\*The discharge load in amperes which a new fully charged battery at 0°F (-17.8°C) can deliver for 30 seconds and maintain a voltage of 1.2 volt per cell or higher.

\*\*The number of minutes a new fully charged battery at 80°F (26.7°C) can be discharged at 25 amperes and maintain a voltage of 1.75 volt per cell or higher.

## ALTERNATOR

### Service precautions

**CAUTION:** When the battery is connected observe the following items. Failure to observe them will probably result in damage to the regulator, alternator, or both.

- Never attempt to polarize an alternator.
- Disconnect the battery when working near or on the regulator or alternator.

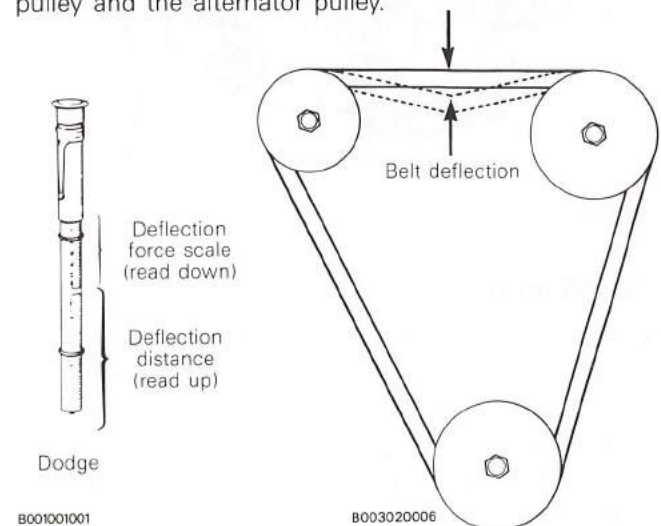
- If either the regulator or alternator wiring is disconnected, be sure that it is properly connected BEFORE the battery is connected.
- The alternator field circuit between the alternator and regulator must never be grounded when the key switch is on or if the engine is running.
- Never ground the alternator output terminal or the circuit between the alternator and the battery.
- The alternator must not be operated on an open circuit/battery disconnected or with a broken or disconnected wire between the alternator and the battery. The high voltage resulting from an open circuit operation may damage the alternator or the regulator.

### Drive belt

A new drive belt stretches during the first hour of operation. Therefore, the engine must be run to seat the belt and belt tension must readjusted.

### Belt tension adjustment

Deflection must equal 4.8 mm (3/16") when a force of 2.3 kg (5 lb) is applied midway between the water pump pulley and the alternator pulley.



Using a fish scale or a "Dodge" V-belt tension tester.

## Section 140 ELECTRICAL

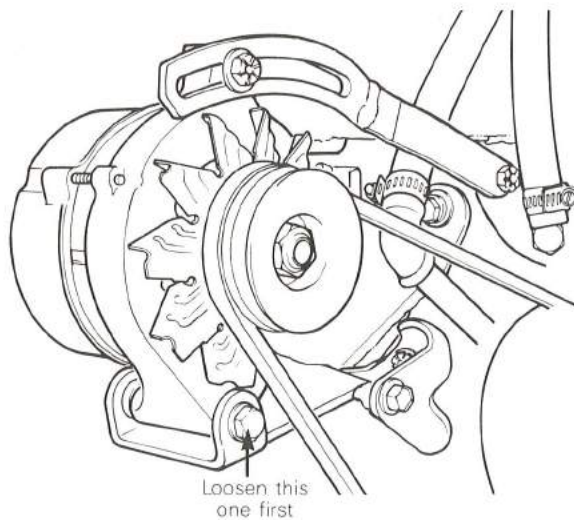
### Sub-section 01 ("GAS ENGINE" (SW-48 FA))

#### Removal

- Before removing the alternator, disconnect the battery ground cable from the battery.
- Disconnect wires from alternator.

Loosen the mounting bracket capscrew and nut, and then the adjusting bracket capscrew. Push the alternator towards the engine and remove the fan belt from the alternator pulley.

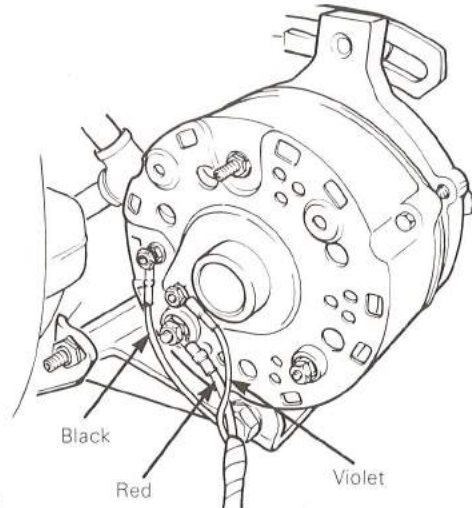
Unscrew completely adjusting bracket capscrew and mounting bracket capscrew and nut. Remove alternator.



B002150001

#### Installation

- Place the alternator on the mounting bracket and fasten it loosely with the mounting bracket screw.
- Push the alternator towards the engine to replace the drive belt.
- Fasten the alternator to the alternator adjusting bracket.
- Adjust the drive belt tension (refer to "drive belt" item in this sub-section).
- Connect wires according to the following illustration.



B002150002

- Reconnect battery ground cable.

#### BATTERY

◆ **WARNING:** (Explosive gases). Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and faces from battery. Do not charge or use booster cables or adjust post connections without proper instructions and training.

**DANGER:** KEEP VENT CAPS TIGHT AND LEVEL.

◆ **WARNING:** (Causes severe burns). Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.

**POISON:** KEEP OUT OF REACH OF CHILDREN.

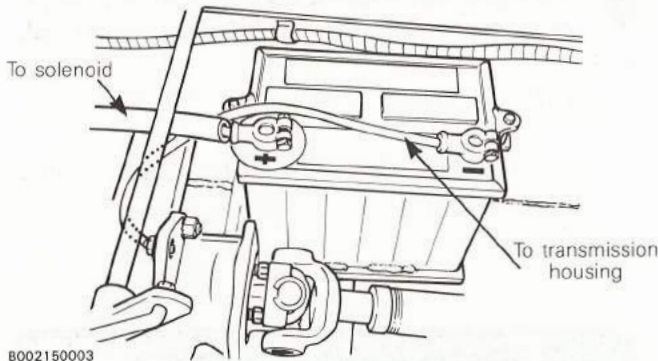
#### Connection precautions

Do not touch grounded metal with a hot wire. This will produce arcing destroying connector or lead. Directly shorting battery system to ground with a tool will cause instant heating of the tool to red hot, burning hand, damaging the tool and vehicle components and batteries. Explosion ignited by sparks will spray hot acid and battery fragments over the surrounding area.

Disconnect first the battery ground terminal on the negative post of the battery and protect it from accidental contact with battery post. After completing work, connect the battery ground terminal last.



## Removal and installation



- Disconnect the battery ground cable (⊖) first; then, disconnect the positive battery cable (⊕).
- When connecting battery cables, connect positive cable (⊕) first; then connect negative ground cable (⊖). Tighten clamps securely. Coat terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

## Service procedures

### Cleaning batteries

Keep the battery clean by wiping it with a damp cloth after every 200 hours of operation or whenever dirt appears excessive.

If corrosion is present around the terminal connections, remove it and wash the terminals with a solution of ammonia or baking soda and water. Be sure the vent plugs are tight to prevent cleaning solution from entering the cells.

After cleaning, flush the outside of the battery and battery compartment with clear water. Examine the vent hole in each battery cap to make sure they are all open.

### Checking specific gravity

Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. Hold the hydrometer vertically and take the reading.

A fully charged battery will have a corrected specific gravity of 1.260. Charge the battery if the reading is below 1.215.

### Checking electrolyte level

Check the electrolyte level (acid and water solution in the batteries) after at least every 200 hours of operation. Fill the battery cells 1 cm (1/2") over plates. Use distilled water.

▼ **CAUTION:** Too high a battery electrolyte level will spill out in the accessories support when vehicle is working on a steep grade.

▼ **CAUTION:** Since water and electrolyte will not mix immediately, do not add water in freezing weather unless the engine is to be run long enough (2 or 3 hours) to assure a thorough mixing of water and electrolyte.

▼ **CAUTION: COLD WEATHER BATTERY SERVICE:** During cold weather, it is particularly important to keep a proper level of electrolyte in the battery and to keep the battery fully charged. Otherwise the battery might freeze.

## Batteries storage

If the batteries are not to be used for more than 30 days, remove them. With the electrolyte level at the bottom of the split ring, load the batteries before storing them. Load the batteries every 30 days of storage. To minimize self-discharge, store the batteries in a place as cool as possible provided the electrolyte does not freeze. Electrolyte with a specific gravity of 1.220 (corrected reading) will freeze at -35°C (-31°F).

## STARTER

### Removal

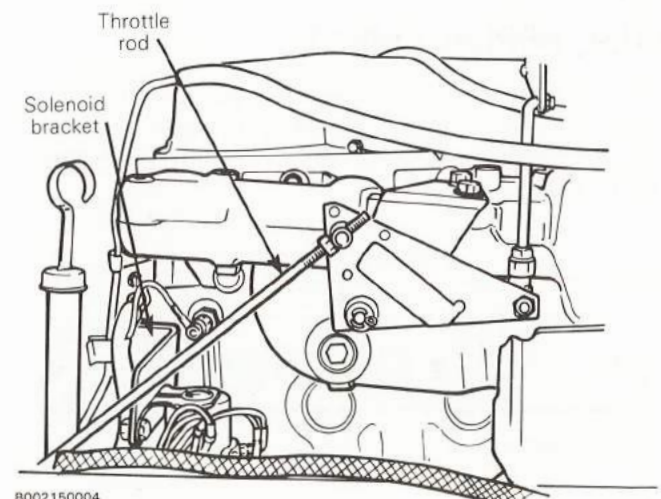
Disconnect negative cable from battery.

Disconnect positive cable from starter.

Disconnect solenoid wires and unscrew its bracket screw from the engine.

Remove solenoid with its bracket.

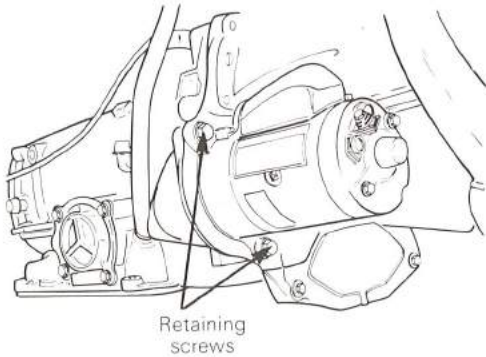
Detach the throttle rod.



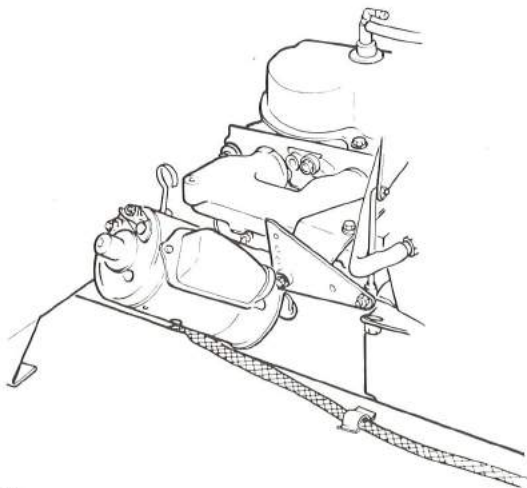
## Section 140 ELECTRICAL

### Sub-section 01 ("GAS ENGINE" (SW-48 FA))

Unscrew the two retaining screws on the starter; then bring the starter near the transmission dipstick to remove it from the vehicle.



B002040006



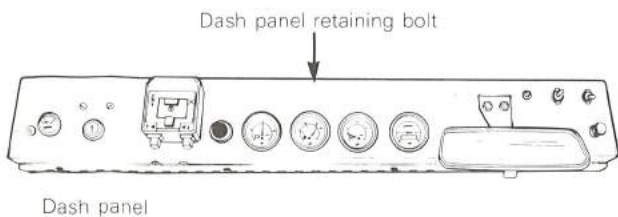
B002150005

## INSTALLATION

Reverse removal procedure.

## FUSE REPLACEMENT

The fuse holder is located under the dash panel. To gain access to the fuse holder, completely unscrew the retaining bolt located on top of the dash and tilt the dash downwards.



B002160010

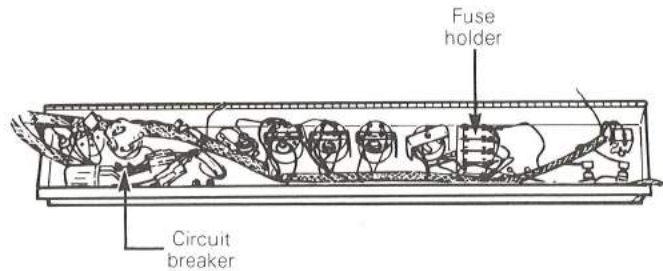
140-01-5

○ **NOTE:** If an instrument or an electrical device stops working, the first thing to do is to check fuses.

▼ **CAUTION:** Never replace a fuse with a stronger one since the electrical system could be seriously damaged.

○ **NOTE:** All SW-48 fuses have a 15 A capacity.

The circuit breaker is located near the ignition switch.



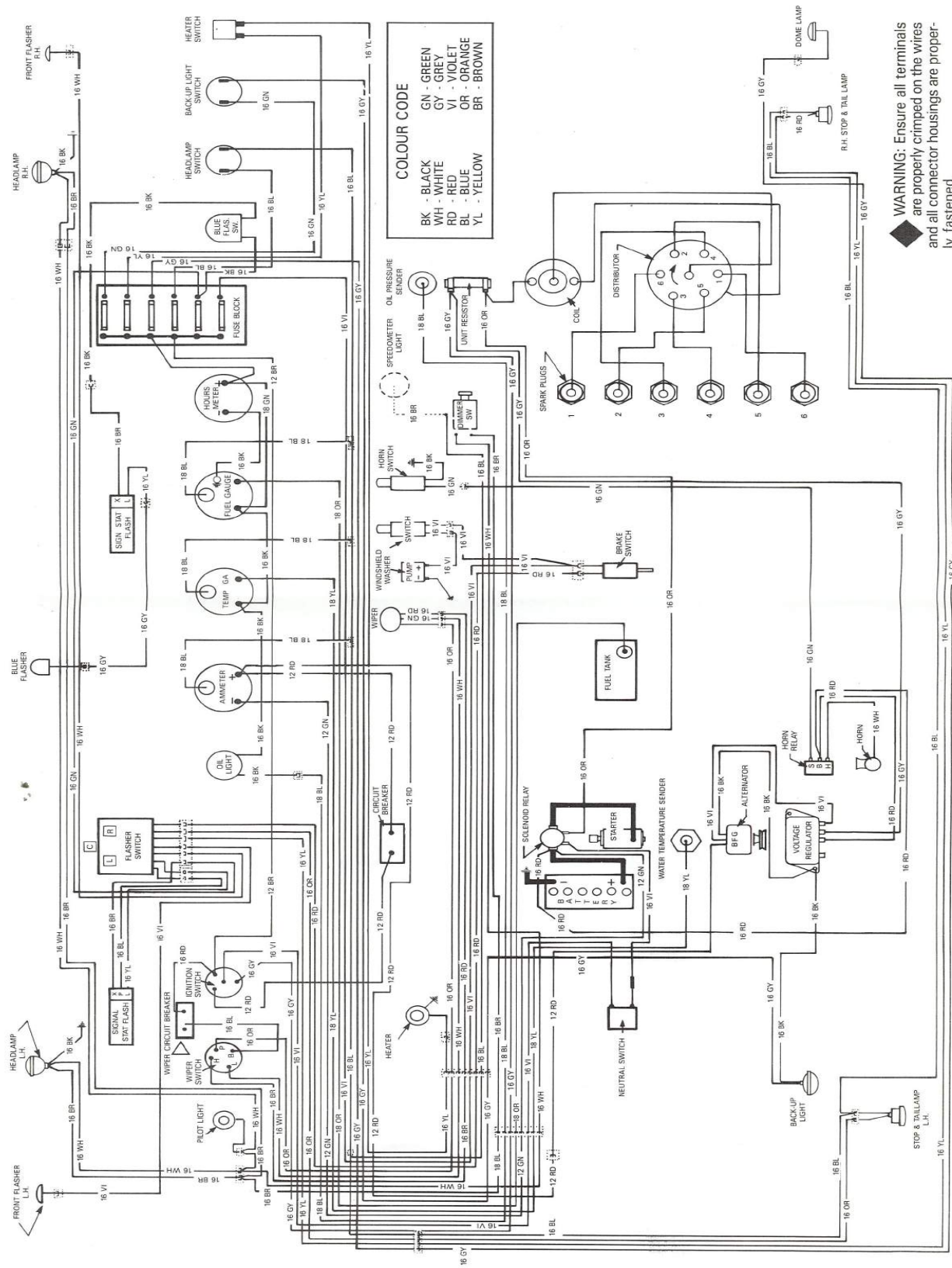
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## ENGINE ELECTRICAL COMPONENTS

See manufacturer's manual.



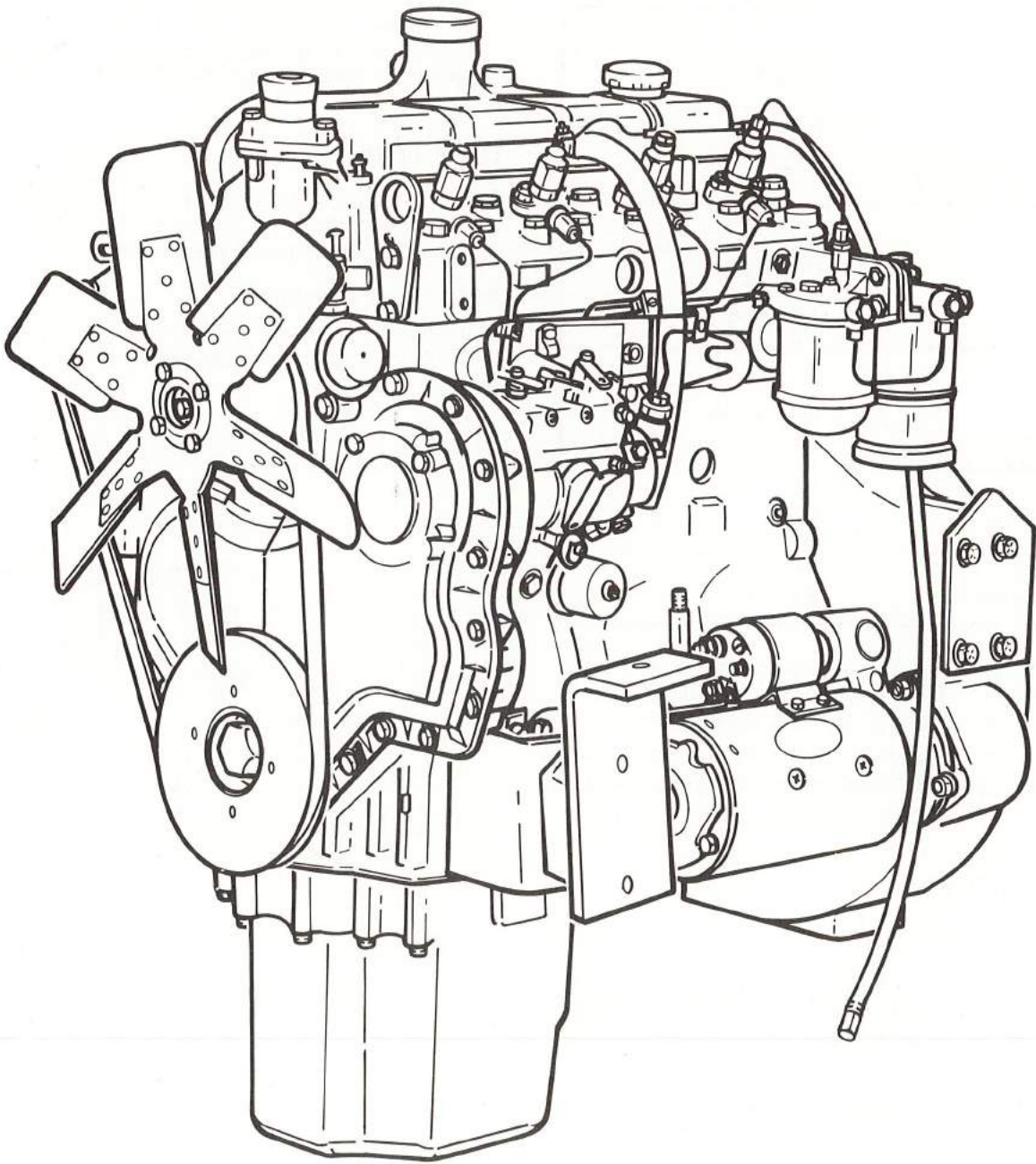
# WIRING DIAGRAM



**Section 140 ELECTRICAL**  
Sub-section 02 (DIESEL ENGINE" (SW-48 DA))

---

**"DIESEL ENGINE" (SW-48 DA)**



B002020015

## Section 140 ELECTRICAL

### Sub-section 02 (DIESEL ENGINE" (SW-48 DA))

## SPECIFICATIONS

<b>Alternator:</b>	
-Make:	Delco Remy
-Model:	10 SI
-Output:	12 volts - 61 AMPS
<b>Batteries:</b>	
-Voltage:	6 volts
-Quantity:	2
-Make:	Prestolite
- *Cranking performance:	630 AMPS
- ** Reserve capacity	120 min.
<b>Starter:</b>	
-Make:	Delco Remy
-Model:	4 E 01 1998389
<b>Fuses:</b>	
Circuit:	Rating (A)
-Directional	15
-Windshield washer	15
-Heater	15
-Dome lamp	15
-Back up	15
-Headlamp	15
Circuit breaker	2 x 30

\*The discharge load in amperes which a new fully charged battery at 0°F (-17.8°C) can deliver for 30 seconds to maintain a voltage of 1.2 volts per cell or higher.

\*\*The number of minutes a new fully charged battery at 80°F (26.7°C) can be discharged at 25 amperes and maintain a voltage of 1.75 volts per cell or higher.

## ALTERNATOR

### Service precautions

▼ **CAUTION:** When the batteries are connected observe the following items. Failure to observe them will probably result in damage to the regulator, alternator, or both.

- Never attempt to polarize an alternator.
- Disconnect the batteries when working near or on the regulator or alternator.
- If either the regulator or alternator wiring is disconnected, be sure that it is properly connected BEFORE the batteries are connected.

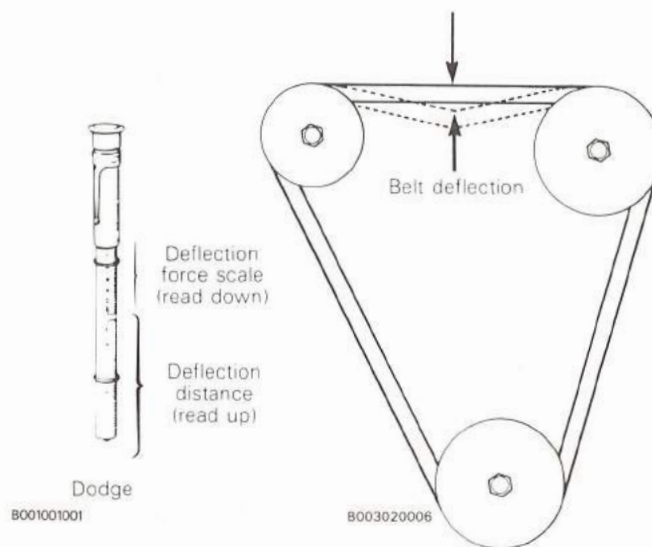
- The alternator field circuit between the alternator and regulator must never be grounded when the key switch is on or if the engine is running.
- Never ground the alternator output terminal or the circuit between the alternator and the battery.
- The alternator must not be operated on an open circuit/batteries disconnected or with a broken or disconnected wire between the alternator and the batteries. The high voltage resulting from an open circuit operation may damage the alternator or the regulator.

### Drive belts

New drive belts stretch during the first hours of operation. Therefore, the engine must be run to seat the belts and belt tension must be readjusted.

### Belt tension adjustment

Belt deflection must be 6.4 mm (1/4") under a force of 11.3 kg (25 lb) applied midway between the alternator and fan pulleys.



Using a fish scale or a "Dodge" V-belt tension tester.



## Section 140 ELECTRICAL

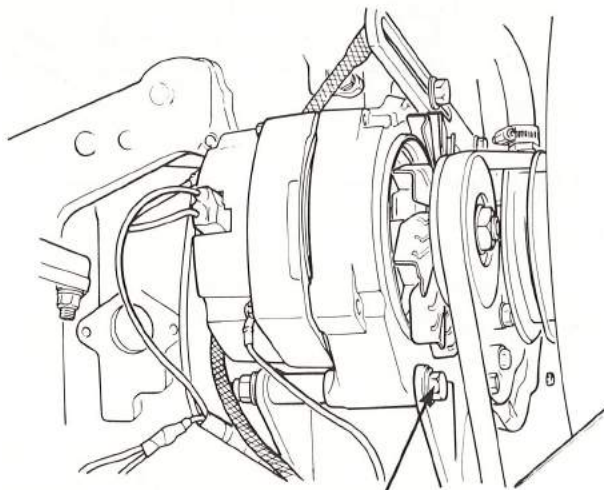
### Sub-section 02 (DIESEL ENGINE'' (SW-48 DA))

#### Removal

- Before removing the alternator, disconnect the battery ground cable from the battery.
- Disconnect wires from alternator.

Loosen the mounting bracket capscrew and nut, and then the adjusting bracket capscrew. Push the alternator towards the engine and remove the fan belt from the alternator pulley.

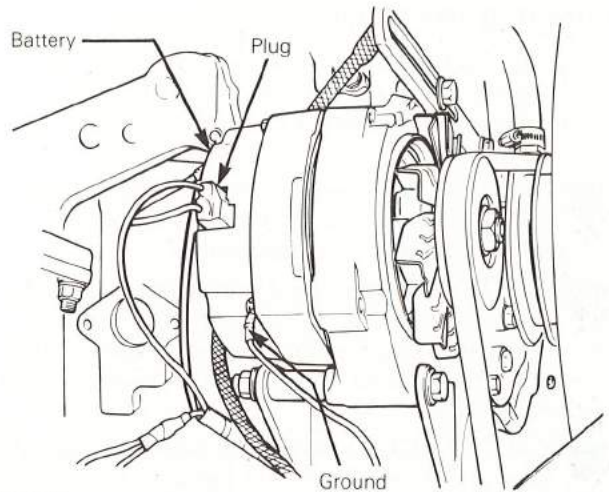
Unscrew completely adjusting bracket capscrew and mounting bracket capscrew and nut. Remove alternator.



B002150007

#### Installation

- Place the alternator on the mounting bracket and fasten it loosely with the mounting bracket screw.
- Push the alternator towards the engine to replace the drive belt.
- Fasten the alternator to the alternator adjusting bracket.
- Adjust the drive belt tension (refer to "drive belt" item in this sub-section).
- Connect plugs and wires according to the following illustration.



B002150007

- Reconnect battery ground cable.

#### BATTERIES

- Disconnect the battery ground cable  $\ominus$  first; then, disconnect the positive battery cable  $\oplus$ .
- When connecting battery cables, connect positive cable  $\oplus$  first; then connect negative ground cable  $\ominus$ . Tighten clamps securely. Coat terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

#### Service procedures

##### Cleaning batteries

Keep the batteries clean by wiping them with a damp cloth after every 200 hours of operation or whenever dirt appears excessive.

If corrosion is present around the terminal connections, remove it and wash the terminals with solution of ammonia or a solution of baking soda and water. Be sure the vent plugs are tight to prevent cleaning solution from entering the cells.

After cleaning, flush the outside of the battery and battery compartment with clear water. Examine the vent hole in each battery cap to make sure they are all open.

##### Checking specific gravity

Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. Hold the hydrometer vertically and take the reading.

A fully charged battery will have a corrected specific gravity of 1.260. Charge the battery if the reading is below 1.215.



## Section 140 ELECTRICAL

### Sub-section 02 (DIESEL ENGINE" (SW-48 DA))

#### Checking electrolyte level

Check the electrolyte level (acid and water solution in the battery after at least every 200 hours of operation. Fill the battery cells to cover 1 cm (1/2") over plates. Use distilled water.

▼ **CAUTION:** Too high a battery electrolyte level will spill out in the accessories support when the vehicle is working on a steep grade.

▼ **CAUTION:** Since water and electrolyte will not mix immediately, do not add water in freezing weather unless the engine is to be run long enough (2 or 3 hours) to assure a thorough mixing of water and electrolyte.

▼ **CAUTION: COLD WEATHER BATTERY SERVICE:** During cold weather, it is particularly important to keep a proper level of electrolyte in the batteries, and to keep the batteries fully charged. Otherwise the batteries might freeze.

#### Batteries storage

If the battery is not to be used for more than 30 days, remove it. With the electrolyte level at the bottom of the split ring, charge the battery before storing it. Reload the battery every 30 days of storage. To minimize self-discharge, store the battery in a place as cool as possible provided the electrolyte does not freeze. Electrolyte with a specific gravity of 1.220 (corrected reading) will freeze at -35°C (-31°F).

◆ **WARNING:** (Explosive gases). Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. Do not charge or use booster cables or adjust post connections without proper instructions and training.

**DANGER:** KEEP VENT CAPS TIGHT AND LEVEL.

◆ **WARNING:** (Causes severe burns). Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately.

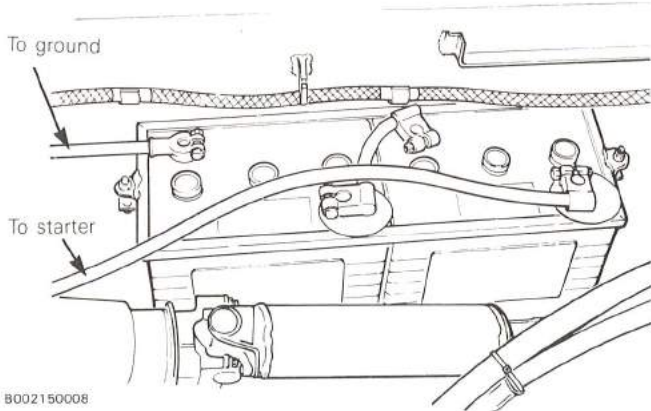
**POISON:** KEEP OUT OF REACH OF CHILDREN.

#### Connection precautions

Do not touch grounded metal with a hot wire. This will produce arcing destroying connector or lead. Directly shorting battery system to ground with a tool will cause instant heating of this tool to red hot, burning hand, damaging the tool and vehicle component and batteries. Explosion ignited by sparks will spray hot acid and battery fragments over the surrounding area.

First disconnect the battery ground terminal on the negative post of the battery and protect it from accidental contact with battery post. After completing work, connect the battery ground terminal last.

#### Removal and installation



B002150008

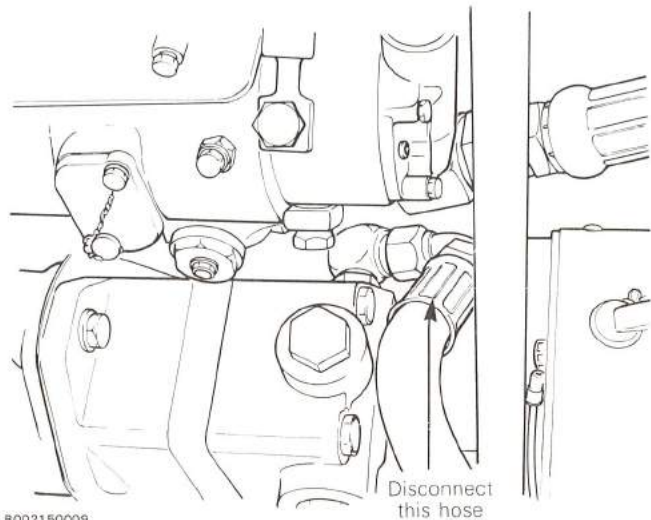
#### STARTER

##### Removal

Disconnect negative cable from battery.

Drain hydraulic tank.

Disconnect hydraulic hose.



B002150009

Disconnect wires from starter.

Remove starter retaining screws.

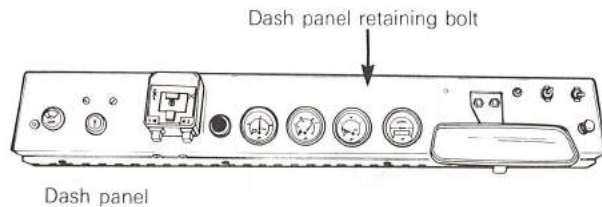
Remove starter.

#### INSTALLATION

Reverse removal procedure.

## FUSE REPLACEMENT

The fuse holder is located under the dash panel. To gain access to the fuse holder, completely unscrew the retaining bolt located on top of the dash and tilt the dash downwards.



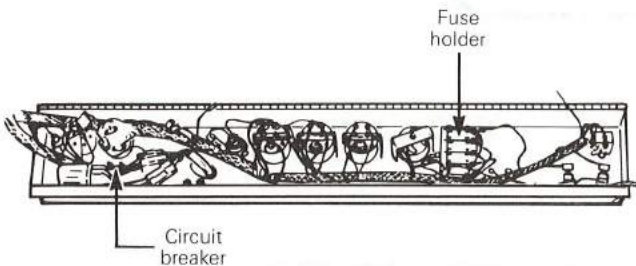
B002160010

○ **NOTE:** If an instrument or an electrical device stops working, the first thing to do is to check fuses.

▼ **CAUTION:** Never replace a fuse with a stronger one since the electrical system could be seriously damaged.

○ **NOTE:** All SW-48 fuses have a 15 A capacity.

The circuit breaker is located near the ignition switch.

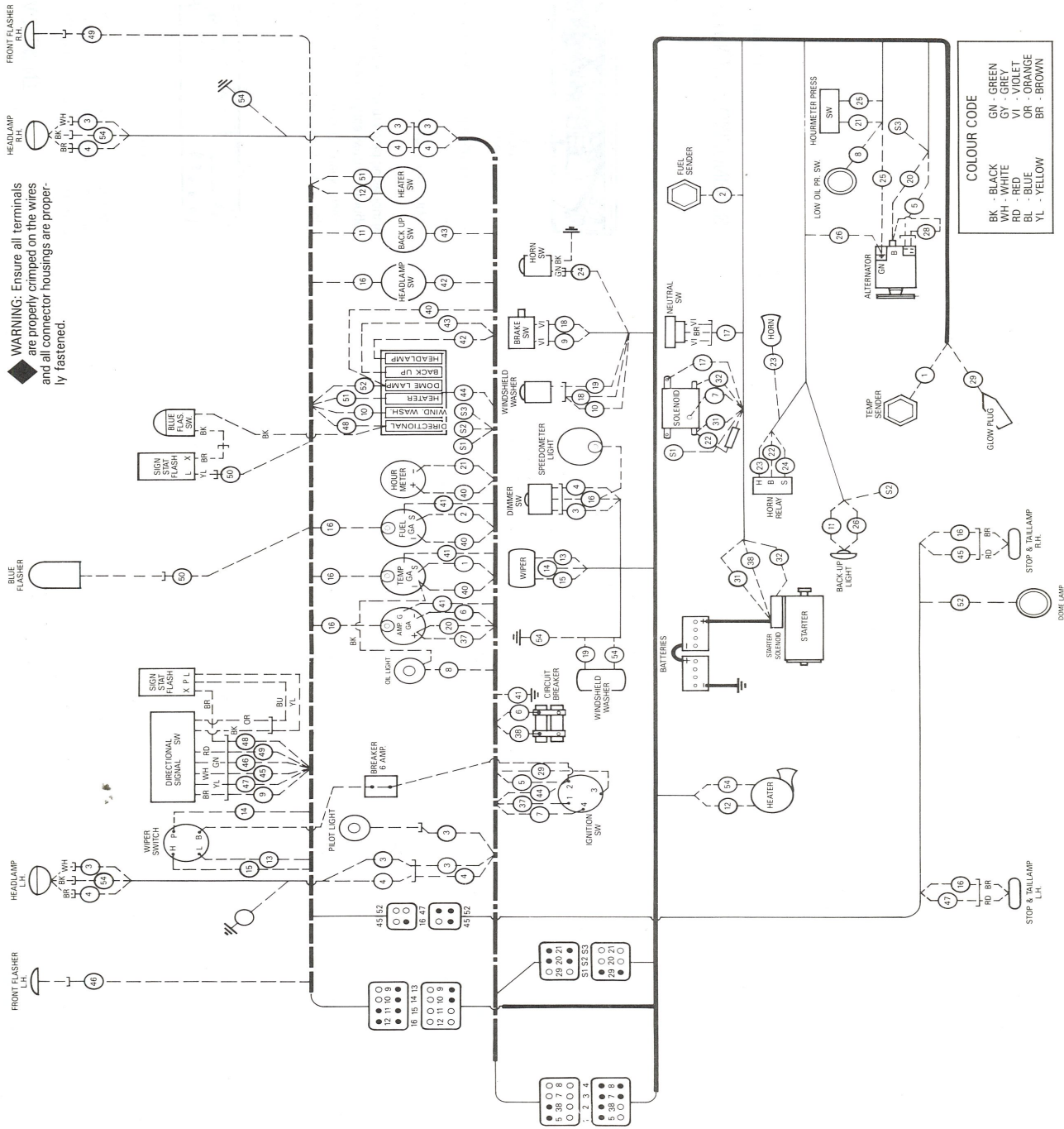


B002150006

## ENGINE ELECTRICAL COMPONENTS

See manufacturer's manual.

# WIRING DIAGRAM



# CAB, CONTROLS & FRAME

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### CAB

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### FRAME

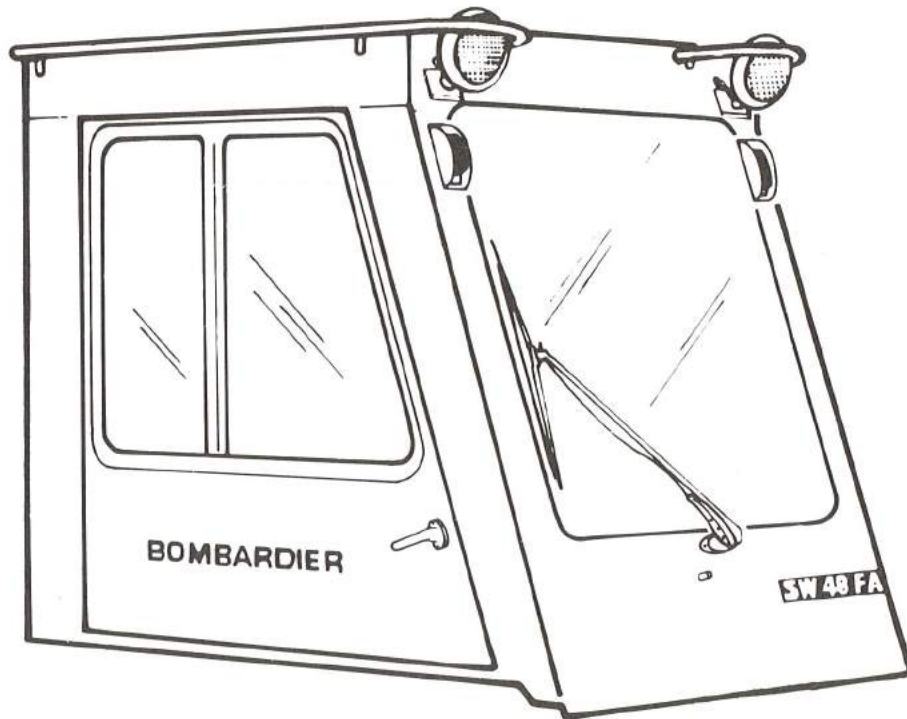
Specifications .....	150-03-2
Safety notice .....	150-03-2



**Section 150 CAB, CONTROLS & FRAME**  
Sub-section 01 (CAB)

---

**CAB**



B002160001

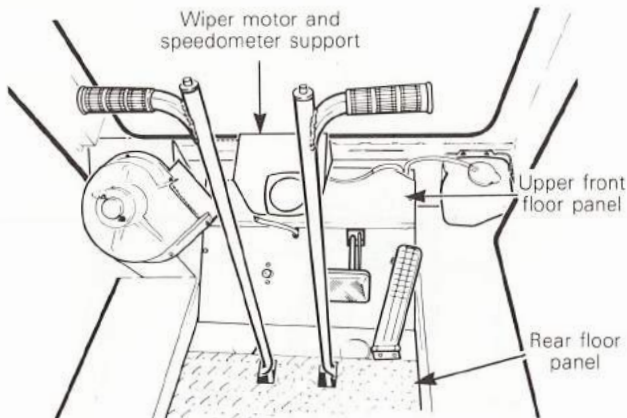
## Section 150 CAB, CONTROLS & FRAME

### Sub-section 01 (CAB)

## SPECIFICATION

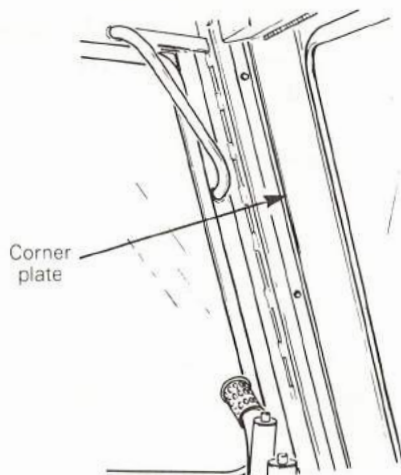
Cab material:	H.R.M.S. Steel
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## REMOVAL



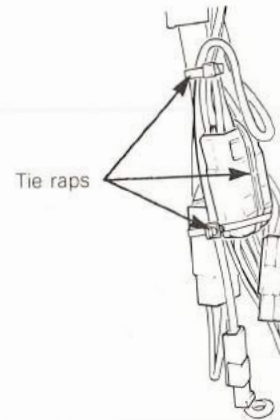
B002080007

- Remove the upper front floor panel and the rear floor panel. Disconnect the ground cable from the battery.
- Disconnect electrical connectors from the wiper motor and speedometer support.
- Disconnect the speedometer cable at speedometer.
- Disconnect the two windshield washer hoses from tank and nozzle.



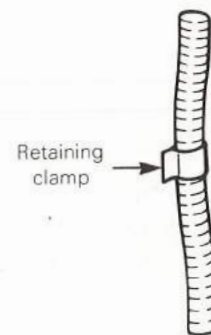
B002160002

- Remove the cab corner plate to gain access to the wiring harness.



B002160003

- Remove the tie raps, and then disconnect electrical connectors.



B002160004

- Slightly open the wiring harness retaining clamps in order to pull the wiring harness away from the cab.

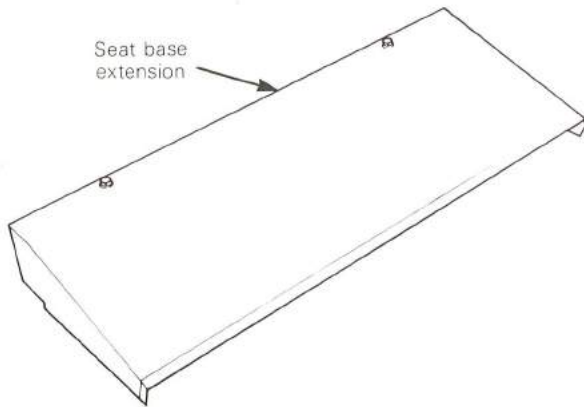


B002080009

- Remove the safety pin in order to tilt the operator's seat.

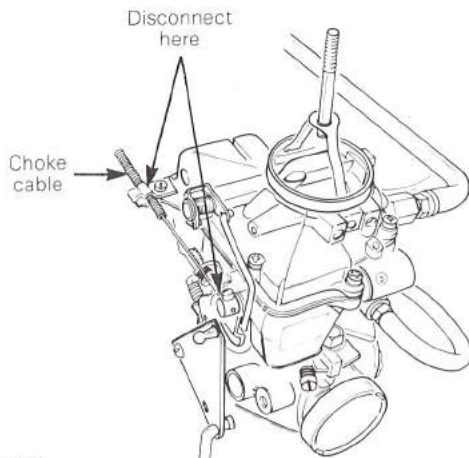
## Section 150 CAB, CONTROLS & FRAME

### Sub-section 01 (CAB)

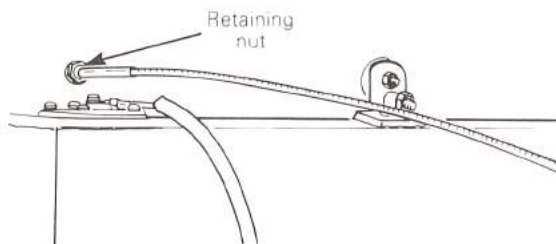


B002160005

- Remove the seat base extension.
- Tilt back the engine hood.



B002160006

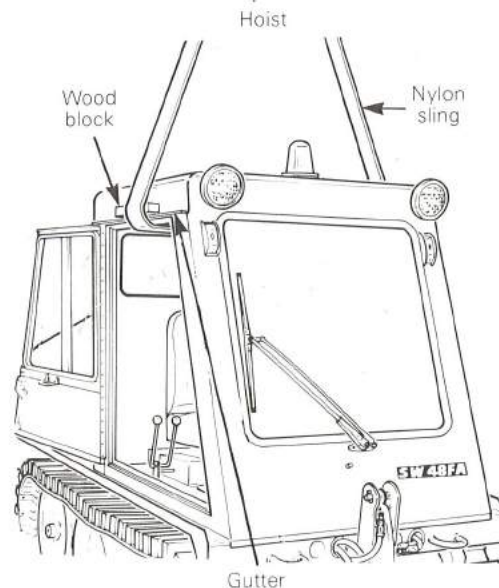


B002160007

- Disconnect the choke cable from carburetor, and then remove the choke control knob and cable assembly from the cab by unscrewing the retaining nut.
- Disconnect the fuel sender wire and hoses from the fuel tank then remove the tank from the vehicle.

▼ **CAUTION:** Fuel is flammable and explosive under certain conditions. Always manipulate in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

- Remove the hydraulic oil tank fixing bolts then pull the tank enough to free the cab at the time of its removal.

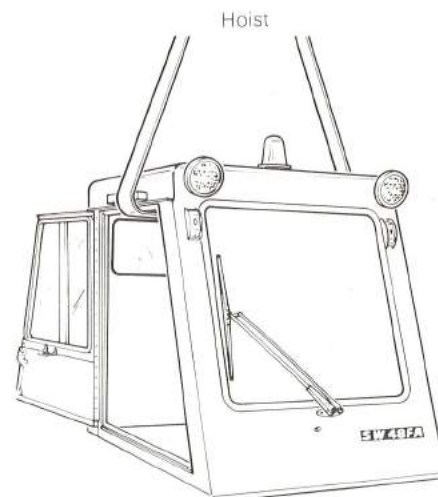


B002160008

- Open cab doors and pass a nylon sling through the cab. Attach the sling to a hoist.

▼ **CAUTION:** Place a wood block above the cab gutter between cab and sling to prevent the gutter from being damaged.

- Remove the six (6) bolts and nuts (three (3) on each side) fixing the cab to the frame.



B002160009

## Section 150 CAB, CONTROLS & FRAME

### Sub-section 01 (CAB)

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▼ **CAUTION:** Before lifting the cab, place the sling in such a way to counterbalance the cab weight. Carefully lift the cab. Make sure that all disconnections have been made.

◆ **WARNING:** Do not work under or near a weight which is solely attached to a lifting device.

### INSTALLATION

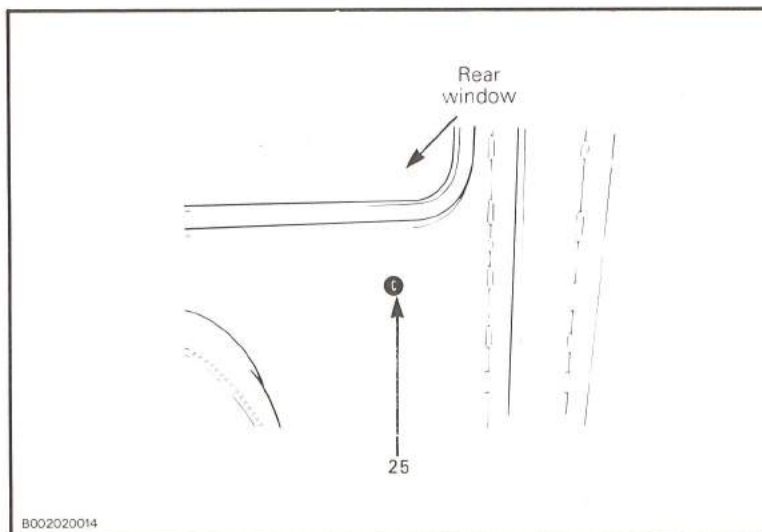
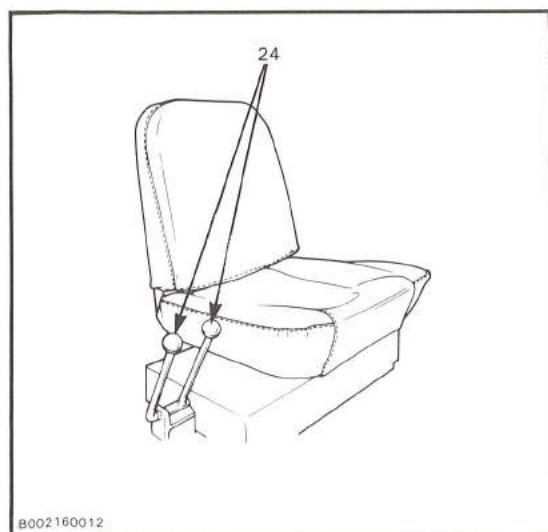
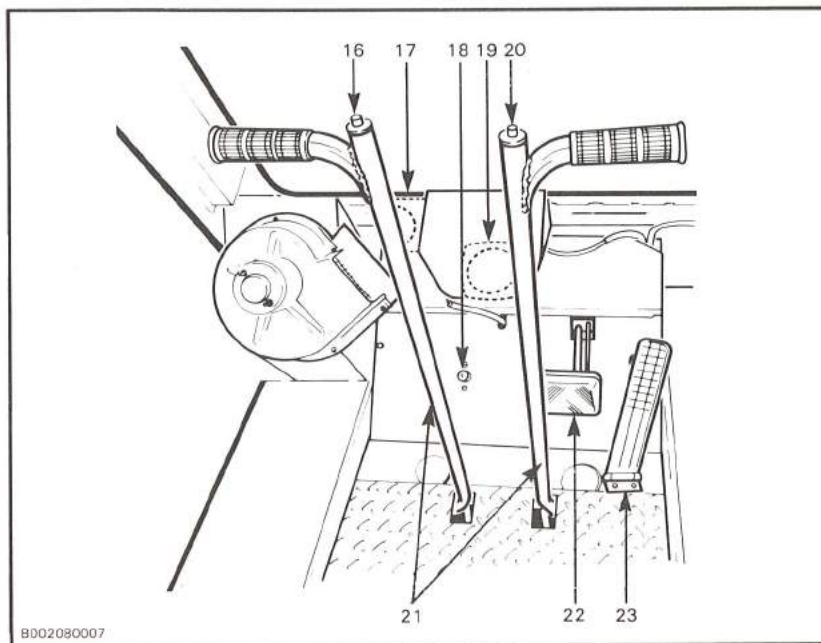
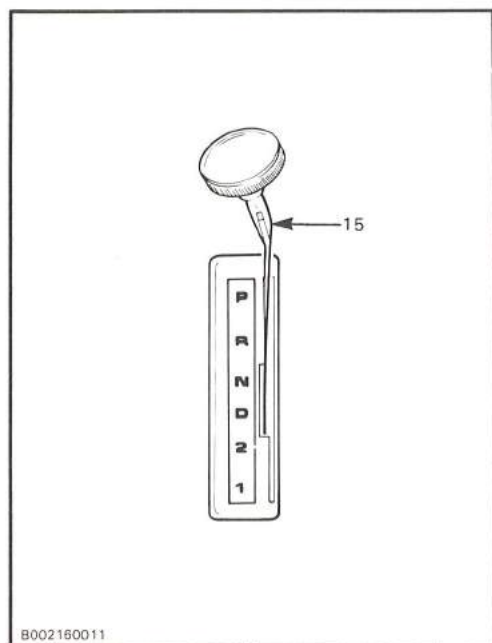
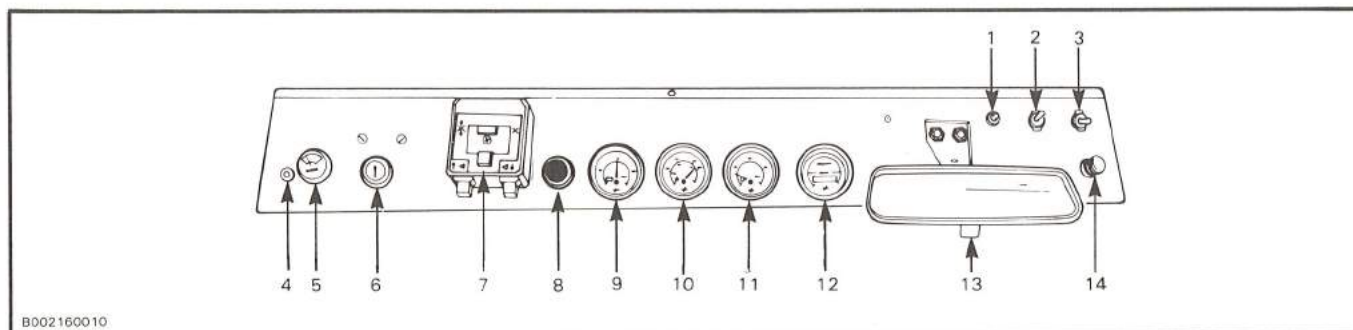
To install the cab, reverse the procedure for its removal.



## Section 150 CAB, CONTROLS & FRAME

### Sub-section 02 (CONTROLS)

## CONTROLS




## Section 150 CAB, CONTROLS & FRAME

### Sub-section 02 (CONTROLS)

---

1. Flasher switch
2. Light switch
3. Back-up light switch
4. Main headlamp indicator light
5. Wiper control knob
6. Starter switch
7. Directional signal light
8. Oil pressure warning light
9. Ammeter
10. Cooling liquid temperature indicator
11. Fuel level indicator
12. Hour meter
13. Mirror
14. Heater control knob
15. Gear shift lever

16. Horn switch
17. RPM indicator
18. Main headlamp light switch
19. Speedometer
20. Windshield washer switch
21. Steering levers
22. Emergency and parking brake pedal
23. Throttle pedal
24. Hydraulic control levers
25. Choke control knob

 **NOTE:** For complete description of controls and instruments, refer to Bombardier SW-48 FA or SW-48 DA operator's manual.

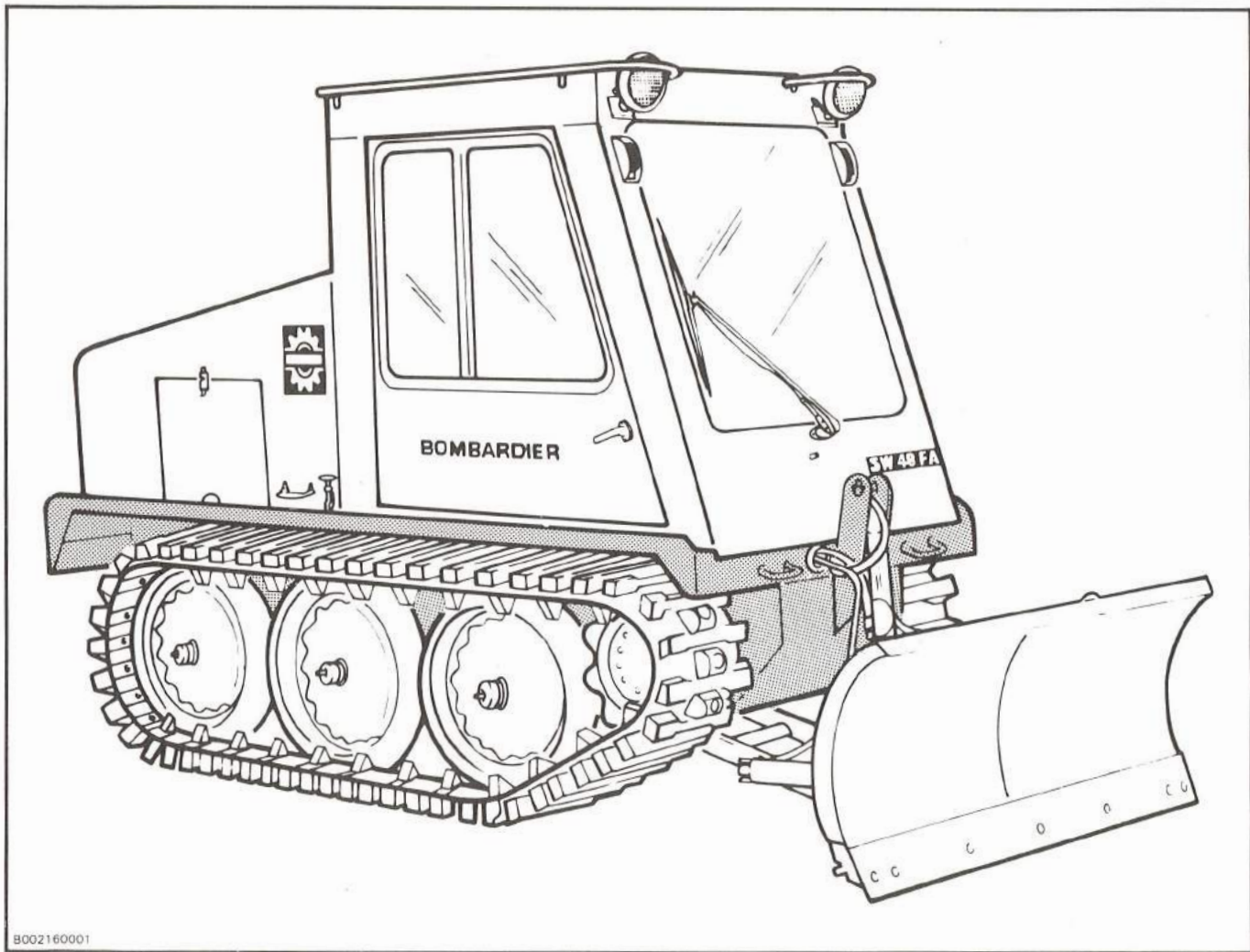
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## Section 150 CAB, CONTROLS & FRAME

### Sub-section 03 (FRAME)

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#### FRAME



## SPECIFICATION

Frame material:	H.R.M.S. Steel A36
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## SAFETY NOTICE

▼ **CAUTION:** Never weld, fire cut, drill or modify the frame in the area where the following parts are installed.

- Hydraulic cylinder
- Push frame
- Drive axle housings
- Flexitor shells
- Tandems
- Engine supports
- Transmission support





# HYDRAULIC SYSTEM

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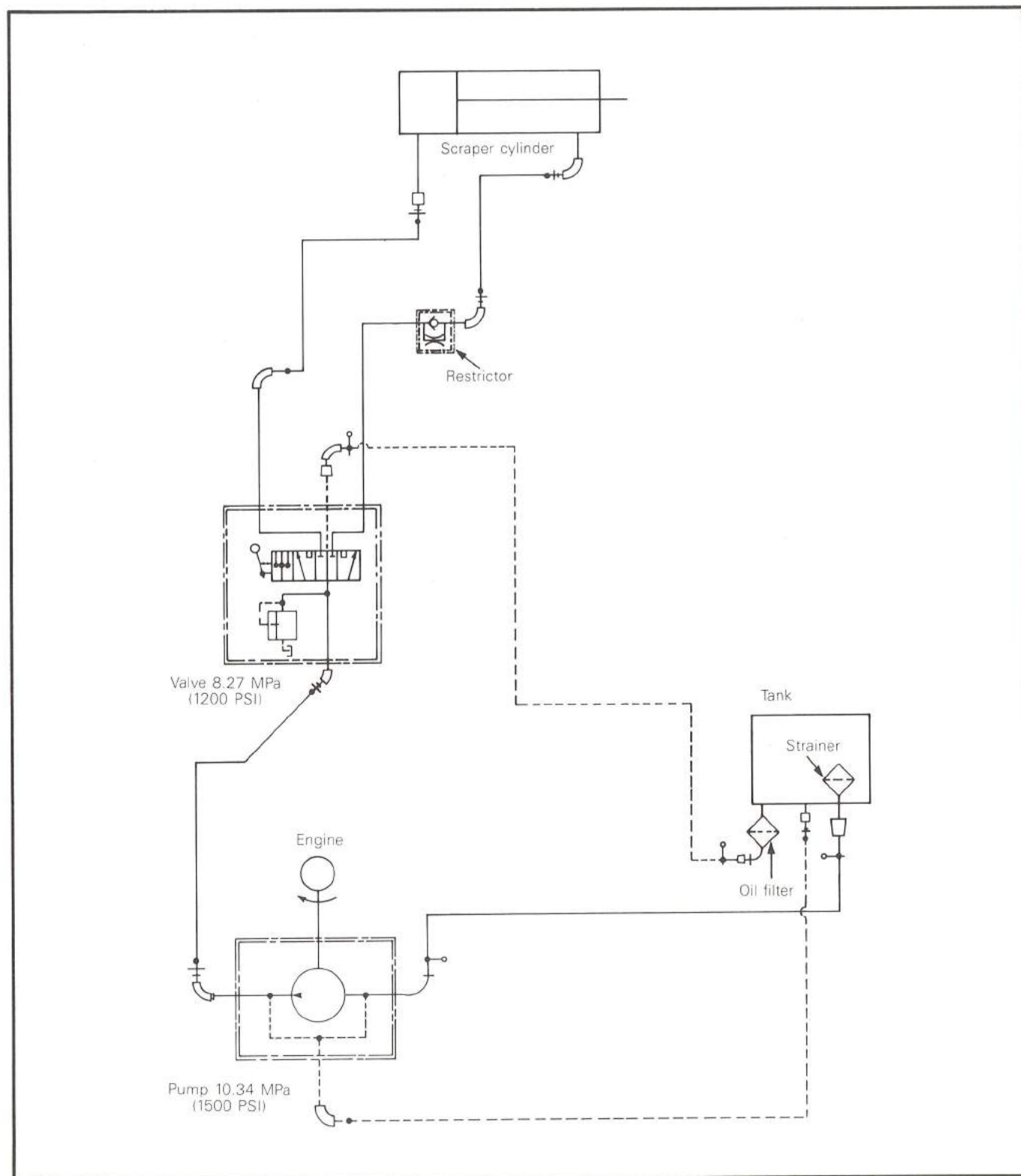
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## Section 160 HYDRAULIC SYSTEM

### Sub-section 01 (HYDRAULIC SCHEMATIC DIAGRAMS)

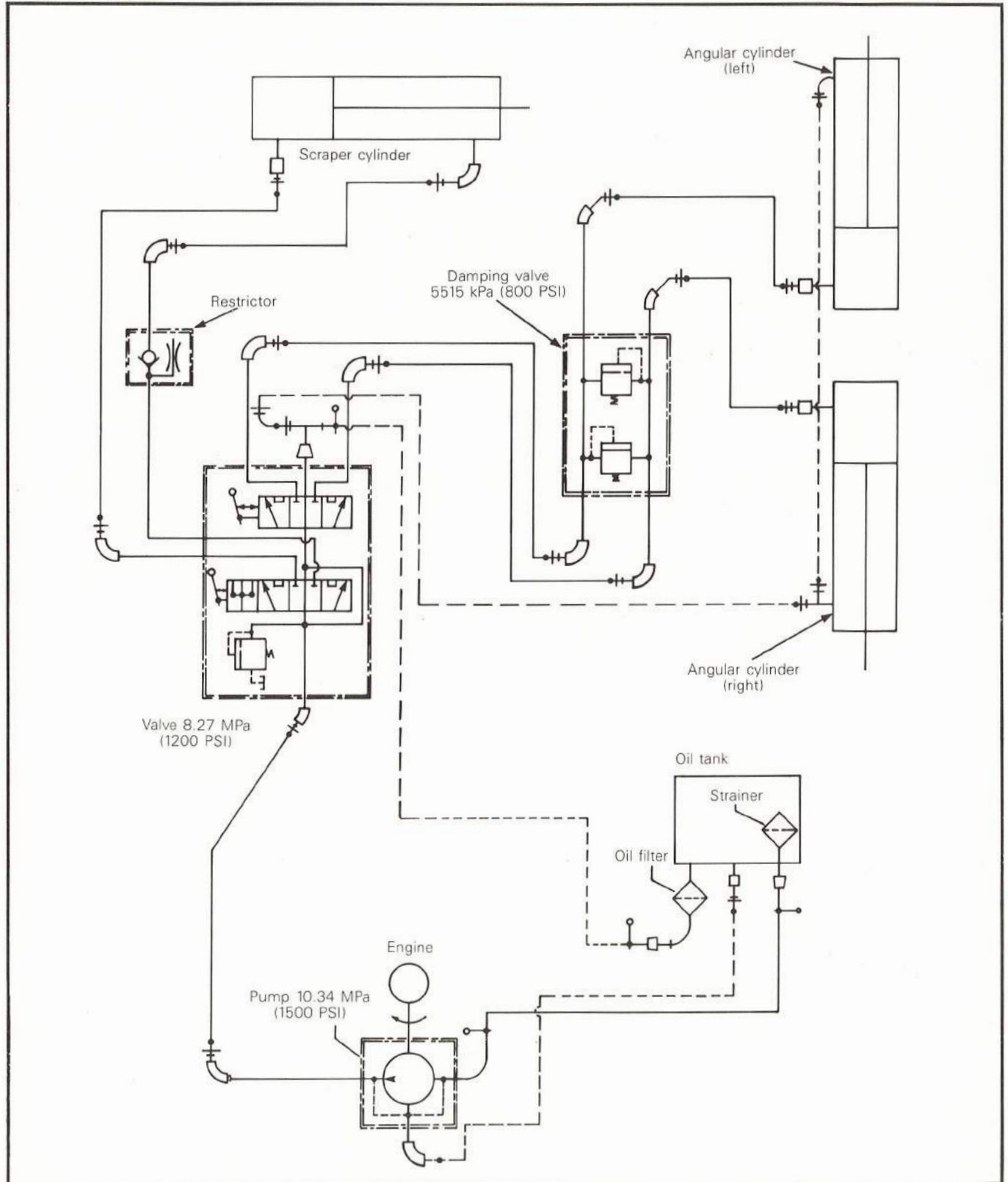
## HYDRAULIC SCHEMATIC DIAGRAMS

### SCRAPER ONLY



**Section 160 HYDRAULIC SYSTEM**  
Sub-section 01 (HYDRAULIC SCHEMATIC DIAGRAMS)

**WITH ANGULAR CYLINDER**







# SCRAPER & PUSH FRAME

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#### SCRAPER

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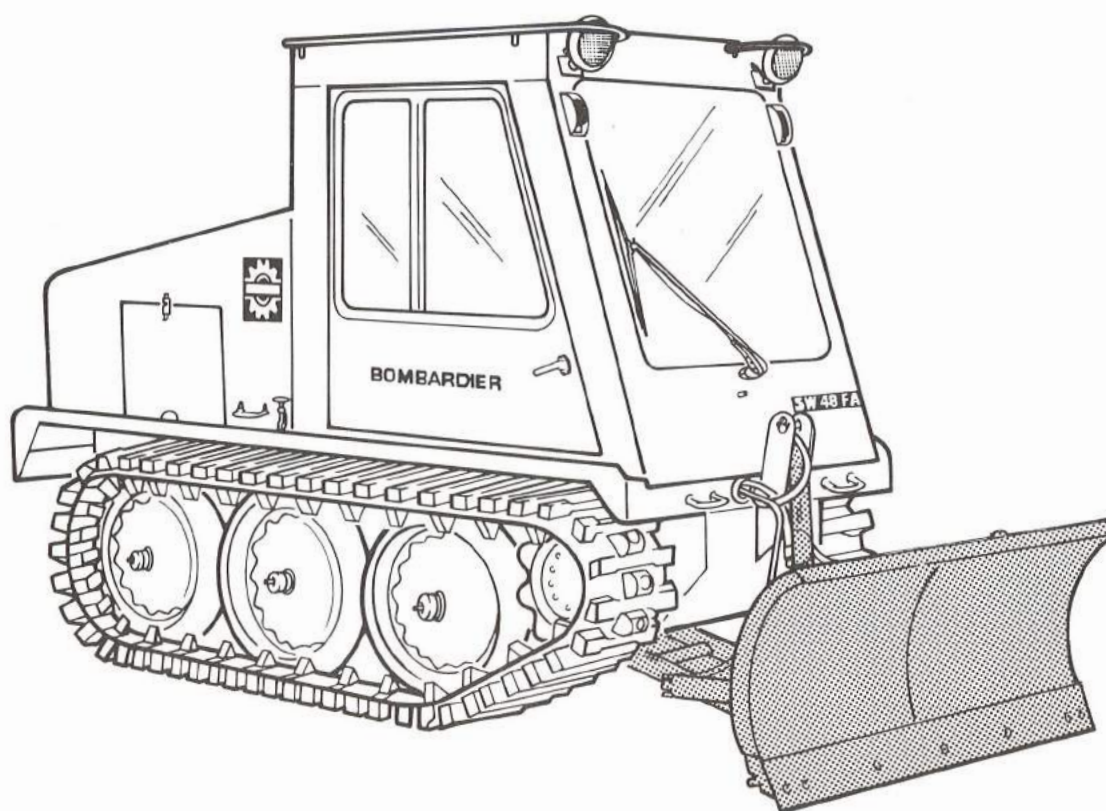
#### PUSH FRAME

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## Section 170 SCRAPER & PUSH FRAME

Sub-section 01 (SCRAPER & PUSH FRAME ASSEMBLY)

### SCRAPER & PUSH FRAME ASSEMBLY

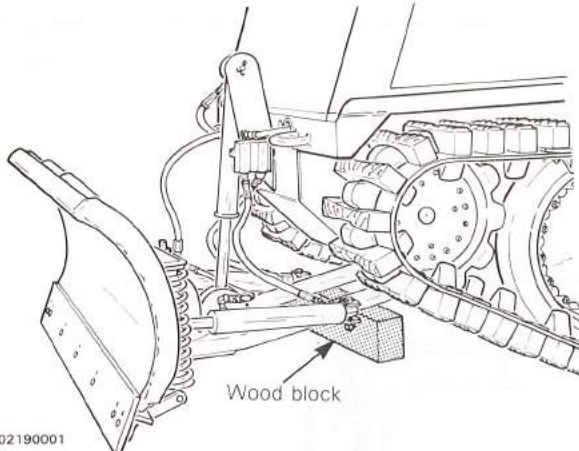


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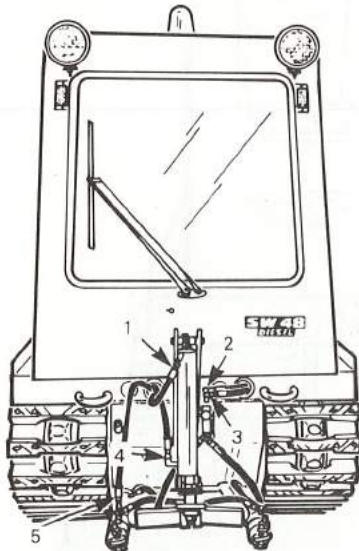
## Section 170 SCRAPER & PUSH FRAME

### Sub-section 01 (SCRAPER & PUSH FRAME ASSEMBLY)

#### REMOVAL



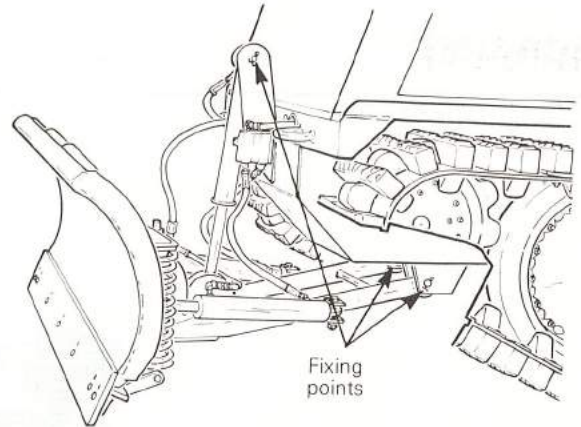
- Lower the scraper to the ground. Then place a wood block against the push frame, underneath both fixing arms.



- Disconnect all the hydraulic hoses connecting the scraper and push frame assembly to the vehicle.

○ **NOTE:** Install plugs on the line connectors and on oil lines when these have been disconnected.

▼ **CAUTION:** Never run the hydraulic system if an oil line has been disconnected.

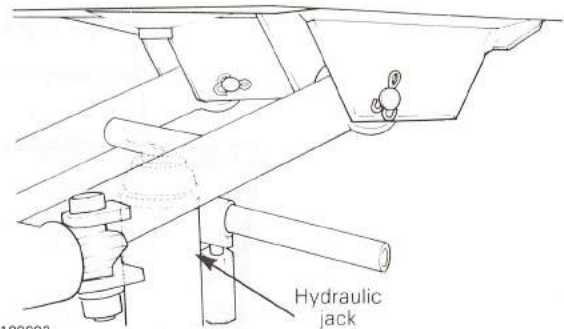


- Remove the cotter pins, and then pull off pins fixing both the lift cylinder and the push frame to the vehicle.
- Slowly move the vehicle backward to free the scraper and push frame assembly.

◆ **WARNING:** Do not stand close to the vehicle when it is in movement. Slowly move the vehicle.

#### INSTALLATION

To install the scraper and push frame assembly on the vehicle, reverse the procedure for its removal with the following additions:



- Use a hydraulic jack to align fixing holes on the push frame with those on the vehicle.

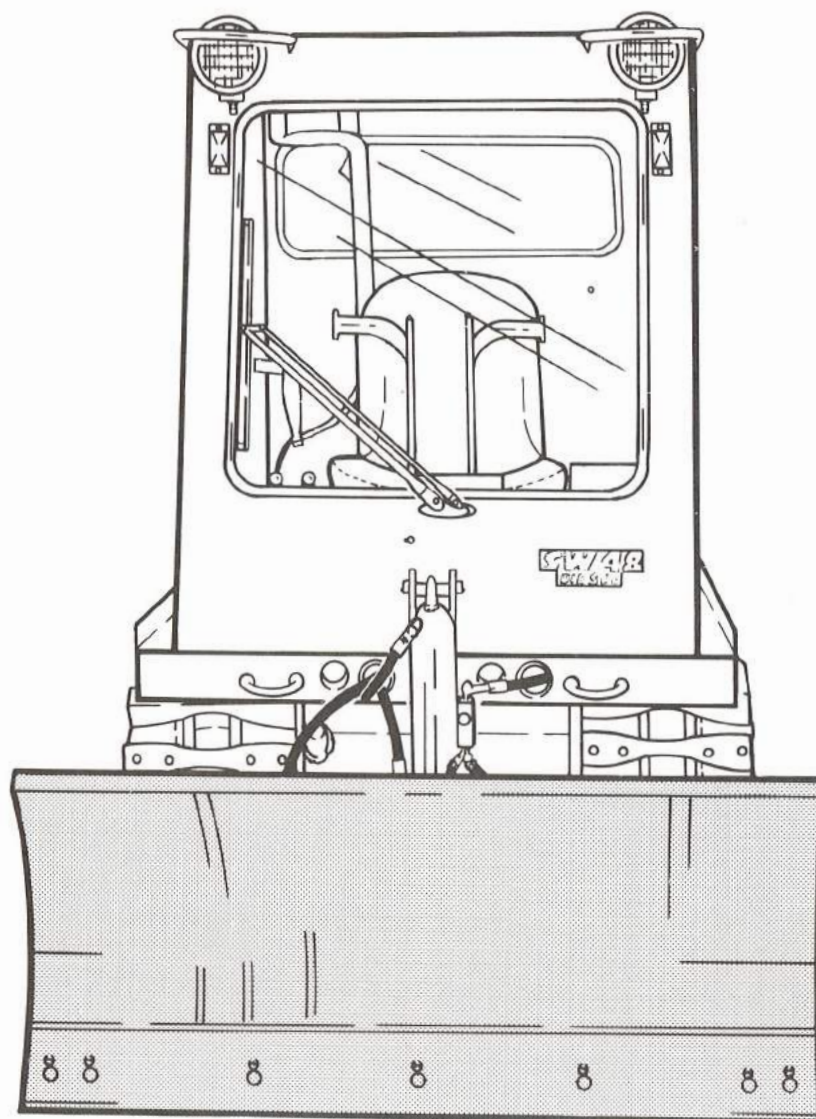
▼ **CAUTION:** Always use new cotter pins when securing the fixing pins in position.



**Section 170 SCRAPER & PUSH FRAME**  
Sub-section 02 (SCRAPER)

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**SCRAPER**

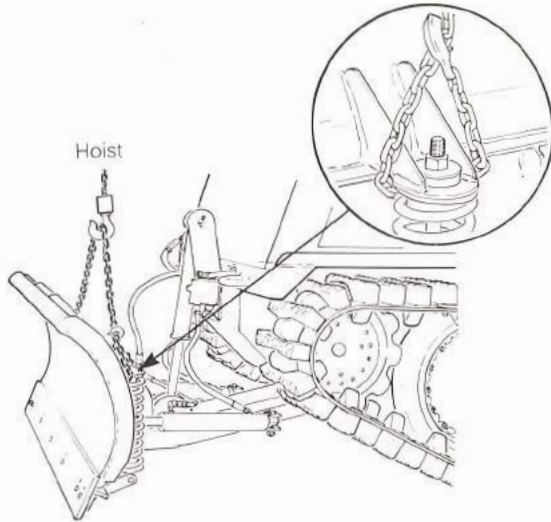


B002190003

## Section 170 SCRAPER & PUSH FRAME

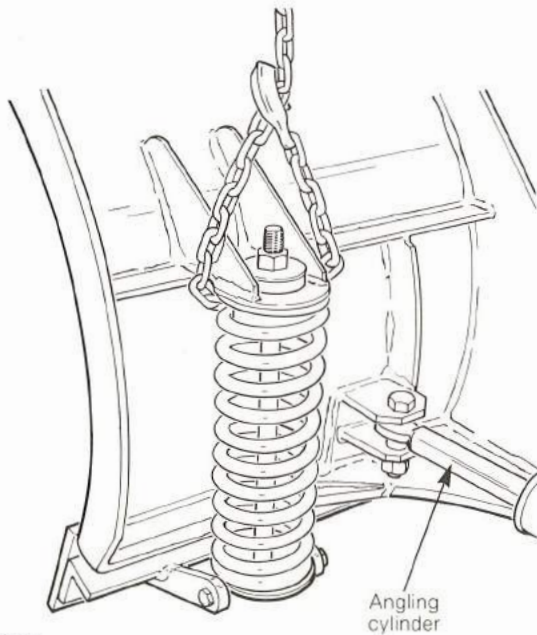
### Sub-section 02 (SCRAPER)

#### REMOVAL



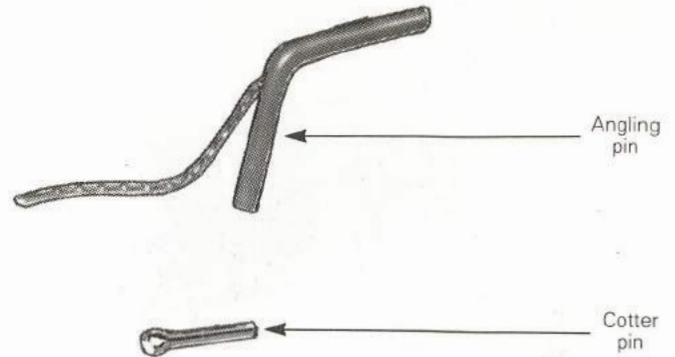
B002190001

- Using chains, fix the scraper to a hoist. Apply a light tension on the chains.



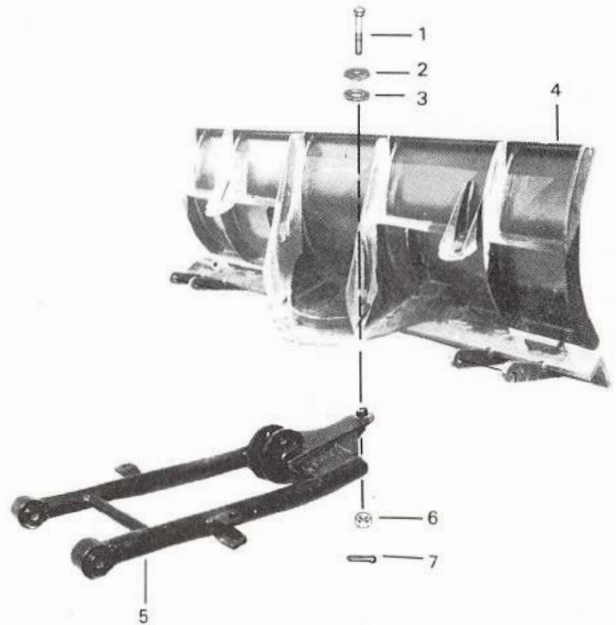
B002190004

- Disconnect both angling cylinders from the scraper.



B002190005

- NOTE:** If the vehicle is not equipped with angling cylinders; pull off the angling pin from the scraper and push frame assembly.



B002190006

1. Pivot bolt
2. Washer
3. Rubber washer
4. Scraper

5. Push frame
6. Nut
7. Cotter pin

- Remove the pivot bolt from the scraper and push frame assembly.

- Using the hoist, free the scraper from the push frame.

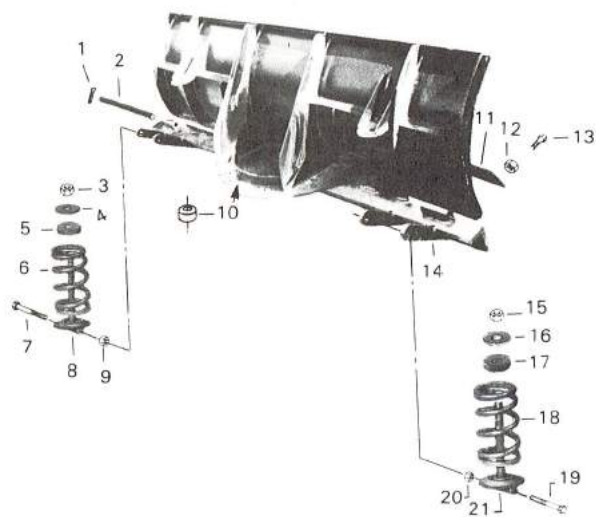
#### INSTALLATION

To install the scraper, reverse the procedure for its removal.

## Section 170 SCRAPER & PUSH FRAME

### Sub-section 02 (SCRAPER)

#### DISASSEMBLY AND ASSEMBLY



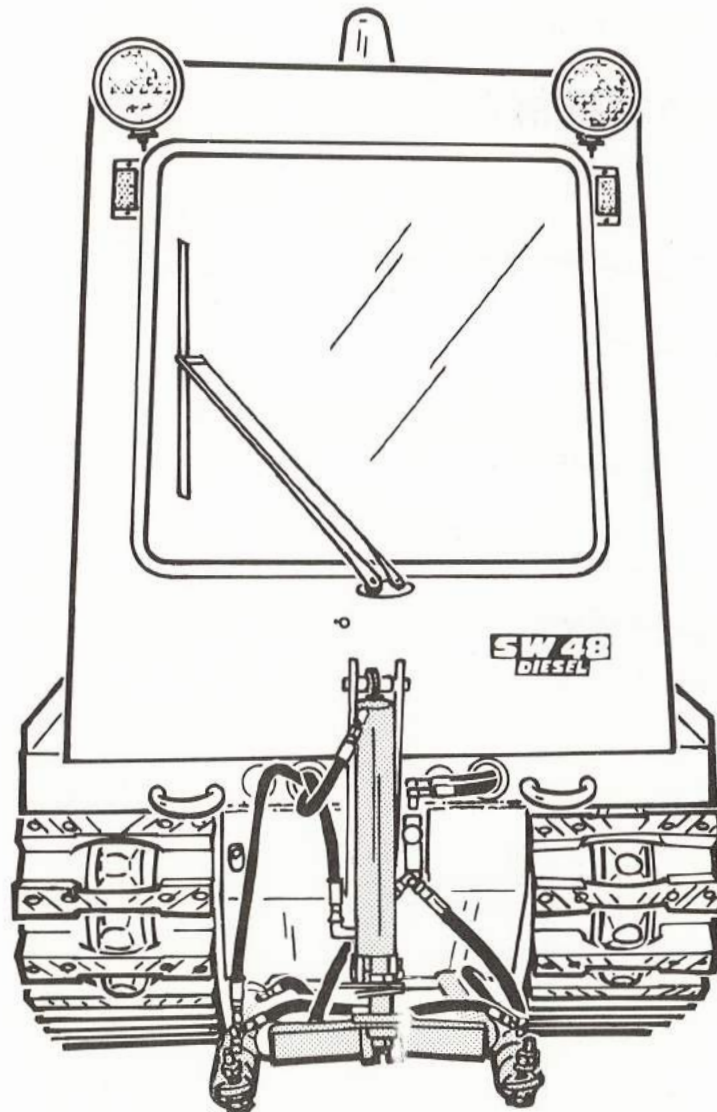
B002190007

- 1. Cotter pin (8 used)
- 2. Blade hinge rod (4 used)
- 3. Nut
- 4. Washer
- 5. Rubber pad
- 6. Spring
- 7. Bolt
- 8. Spring seat
- 9. Nut
- 10. Bushing (3 used)
- 11. Cutting edge

- 12. Nut
- 13. Bolt
- 14. Lower blade
- 15. Nut
- 16. Washer
- 17. Rubber pad
- 18. Spring
- 19. Bolt
- 20. Nut
- 21. Spring seat

**Section 170 SCRAPER & PUSH FRAME**  
Sub-section 03 (PUSH FRAME)

**PUSH FRAME**





## Section 170 SCRAPER & PUSH FRAME

### Sub-section 03 (PUSH FRAME)

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#### REMOVAL

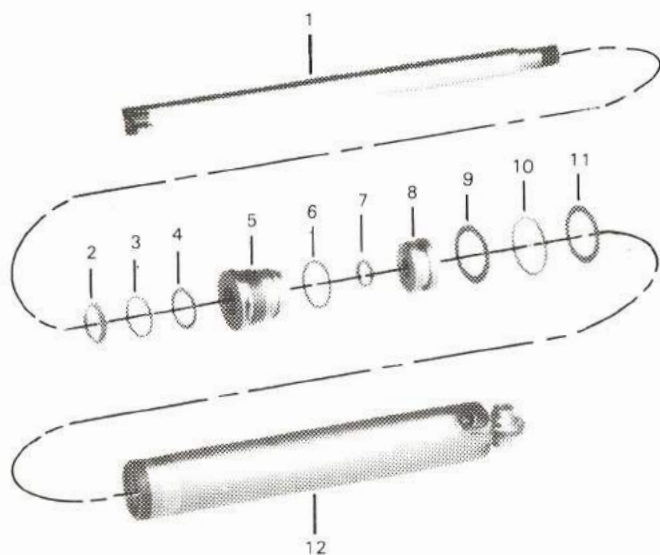
- Remove the scraper and push frame assembly from the vehicle (refer to "Scraper and push frame assembly" sub-section in this section).
- Remove the scraper from the push frame (refer to "scraper" sub-section in this section).

#### INSTALLATION

To install the push frame, reverse the procedure for its removal.

#### DISASSEMBLY AND ASSEMBLY

##### Cylinder



B002190008

1. Cylinder rod
2. Wiper ring
3. Back-up ring
4. O-ring
5. Piston head
6. O-ring

7. O-ring
8. Guide bushing
9. Back-up ring
10. O-ring
11. Back-up ring
12. Cylinder housing

# TECHNICAL DATA

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SPECIFICATIONS .....310-02-1

## Section 310 TECHNICAL DATA

### Sub-section 01 (SI\* METRIC INFORMATION CHART)

#### SI\* METRIC INFORMATION CHART

BASE UNITS		
DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
liquid	liter	l
temperature	celsius	°C
pressure	kilopascal	kPa
torque	Newton meter	N•m
speed	kilometer per hour	km/h

PREFIXES			
PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1,000
centi	c	one hundredth of a	0.01
milli	m	one thousandth of a	0.001

CONVERSION TABLE		
MULTIPLY	BY	TO OBTAIN
meter	39.370	inch
kilogram	2.205	pound
liter	0.264	U.S. gallon
liter	0.220	Imperial gallon
kilopascal	0.145	PSI
Newton meter	0.738	lbf•ft
kilometer	0.621	mile
$\text{Degrees Celcius} = \frac{5 \times (\text{degrees Fahrenheit} - 32)}{9}$		

\*THE INTERNATIONAL SYSTEM OF UNITS (SYSTÈME INTERNATIONAL) ABBREVIATES "SI" IN ALL LANGUAGES.

**Section 310 TECHNICAL DATA**  
**Sub-section 02 (SPECIFICATIONS)**

**SPECIFICATIONS**

VEHICLE MODEL	SW-48 FA	SW-48 DA
<b>ENGINE</b>		
Make	Ford	Perkins
Model	4.9 I (300 cid)	4.236
Type	Gasoline in line	In-line diesel
No. of cylinders	6	4
Power at R.P.M. (without fan)	88 kw (118 H.P.) at 2800 RPM	58 kw (78 H.P.) @ 2500 R.P.M.
Torque at R.P.M. (without fan)	327 N•m (241 lbf•ft) at 2000 R.P.M.	260 N•m (192 lbf•ft) @ 1300 R.P.M.
Maximum operating R.P.M.	2800 R.P.M. (no load)	2650-2700 R.P.M. (no load)
Firing order	1-5-3-6-2-4	1-3-4-2
Stroboscopic timing at R.P.M.	6° BTDC at 600 R.P.M.	N.A.
Breaker point:		
— set adjustment	.61 - .66 mm (.024" - .026")	N.A.
— spring tension	4.7 - 5.8 N (17 - 21 ounces)	N.A.
Spark plug:		
— make	Autolite	N.A.
— model	resister BTF - 42	N.A.
— spark plug gap	.81 mm (.032")	N.A.
— torque	20-27 N•m (15-20 lbf•ft)	N.A.
Oil filter	full flow (replaceable cartridge)	
Exhaust type	Bombardier	
<b>CARBURETION</b>		
Supply type	Carburetor	Direct injection
Carburetor:		
— make	Motorcraft	N.A.
— model	D9JLJ	N.A.
Injection pump:		
— make	N.A.	C.A.V.
— model	N.A.	3248F 451
Idle speed R.P.M.	600 R.P.M. (transmission on "D")	600 R.P.M. (no load)
<b>COOLING SYSTEM</b>		
Engine:		
— type	Liquid cooling/radiator/fan	
— antifreeze/water mixture	60/40	
— antifreeze	Ethylene glycol	
— thermostat	Opening at 71°C (160°F)	Opening at 80 - 84°C (174-182°F)
— radiator cap pressure	90 kPa (13 PSI)	
Transmission:		
— type	Radiator/fan cooling	
Fan type	Blower (V-belt driven)	



## Sub-section 02 (SPECIFICATIONS)

310-02-2

**Section 310 TECHNICAL DATA**  
**Sub-section 02 (SPECIFICATIONS)**

VEHICLE MODEL	SW-48 FA	SW-48 DA
<b>STEERING</b> Type: Inside turning radius	manual 3.6 m (12')	
<b>BRAKE</b> Service brake Emergency and parking brake	steering lever deceleration foot-operated drum brake	
<b>HYDRAULIC SYSTEM</b> Hydraulic pump: — make — model — type — capacity  — drive Hydraulic system control valves: — make — models — type Hydraulic cylinders: — make — type Hydraulic liquid operating temperature	Vickers VTM 42-40-45-15-MF RI 14 vane 15 l (3.3 imp. gal., 4 U.S. gal.)/mn at 1200 R.P.M. and 690 kPa (100 PSI) V-belt driven  Gresen SPK-4 and SPK-4-4 directional  Bombardier double action Min. -40°C (-40°F) Max. 93°C (200°F)	
<b>LIQUID CAPACITIES</b> Fuel tank Hydraulic system & tank Engine cooling system Engine oil with filter Transmission oil Differential Windshield washer tank	91 l (20 imp. gal., 24 U.S. gal.) 13 l (3 imp. gal., 3.4 U.S. gal.) 20.5 l (4.5 imp. gal., 5.4 U.S. gal.) 6.6 l (1.5 imp. gal., 1.75 U.S. gal.) 9.1 l (2 imp. gal., 2.4 U.S. gal.) 18.2 l (4 imp. gal., 4.8 U.S. gal.) 1 l (1 imp. qt. 1 U.S. qt.)	V10F-1P2P12A4F-11 6.3 l (1.4 imp. gal., 1.66 U.S. gal.)/mn at 1200 R.P.M. and 690 kPa (100 psi) gear driven
<b>VEHICLE</b> Frame material Cab material Overall length (with push frame) Overall width (without blade) Overall height Ground clearance Dry weight Curb weight (with blade)	A-36 H.R.M.S. steel H.R.M.S. steel 343 cm (135") 127.6 cm (50 1/4") 218 cm (86") 20.3 cm (8")  2273 kg (5000 lb) 2500 kg (5500 lb)	2404 kg (5300 lb) 2632 kg (5800 lb)

## Section 310 TECHNICAL DATA

### Sub-section 02 (SPECIFICATIONS)

VEHICLE MODEL	SW-48 FA	SW-48 DA
<b>PERFORMANCE</b>		
Maximum speed	35 km/h (22 MPH)	31 km/h (19 MPH)
Ground pressure with a penetration of 0 cm (0'')	24.8 kPa (3.6 PSI)	
Bearing area with a penetration of 0 cm (0'')	9487 cm <sup>2</sup> (1470 in <sup>2</sup> )	
Loading capacity	682 kg (1500 lb)	
Gradeability:		
— up	55%	
— down	55%	
— side	35%	
<b>TORQUES</b>		
Engines support-engine/frame	130-160 N•m (96-118 lbf•ft)	81-108 N•m (60-80 lbf•ft)
Cooling fan screws	34 N•m (25 lbf•ft)	20-27 N•m (15-20 lbf•ft)
Transmission support/transmission	1/2"-13 gr.8 54-61 N•m (40-45 lbf•ft)	N.A.
Crosslink/track	3/8"-24 gr.8 27-34 N•m (20-25 lbf•ft)	
Flexitor shell/frame	1/2"-20 gr.5 98-122 N•m (72-90 lbf•ft)	
Trailing arm	5/8"-18 gr.8 190 N•m (140 lbf•ft)	
Drive sprocket/flange (3/8"-24 gr.5)	outside bolts (16): 27 N•m (20 lbf•ft) inside bolts (4): 47 N•m (35 lbf•ft)	
Flange companion/pinion shaft (differential)	3/4"-16 gr.8 122 N•m (90 lbf•ft)	
Flange-yoke (transmission shaft)/flange companion	7/16"-20 gr.5 60-75 N•m (44-55 lbf•ft)	
Universal joint/yoke transmission	U-bolt 3/8"-24 24-31 N•m (18-23 lbf•ft)	1/4"-28 gr.8 9.5 - 11 N•m (7-8 lbf•ft)
Hydraulic valve/frame	3/8"-24 gr.5 38-47 N•m (28-35 lbf•ft)	

Bombardier Inc. reserves the right to make changes in design and specifications and/or to make additions to, or improvements in its product without imposing any obligation upon itself to install them on its products previously manufactured.

# GENERAL TROUBLE SHOOTING

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## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 01 (ENGINE)

---

## ENGINE

### "FORD" 4.9 l (300 C.I.D.), (SW-48 FA)

#### General information

Water and dirt that accumulate in the fuel tank can cause a restricted fuel line or filter and malfunction of the fuel pump or carburetor. Condensation, which is the greatest source of water entering the fuel tank, is formed by moisture in the air when it strikes the cold interior walls of the fuel tank.

If the accumulation of dirt and water in the filter is excessive, the fuel tank should be removed and flushed, and the line from the fuel pump to the tank should be blown out.

Air leakage in the fuel inlet line can cause low fuel pump pressure and volume.

A restricted fuel tank vent can cause low fuel pump pressure and volume and can result in collapsed inlet hoses or a collapsed fuel tank.

High or low pressure are the two most likely fuel pump troubles that will affect engine performance. Low pressure will cause a lean mixture and fuel starvation at high speed and excessive pressure will cause high fuel consumption and carburetor flooding.

Dirt accumulation in the fuel and air passages, improper idle adjustments, and improper fuel level are the major sources of carburetor troubles.

#### Hard starting

- Improper starting procedure causing a flooded engine.
- Improper carburetor fuel level.
- Improper idle adjustments.
- Sticking or incorrectly seating fuel inlet needle.
- Incorrect fuel pump pressure.
- Restrictions or air leaks in the choke vacuum or hot air passages.
- Dirty air cleaner element.

#### Stalling

- Incorrect idle fuel mixture.
- Engine idle speed too slow.
- Dirt water or ice in fuel filter.
- Fuel lines restricted or leaking air.
- Fuel tank vent restricted.
- Leaking intake manifold or carburetor gaskets.
- Carburetor icing (cold, wet or humid weather).
- Incorrect throttle linkage adjustment to carburetor.
- Clogged air bleeds or idle passages.
- Defective fuel pump.
- Excessive looseness of throttle shaft in bore(s) of throttle body.

#### Rough idle

- Incorrect idle mixture adjustment.
- Idle adjusting needles(s) grooved, worn, or otherwise damaged.
- Idle air bleeds restricted.
- Accelerating pump discharge check valve not seating properly.
- Idle air of fuel passages restricted.
- Idle discharge holes restricted.
- Idle discharge holes not in proper relation to throttle plate.
- Excessive dirt in air cleaner.
- High or low float setting.

## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 01 (ENGINE)

---

#### Inconsistent engine idle speed

- Incorrect throttle linkage adjustment to carburetor.
- Governor not adjusted properly or faulty.
- Binding or sticking throttle linkage.
- Sticking carburetor throttle shaft.
- Excessive looseness of throttle shaft in bores of throttle body.
- Incorrectly installed throttle plates.
- Sticking fuel inlet needle.
- Defective spark valve or gasket (manual choke carburetor).

#### Surging above idle speed

- Clogged main jets.
- Improper size main jets.
- Low fuel level or float setting.
- Clogged fuel filter or fuel pump filter screen.
- Distributor vacuum passage clogged.
- Defective spark valve or gasket.

#### Poor acceleration

- Poor acceleration complaints fall under one of three headings: the engine is sluggish on acceleration, the engine stalls when accelerated, or the engine hesitates or develops a flat spot when accelerated. Poor acceleration is caused by either an excessively lean or rich mixture on acceleration and/or defects of improper adjustments in the ignition system.
- Incorrect accelerating pump stroke adjustment.
- Accelerating pump fuel inlet or outlet valve not seating.
- Restriction in the accelerating pump discharge passage.
- Air leak at the accelerating pump cover caused by a defective gasket or warped pump cover.

#### A lean mixture can be caused by:

- Low fuel pump pressure.
- Sticking fuel inlet needle.
- Low fuel level or float setting.
- Restriction in main fuel passage.
- Air leak between the carburetor and the manifold caused by loose mounting bolts or defective gasket.
- Air leak at the throttle shaft caused by a worn throttle shaft.
- Accelerating pump diaphragm defective.

#### A rich mixture can be caused by:

- Excessive fuel pump pressure.
- High fuel level or float setting.
- Fuel inlet needle not seating properly or worn needle and/or seat.
- Excessively dirty air cleaner.
- Incorrect accelerating pump stroke adjustment. Restricted air bleeds.
- Worn or damaged main metering jet.
- Accelerating pump outlet valve not seating properly.

#### Reduced power output

- Float setting too high or too low.
- Fuel pump pressure too high or too low.
- Improper size or obstructed main jets.
- Restricted air bleeds.
- Restriction in main fuel passages.
- Excessive dirt in air cleaner.
- Throttle plate not fully open.
- Faulty choke operation.
- Improper throttle linkage adjustment.

## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 01 (ENGINE)

#### “PERKINS” 4.236 (SW-48 DA)

##### Fault finding chart

Fault	Possible cause
Low cranking speed	1, 2, 3, 4.
Will not start	5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 31, 32, 33.
Difficult starting	5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 24, 29, 31, 32, 33.
Lack of power	8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 31, 32, 33.
Misfiring	8, 9, 10, 12, 13, 14, 16, 18, 19, 20, 25, 26, 28, 29, 30, 32.
Excessive fuel consumption	11, 13, 14, 16, 18, 19, 20, 22, 23, 24, 25, 27, 28, 29, 31, 32, 33.
Black exhaust	11, 13, 14, 16, 18, 19, 20, 22, 24, 25, 27, 28, 29, 31, 32, 33.
Blue/white exhaust	4, 16, 18, 19, 20, 25, 27, 31, 33, 34, 45, 56.
Low oil pressure	4, 36, 37, 38, 39, 40, 42, 43, 44, 58.
Knocking	9, 14, 16, 18, 19, 22, 26, 28, 29, 31, 33, 36, 45, 46, 59.
Erratic running	7, 8, 9, 10, 11, 12, 13, 14, 16, 20, 21, 23, 26, 28, 29, 30, 33, 45, 59.
Vibration	13, 14, 20, 23, 25, 26, 29, 30, 33, 45, 47, 48, 49.
High oil pressure	4, 38, 41.
Overheating	11, 13, 14, 16, 18, 19, 24, 25, 45, 50, 51, 52, 53, 54, 57.
Excessive crankcase pressure	25, 31, 33, 34, 45, 55, 60.
Poor compression	11, 19, 25, 28, 29, 31, 32, 33, 34, 46, 59.
Start and stops	10, 11, 12.



## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 01 (ENGINE)

---

#### Key to fault finding chart

1. Battery capacity low.
2. Bad electrical connections.
3. Faulty starter motor.
4. Incorrect grade of lubricating oil.
5. Low cranking speed.
6. Fuel tank empty.
7. Faulty stop control operation.
8. Blocked fuel feed pipe.
9. Faulty fuel lift pump.
10. Choked fuel filter.
11. Restriction in air cleaner or induction system.
12. Air in fuel system.
13. Faulty fuel injection pump.
14. Faulty atomisers or incorrect type.
15. Incorrect use of cold start equipment.
16. Faulty cold starting equipment.
17. Broken fuel injection pump drive.
18. Incorrect fuel pump timing.
19. Incorrect valve timing.
20. Poor compression.
21. Blocked fuel tank vent.
22. Incorrect type or grade of fuel.
23. Sticking throttle or restricted movement.
24. Exhaust pipe restriction.
25. Cylinder head gasket leaking.
26. Overheating.
27. Cold running.
28. Incorrect tappet adjustment.
29. Sticking valves.
30. Incorrect high pressure pipes.
31. Worn cylinder bores.
32. Pitted valves and seats.
33. Broken, worn or sticking piston ring/s.
34. Worn valve stems and guides.
36. Worn or damaged bearings.
37. Insufficient oil in sump.
38. Inaccurate gauge.
39. Oil pump worn.
40. Pressure relief valve sticking open.
41. Pressure relief valve sticking closed.
42. Broken relief valve spring.
43. Faulty suction pipe.
44. Choked oil filter.
45. Piston seizure/pick up.
46. Incorrect piston height.
47. Damaged fan.
48. Faulty engine mounting (housing).
49. Incorrect aligned flywheel housing, or flywheel.
50. Faulty thermostat.
51. Restriction in water jacket.
52. Loose fan belt.
53. Choked radiator.
54. Faulty water pump.
55. Choked breather pipe.
56. Damaged valve stem oil deflectors (if fitted).
57. Coolant level too low.
58. Blocked sump strainer.
59. Broken valve spring.
60. Fault in exhauster or vacuum pipe leaks.



## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

## TRANSMISSION

### "FORD" C-6 (SW-48 FA)

Elements in use at each position of the selector lever

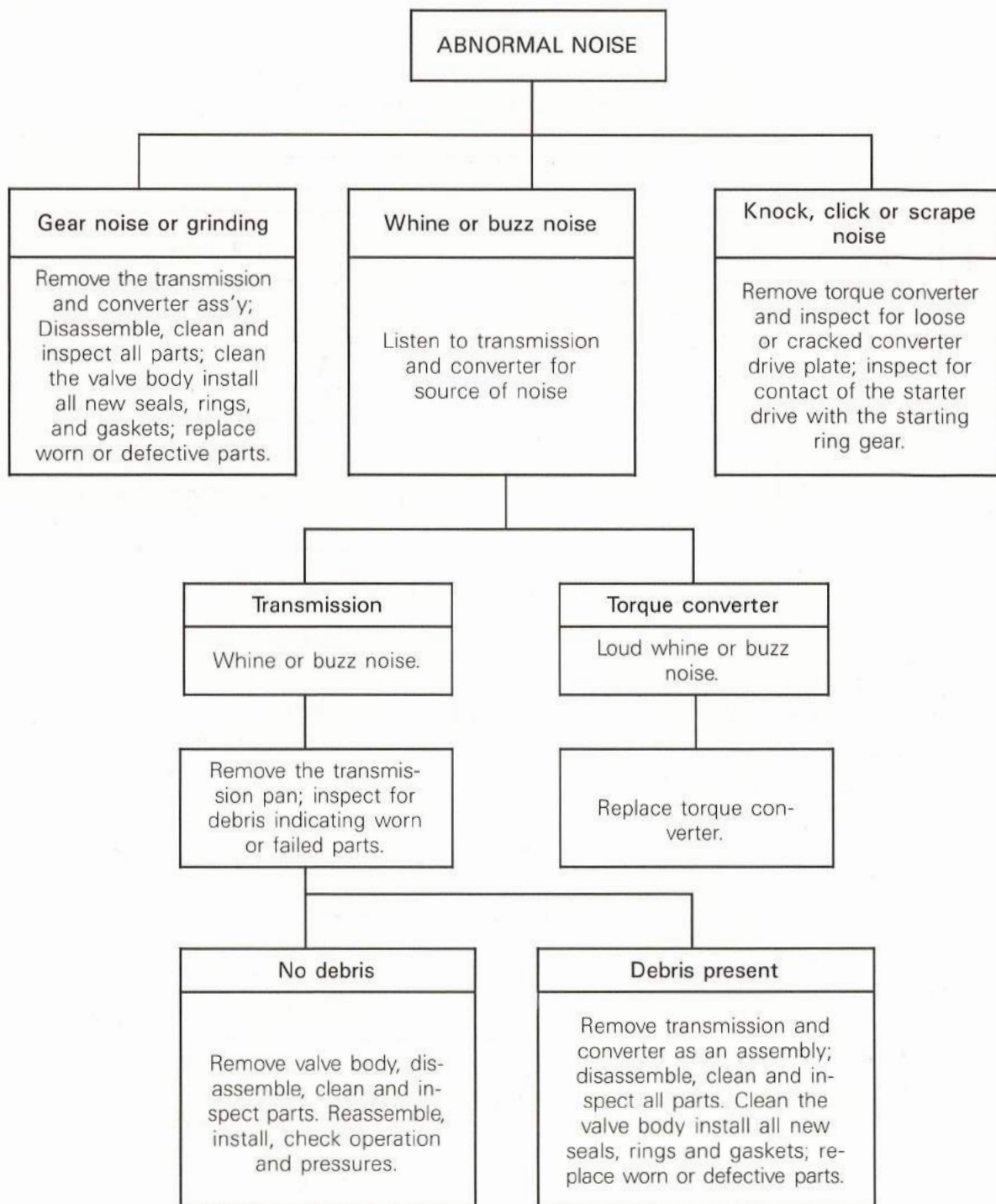
GEAR	HOLDING MEMBERS	FRONT PLANETARY GEARSET			REAR PLANETARY GEARSET		
		DRIVEN	HELD	OUTPUT	DRIVEN	HELD	OUTPUT
Manual Low 1	Forward clutch Low-and-reverse clutch	Ring gear	*Carrier	Sun gear	Sun gear	Carrier	Ring gear
D Low	Forward clutch One-way clutch	Ring gear	*Carrier	Sun gear	Sun gear	Carrier	Ring gear
D second or 2	Forward clutch and band	Ring gear	Sun gear	Carrier	EFFECTIVELY IN NEUTRAL		
High	Forward clutch Reverse-and-high clutch	Sun gear Ring gear	None	Carrier	TURNS AS A UNIT		
Reverse	Reverse-and-high clutch Low-and-reverse clutch	EFFECTIVELY IN NEUTRAL			Sun gear	Carrier	Ring gear

\* The carrier is actually turning with the output shaft, but at a slower speed than the input.

**Section 320 GENERAL TROUBLE SHOOTING**  
**Sub-section 02 (TRANSMISSION)**

**Diagnosis guide for abnormal noise**

○ **NOTE:** Inspect and correct the transmission oil level, and then road test to identify the type of noise, driving ranges, and conditions when the noise occurs.

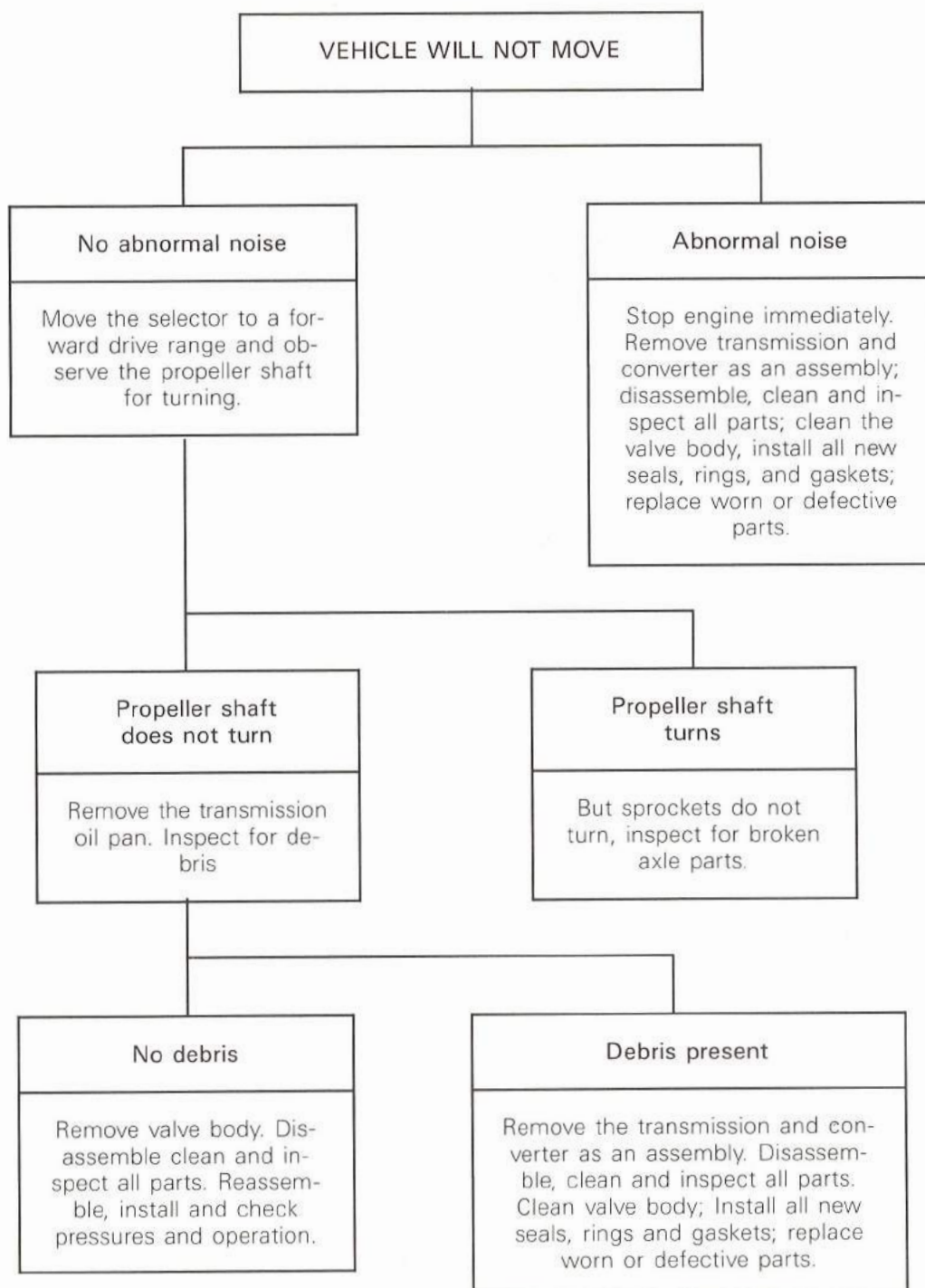


## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

#### Diagnosis guide - Vehicle will not move

○ NOTE: Check the transmission oil level before starting the engine. If no fluid is visible on the dipstick, add sufficient oil to reach the "low level" mark. Then start the engine with the transmission in neutral and listen for noise.



## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

#### "CHRYSLER" A-727 (SW-48 DA)

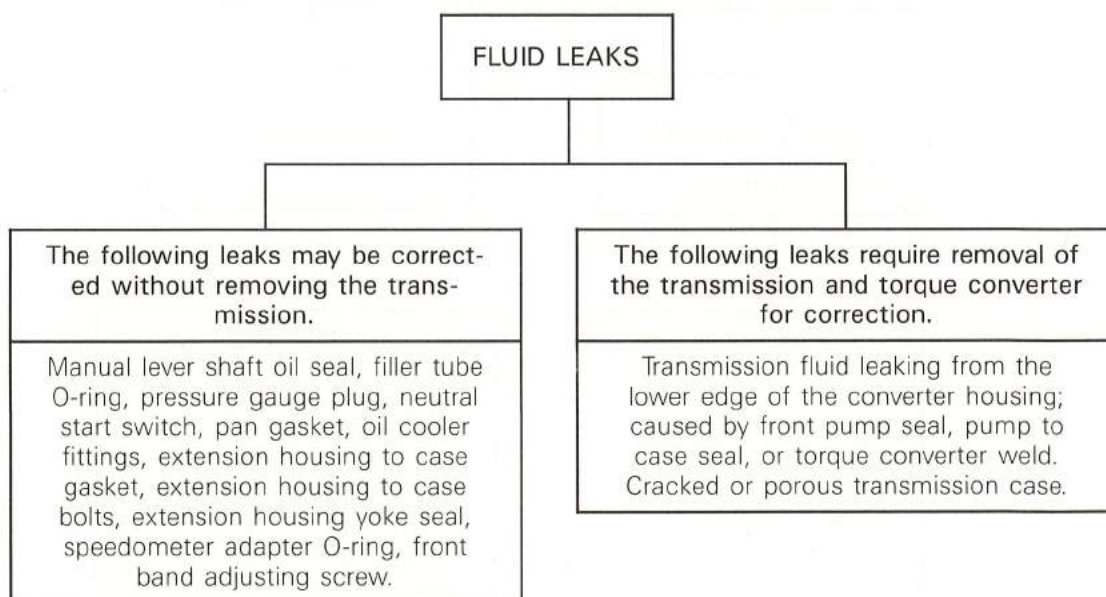
Elements in use at each position of the selector lever.

Lever position	Gear ratio	Start safety	Parking sprag	Clutches			Bands	
				Front	Rear	Over-running	(Kickdown) Front	(Low revolution) Rear
P-PARK		X	X					
R-REVERSE	2.21			X				X
N-NEUTRAL		X						
D-DRIVE								
First	2.45				X	X		
Second	1.45				X		X	
Direct	1.00			X	X			
2-SECOND								
First	2.45				X	X		
Second	1.45				X		X	
1-LOW								
First	2.45				X			X

#### Diagnosis guide for fluid leaks



**NOTE:** Visually inspect for source of leak. If the source of leak cannot be readily determined, clean the exterior of the transmission. Check the transmission oil level, and correct if necessary.



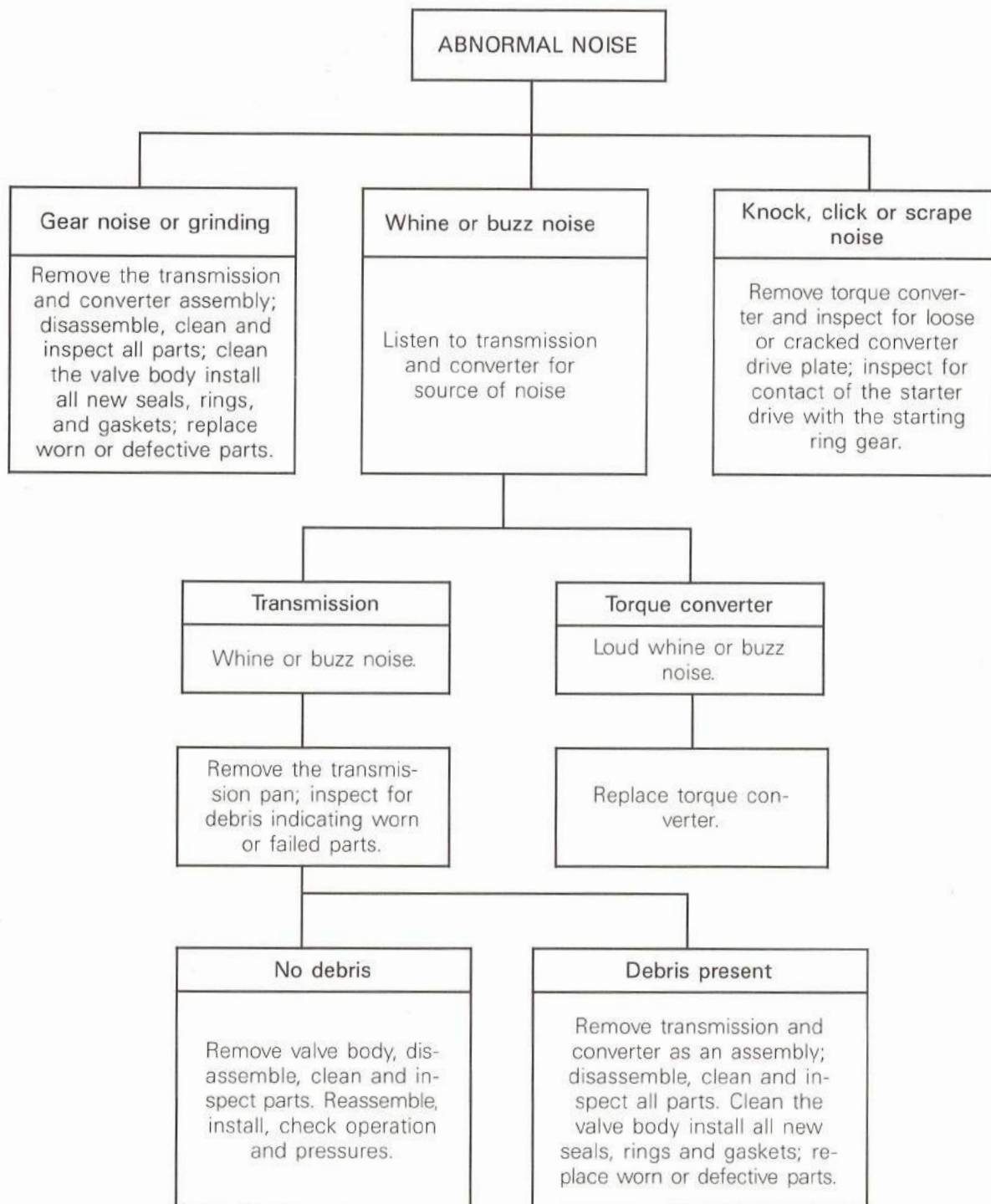


## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

#### Diagnosis guide for abnormal noise

○ **NOTE:** Inspect and correct the transmission oil level, and then road test to identify the type of noise, driving ranges, and conditions when the noise occurs.

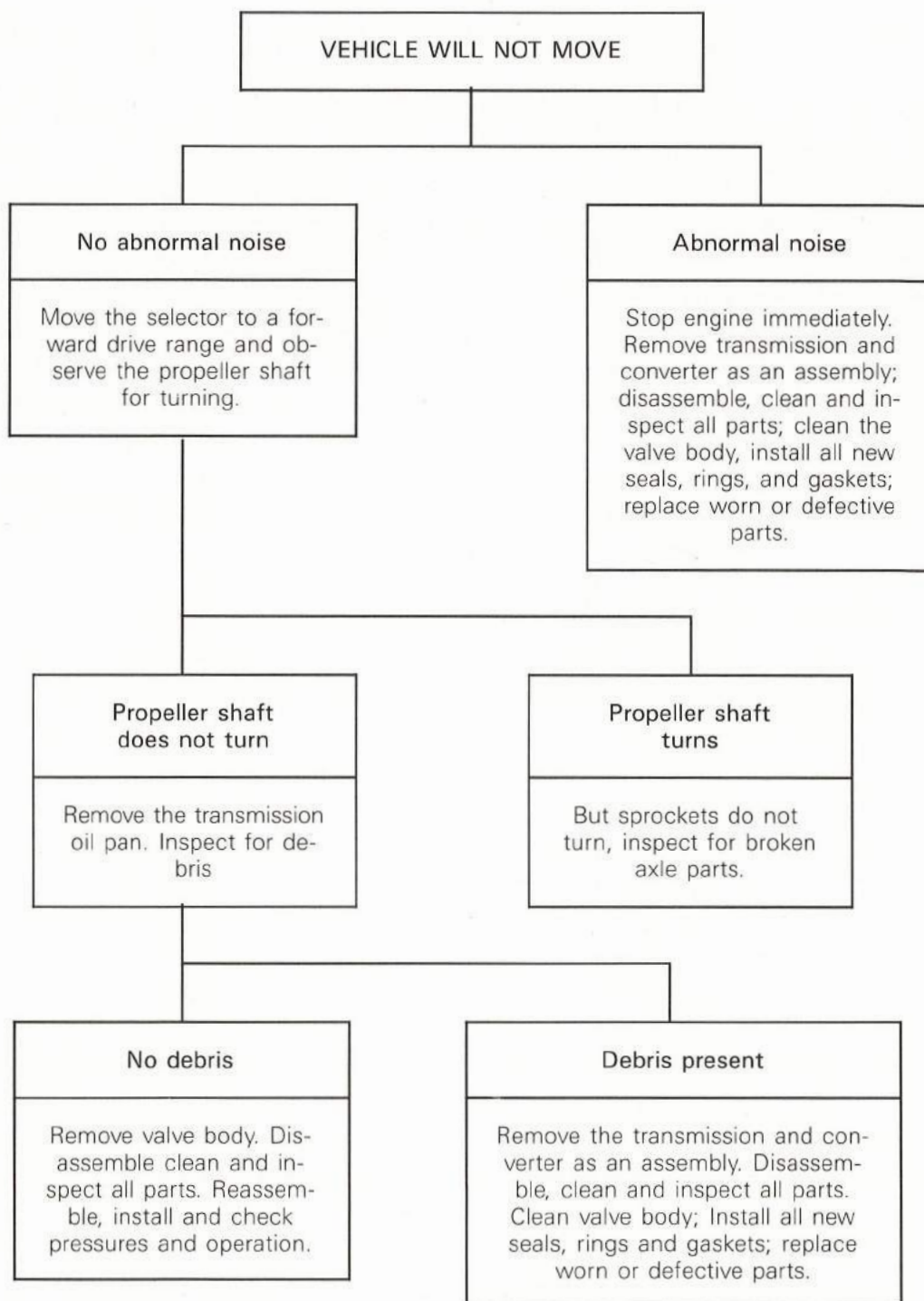


## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

#### Diagnosis guide - Vehicle will not move

○ **NOTE:** Check the transmission oil level before starting the engine. If no fluid is visible on the dipstick, add sufficient oil to reach the "low level" mark. Then start the engine with the transmission in neutral and listen for noise.



## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 02 (TRANSMISSION)

#### General diagnosis guide

Condition \ Possible cause	Harsh engagement from neutral to D or R	Delayed engagement from neutral to D or R	Runaway upshift	No upshift	Shifts erratic	Slips in forward drive positions	Slips in reverse only	Slips in all positions	No drive in any position	No drive in forward drive positions	No drive in reverse	Drives in neutral	Drags or locks	Grating, scraping, growling noise	Buzzing noise	Hard to fill, oil blows out tiller tube	Transmission overheats	Harsh upshift	Delayed upshift	Slips in reverse or manual low
Overrunning clutch inner race damaged.															X					
Overrunning clutch worn, broken or seized.						X				X			X	X						
Planetary gear sets broken or seized.									X	X	X		X	X						
Rear clutch dragging.												X								
Worn or faulty rear clutch.	X	X				X				X	X	X								
Insufficient clutch plate clearance.												X					X			
Faulty cooling system.																	X			
Kickdown band adjustment too tight.													X				X			
Hydraulic pressure too high.	X																	X		
Breather clogged.																X				
High fluid level.																X				
Worn or faulty front clutch.		X	X	X	X		X				X								X	
Kickdown servo band malfunction.			X	X	X														X	
Governor malfunction.				X	X														X	
Worn or broken reaction shaft support seal rings.		X	X	X	X		X				X								X	
Governor support seal rings broken or worn.				X	X														X	
Output shaft bearing and/or bushing damaged														X						
Overrunning clutch not holding.						X				X										
Kickdown band out of adjustment.														X				X	X	
Incorrect throttle linkage adjustment.			X	X	X	X												X	X	
Engine idle speed too low.		X																		
Aerated fluid.		X	X		X	X	X	X							X	X				
Worn or broken input shaft seal rings.		X				X		X		X										
Faulty oil pump.		X			X	X	X	X	X								X			X
Oil filter clogged		X	X		X	X		X	X							X				
Incorrect gearshift control linkage adjustment.		X		X	X	X	X				X	X					X			
Low fluid level.		X	X	X	X	X	X	X	X	X					X		X			
Low-reverse servo, band or linkage malfunction.		X					X				X									
Valve body malfunction or leakage.	X	X	X	X	X	X	X	X	X	X	X	X			X					
Low-reverse band out of adjustment.							X				X		X	X						X
Hydraulic pressures too low.		X	X	X	X	X	X	X	X	X	X						X	X		
Engine idle speed too high.	X																X			
Stuck lock-up valve.													X							
Stuck switch valve.																	X			

**Section 320 GENERAL TROUBLE SHOOTING**  
Sub-section 02 (TRANSMISSION)

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**PROPELLER SHAFT**

TROUBLE	CAUSES	SUGGESTIONS
Vibration	Lack of grease	Grease.
	Worn out	Change universal joint.
Propeller shaft noisy	Joint not aligned	Correct.
	Bent.	Replace.
	Out of balance	Correct or replace.
	Worn bearings and cross	Replace.
Hot journal bearing	U-bolt to tight	Tighten according to specification.
	Paint on bearing or end yoke	Clean.



## Section 320 GENERAL TROUBLE SHOOTING

### Sub-section 03 (DIFFERENTIAL)

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## DIFFERENTIAL

### DIAGNOSIS CHART

TROUBLE	CAUSES	SUGGESTIONS
Noisy axle on drive	Insufficient oil	Add oil.
	Crown gear and pinion	Check for scored crown gear and pinion.
	Carrier bearings	Check and change worn carrier bearings.
Noisy axle on coasts	Crown gear and pinion	Check for scored crown gear and pinion. Check for backlash between crown gear and pinion. If necessary, replace bearings, ring and pinion.
	Pinion	Check for end play in pinion.
Noisy axle on both drive and coast	Crown gear pinion and differential bearings	Check and replace damaged pinion, gear and bearings.
	Crown gear or pinion scored	Check and replace crown gear and pinion.
Excessive backlash	Axle gears and pinion	Check for worn axle gears, splines and idling pinions.
	Universal joints	Check and replace worn universal joint parts.
	Crown gear, pinion and differential side bearings	Check for worn gear, pinion and differential side bearings.
Lubricant leaks	Differential carrier housing	Check gaskets.
	Pinion housing	Check oil seals.
	Drive axle housing	Check O-ring and seal washer.

**Section 320 GENERAL TROUBLE SHOOTING****Sub-section 04 (STEERING)****STEERING****DIAGNOSIS CHART**

TROUBLE	CAUSES	SUGGESTIONS
Does not steer	Steering brake bands too loose	Adjust.
	Faulty differential	Repair.
Steers to one side only	Broken axle	Replace.
	Broken axle gear	Replace.
	Broken steering band	Replace.
Veers to one side	Uneven track tension	Adjust tracks.
	Suspension arms at incorrect angle	Correct.
	Broken wheel bearings	Replace.
	Low tire pressure on 2 or 3 tires on same side	Correct.
	Faulty track belts	Correct or replace.

## **Section 320 GENERAL TROUBLE SHOOTING**

### **Sub-section 05 (ELECTRICAL)**

---

## **ELECTRICAL**

### **AMMETER SHOWS CONSTANT DISCHARGE:**

— Drive belt, wire, cable and/or battery not within specifications.

Replace, and/or adjust drive belt. Inspect all connections, wire and cables. Service or replace as necessary. Perform a battery capacity test.

### **AMMETER NEEDLE FLUCTUATES:**

— Dirty or oxidized regulator contacts.

Clean contacts or replace regulator.

— Loose or damaged wires and/or cables.

Tighten connections and/or replace wiring.

— Worn alternator brushes or improper brush tension.

Remove alternator and replace brushes.

### **FLASHING OIL LIGHT WITH STARTING SWITCH OFF:**

— Shorted positive diode.

Remove alternator and test diodes. Replace as necessary.

### **ENTIRE ELECTRICAL SYSTEM DOES NOT FUNCTION:**

— Faulty battery connection.

Clean and tighten connections.

— Sulfated or worn-out batteries.

Check specific gravity and electrolyte level for each battery.

— Faulty ignition switch.

Replace ignition switch.

### **BATTERY WILL NOT CHARGE:**

— Loose or corroded connections.

Clean and tighten connections (battery, alternator).

— Sulfated or worn-out batteries.

Check specific gravity of each battery.

Check electrolyte level of each battery.

— Loose or defective alternator belt.

Adjust belt tension.

Replace belt.

— Faulty alternator.

Remove and check alternator.

### **BATTERY LOW IN CHARGE:**

— Broken, loose or slipping alternator belt.

Adjust belt tension.

Replace belt.

— Corroded, loose or damaged circuit wiring and/or cables.

Inspect all connections, wires and cables. Service or replace as necessary.

— Faulty alternator.

Remove and check alternator.

— Battery needs replacement.

Perform a battery capacity test.

### **BATTERY WON'T HOLD CHARGE:**

— Unwanted external load.

Disconnect battery ground cable. Connect voltmeter between battery negative post and cable. With all circuits off, meter should read zero. If voltage is indicated, check for improper wiring connection.

— Battery needs replacement.

Perform a battery capacity test.

### **SHORT BATTERY LIFE:**

— Faulty wiring connection in charging system, including regulator ground wire.

Inspect all wiring connections.

Tighten or repair as necessary.

### **BATTERY USES EXCESSIVE WATER:**

— Alternator regulator voltage limiter needs adjustment.

Check voltage limiter setting. If within specifications, set at low end. If setting is too high, inspect contacts. If burned, replace regulator. If in good condition, adjust setting to specifications.

**ALTERNATOR HAS LOW OR NO OUTPUT:**

— Faulty alternator.

Remove and check alternator.

**ALTERNATOR NOISY:**

First try to localize the noise to make sure the alternator is at fault, and not the belt, water pump or other part of the engine.

A shorted diode will cause a whine (magnetic noise) at idle speed. Check alternator output.

If noise is traced to the alternator, and the cause cannot be determined, remove the alternator and inspect the bearings.

**STARTER INOPERATIVE:**

— Loose or corroded connections.

Clean and tighten loose connections.

— Low battery output.

Check specific gravity of each battery.

Check electrolyte level of each battery.

**When key switch is turned to start position, nothing happens. Solenoid does not click.**

— Solenoid is not engaging.

This usually means problem is in solenoid or wiring.

**Solenoid clicks but starting motor does not operate**

1. Make sure all battery cable connections are clean and tight. Low voltage caused by a poor connection is a common problem.
2. Test batteries. Recharge or replace batteries if necessary.
3. If solenoid chatters and low voltage is not the cause, an open circuit in hold-in winding is indicated. Replace solenoid.
4. If solenoid appears to work properly, problem is inside starting motor.

**Starting motor runs, but does not crank engine**

This usually means problem is in starter.

**Starting motor cranks engine slowly or erratically**

1. Make sure all battery cable connections are clean and tight. Low voltage caused by a poor connection is a common problem.
2. Test batteries. Recharge or replace batteries if necessary.
3. If low voltage is not at fault, problem is inside starter. Brush assembly could be defective. Field windings or armature windings could be short circuit or open circuited. Bushings, pinion, or flywheel ring gear could be defective and binding. Pole shoes could be dragging on armature.
4. Crankcase oil too heavy.



## **Section 320 GENERAL TROUBLE SHOOTING**

### **Sub-section 06 (HYDRAULIC SYSTEM)**

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## **HYDRAULIC SYSTEM**

### **LACK OF PULL PRESSURE IN THE SYSTEM:**

- Air in the system.
- Pump starved by clogged inlet strainer.
- Loose inlet connections to pump.
- Relief valve not properly seated.
- Lack across directional control valve ports.
- Leak in conductor or connector.
- Defective seals on cylinder piston assembly or rod gland.
- Loose or cracked piston rod gland seal.
- Cylinder cracked or scored.
- Check valve not seated.
- Defective or worn pump.

### **WHEN NO PRESSURE DEVELOPS IN THE SYSTEM:**

- Pump housing bolts not properly torqued.
- Not enough hydraulic fluid in the reservoir.
- Ruptured conductor.
- Defective relief valve.
- Inlet to pump blocked.

### **ACTUATING CYLINDER FAILS TO DEVELOP FULL SPEED**

- Air in system.
- Wrong viscosity fluid.
- Defective seals in cylinder piston assembly.
- Fluid too hot, causing excessive internal leakage.
- Trapped fluid under back pressure.
- Bent piston rod.
- Inlet to pump blocked or too small.
- Excessive friction in conductors, or hose kinked.

### **IRREGULAR MOTION OF CYLINDER:**

- Air in system.
- Not enough fluid in the system.
- Mechanical bind.
- Defective seals in cylinder piston assembly.
- Relief valves defective.
- Excessive back pressure on externally drained control valves.
- Pump inlet leaks.
- Defective pump.
- A defective check valve.
- Broken spring in a control valve.

### **AIR IN SYSTEM:**

- Defective seals.
- Leaks at joints.
- Loose inlet to pump.
- Not enough fluid in the system.
- Loose pump casing.
- Improper maintenance procedures.

### **ACTUATING CYLINDER FAILS TO MOVE:**

- Directional control valve fails to shift.
- Broken spring in control valve.
- Control sticks open or closed.
- System hooked up wrong.
- Check valve in backwards.
- Hydraulic lock prevents control from operating.
- Mechanical obstruction.
- Insufficient power.

**EXCESSIVE NOISE IN OPERATION:**

- Air entering the pump inlet line.
- Trapped air.
- Conductors vibrating.
- Vibration of system components.
- Relief valve chattering when set too close to load pressure.
- Defective pump.

**EXCESSIVE HEAT, CAUSING HIGH TEMPERATURE OF HYDRAULIC FLUID:**

- Wrong grade of fluid, or dirty fluid.
- Not enough fluid in the system.
- Small high pressure leaks within components.
- Dirt holding relief valve partially opened.
- Defective pump.
- Air in the hydraulic fluid.

**CAVITATION:**

- Low fluid supply.
- Clogged oil strainer.
- Leak in intake.
- Too high RPM when fluid is cold.



**Section 330 SERVICE PRODUCTS**  
**Sub-section 01 (SERVICE PRODUCTS LIST)**

## SERVICE PRODUCTS




### SERVICE PRODUCT LIST

ITEM	USE	APPLICABLE TO
Multi-viscosity oil SAE 10W30 API service CC/SF	All season	— Engine ("Ford" 4.9 l (300 CID))
Multi-viscosity oil SAE 10W40 API service CC/SF	All season	— Engine ("Ford" 4.9 l (300 CID)) — Engine ("Perkins" 4.236)
Multi-viscosity oil SAE 20W50, API service CC/SF	Above 0°C (32°F)	— Engine ("Perkins" 4.236)
Multi-viscosity oil SAE SW20, API service CC/SF	Below 0°C (32°F)	— Engine ("Perkins" 4.236)
Automatic transmission fluid (type F) meeting Ford specifications M2C 33F		— Automatic transmission ("Ford" C-6) — Hydraulic system — Differential
Dexron		— Hydraulic system
Dexron II		— Automatic transmission ("Chrysler" A-727) — Hydraulic system — Differential
Esso torque fluid #56		Differential
Ethylene glycol	Coolant fluid	— Engine cooling system





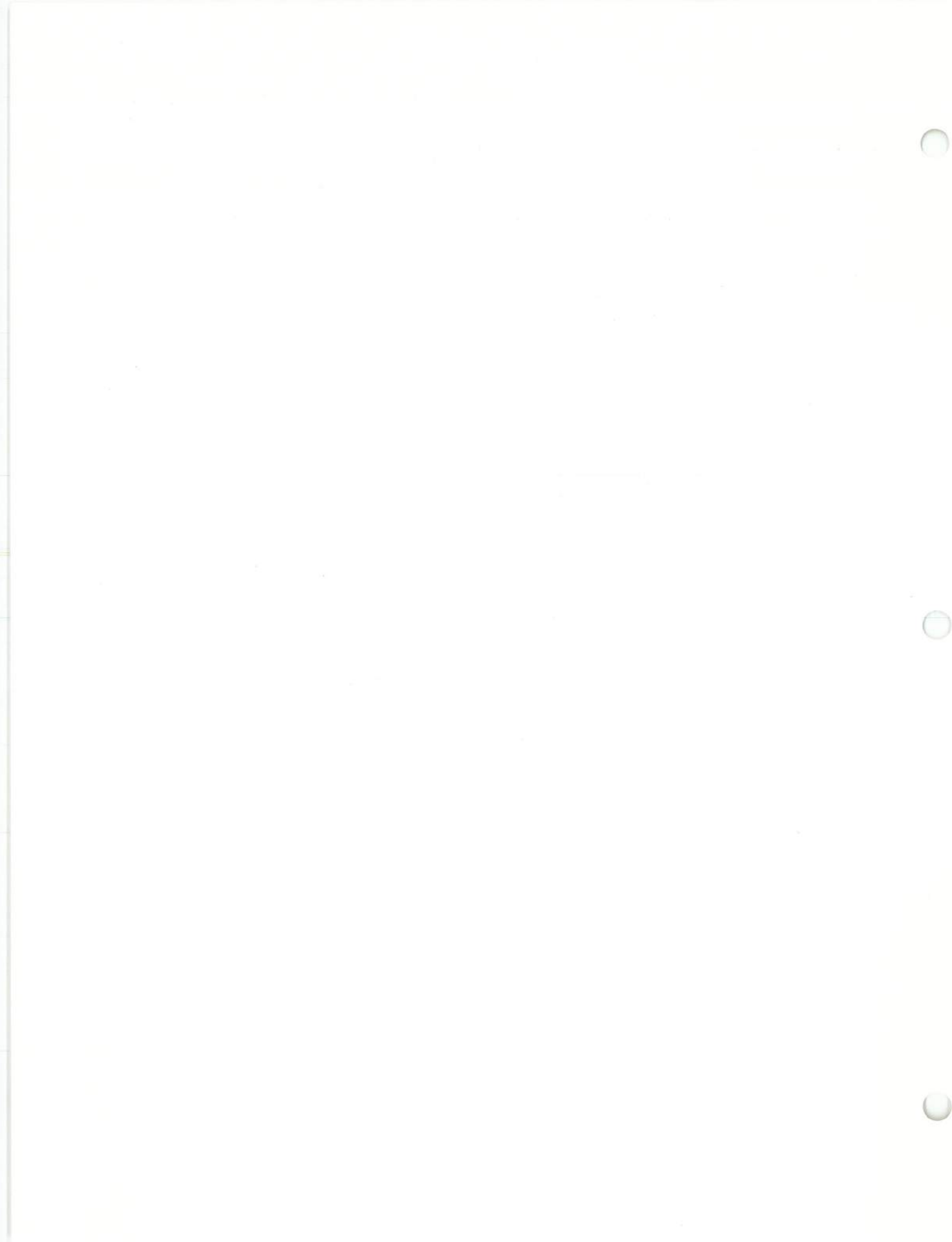
## Section 330 SERVICE PRODUCTS

### Sub-section 01 (SERVICE PRODUCTS)

ITEM	USE	APPLICABLE TO
<p>LOCTITE SEALANT KIT contains: PST Pipe sealant with Teflon (50 ml) P/N 413 7023 00 Gasket eliminator 515 (50 ml) P/N 413 7027 00 Retaining compound RC/601 (10 ml) P/N 413 7031 00 Threadlocker 242 (10 ml) P/N 413 7030 00 Threadlocker 271 (10 ml) P/N 413 7029 00 Super bonder 495 (3-gram tube) P/N 413 7032 00</p>  <p>A000001061 P/N 413 7026 00</p>	<p>For threadlocking threadsealing, gasketing, bonding and retaining applications.</p>	<p>Pulleys, fasteners etc..</p>
<p>LOCK'N SEAL (271) RED HIGH STRENGTH 6 ml</p>  <p>A000001063 P/N 747 0200 00</p>	<p>Hi-strength threadlocking threadsealing adhesive for large parts.</p>	<p>Fasteners and studs under 25 mm (1") dia.</p>
<p>CHISEL gasket remover (spray) 300 g</p>  <p>A000001067 P/N 413 7045 00</p>	<p>Creates a foaming action that lifts gaskets off in minutes</p>	<p>any metal surface</p>

**Section 330 SERVICE PRODUCTS**  
**Sub-section 01 (SERVICE PRODUCTS)**

ITEM	USE	APPLICABLE TO
<p>SILICONE DIELECTRIC GREASE 3 oz.</p>  <p>A000001069 P/N 413 7017 00</p>	<p>Special dielectric grease that prevents moisture and corrosion build-up in electric connections.</p>	<p>On all electric connections. High tension coil. Spark plug connections. Connector housings, etc..</p>
<p>GREASE TUBE SPHEEROL MULTI EP 400 g</p>  <p>A000001070 P/N 413 7044 00</p>	<p>Multi-purpose lithium based grease. It is an antifriction, anticorrosion and water resistant bearing grease for use through temperatures between -50°F to 225°F (-45°C to 107°C)</p>	<ul style="list-style-type: none"> <li>— track tensioner</li> <li>— wheel bearing</li> <li>— tandem bearing</li> </ul>



# TOOLS

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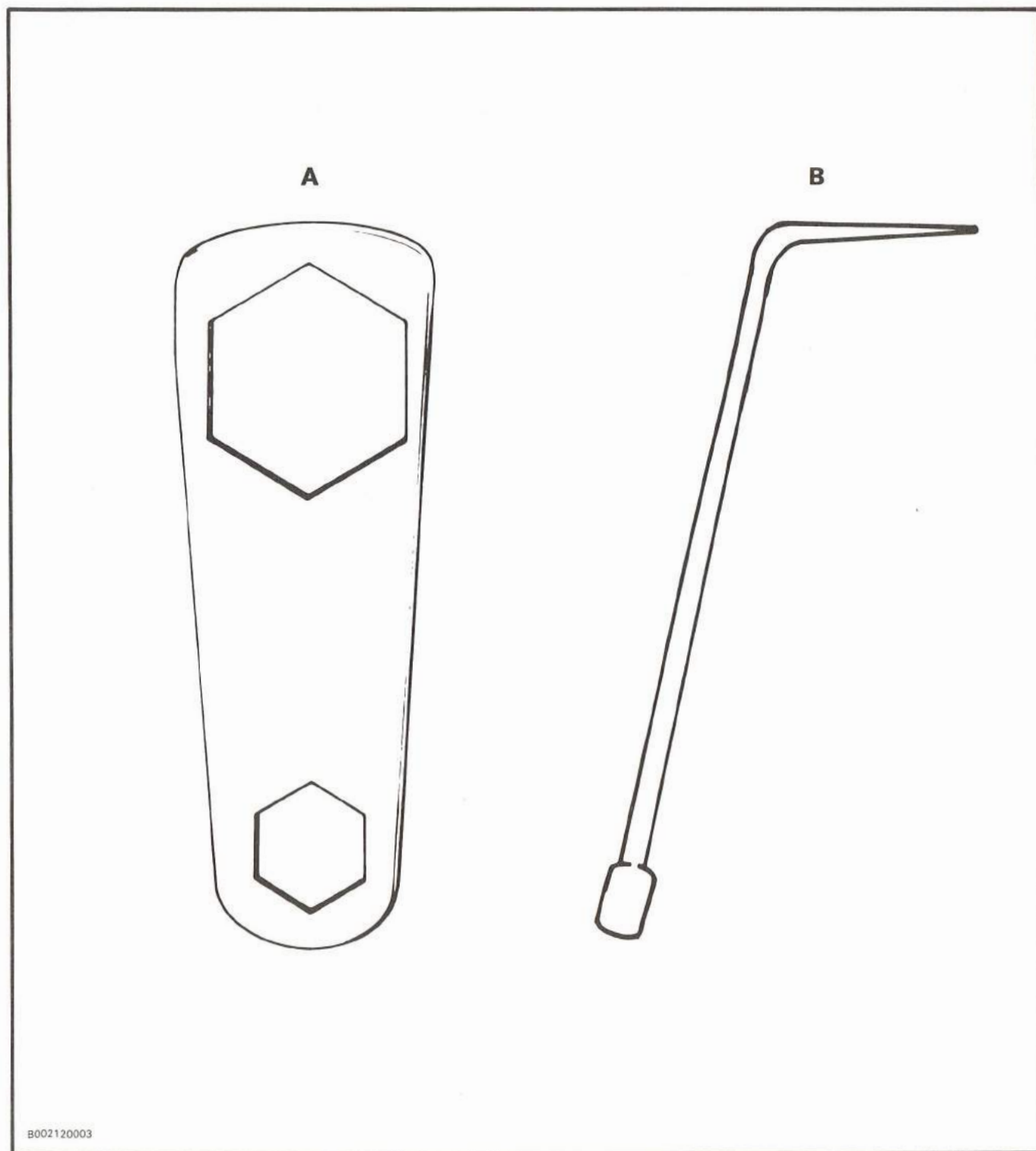


## Section 340 TOOLS

### Sub-section 01 (BASIC TOOLS)

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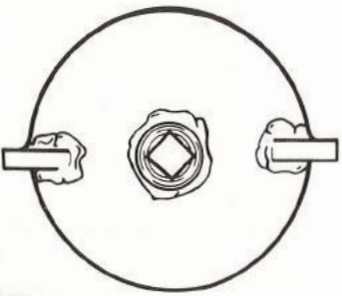
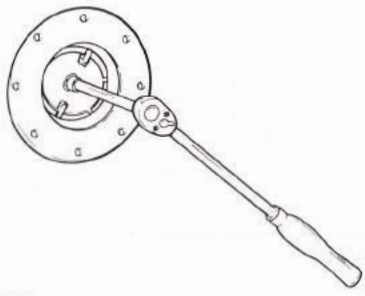
## BASIC TOOLS



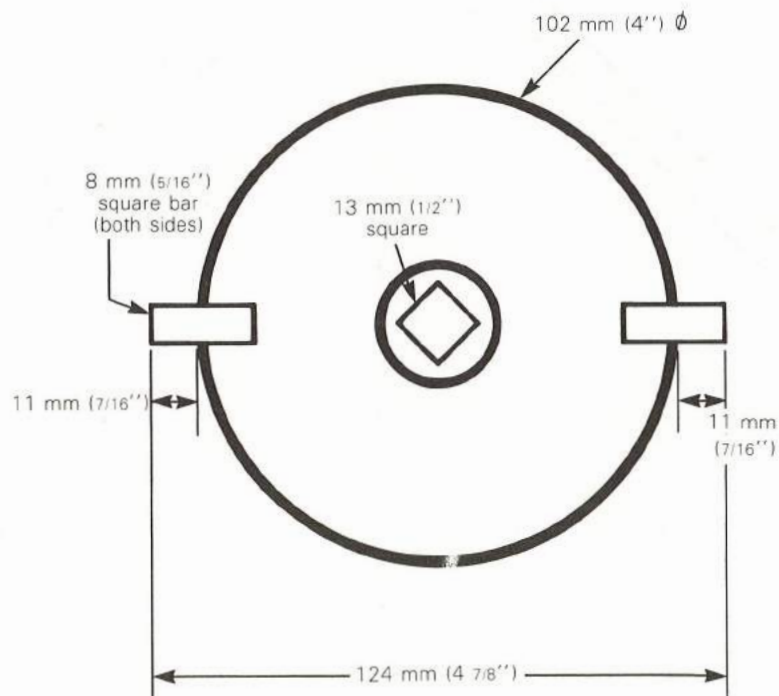
A) Hub cap wrench 38 mm x 68 mm (1 1/2" x 2 11/16")  
P/N 629 0005 00

B) Track tensioner bleeder P/N 629 0008 00

## SPECIAL TOOLS

ITEM	USE	APPLICABLE TO
<p>Bearing adjusting tool</p>  <p>B002080030</p>	<p>To adjust differential bearings</p>  <p>B002080039</p>	<p>Differential</p>



### DIMENSIONS



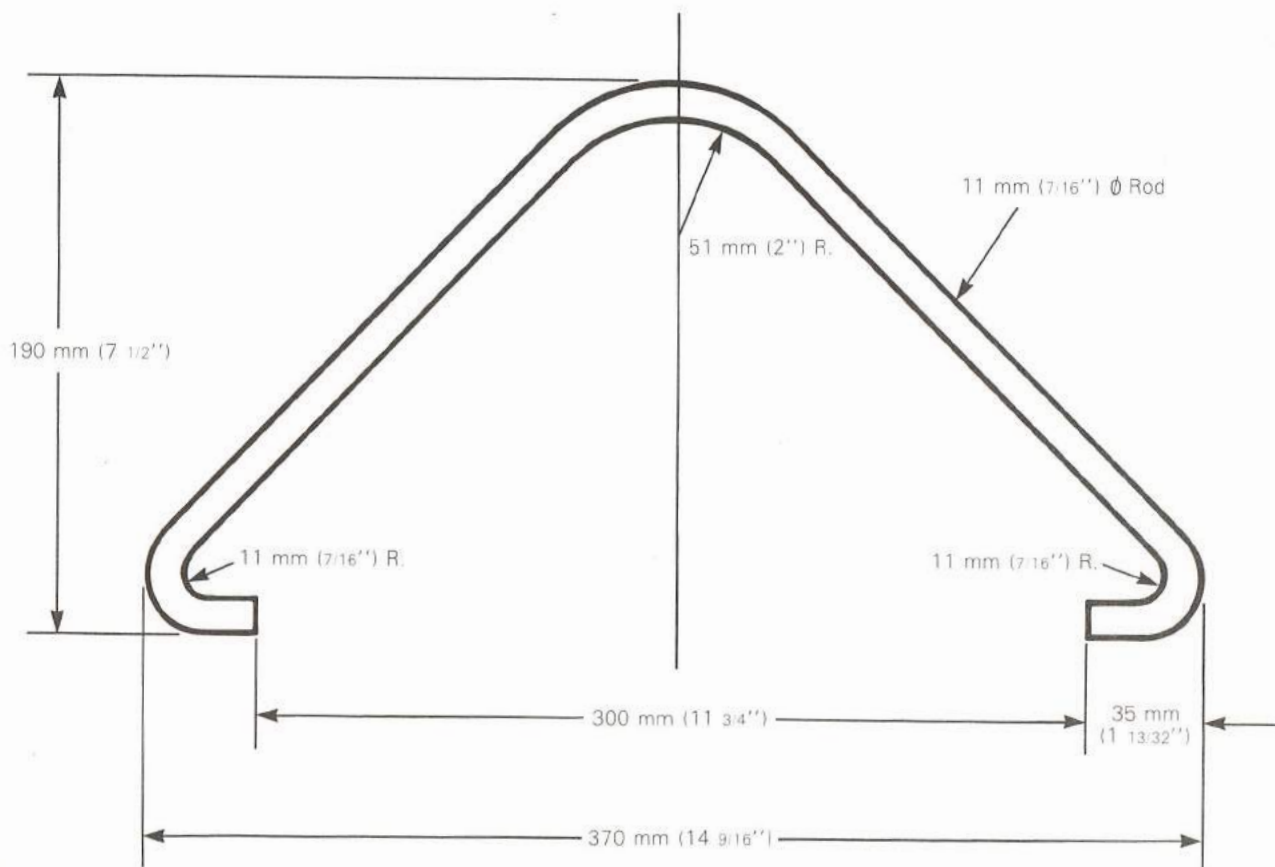
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## Section 340 TOOLS

### Sub-section 02 (SPECIAL TOOLS)

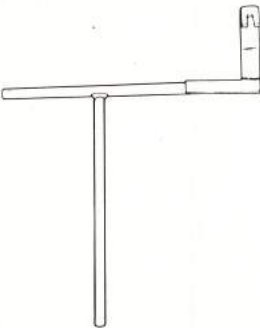
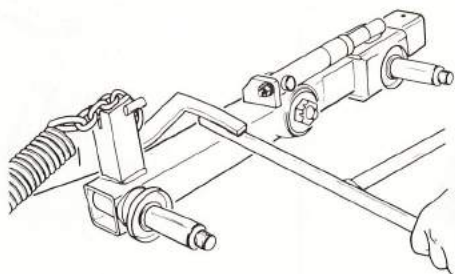
ITEM	USE	APPLICABLE TO
<p>Grip</p>  <p>B002001001</p>	<p>To remove differential</p>  <p>B002080036</p>	<p>Differential</p>

#### DIMENSIONS

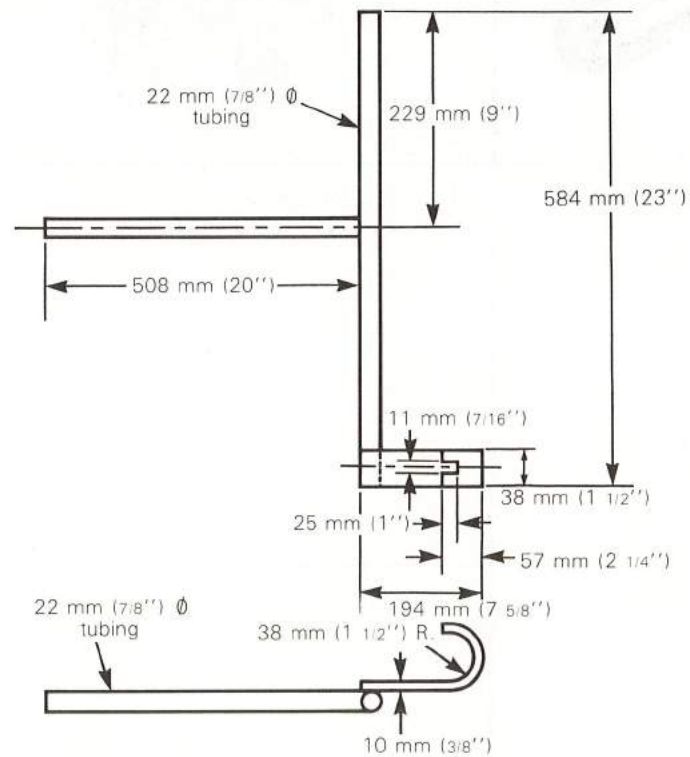


B002001001

**Section 340 TOOLS**  
**Sub-section 02 (SPECIAL TOOLS)**

ITEM	USE	APPLICABLE TO
<p>Spring installer</p>  <p>B002100009</p>	<p>To install suspension springs</p>  <p>B002100008</p>	<p>Suspension</p>

**DIMENSIONS**



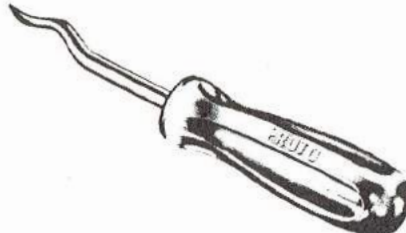
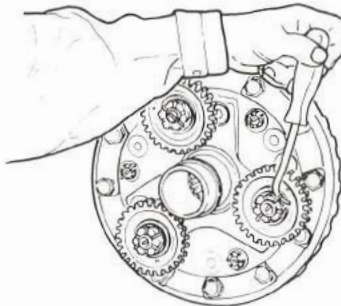

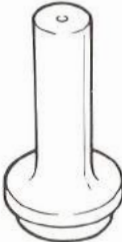


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## Section 340 TOOLS

### Sub-section 02 (SPECIAL TOOLS)

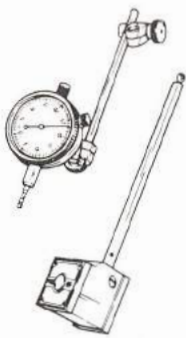
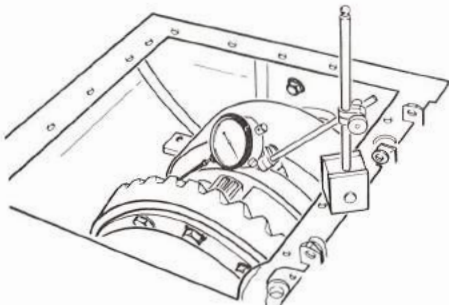
ITEM	USE	APPLICABLE TO
<p>Hoist</p>  <p>B002080032</p>	<p>To lift heavy pieces</p>  <p>B002080031</p>	<ul style="list-style-type: none"><li>— Transmission</li><li>— Differential</li></ul>
<p>Cotter pin puller</p>  <p>B002001004</p>	<p>To remove cotter pins</p>  <p>B002080048</p>	<p>Any assembly requiring cotter pins</p>
<p>Brake drum gear bushing installer</p>  <p>P/N 629 0018 00</p> <p>B002080061</p>	<p>To install bushings</p>	<p>Differential</p>
<p>Center and side case bushing installer</p>  <p>P/N 629 0017 00</p> <p>B002080061</p>	<p>To install bushings</p>	<p>Differential</p>

**Section 340 TOOLS**  
Sub-section 02 (SPECIAL TOOLS)

ITEM	USE	APPLICABLE TO
<p>Pinion gear small bushing installer</p>  <p>P/N 629 0019 00</p> <p>B002080061</p>	<p>To install bushings</p>	<p>Differential</p>
<p>Pinion gear large bushing installer</p>  <p>P/N 629 0020 00</p> <p>B002080061</p>	<p>To install bushings</p>  <p>B002080062</p>	<p>Differential</p>
<p>Pinion gear large bushing 1 1/4" burnishing bar</p>  <p>P/N 629 0016 00</p> <p>B002080061</p>	<p>To remove burrs</p>  <p>B002080063</p>	<p>Differential</p>
<p>Pinion gear small bushing 1" burnishing bar</p>  <p>P/N 629 0015 00</p> <p>B002080061</p>	<p>To remove burrs</p>	<p>Differential</p>

## Section 340 TOOLS

### Sub-section 02 (SPECIAL TOOLS)

ITEM	USE	APPLICABLE TO
<p>Dial indicator with magnetic stand</p>  <p>B002001004</p>	<p>To check differential backlash</p>  <p>B002080082</p>	<p>Differential</p>





