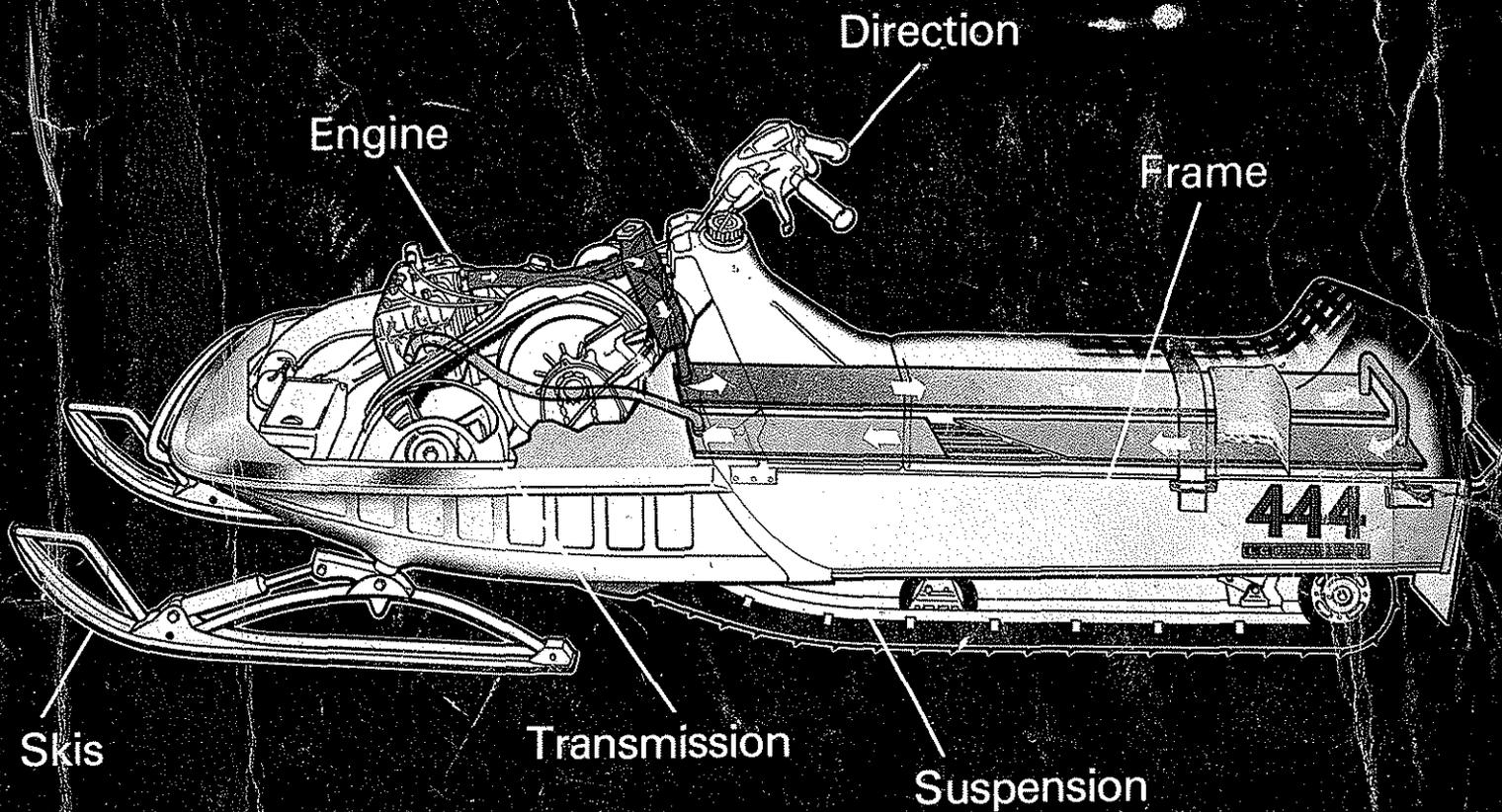


# SHOP MANUAL



**1978 BOMBARDIER Snowmobiles**

Litho'd in Canada





## **SAFETY NOTICE**

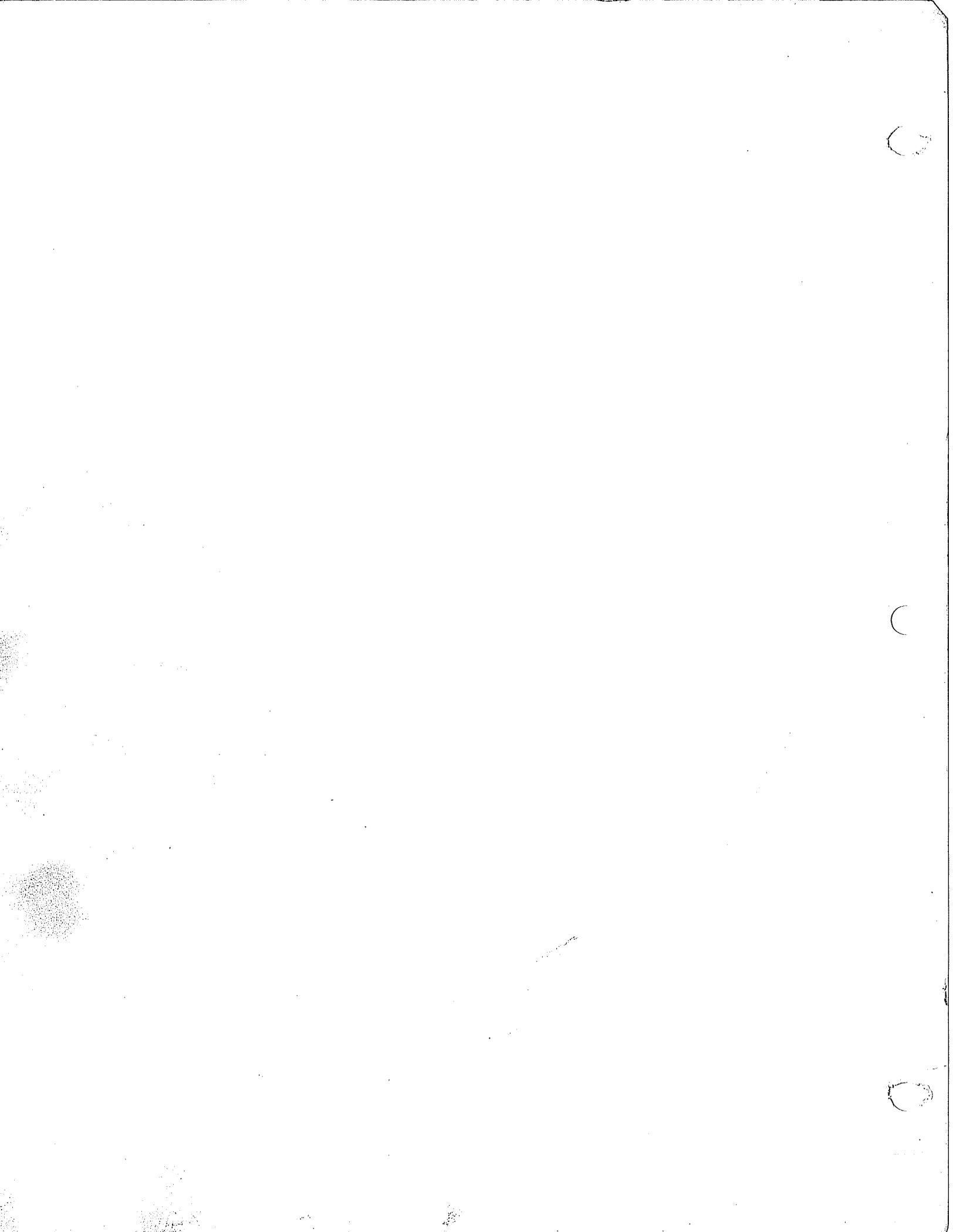
This Shop Manual has been prepared primarily for use by professional snowmobile mechanics, who are already familiar with all service procedures relating to Bombardier made snowmobiles, and secondly to assist the mechanically oriented snowmobiler who has limited access to an authorized dealer, or prefers to perform his own servicing.

In either case, special tools must be used, where required, and a good sense of safety is deemed necessary. If in doubt, contact your dealer for assistance.

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.



## INTRODUCTION

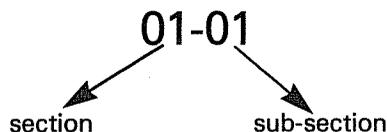
This Shop Manual covers the following Bombardier made 1978 snowmobiles:

Elan® and Spirit\*  
Olympique\* and Nuvik\*  
Citation\*  
Everest® and Futura®  
T'NT® F/A and F/C  
RV\* and Sonic\*  
Blizzard® 6500 Plus  
Alpine®  
Elite®

® \*Trademarks of Bombardier Limited.

## DEFINITION OF NUMBERING SYSTEMS

The manual makes use of a 2-part digital numbering system (i.e. 01-01), in which the first digit represents the Section, the second digit the Sub-section.



The numerotation at the bottom of each page assists the user in page location.

## ARRANGEMENT OF THE MANUAL

The Manual is divided into nine (9) major sections:

- 01 Suspension
- 02 Transmission
- 03 Steering and skis
- 04 Engine
- 05 Electrical
- 06 Cab and chassis
- 07 Tools
- 08 Technical data
- 09 Warranty

Each section is comprised of various sub-sections, and yet again each sub-section has one or more divisions.

Ex.: 02 TRANSMISSION

- 07 Chaincase
- Steel chaincase
- Aluminum chaincase

## ILLUSTRATIONS & PROCEDURES

An exploded view is conveniently located at the beginning of each section and is meant to assist the user in identifying parts and components. When something special applies (such as adjustment,... etc), the specific parts are circled and referred to in the text.

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

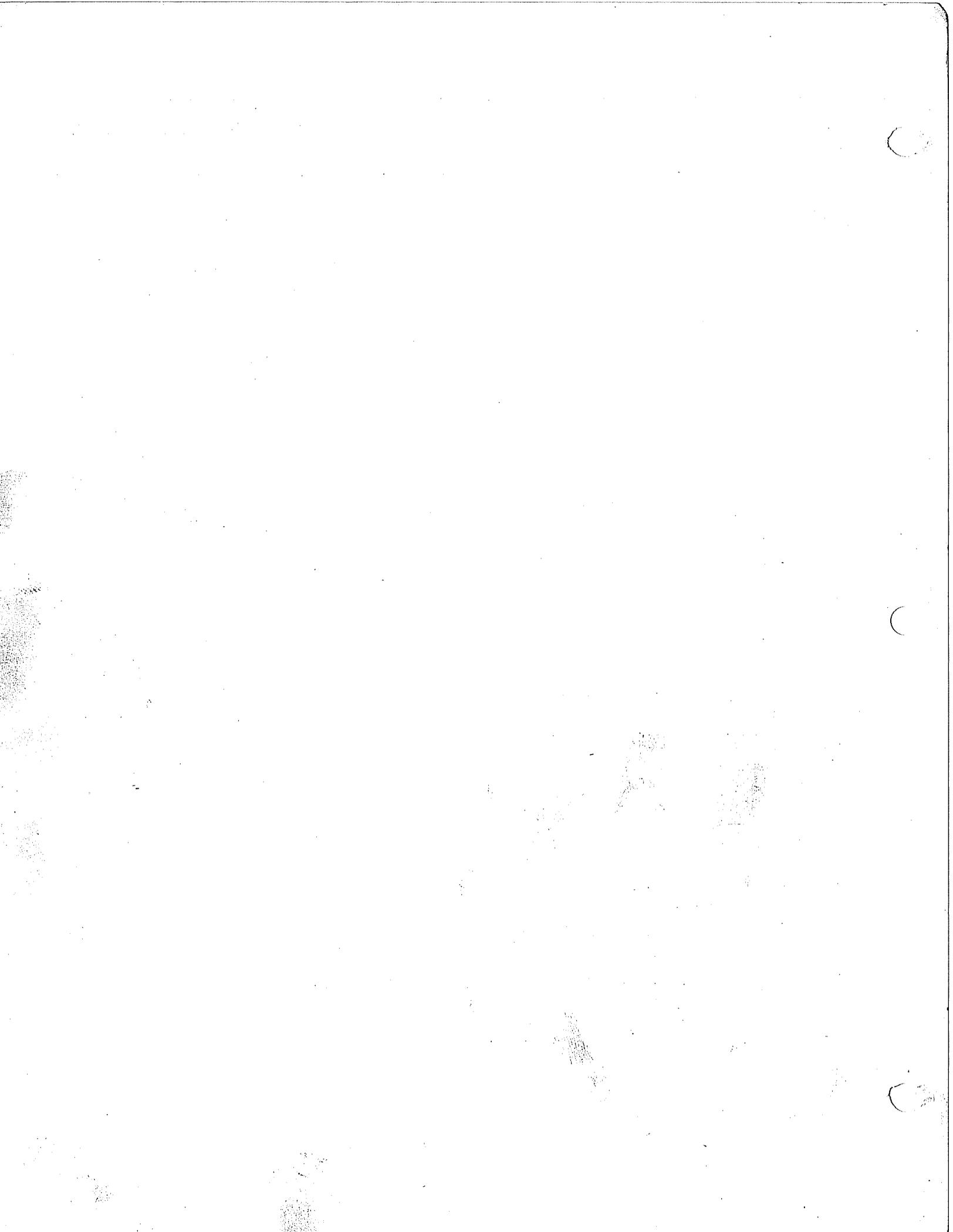
A number of procedures throughout the book require the use of special tools. Where a special tool is indicated, refer to section 07. Before commencing any procedure, be sure that you have on hand all of the tools required, or approved equivalents.

## GENERAL

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

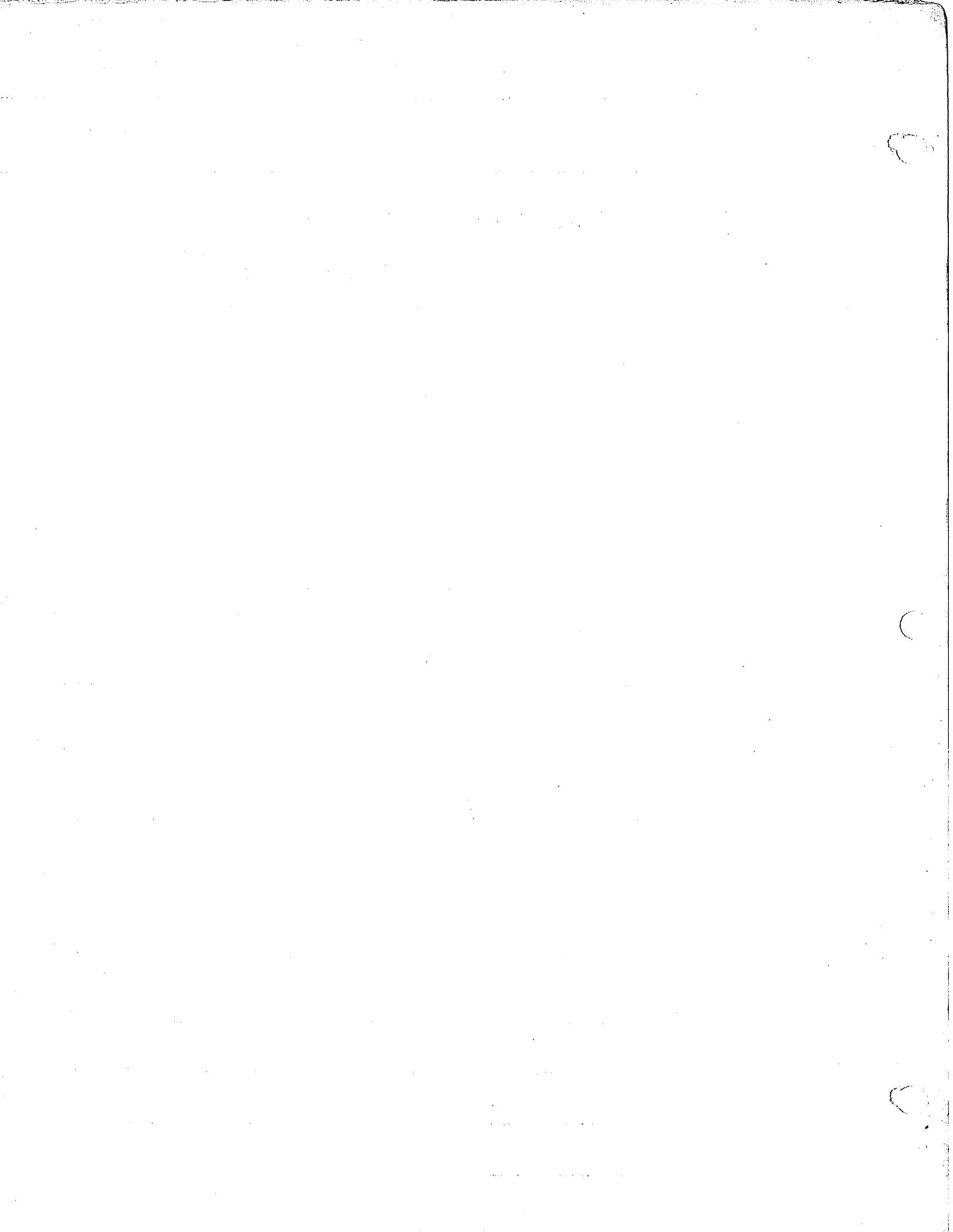
This manual has been published by the

TECHNICAL INFORMATION CENTRE  
SERVICE DEPARTEMENT  
BOMBARDIER LIMITED  
VALCOURT, QUÉBEC, CANADA

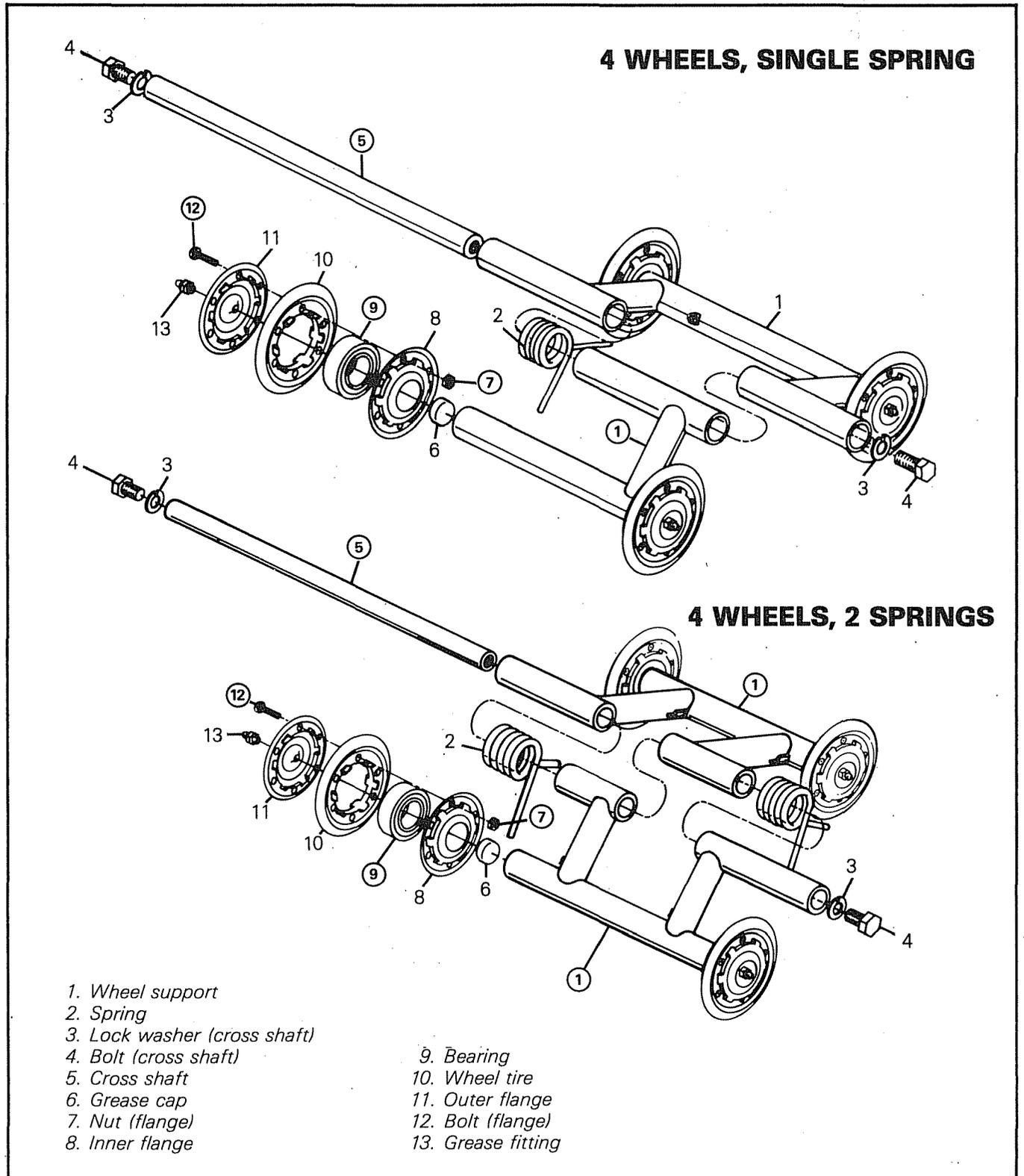


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<b>02</b> TRANSMISSION	01 – Pulley guard 02 – Drive belt 03 – Drive pulley 04 – Driven pulley 05 – Pulley alignment 06 – Brake 07 – Chaincase 08 – Gearbox 09 – Drive chain
<b>03</b> STEERING/SKI	01 – Steering system 02 – Ski system
<b>04</b> ENGINE	01 – Engine tolerances measurement 02 – Engines 03 – Rewind starter 04 – Timing 05 – Carburetor 06 – Air intake silencer and fuel tank
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# BOGIE WHEELS

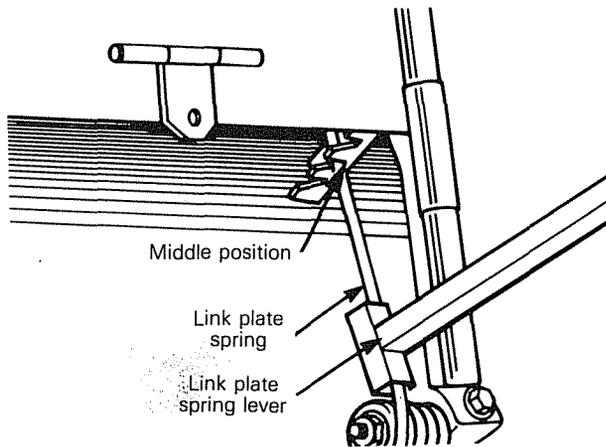


## SECTION 01 SUB-SECTION 01 (BOGIE WHEELS)

### REMOVAL

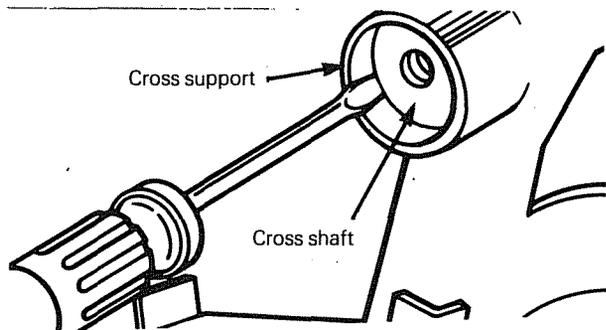
Raise and block rear of vehicle off the ground.

Release track tension by unlocking the link plate springs using link plate lever (See Tool Section).



Starting at center bogie wheel set, remove bolts and lock washers securing cross shaft to frame.

**NOTE:** To prevent the cross shaft from rotating within the cross support, wedge a screwdriver blade between the cross shaft and cross support.



Remove bogie wheel set.

**NOTE:** Since spring diameter may vary depending upon actual installation location, it is important to identify the installation of each bogie wheel set. Observe this position when reinstalling sets.

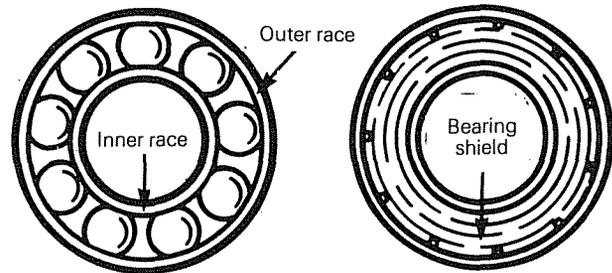
Repeat operation for remaining bogie wheel sets.

### DISASSEMBLY & ASSEMBLY

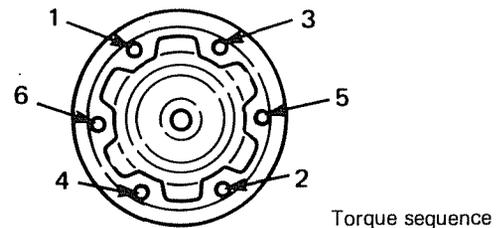
① Heat wheel support anchor before attempting to open or close anchor.

⑤ Clean, then lubricate cross shaft with low temperature grease before installation.

⑨ Always pull or push bearing by inner race. When installing bearing on wheel support, position bearing shield towards inner flange, then press down until bearing is sitting flush with support end.



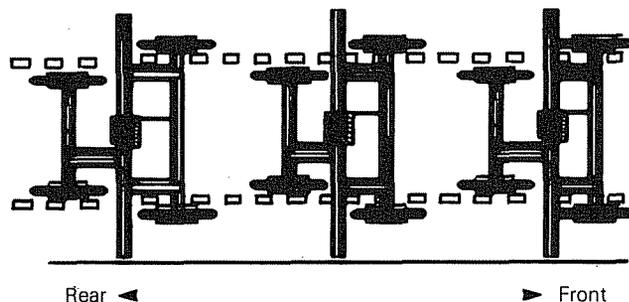
⑦⑫ Bogie wheels are factory riveted. When separation is necessary, remove rivets securing wheel tire and flanges by using a 3/16" dia. Secure flanges and tire using bolts and nuts tighten in the following sequence to 38 N•m (28 ft-lbs).



### INSTALLATION

With rear of vehicle supported off the ground, position front bogie wheel set in location and secure to frame using lock washers and bolts. Secure rear set then remaining set(s) to frame.

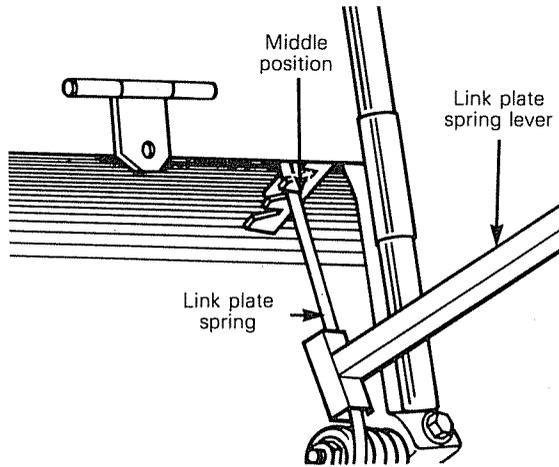
**NOTE:** On a single bogie wheel set, position bogie wheel set so that wider wheel support is toward front of vehicle.



SECTION 01  
SUB-SECTION 01 (BOGIE WHEELS)

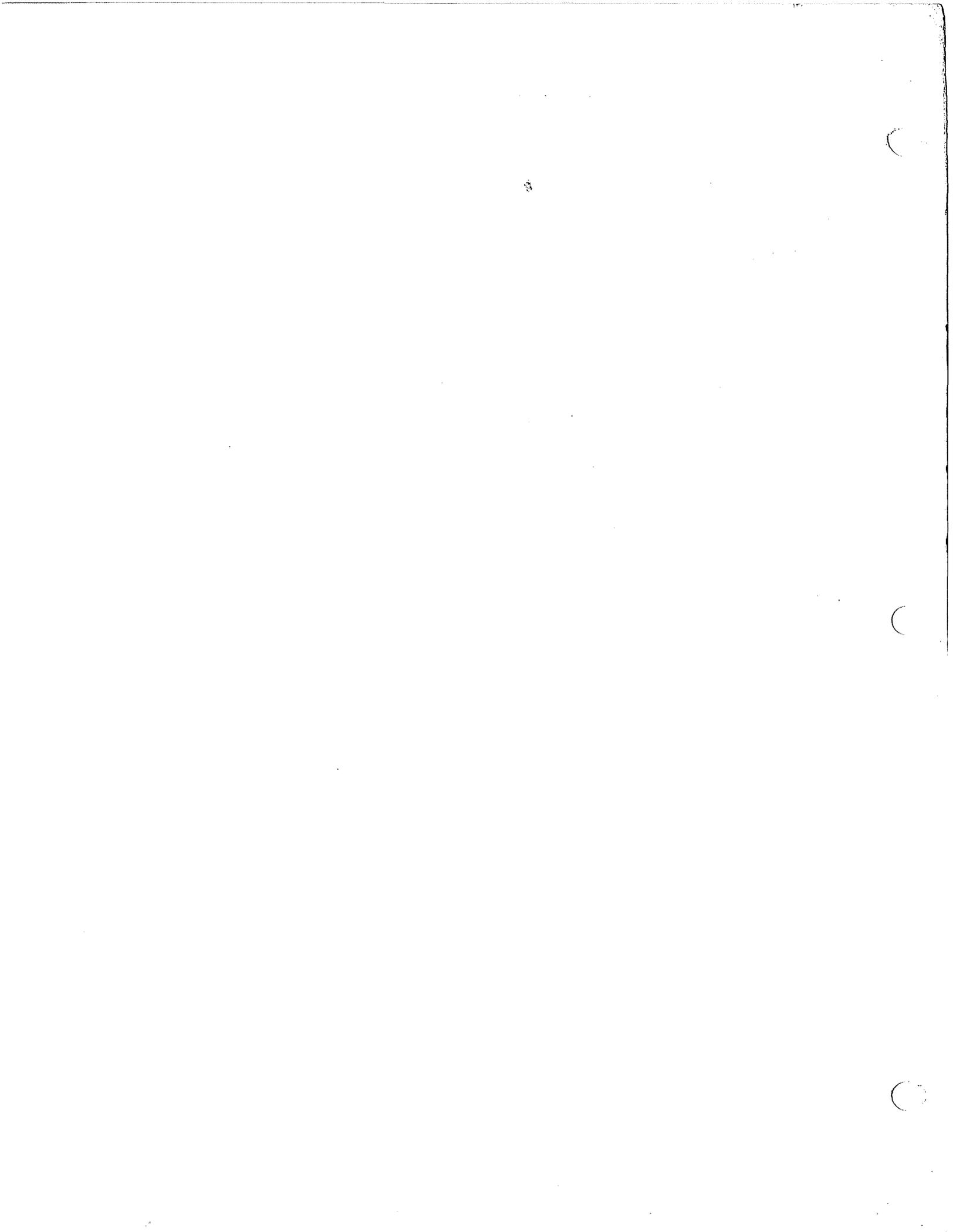
Using link plate spring lever, apply track tension by hooking the link plate springs into anchors.

○ **NOTE:** If applicable, place spring ends in middle position of the 3 position slotted anchor.

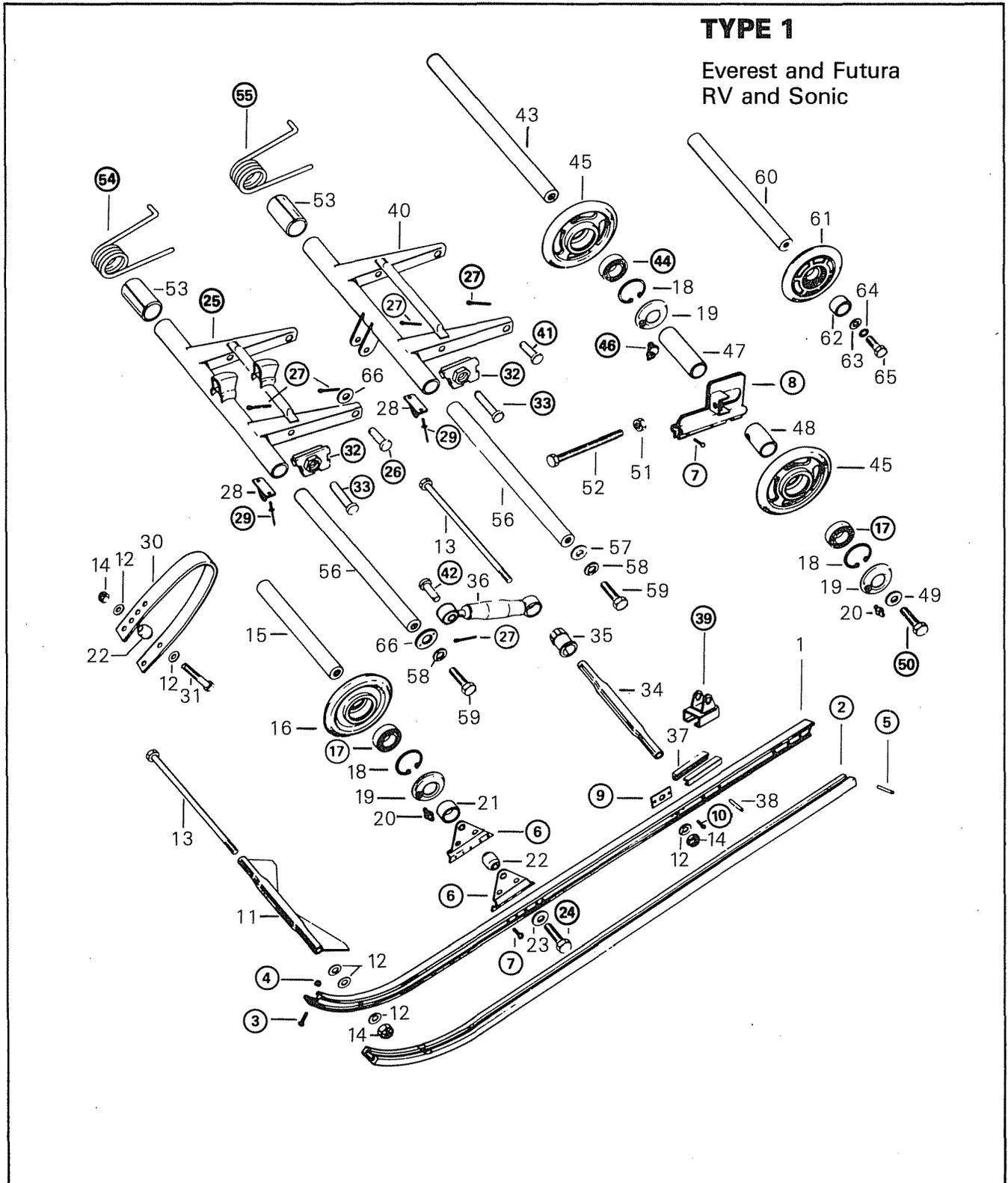


Lubricate each bogie wheel until new grease appears at joint. Wipe off excess grease.

Check track tension and alignment.



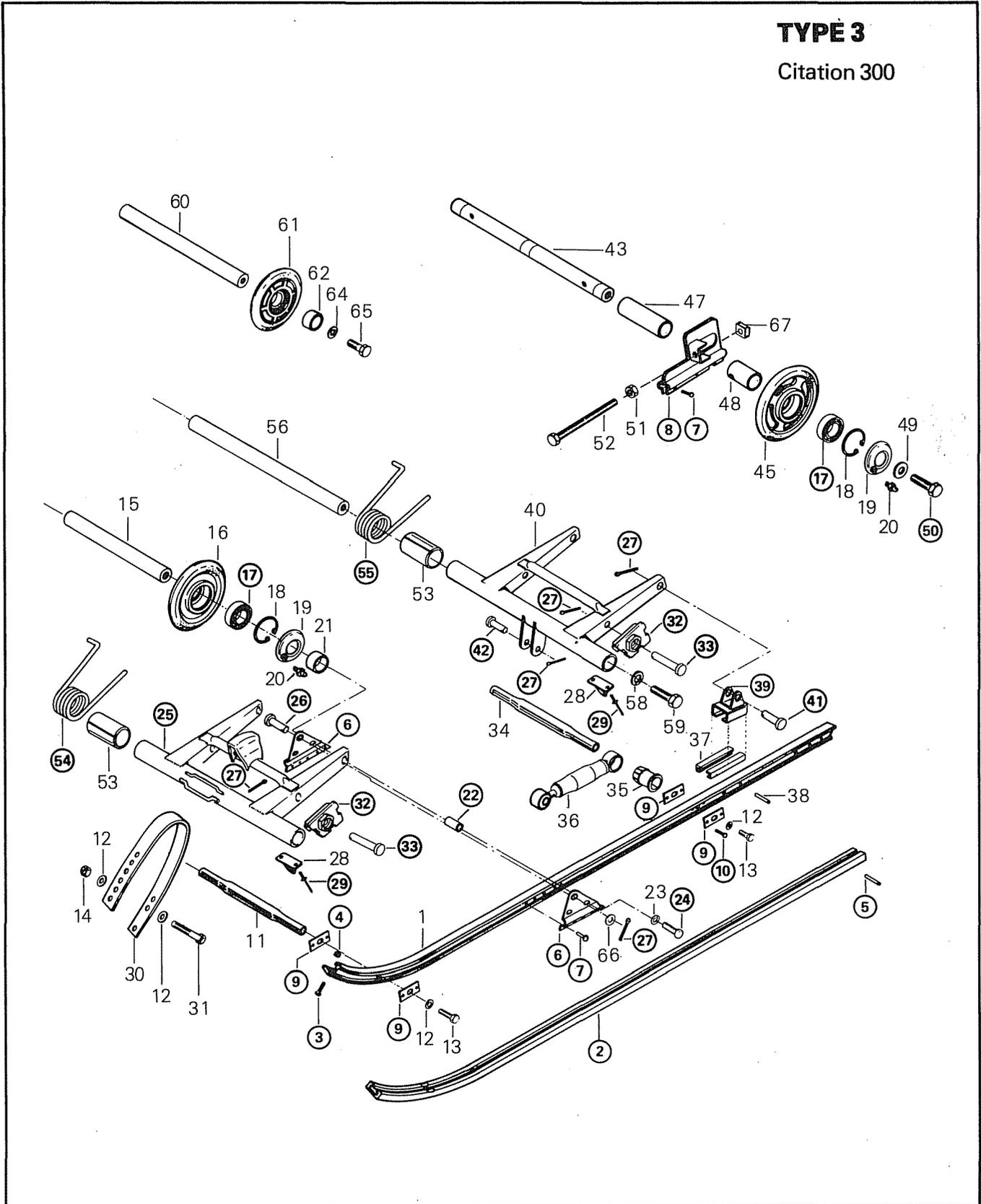
# "TORQUE REACTION" TYPE SUSPENSION





**TYPE 3**

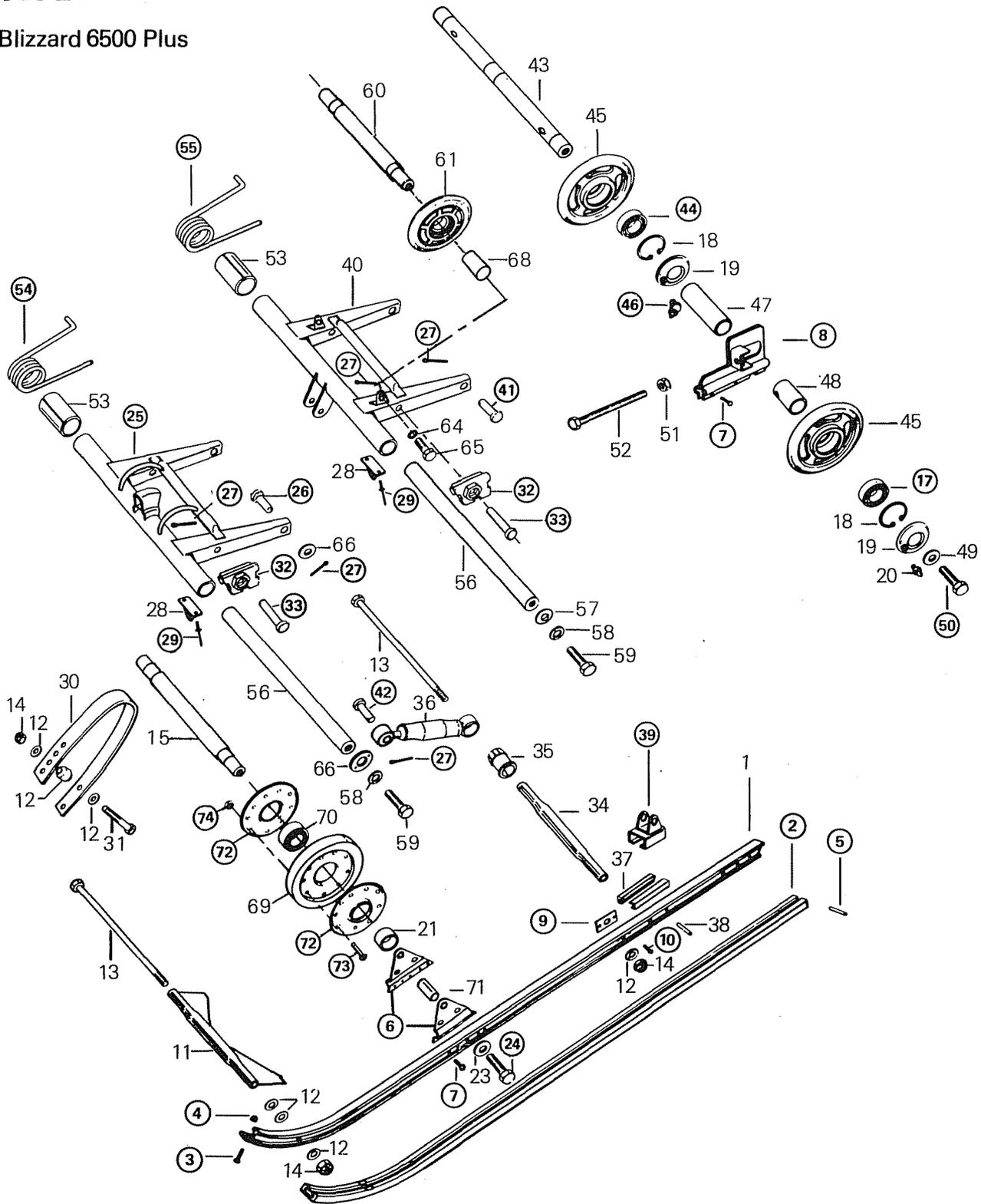
Citation 300



SECTION 01  
SUB-SECTION 02 (SLIDE SUSPENSION)

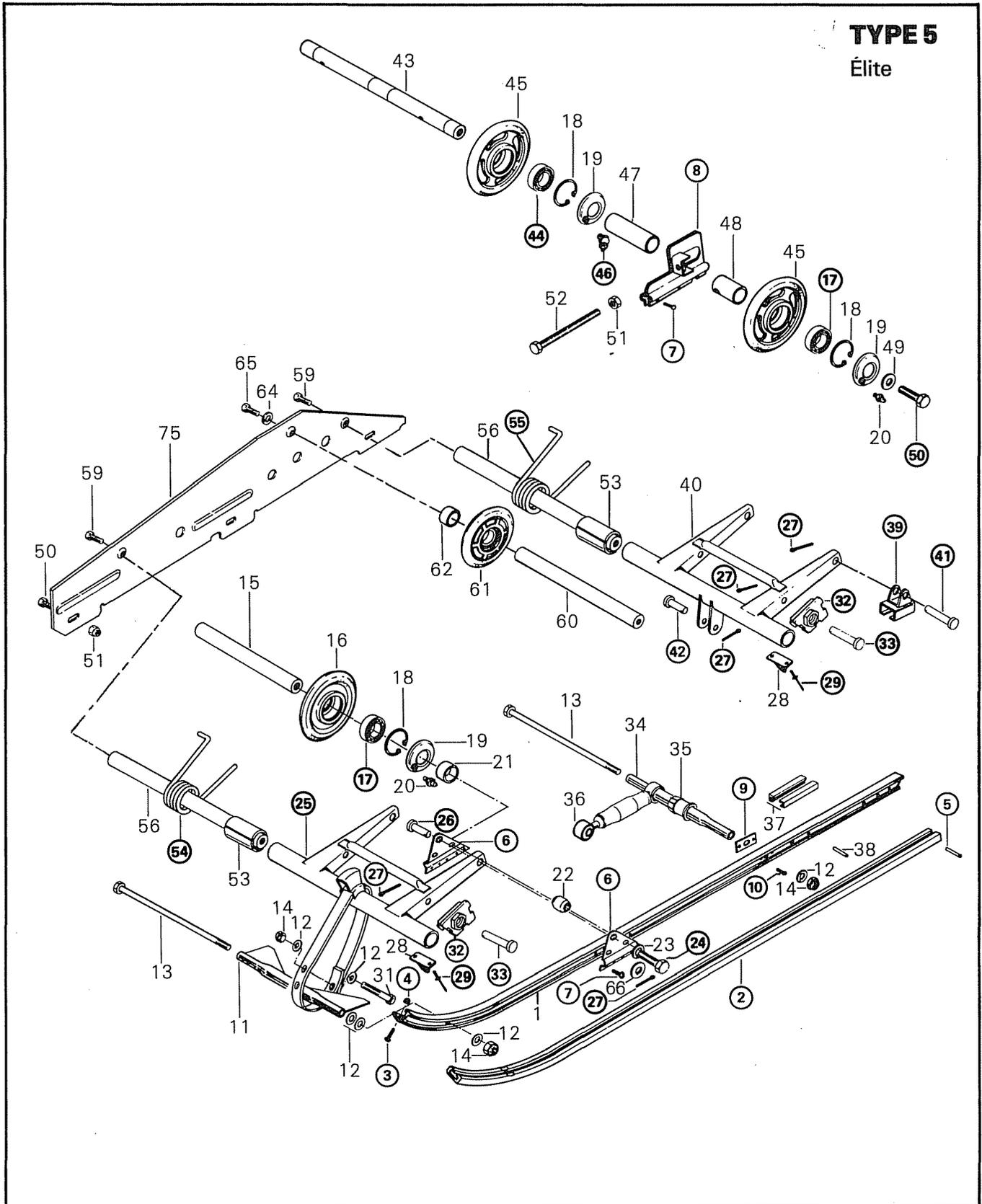
**TYPE 4**

Blizzard 6500 Plus



SECTION 01  
SUB-SECTION 02 (SLIDE SUSPENSION)

**TYPE 5**  
Élite

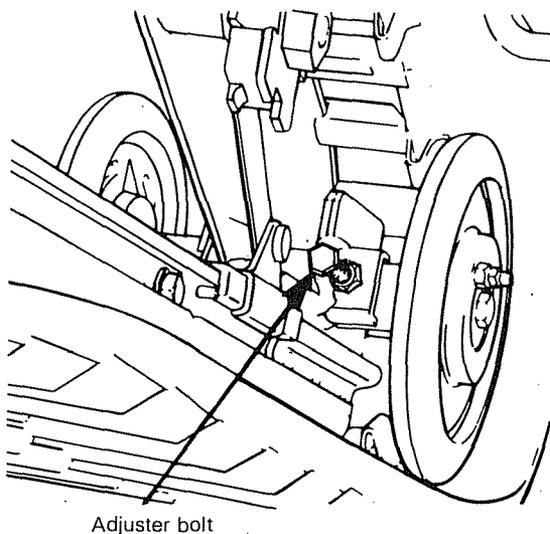


**SECTION 01**  
**SUB-SECTION 02 (SLIDE SUSPENSION)**

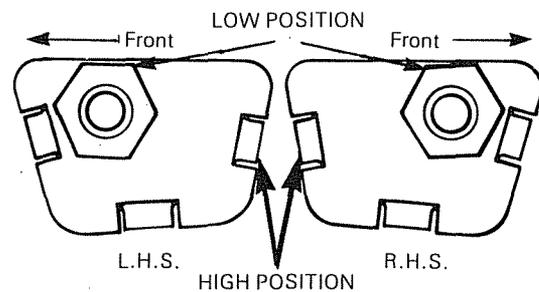
- |                          |                         |                     |
|--------------------------|-------------------------|---------------------|
| 1. Runner                | 26. Clevis pin          | 51. Nut             |
| 2. Slider shoe           | 27. Cotter pin          | 52. Adjustment bolt |
| 3. Screw                 | 28. Stop bonding        | 53. Spring bushing  |
| 4. Nut                   | 29. Rivet               | 54. Front spring    |
| 5. Spirol pin            | 30. Stopper strap       | 55. Rear spring     |
| 6. Front arm bracket     | 31. Bolt                | 56. Cross shaft     |
| 7. Rivet                 | 32. Adjustment cam      | 57. Washer          |
| 8. Adjustment plate      | 33. Clevis pin          | 58. Lock washer     |
| 9. Reinforcement bracket | 34. Swaged tube         | 59. Bolt            |
| 10. Rivet                | 35. Bushing             | 60. Cross shaft     |
| 11. Swaged tube          | 36. Shock               | 61. Idler           |
| 12. Washer               | 37. Sliding pad         | 62. Spacer bushing  |
| 13. Bolt                 | 38. Spirol pin          | 63. Washer          |
| 14. Nut                  | 39. Sliding support     | 64. Lock washer     |
| 15. Cross shaft          | 40. Rear arm            | 65. Bolt            |
| 16. Idler                | 41. Clevis pin          | 66. Retainer washer |
| 17. Bearing              | 42. Clevis pin          | 67. Square nut      |
| 18. Retainer ring        | 43. Rear axle           | 68. Spacer tube     |
| 19. Cap                  | 44. Bearing             | 69. Idler           |
| 20. Grease fitting       | 45. Idler               | 70. Bearing         |
| 21. Spacer tube          | 46. Grease fitting      | 71. Spacer tube     |
| 22. Spacer               | 47. Spacer tube (inner) | 72. Wheel flange    |
| 23. Washer               | 48. Spacer tube (outer) | 73. Bolt            |
| 24. Bolt                 | 49. Washer              | 74. Nut             |
| 25. Front arm            | 50. Bolt                | 75. Side member     |

**REMOVAL**

Release track tension by loosening adjuster bolts located on inner side of rear idler wheels.



Position the adjustment cams at the lowest elevation.



Remove the four (4) bolts securing suspension to frame.

On Elite model, remove bolts securing side members to chassis.

Lift rear of vehicle then withdraw suspension ass'y from track area.

○ **NOTE:** To prevent cross shaft from turning within the suspension arm, wedge the blade of a small screwdriver between the shaft and suspension arm.

**SECTION 01**  
**SUB-SECTION 02 (SLIDE SUSPENSION)**

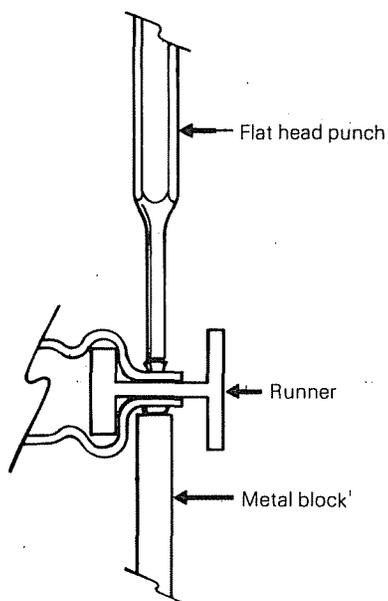
**DISASSEMBLY & ASSEMBLY**

②③④⑤ To replace a worn slide shoe, remove nut and bolt securing front of shoe to runner, and remove rear spirol pin.

Slide shoe rearwards out of runner.

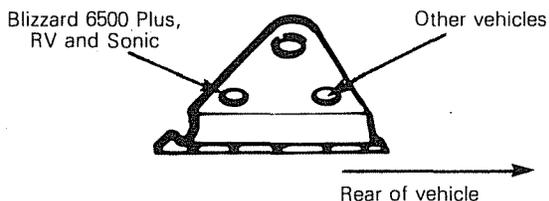
⑥⑦⑧ To remove rivets securing adjustment plate or front arm supports, cut rivet head using a chisel.

At assembly, rest rivet head on a suitable metal block and hold ass'y firmly. Using a flat head punch and hammer secure rivet.



⑨⑩ To remove rivet use a 3/16" dia. drill. At assembly, secure reinforcement bracket to runner with two (2) 10-32 x 1/2" bolts and nuts.

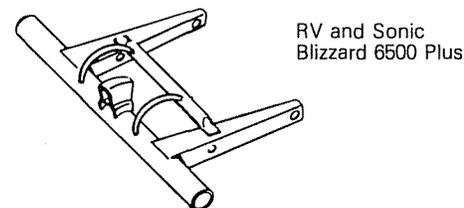
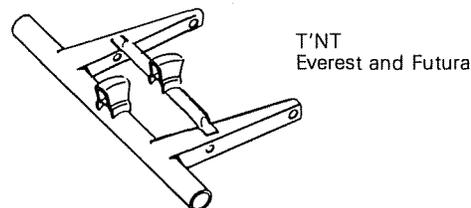
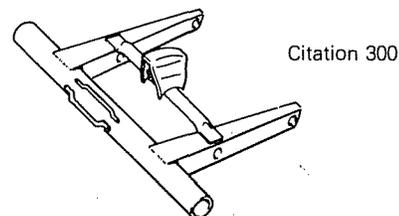
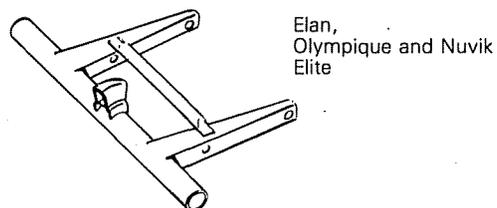
⑥⑳ Front idler cross shaft must be positioned in rear hole of front arm bracket, except on Blizzard 6500 Plus, RV and Sonic.



⑰④④ Bearing must be installed with shield facing the inside of idler wheel.

Center ball bearing on rear axle has slightly larger inside diameter, i.e. 25.37 mm (.999") instead of 24.99 mm (.984").

⑳ Front arm.



⑳ ③③ ④① ④② Clevis pin lengths are:

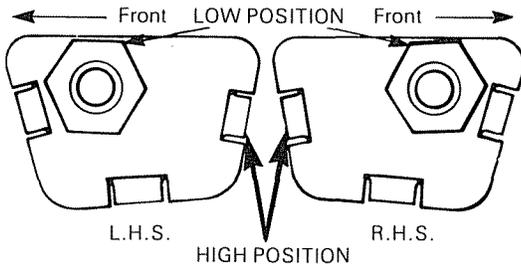
- 44 mm (1 3/4") for no. 26
- 76 mm (3") for no. 33
- 33 mm (1 5/16") for no. 41
- 50 mm (2") for no. 42

㉑ At assembly, discard used cotter pins and install new ones.

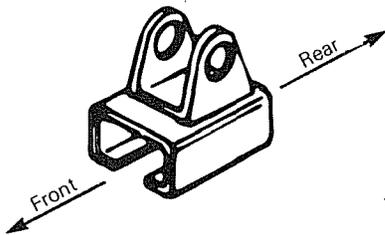
㉒ To remove rivet, use a 7/32" dia. drill.

**SECTION 01**  
**SUB-SECTION 02 (SLIDE SUSPENSION)**

③② At assembly, adjustment cam must be installed so that hexagonal projection on cam is located toward front of vehicle.



③⑨ Sliding support must be installed with offset toward front.



④⑥ Center wheel grease fitting is angled at 45°.

⑤⑩ Clean all traces of plastic from threads. Prior to assembly, apply a light coat of "Loctite" thread locking compound or equivalent, on threads.

⑤④ ⑤⑤ Prior to assembly, identify front and rear springs. Front spring coil diameter is smaller than rear.

⑦② ⑦③ ⑦④ Idler wheels are factory riveted. If wheel tire has to be changed, use a 7/32" dia. bit to separate wheel flanges.

At assembly, use 7/32" x 3/4" bolts with self-locking nut and torque to 3 N•m (2 ft-lbs).

**INSTALLATION**

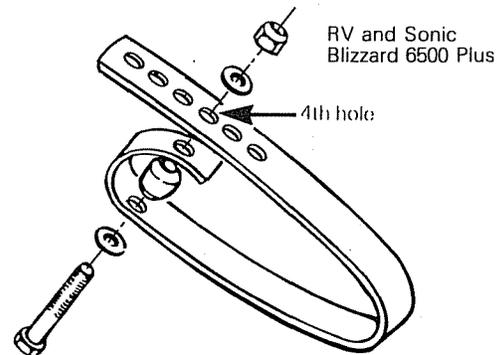
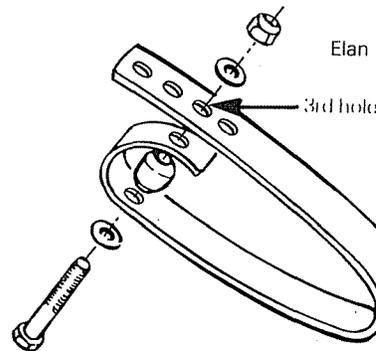
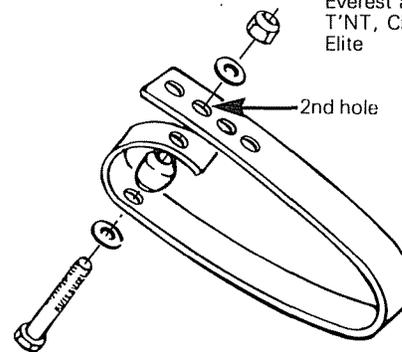
Detach front stopper strap and shock absorber of the suspension. Lift the rear of vehicle off the ground.

Place suspension within the track and align front arm of suspension with front holes of frame and secure using bolts and washers. Torque to 43 N•m (32 ft-lbs).

Raise the rear section of the suspension and track into the tunnel and align rear arm with rear holes in frame. Secure to frame using bolts and washers. Torque to 43 N•m (32 ft-lbs).

Reposition vehicle on the ground. Position the adjustment cams at the lowest elevation then apply downward pressure on the seat of vehicle and connect the shock absorber. Attach front stopper strap.

Olympique and Nuvik  
 Everest and Futura  
 T'NT, Citation  
 Elite

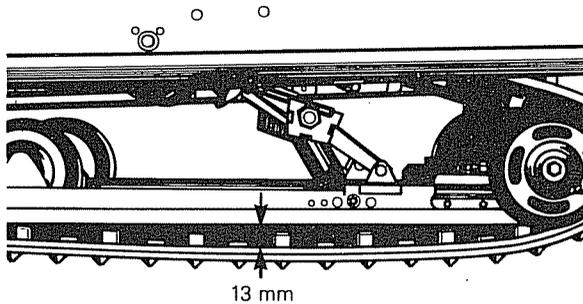


○ **NOTE:** There are many installation positions for the stopper strap. The recommended position provides maximum traction and steering efficiency for almost every snow condition. However, for very special purposes or snow condition, it may become necessary to alter this setting. Lengthening the strap (1st hole) has the same effect as shifting the weight toward rear of vehicle; as a result, traction is increased but steering efficiency is decreased. Inversely, by shortening the strap length (last hole), traction is decreased while steering efficiency and effort are increased.

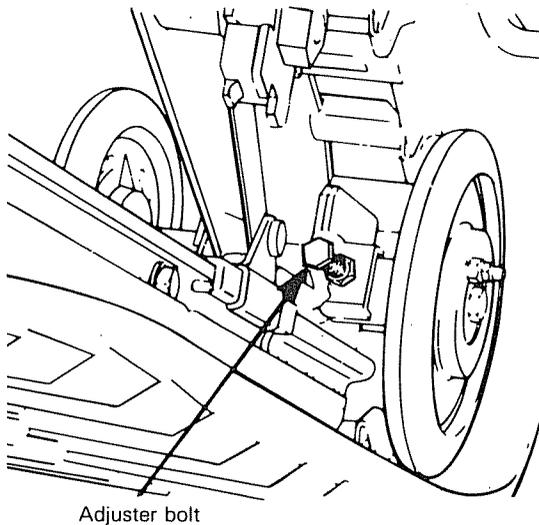
## ADJUSTMENT

### Track tension

Lift rear of vehicle and support it off the ground. Allow track to extend normally. There must be a gap of 13 mm (1/2") between slider shoe and bottom inside of track, on each side.



To adjust tension, loosen or tighten adjuster bolts located on inner side of rear idler wheels.



○ **NOTE:** Track tension, track alignment and ride adjustment are interrelated adjustments. The measurement given for ride adjustment is initial. When ride adjustment is finalized for snow condition and driver suitability, it may be necessary to readjust track tension and alignment to specifications.

### Track alignment

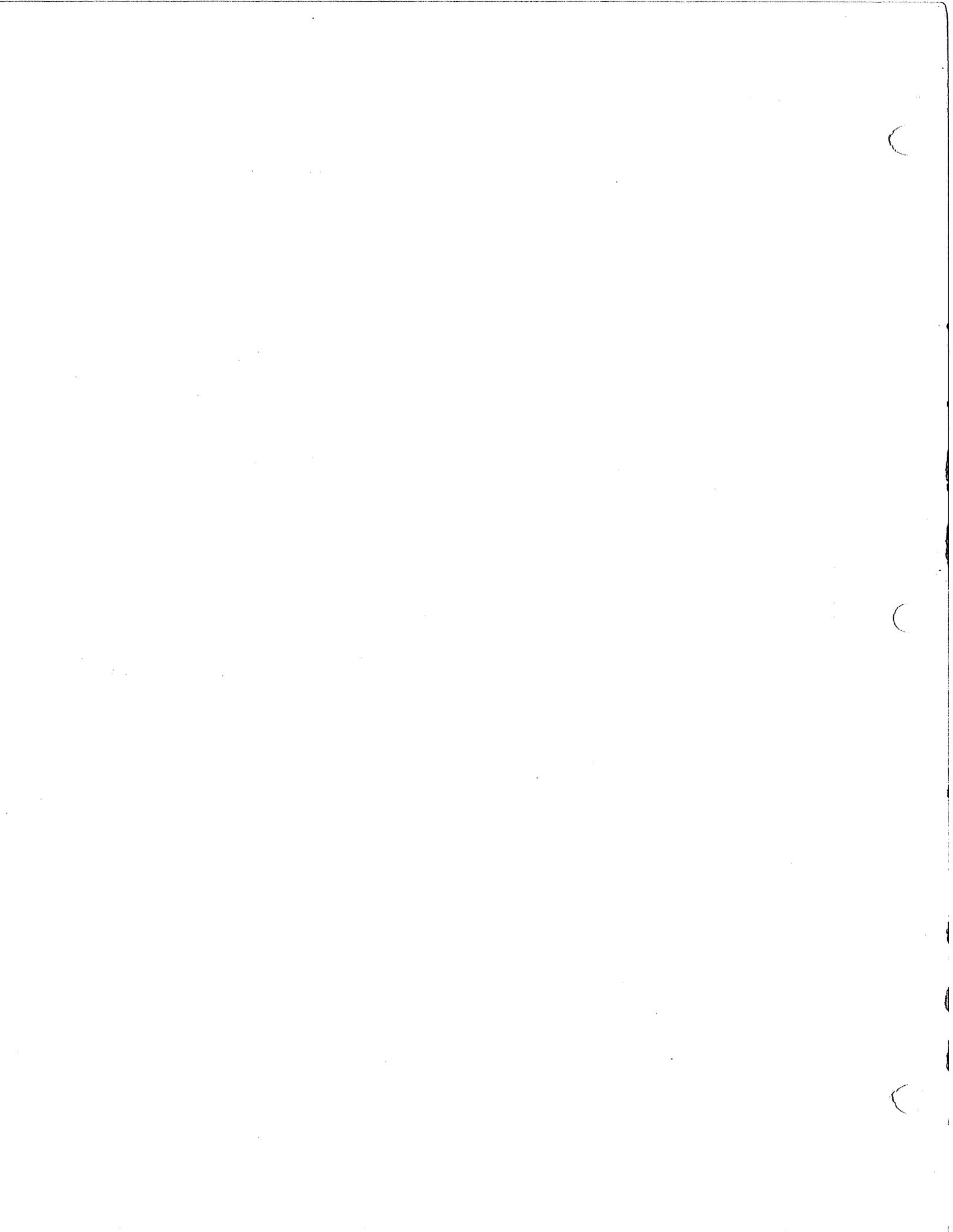
After track tension has been corrected, start the engine and accelerate slightly so that track turns **slowly**. Check that track is well centered and turns evenly. To correct stop the engine then loosen the lock nuts and tighten the adjuster bolt on side where track is closest to the frame. Tighten lock nut and recheck alignment.

◆ **WARNING:** Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, feet, tools and clothing clear of track.

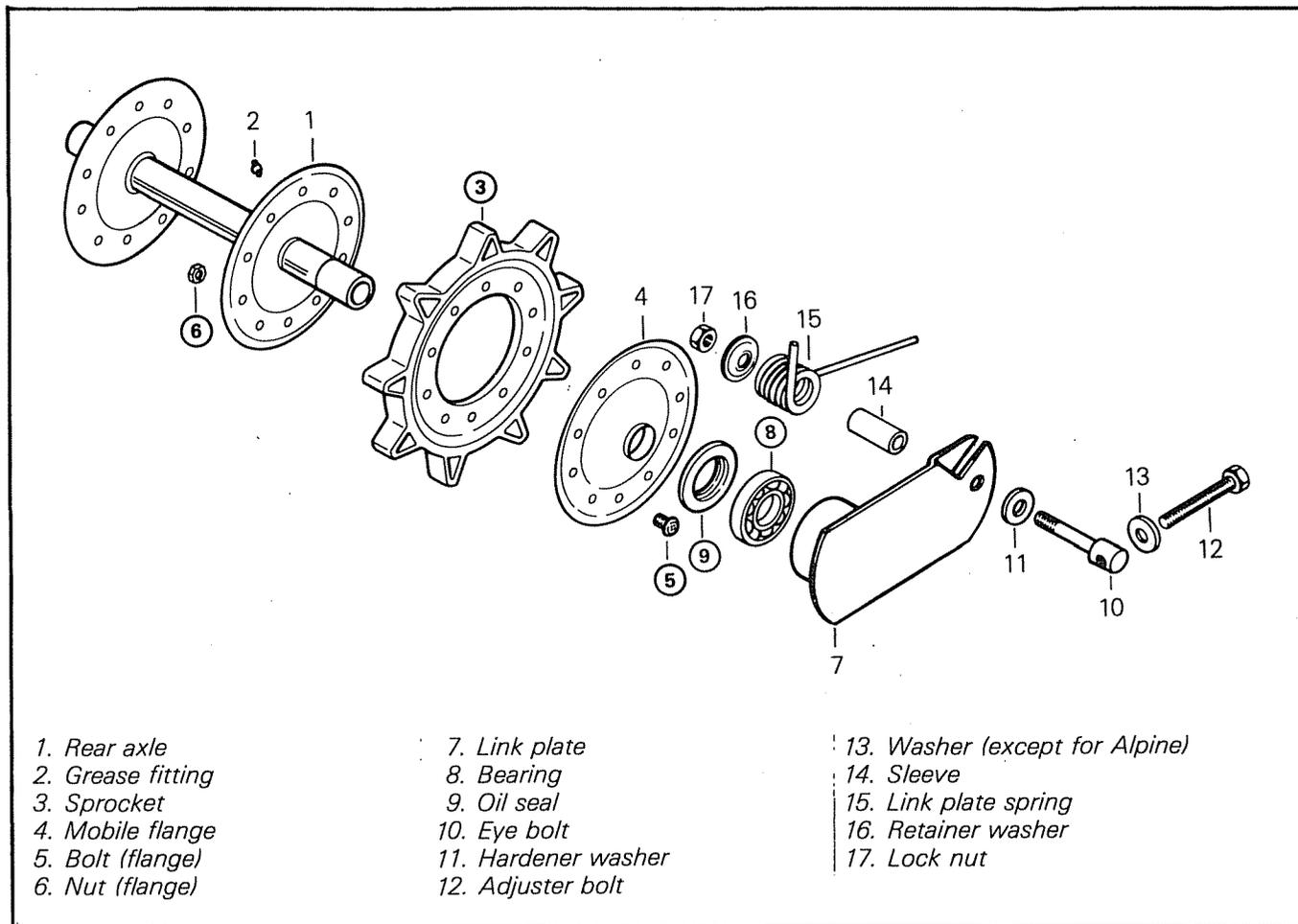
### Ride adjustment

The front adjustment cams are used for snow condition, and the rear for driver's weight. The front adjustment cams should be positioned at the lowest elevation for deep snow conditions. A higher elevation is preferred when negotiating icy snow. The rear adjustment cams should be adjusted until a distance of 11-14 cm (4.5-5.5") is obtained between rear of footrest and ground when driver is seated on the vehicle.

▼ **CAUTION:** Always turn left side adjustment cams in a clockwise direction, the right side cams in a counter-clockwise direction. Left and right adjustment cams of each adjustment (front and rear), must always be set at the same elevation.



## REAR AXLE



### REMOVAL

Lift and block rear of vehicle off the ground.

Remove the link plate spring lock nuts and retainer washers.

Using link plate spring lever (See Tool Section), unlock link plate springs.

Remove track adjuster bolts, eye bolts, hardener washers and adjuster sleeves.

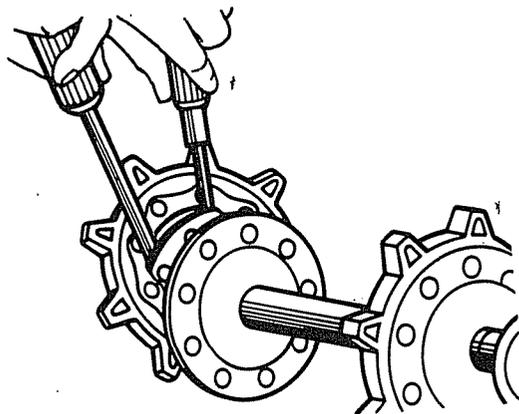
Withdraw rear axle from vehicle.

### DISASSEMBLY & ASSEMBLY

③ Idler wheels and sprockets are factory riveted. When separation is necessary, remove rivets securing idler with a 1/4" dia. bit.

To remove sprocket, apply liquid soap or petroleum jelly

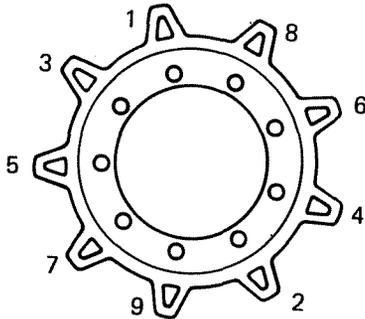
on sprocket bead and flange then with two (2) screwdrivers (round bars), pass the sprocket over flange. Reverse change-over procedure to install sprocket.



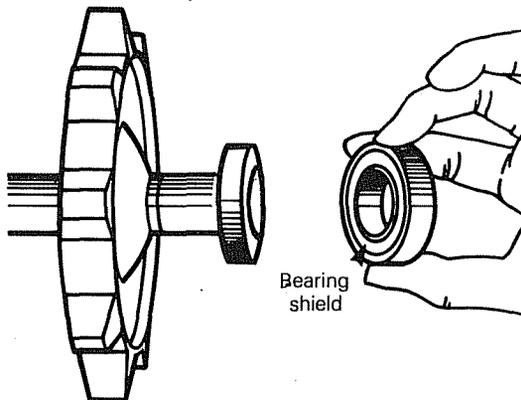
## SECTION 01 SUB-SECTION 03 (REAR AXLE)

Secure idler wheel and flanges using bolts and nuts tightened in the following sequence to 3.5 N•m (3 ft-lbs).

⑤⑥ Tightening torques for sprockets are 3.5 N•m (3 ft-lbs).



⑧ Always pull or push the bearing by inner race. Install bearing with shield facing the sprocket.



⑨ When assembling, always position a new seal. When inserting seals into link plate, seal lip must sit correctly in groove of link plate. After lubricating the rear axle, ensure that seals remain in position.

## INSTALLATION

With rear of vehicle off the ground, position the rear axle within the track.

Install sleeves, hardener washers and eye bolts.

Partially screw-in the track adjuster bolts.

Hook the link plate springs. If applicable, hook springs into middle position of 3 position anchors.

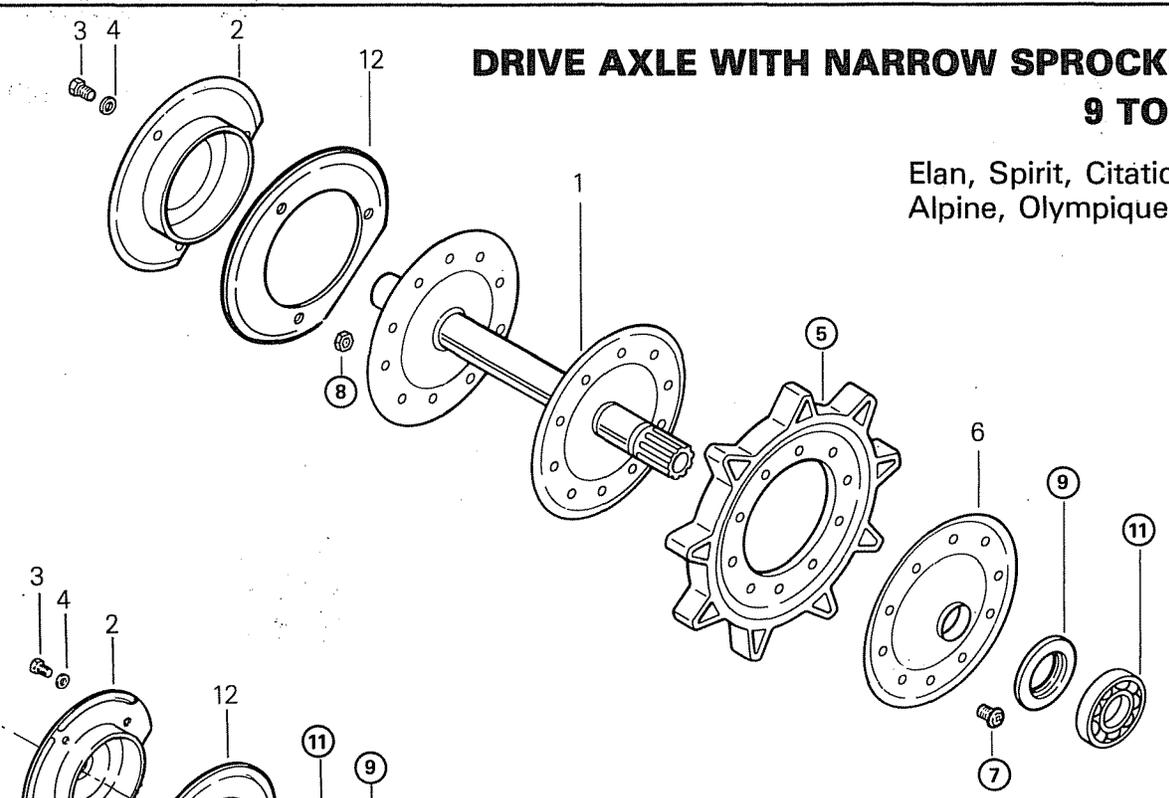
Install retainer washers and partially tighten the link plate spring lock nuts.

Carry out track tension and alignment.

# DRIVE AXLE

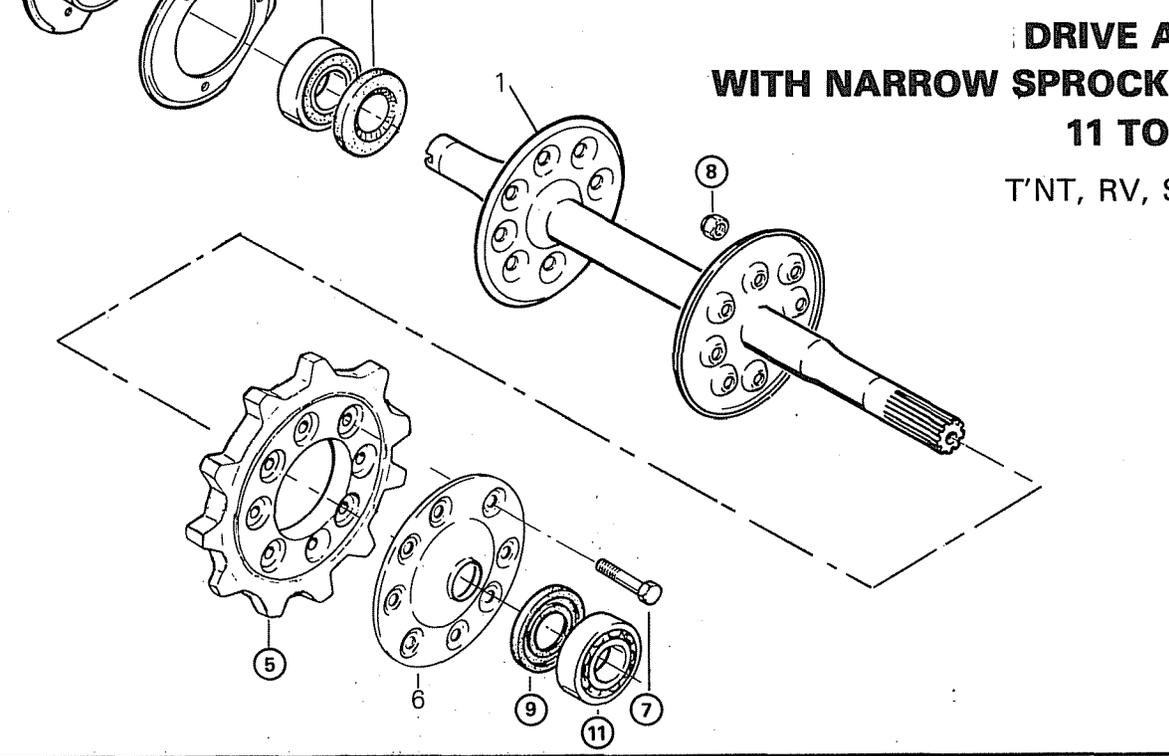
## DRIVE AXLE WITH NARROW SPROCKETS, 9 TOOTH

Elan, Spirit, Citation,  
Alpine, Olympique 300T



## DRIVE AXLE WITH NARROW SPROCKETS, 11 TOOTH

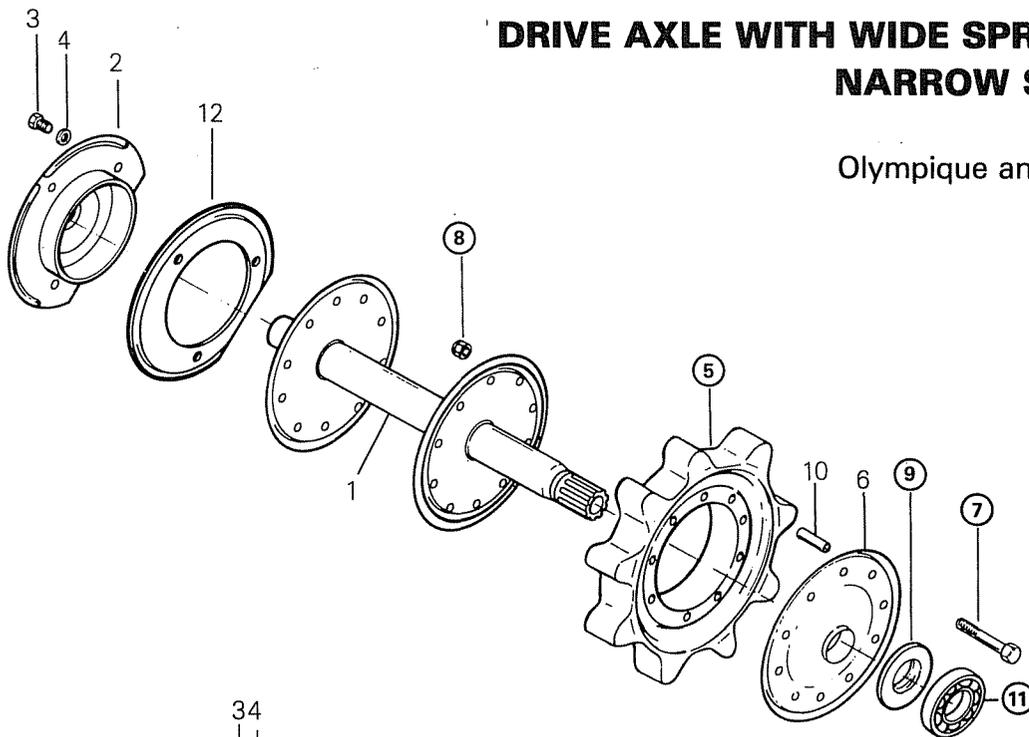
T'NT, RV, Sonic



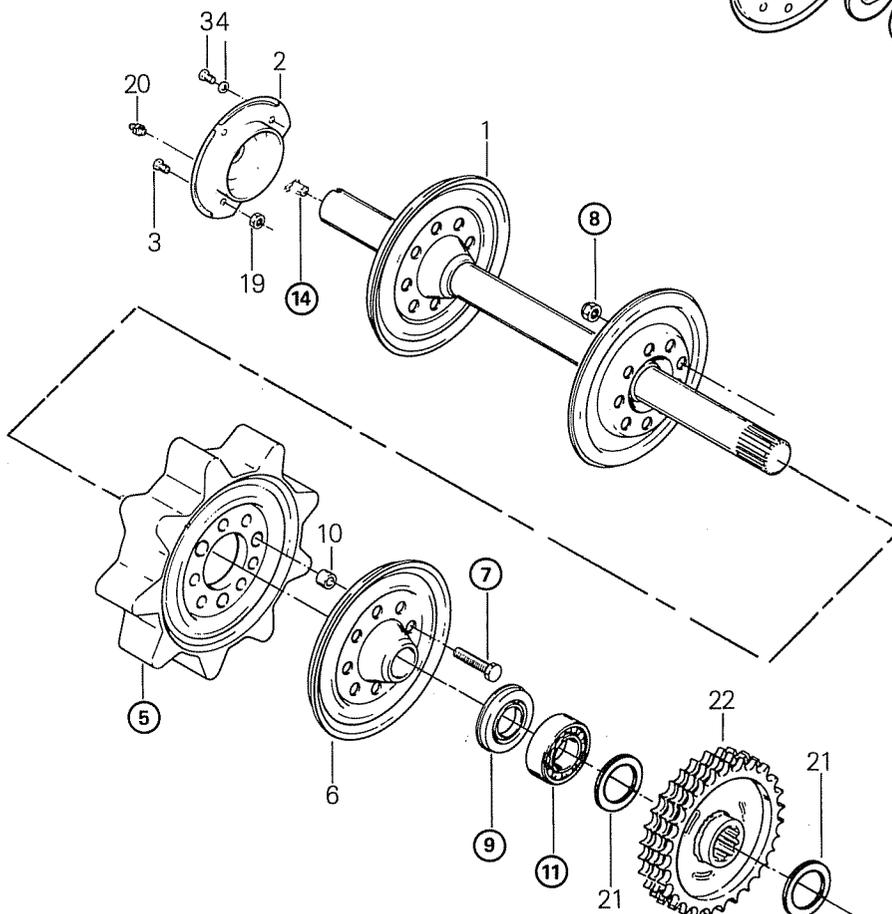
SECTION 01  
SUB-SECTION 04 (DRIVE AXLE)

**DRIVE AXLE WITH WIDE SPROCKETS,  
NARROW SPACERS**

Olympique and Nuvik 340

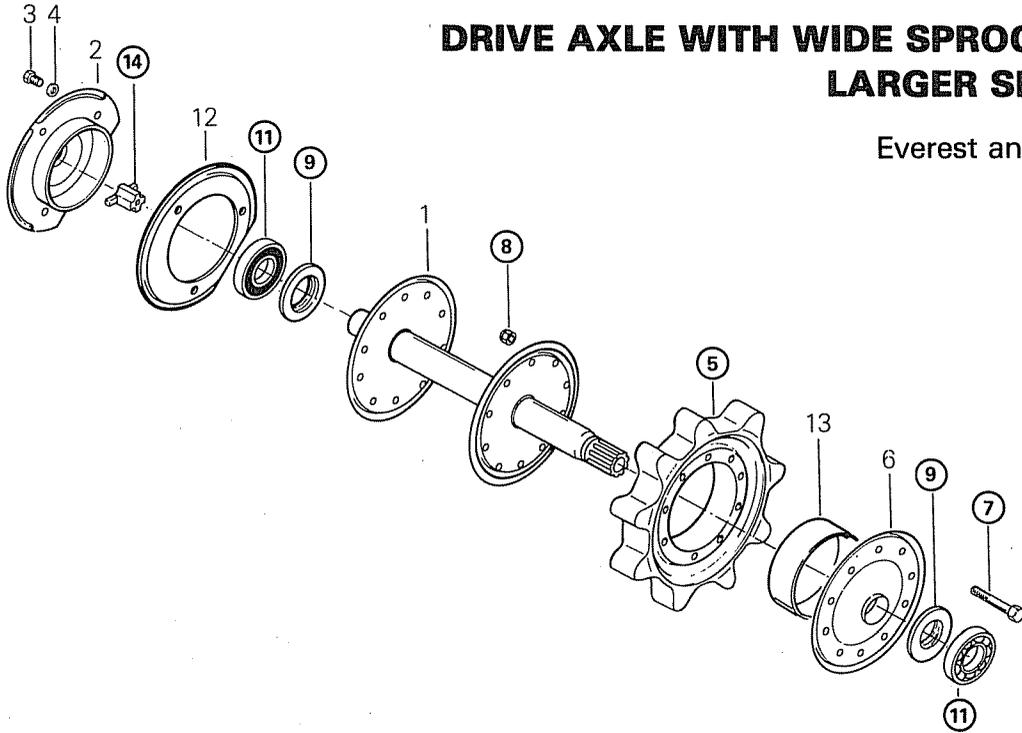


Elite 450 LC



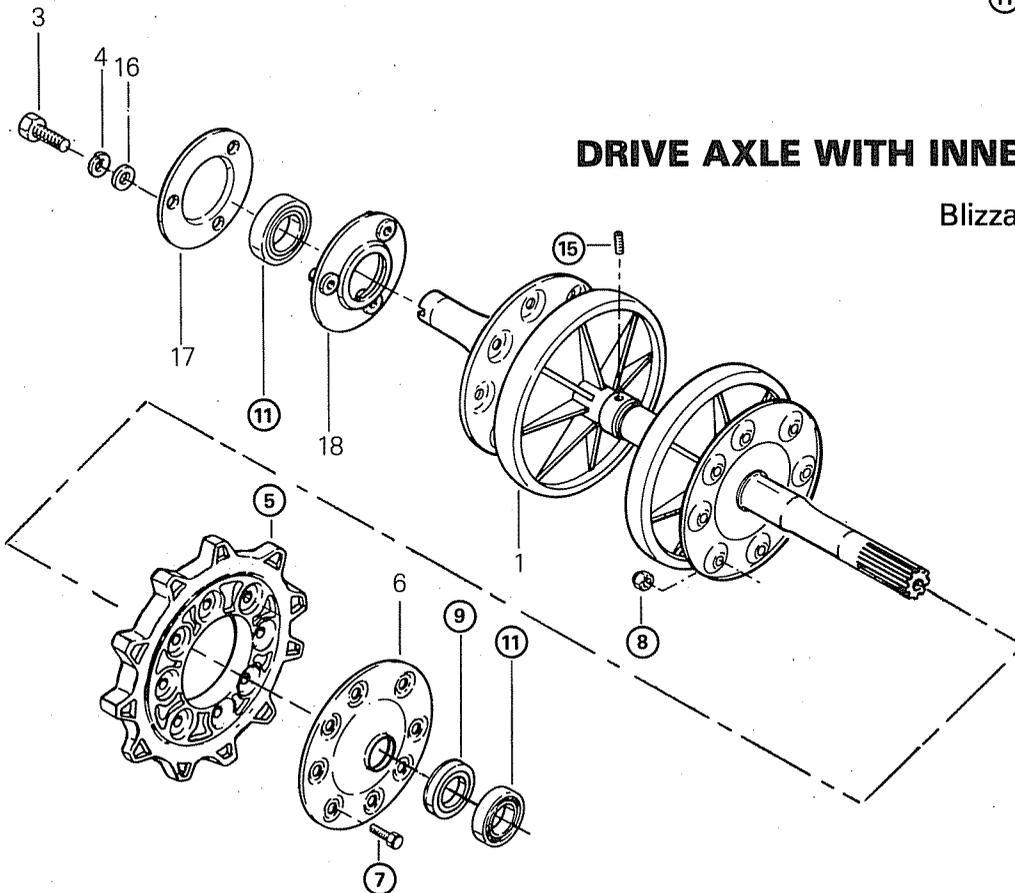
**DRIVE AXLE WITH WIDE SPROCKETS,  
LARGER SPACER**

Everest and Futura



**DRIVE AXLE WITH INNER IDLERS**

Blizzard 6500 Plus



## SECTION 01 SUB-SECTION 04 (DRIVE AXLE)

1. Drive axle
2. End bearing housing
3. Screw
4. Lock washer
5. Sprocket
6. Flange (sprocket)
7. Bolt
8. Nut
9. Oil seal
10. Spacer
11. Bearing
12. Retainer ring
13. Spacer
14. Speedo drive insert
15. Allen Screw
16. Flat washer
17. End bearing housing half (outer)
18. End bearing housing half (inner)
19. Nut
20. Grease fitting
21. Shim
22. Chaincase sprocket

### REMOVAL

Drain oil from chaincase or gear box. Release drive chain tension (if applicable).

Raise and block rear of vehicle off ground.

Remove suspension.

Pry oil seals from chaincase and end bearing housing.

Remove end bearing housing and chaincase if necessary.

**NOTE:** If applicable, remove battery and its seat. If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable.

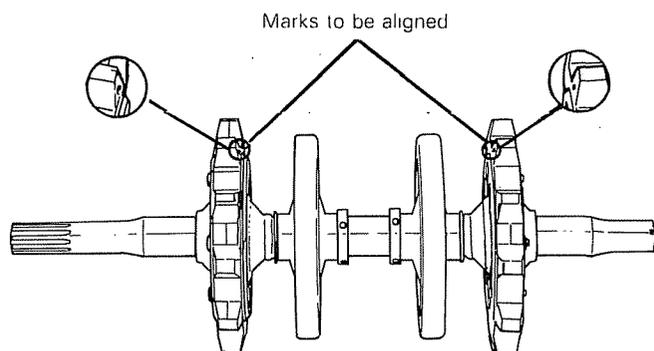
Release drive sprocket teeth from track notches, at the same time, pulling the drive axle towards the end bearing housing side of frame.

Remove drive axle from vehicle. If applicable, pull out shim located between bearing and lower chaincase sprocket.

### DISASSEMBLY & ASSEMBLY

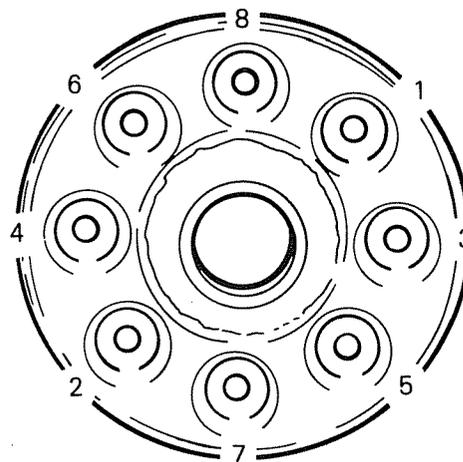
**5** Before securing sprockets and flanges, place axle assembly on an even surface and check alignment of sprocket teeth.

**NOTE:** Some models have aligning marks that are to be aligned.



**7** **8** Tightening torques for sprockets are: 3-4 N•m (2-3 ft-lbs) for narrow sprockets, and 5-7 N•m (4-5 ft-lbs) for wide sprockets.

When reassembling, install a new nut or apply "Loctite Lock'n Seal" (or equivalent) on old one threads. Tighten in the following sequence.



**9** When assembling drive axle, always position a new oil seal on each end of drive axle. The seal lip must face sprocket.

**11** Always pull or push bearing by inner race.

The bearing on the splined side of axle must be pushed until it is seated on bearing stop. The end bearing housing bearing must be flush with end of drive axle. Each bearing must have its shield facing the sprocket.

**14** If the drive axle to be installed is a new component, and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

**15** Tighten to 11 N•m (8 ft-lbs).

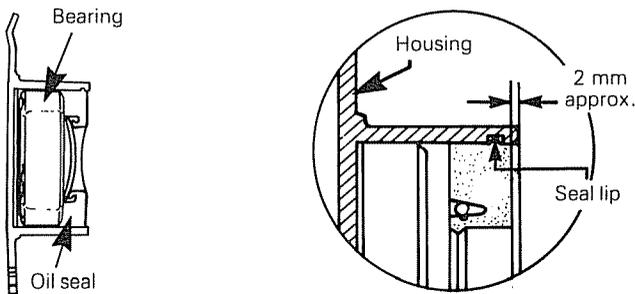
**NOTE:** Idler wheels must turn freely.

## INSTALLATION

If the drive axle to be installed is a new component and the vehicle is equipped with a speedometer, a speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

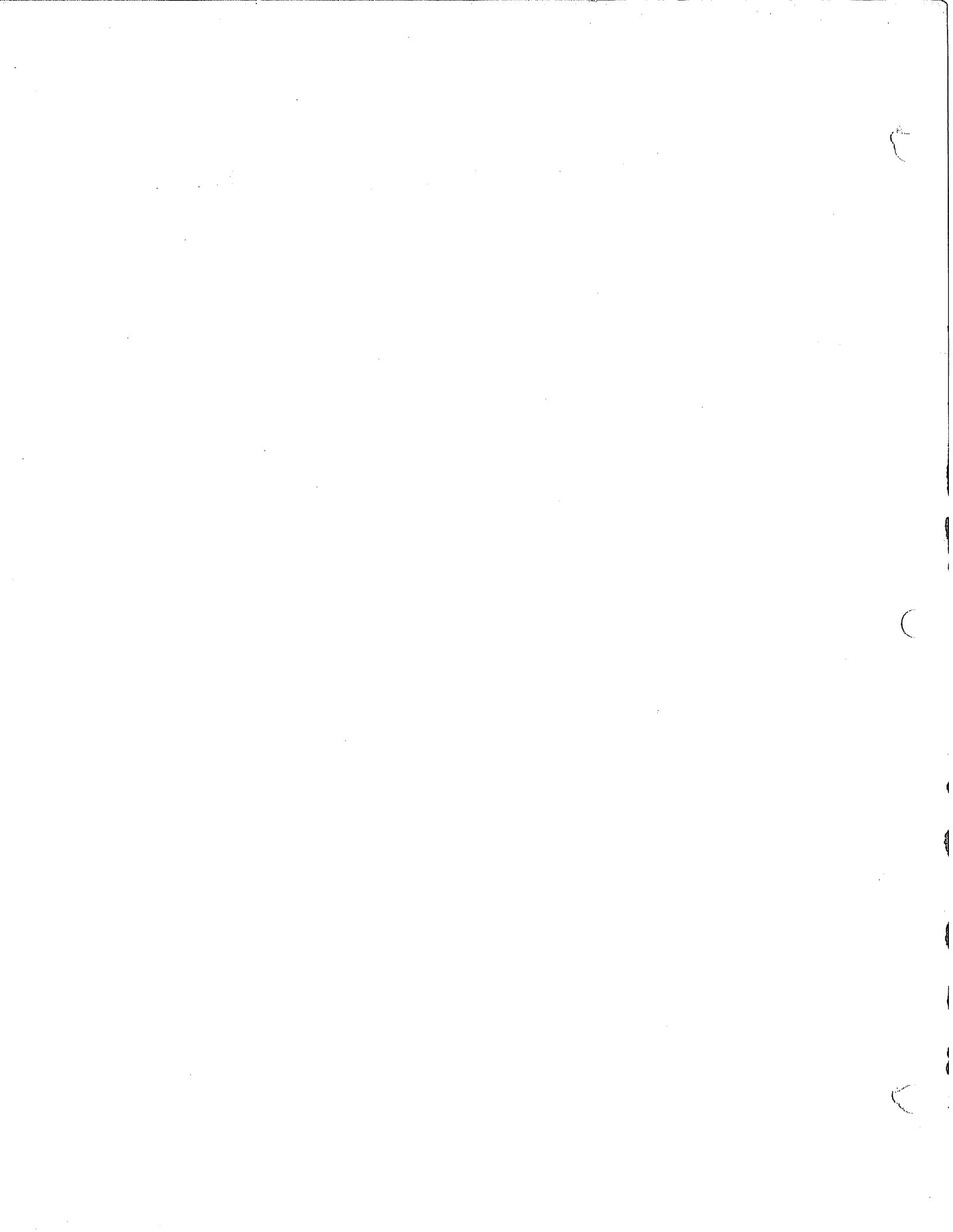
Position drive axle assembly into location. Install shim between bearing and lower chaincase sprocket. Install end bearing housing.

Install chaincase and position oil seals, making sure that a gap of approximately 2 mm (1/16") exists between end of bearing housing and each oil seal.



Replenish chaincase with oil, and check chain tension and pulley alignment.

Install suspension. Apply track tension and carry out track alignment procedure.



# TRACK

## TRACK TYPES APPLICATION

Refer to "Technical Data" section 08, 01-05.

## REMOVAL

- Raise and block rear of vehicle off the ground.
- Remove suspension system.
- Remove rear axle.
- Remove drive axle and withdraw the track from beneath the vehicle.

## INSPECTION

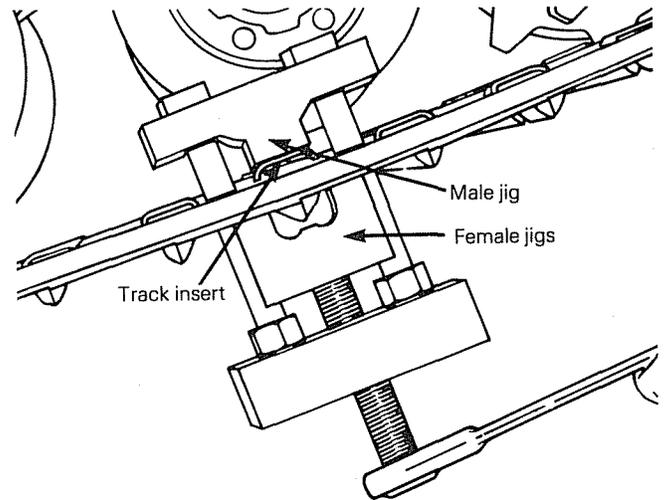
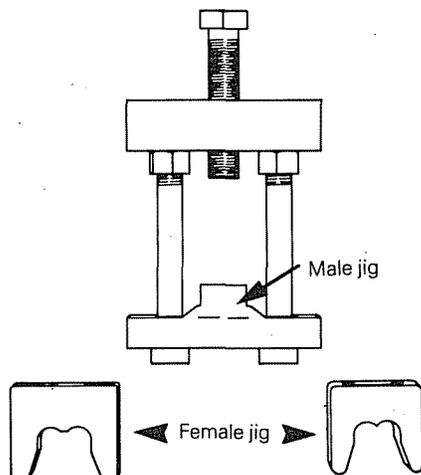
- Visually inspect track for cuts and abnormal wear.
- Inspect track for broken rods. If excessive damage is evident and rods are broken, replace track.
- Inspect track for damaged or missing inserts. Replace damaged insert(s).

**WARNING:** Never run a vehicle with a damaged track.

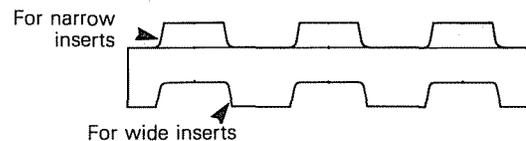
## TRACK INSERT INSTALLATION

Using N°. 419 0027 Tool.

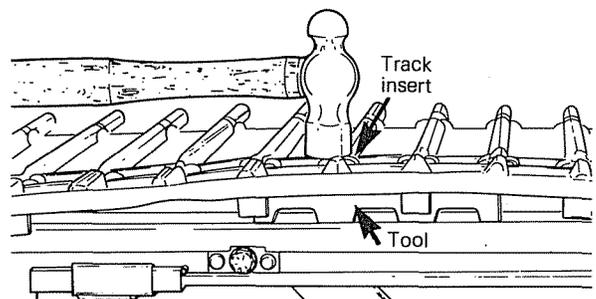
- Tilt vehicle on its side to expose the track notches then place insert into position.
- Place the track insert installer into track notches and position male jig on top of track insert.
- Tighten installer bolt until track insert is locked in place.



Using N°. 529 0026 Tool.



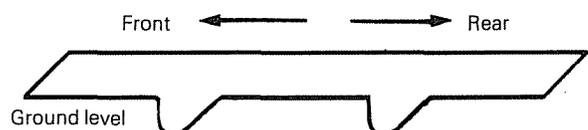
Place inserts into position and, with tool being under the inserts, tap them over the track using a hammer.



## INSTALLATION

Raise and block rear of vehicle off the ground. Position track beneath the vehicle frame tunnel.

**NOTE:** When installing the track, ensure the right angle of bearing surface of the track rib is facing the front of vehicle.



# SECTION 01

## SUB-SECTION 05 (TRACK)

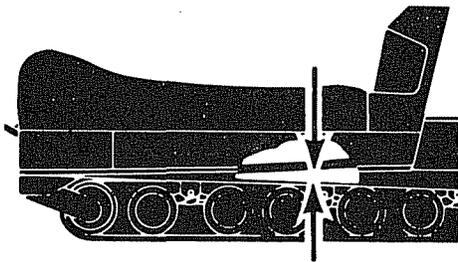
Install drive axle.  
If applicable, install rear axle. Install suspension system.  
Carry out track tension and alignment procedure.

### TRACK TENSION & ALIGNMENT

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

#### Tension (Bogie wheel), all except Alpine

With rear of vehicle blocked off the ground, check the track tension at middle set of bogie wheels as indicated in the Technical Data (Section 08, 01-05).



If applicable, ensure link plate springs are in the middle position of the 3 position slotted anchors.

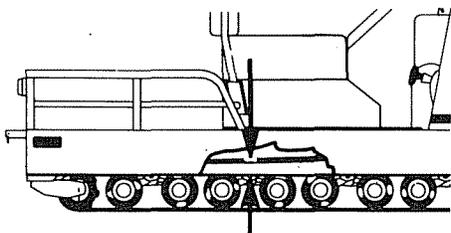
To correct track tension, loosen link plate spring lock nuts on inner side of link plate springs. Turn adjuster bolts clockwise to tighten track or counter-clockwise to slacken.

Tighten link plate spring lock nuts.

#### Tension (Bogie wheel), Alpine

With rear of vehicle blocked off the ground, check the tension of each track as indicated in Technical Data (Section 08, 01-05).

Deflection should be measured between top inside edge of track and center of bogie wheel set retaining bolt.

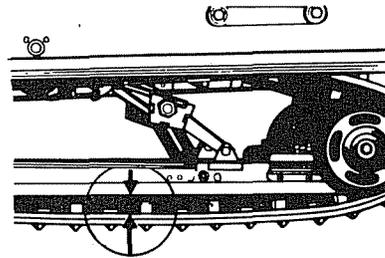


To correct track tension, loosen link plate spring lock nuts on inner side of link plate springs. Turn adjuster bolts clockwise to tighten track or counter-clockwise to slacken.

Tighten link plate spring lock nuts.

#### Tension (Slide Suspension)

With rear of vehicle blocked off the ground, check track tension as indicated in Technical Data (section 08, 01-02). Deflection should be measured between slider shoe and bottom inside of track.



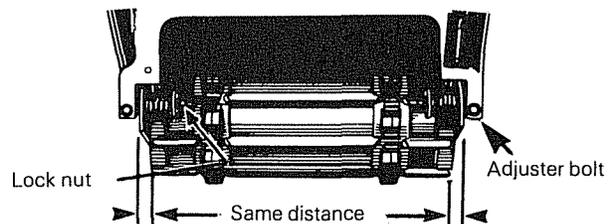
To adjust, loosen or tighten adjuster bolts located on inner side of rear idler wheels.

#### Alignment (Bogie Wheel)

With rear of vehicle supported off the ground, start engine and allow the track to rotate slowly.

Check if track is well centered and turns evenly on rear sprockets. Distance between edge of track and link plate must be equal on both sides. (If applicable, ensure link plate springs are in the middle position of the 3 position slotted anchors).

◆ **WARNING:** Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, feet, tools and clothing clear of track.

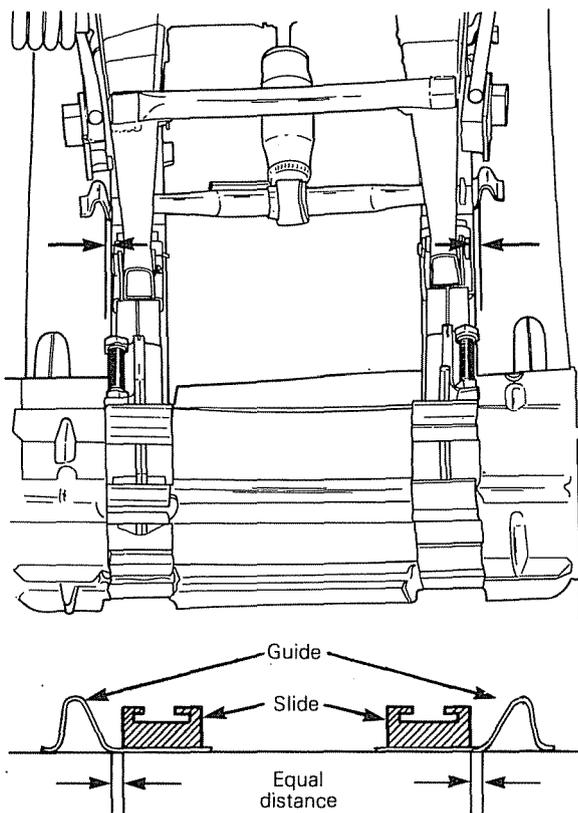


Rotate track slowly and recheck alignment and tension. To correct alignment, loosen link plate spring lock nut on side where track is closest to the link plate. Turn track adjuster bolt on same side, clockwise until track re-aligns. Tighten link plate spring lock nut.

### Alignment (Slide Suspension)

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that track is well centered and turns evenly. To correct, stop engine then loosen the lock nuts and tighten the adjuster bolt on side where guides are closest to slide. Tighten lock nuts and recheck alignment.



◆ **WARNING:** Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

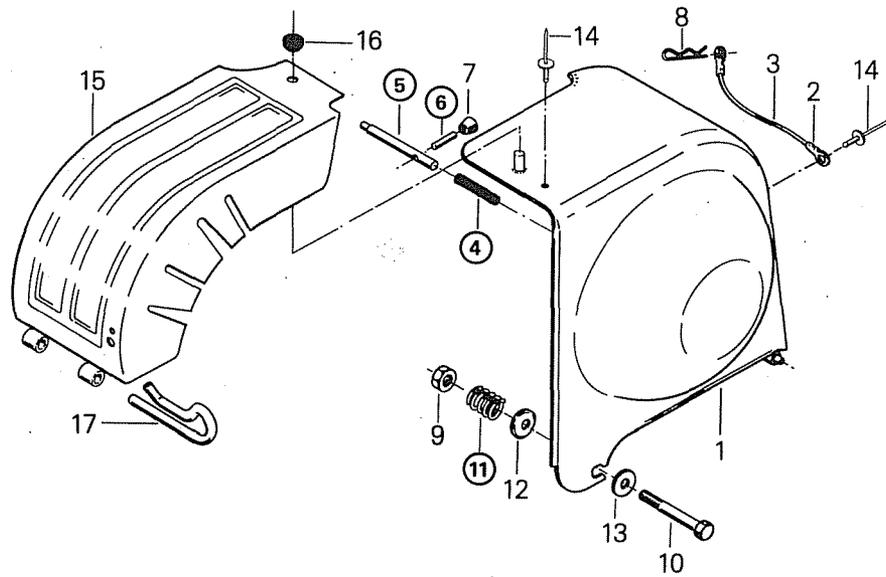
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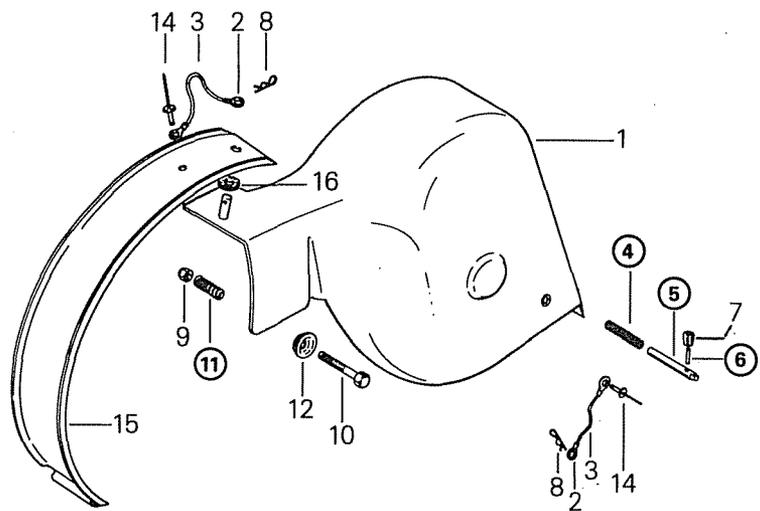
# PULLEY GUARD

## ELAN AND SPIRIT



## ALPINE

1. Drive pulley guard
2. Open barrel
3. Wire
4. Spring (pin)
5. Pin
6. Spirol pin
7. Cap
8. Hair pin cotter
9. Clip nut
10. Bolt
11. Spring
12. Retainer washer
13. Flat washer
13. Rivet
15. Driven pulley guard
16. Grommet
17. Hair pin cotter



## SECTION 02 SUB-SECTION 01 (PULLEY GUARD)

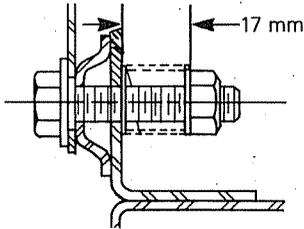
### REMOVAL

Pull out hair pin cotters and remove driven pulley guard. Pull on spring to disengage pin from frame bracket, in order to disengage drive pulley guard.

◆ **WARNING: Never start engine until pulley guard is well installed.**

④ The length of uncompressed pin spring should not be less than 47 mm (1 7/8").

⑪ An uncompressed front guard spring should not be less than 20 mm (13/16"). When assembling adjust length to 17 mm (11/16").

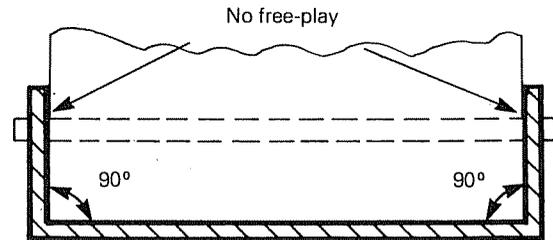


### INSPECTION

⑥ Check condition of coil pin. If damaged, replace.

### INSTALLATION

Prior to installation, ensure that pulley guard and frame bracket are 90° with frame.



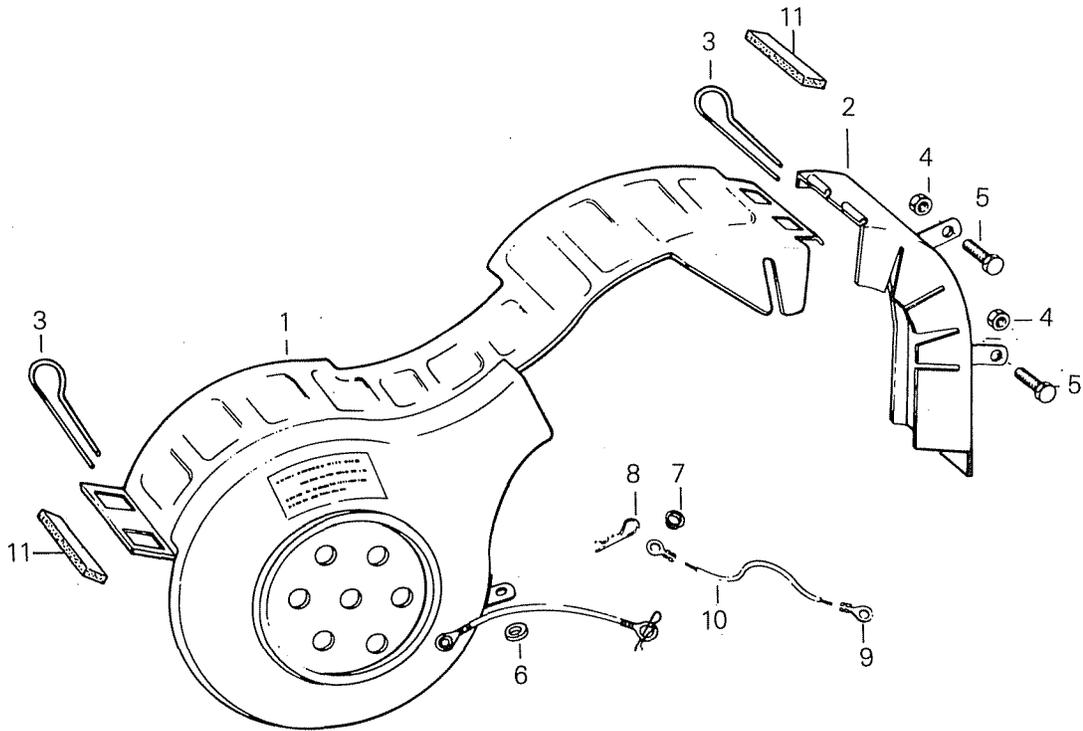
◆ **WARNING: No lateral free-play should exist between drive pulley guard and frame bracket.**

Slide pulley guard into bracket.

Pull on lower spring bolt, engage pin into frame bracket and install hair pin cotter.

Install driven pulley guard.

**OLYMPIQUE, NUVIK, CITATION**



- 1. Drive pulley guard
- 2. Driven pulley guard
- 3. Hair pin
- 4. Nut
- 5. Bolt
- 6. Rubber spacer

- 7. Eyelet
- 8. Hair pin
- 9. Open barrel terminal
- 10. Wire
- 11. Rubber strip

**REMOVAL**

Remove the three (3) hair pins then remove drive pulley guard.

○ **NOTE:** If necessary to remove driven pulley guard, remove bolts and nuts securing it to frame.

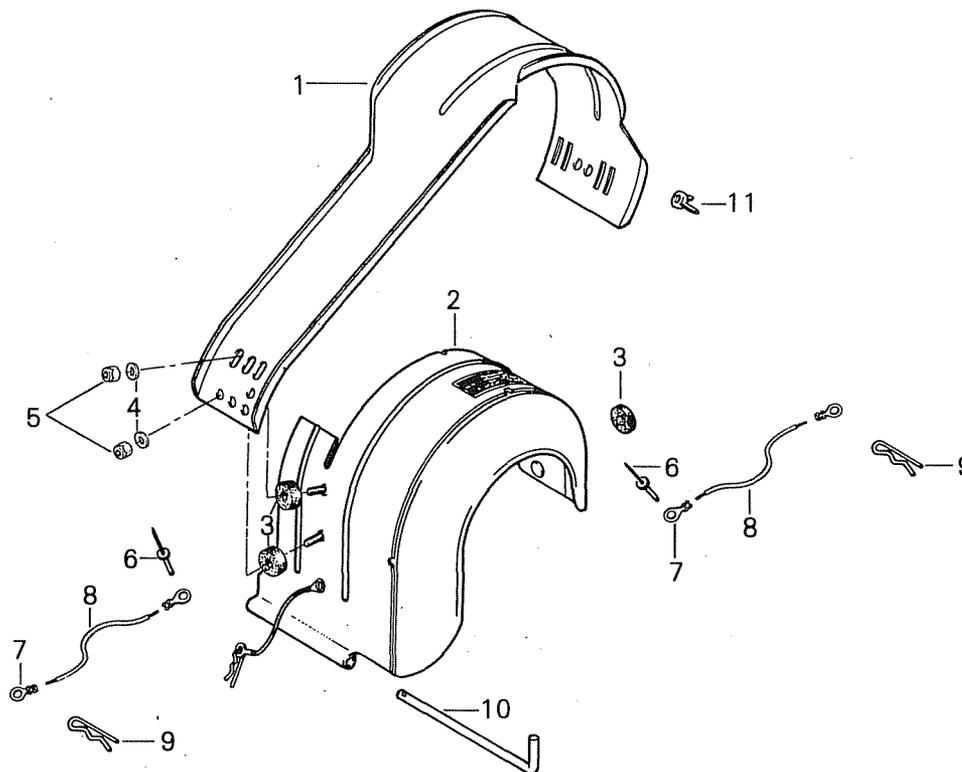
◆ **WARNING:** Never start engine until pulley guard is well installed, and cab is closed.

**INSPECTION**

Check general condition of parts. If damaged, replace.

SECTION 02  
SUB-SECTION 01 (PULLEY GUARD)

**EVEREST, FUTURA, T'NT**

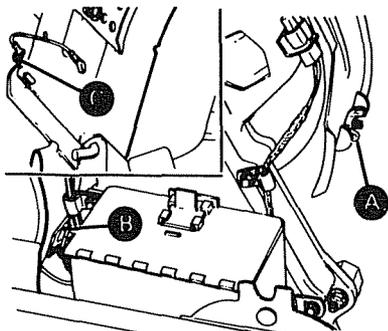


- 1. Driven pulley guard
- 2. Drive pulley guard
- 3. Rubber washer
- 4. Washer
- 5. Nut
- 6. Rivet

- 7. Open barrel terminal
- 8. Wire
- 9. Hair pin
- 10. Retainer pin
- 11. Wing nut

**REMOVAL**

Unscrew wing nut (A) and pull out hair pins (B & C).



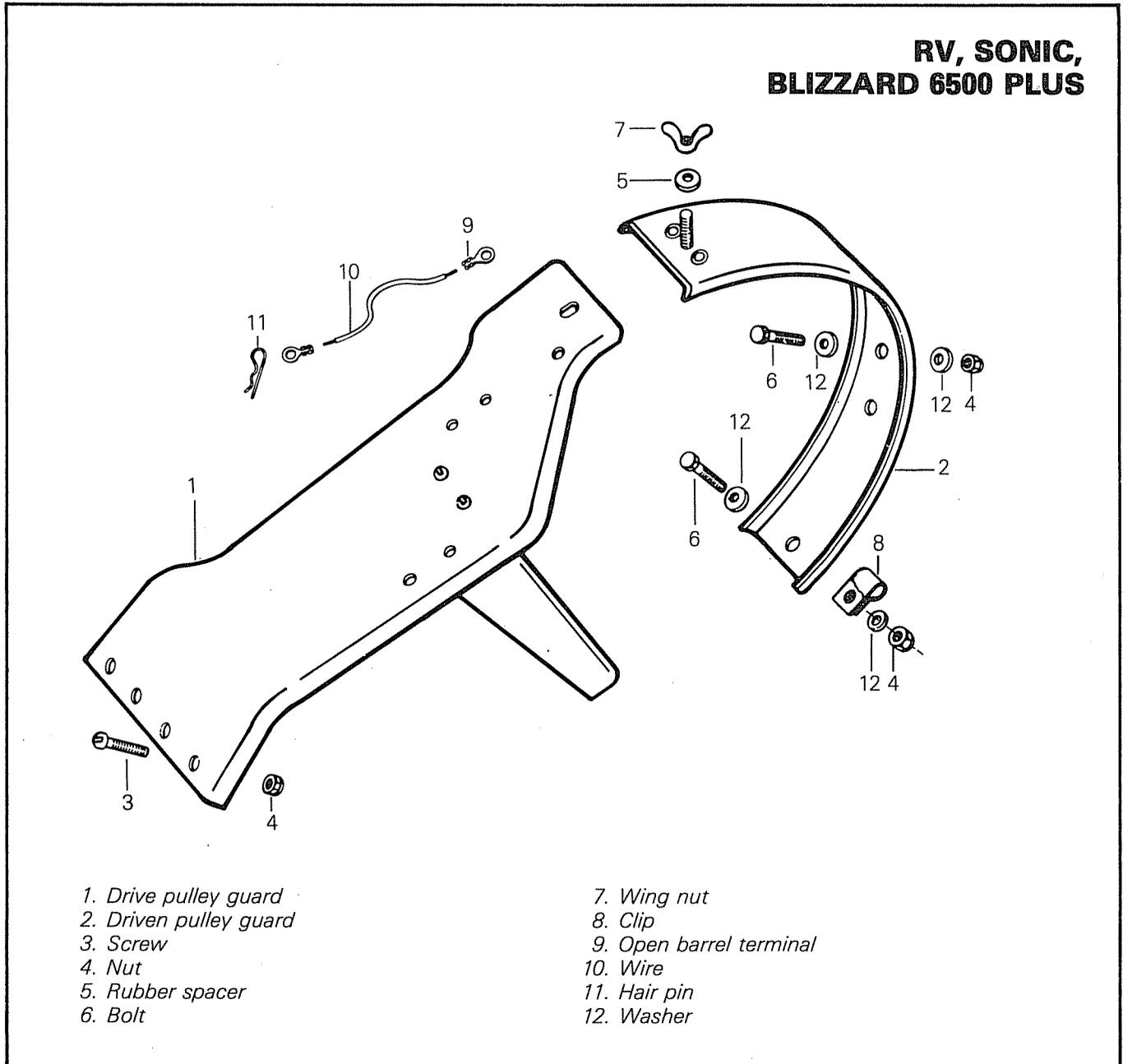
Disengage guard from rear and middle brackets then disengage retainer pin from front bracket.

◆ **WARNING: Never start engine until pulley guard is well installed, and cab is closed.**

**INSPECTION**

Check general condition of parts. If damaged, replace.

**RV, SONIC,  
BLIZZARD 6500 PLUS**



**REMOVAL**

To tilt drive pulley guard, remove hair pin then wing nut.

○ **NOTE:** If necessary to remove drive or driven pulley guard, remove bolts and nuts securing it to frame.

◆ **WARNING:** Never start engine until pulley guard is well installed, and cab is closed.

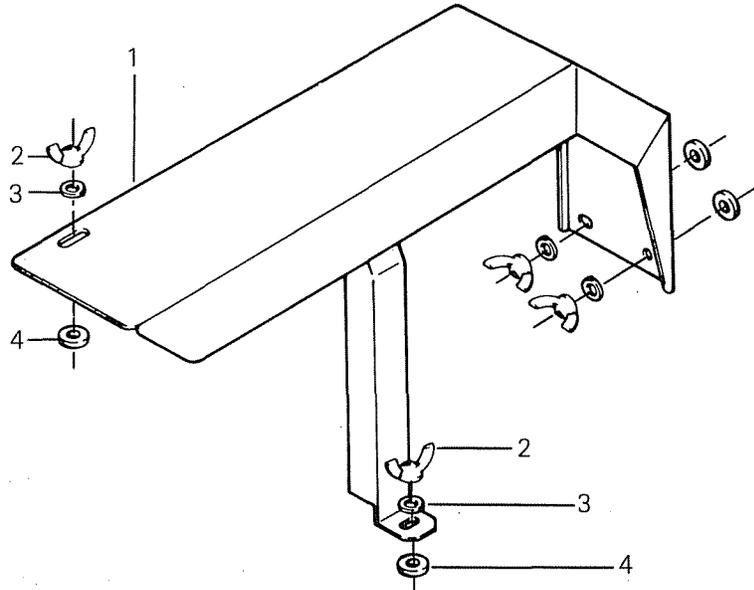
**INSPECTION**

Check general condition of parts. If damaged, replace.

SECTION 02  
SUB-SECTION 01 (PULLEY GUARD)

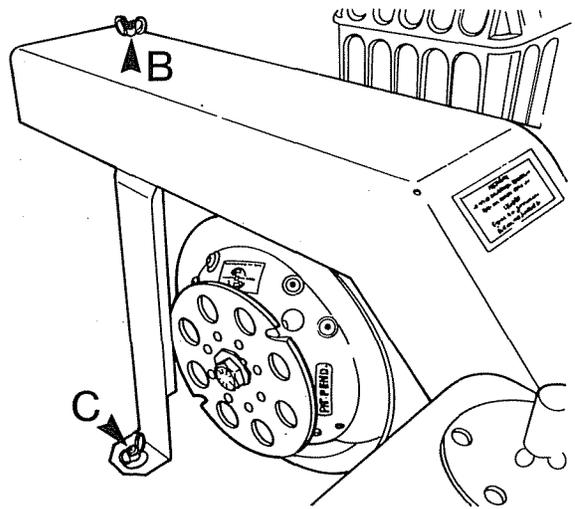
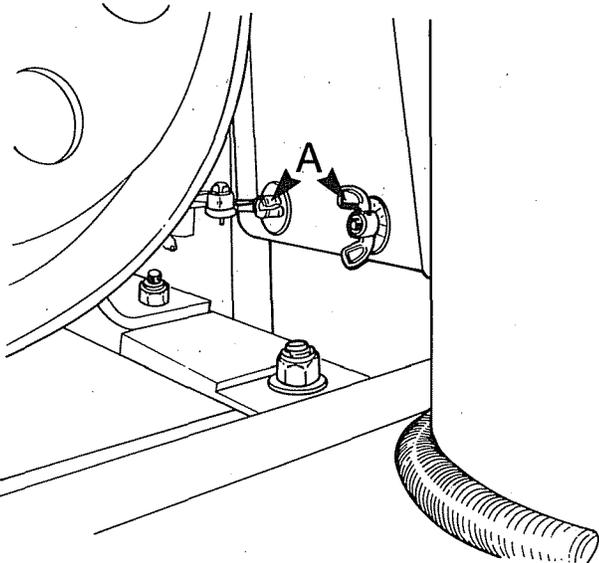
**ELITE**

- 1. Pulley guard
- 2. Wing nut
- 3. Washer
- 4. Rubber spacer



**REMOVAL**

Lift and support the engine compartment hood. Unscrew the wing nuts (A) located behind the drive pulley, the wing nut (B) on top of pulley guard and the wing nut (C) at the pulley guard center support.



Disengage guard with a forward movement and remove complete assembly.

◆ **WARNING:** Engine should be running only when pulley guard is secured in place and cab is closed.

**INSPECTION**

Check general condition of parts. If damaged, replace.

## DRIVE BELT

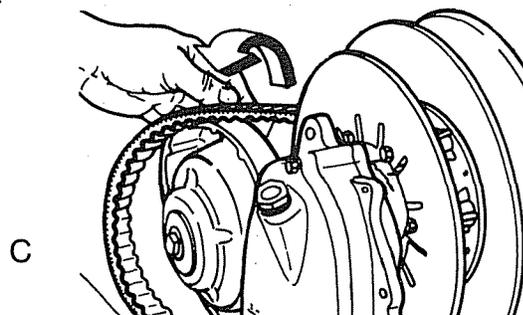
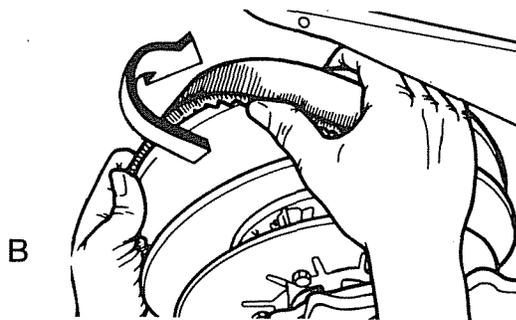
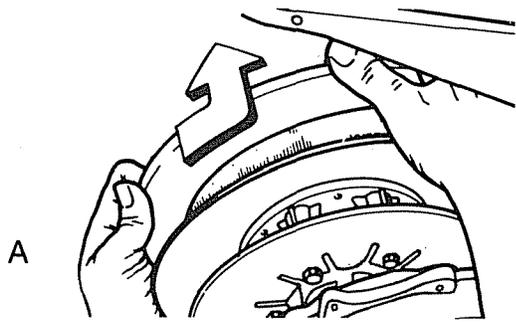
### REMOVAL & INSTALLATION

When removing a drive belt, always mark the rotation direction. Reinstall in same direction.

#### Drive Belt Removal

Tilt cab and remove pulley guard. Open driven pulley by twisting and pushing the sliding half. Hold in open position then slip slackened belt over top edge of pulley. Slip belt from drive pulley.

◆ **WARNING:** Never start or run engine without drive belt installed.



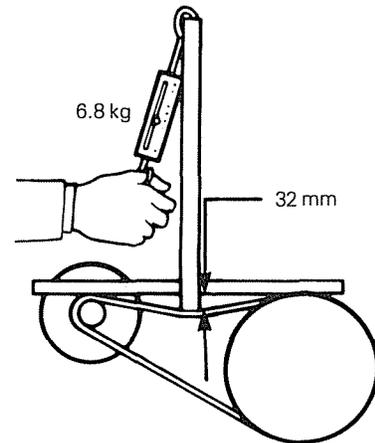
### TENSION ADJUSTMENT

For proper drive belt use, See Technical Data.

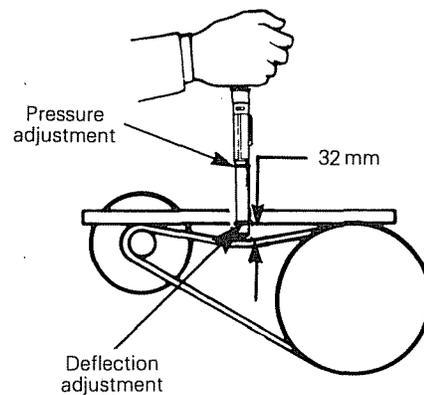
If a drive belt does not have the minimum recommended width, performance will be affected.

#### Adjust belt tension as follows:

Position a reference rule on drive belt. Using a wooden stick and fish scale, apply a 6.8 kg (15 pounds) pressure on drive belt. Deflection must be 32 mm (1 1/4"). To correct, decrease or increase distance between pulleys.

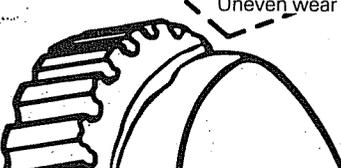
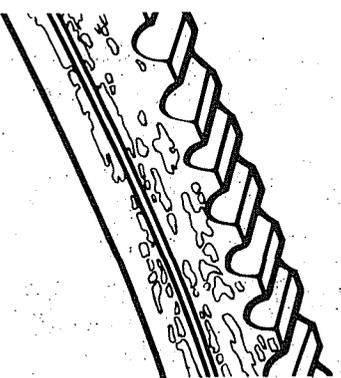
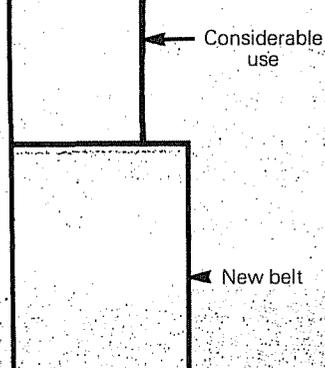
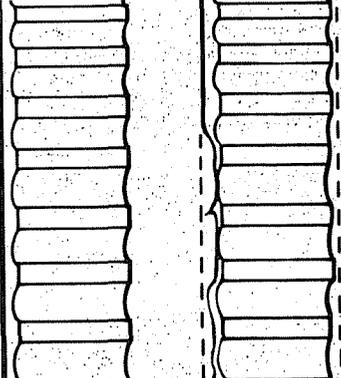


Or using no. 414 3482 tool:

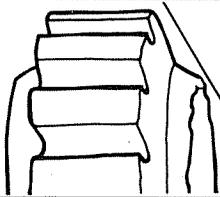
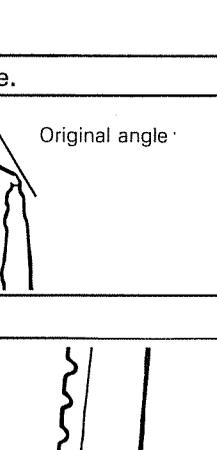
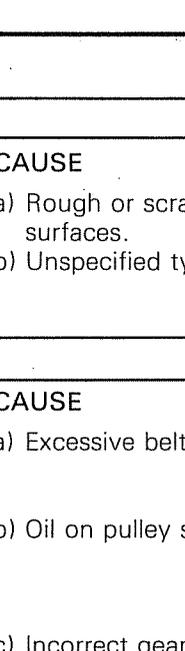
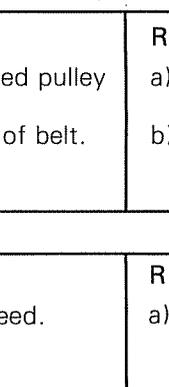
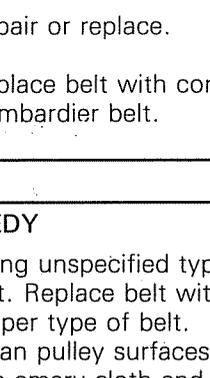


SECTION 02  
SUB-SECTION 02 (DRIVE BELT)

TROUBLE SHOOTING

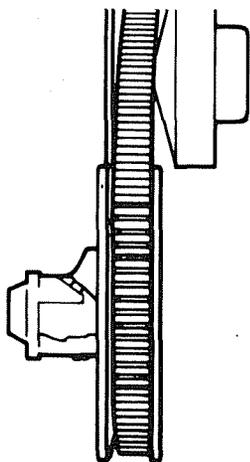
1. Uneven belt wear on one side only.		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Loose engine mount.</li> <li>b) Pulley misalignment.</li> <li>c) Rough or scratched pulley surfaces.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Tighten engine mount nuts equally.</li> <li>b) Align pulleys.</li> <li>c) Repair or replace pulley half.</li> </ul>
2. Belt glazed excessively or having baked appearance.		
	<p><b>CAUSE</b></p> <p>Excessive slippage caused by:</p> <ul style="list-style-type: none"> <li>a) Insufficient pressure on belt sides.</li> <li>b) Rusted drive or driven pulley shafts.</li> <li>c) Oil on pulley surfaces.</li> <li>d) Incorrect centrifugal governor.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Check drive pulley for worn or missing flyweights/rollers.</li> <li>b) Clean shaft with steel wool and lubricate with low temperature grease.</li> <li>c) Clean pulley surfaces with fine emery cloth and clean cloth.</li> <li>d) Install correct governor.</li> </ul>
3. Belt worn excessively in top width.		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Excessive slippage due to irregular outward actuation movement of drive pulley.</li> <li>b) Rough or scratched pulley surfaces.</li> <li>c) Improper belt angle.</li> <li>d) Considerable use.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Carry out inspection.</li> <li>b) Repair or replace pulley.</li> <li>c) Using unspecified type of belt. Replace belt with correct Bombardier belt.</li> <li>d) Replace belt if 3 mm (1/8") less than recommended width (see Technical Data).</li> </ul>
4. Belt worn narrow in one section.		
	<p><b>CAUSE</b></p> <p>Excessive slippage in drive pulley caused by:</p> <ul style="list-style-type: none"> <li>a) Frozen or too tight track.</li> <li>a) Drive pulley not functioning properly.</li> <li>c) Engine idle speed too high.</li> <li>d) Incorrect belt length.</li> <li>e) Incorrect pulley distance.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Liberate track from ice or check track tension and alignment.</li> <li>b) Repair or replace drive pulley.</li> <li>c) Reduce engine RPM.</li> <li>d) Using unspecified type of belt. Replace belt with correct Bombardier belt.</li> <li>e) Readjust to specifications.</li> </ul>

**SECTION 02**  
**SUB-SECTION 02 (DRIVE BELT)**

<b>5. Belt sides worn concave.</b>		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Rough or scratched pulley surfaces.</li> <li>b) Unspecified type of belt.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Repair or replace.</li> <li>b) Replace belt with correct Bombardier belt.</li> </ul>
<b>6. Belt desintegration.</b>		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Excessive belt speed.</li> <li>b) Oil on pulley surfaces.</li> <li>c) Incorrect gear ratio.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Using unspecified type of belt. Replace belt with proper type of belt.</li> <li>b) Clean pulley surfaces with fine emery cloth and lubricate with low temperature grease.</li> </ul> <p>Install specified sprocket (correct gear ratio).</p>
<b>7. Belt edge cord breakage.</b>		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Pulley misalignment.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Align pulleys.</li> </ul>
<b>8. Flex cracks between cogs.</b>		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Considerable use, belt wearing out.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Replace belt.</li> </ul>
<b>9. Sheared cogs, compression section fracture or torn.</b>		
	<p><b>CAUSE</b></p> <ul style="list-style-type: none"> <li>a) Improper belt installation.</li> <li>b) Belt rubbing stationary object on pulleys.</li> <li>c) Violent engagement of drive pulley.</li> </ul>	<p><b>REMEDY</b></p> <ul style="list-style-type: none"> <li>a) Refer to Installation section.</li> <li>b) Check drive components.</li> <li>c) Grease, replace spring or drive pulley.</li> </ul>

SECTION 02  
SUB-SECTION 02 (DRIVE BELT)

10. Belt "Flip-Over" at high speed.



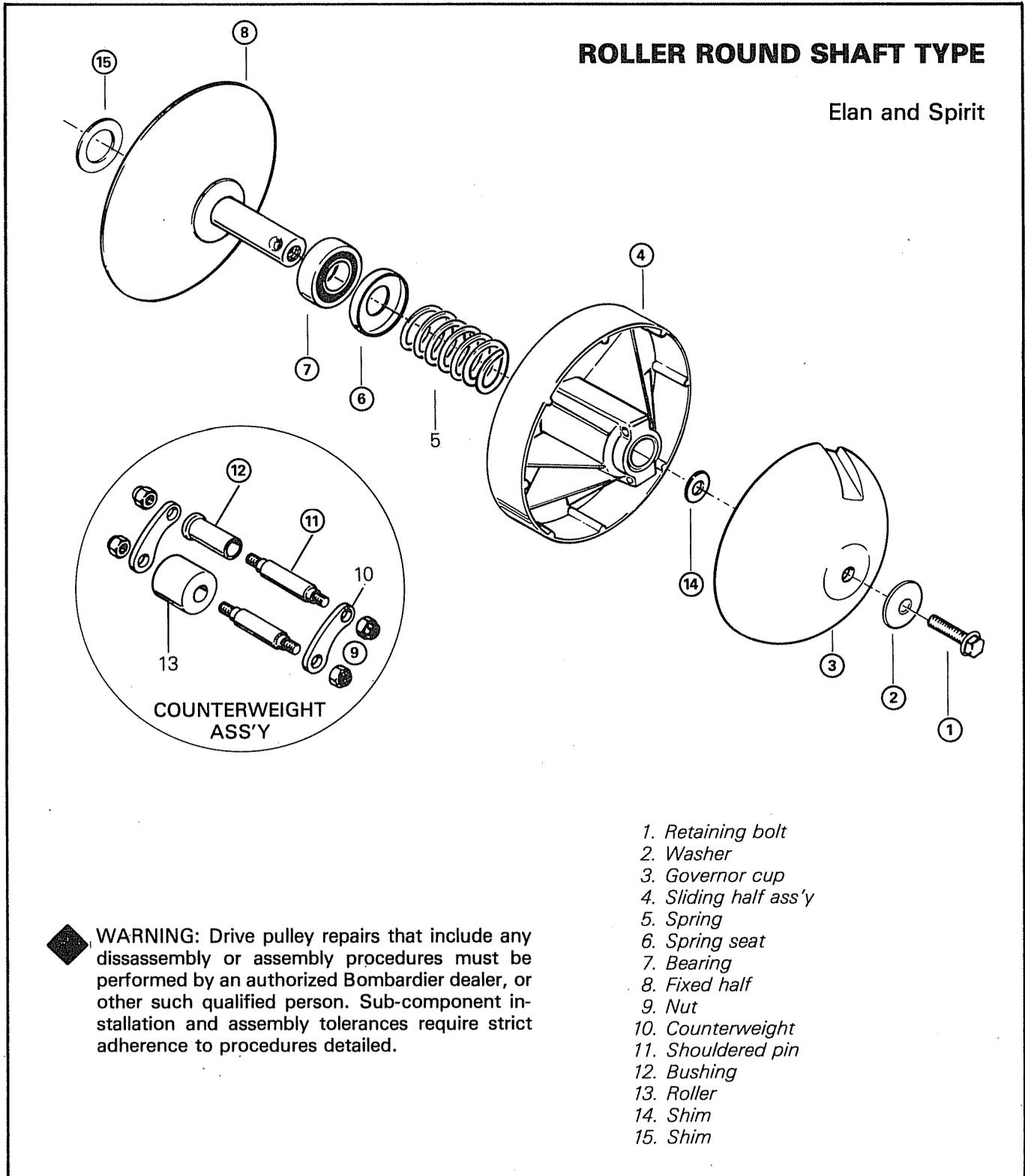
**CAUSE**

- a) Pulley misalignment.
- b) Belt excessive speed.
  
- c) Incorrect sprocket ratio.

**REMEDY**

- a) Align pulleys.
- b) Using unspecified type of belt. Replace belt with correct Bombardier belt.
- c) Install specified sprocket (correct gear ratio).

## DRIVE PULLEY



## SECTION 02

### SUB-SECTION 03 (DRIVE PULLEY)

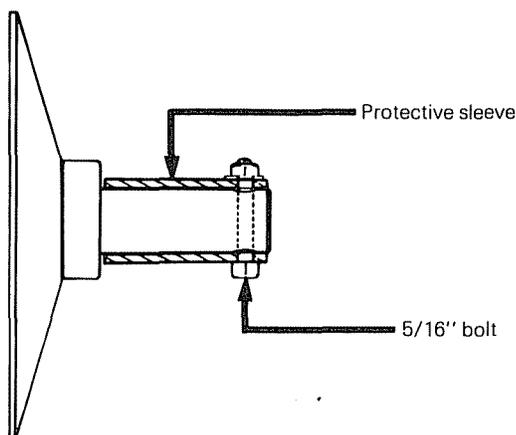
## REMOVAL

With engine cold, remove spark plug(s) then bring P.T.O. (Power Take Off) piston at T.D.C. (Top Dead Center) position.

Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

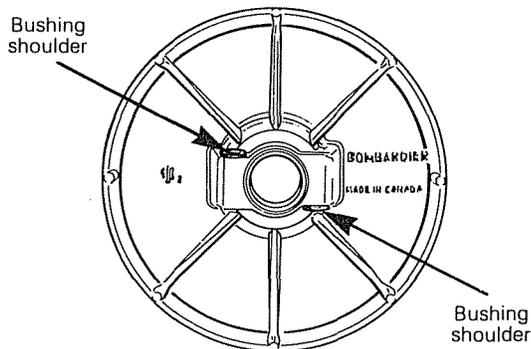
**WARNING:** Spring pressure can force assembly apart; therefore, it is imperative that the governor cup be held firmly during governor retaining bolt removal.

If necessary to remove fixed half, slide a length of steel pipe over shaft. Attach with a 5/16" nut and bolt, as illustrated. The fixed half can then be removed with a pipe wrench.



## DISASSEMBLY & ASSEMBLY

- ① At assembly, lubetorque bolt to 61 N•m (45 ft-lbs).
- ④⑫ Shouldered pin bushings must be installed in sliding half as per illustration.



- ⑦ Bearing is replaceable and can be removed and installed with a standard puller and pusher.

- ⑨⑪ Apply Loctite 242 or equivalent on threads then torque nuts to 14 N•m (10 ft-lbs).

**CAUTION:** Do not disassemble counterweight unless replacement is necessary.

- ⑭ As required, maximum of two (2). Used to obtain a neutral function of the drive pulley when engine is idling: refer to INSTALLATION.

- ⑮ Used to obtain correct pulley alignment, refer to section 02-05.

## CLEANING

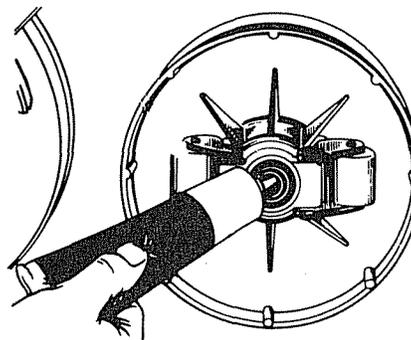
Clean pulley faces and shaft with fine steel wool and dry cloth. Clean sliding half bushing with clean dry cloth.

## INSTALLATION

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope.

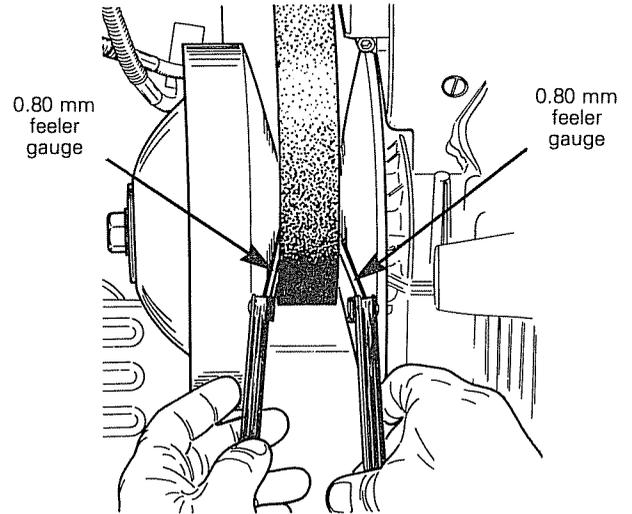
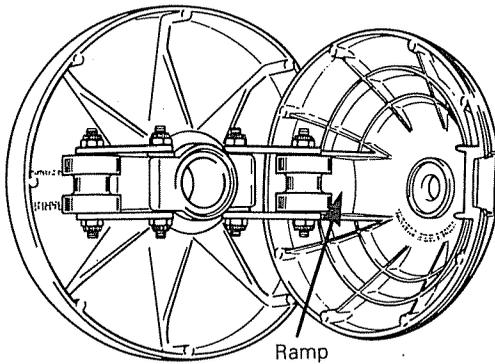
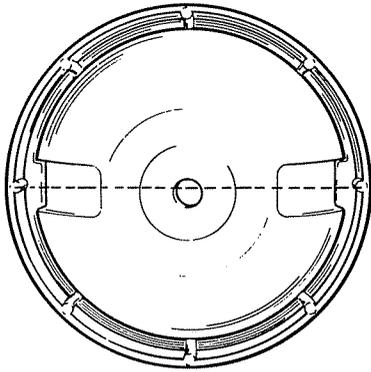
Clean crankshaft extension threads and apply Loctite 242 or equivalent then install fixed half on extension.

Pack inside of pulley shaft with High Performance Drive Pulley Lubricant.



SECTION 02  
SUB-SECTION 03 (DRIVE PULLEY)

Install governor cup correctly as per illustration making sure that the rollers are sliding on their ramp.



Shim ⑭ located between governor cup and drive pulley shaft will help you to obtain correct adjustment. Use not more than two (2) shims.

Position retaining bolt then lube torque to 61 N•m (45 ft-lbs).

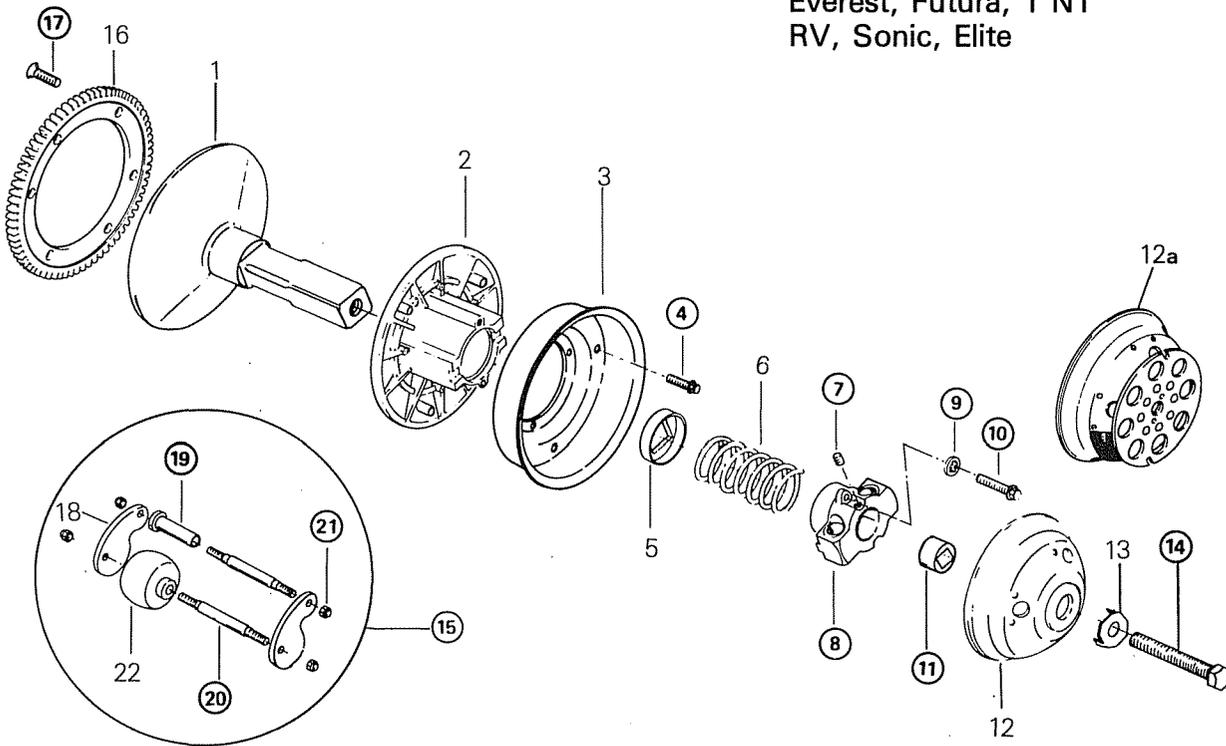
◆ **WARNING:** Shim(s) ⑭ is(are) used to obtain a neutral fonction of the drive pulley when engine is idling. Proceed as follows when retaining bolt is torqued:

With a **new** drive belt installed, you should be able to insert a minimum of 0.80 mm (.030") thick feeler gauge on each side of the drive belt simultaneously when pushing drive belt to sit on bearing.

SECTION 02  
 SUB-SECTION 03 (DRIVE PULLEY)

**ROLLER SQUARE SHAFT WITH DURALON BUSHING**

Olympique, Nuvik, Citation,  
 Everest, Futura, T'NT  
 RV, Sonic, Elite

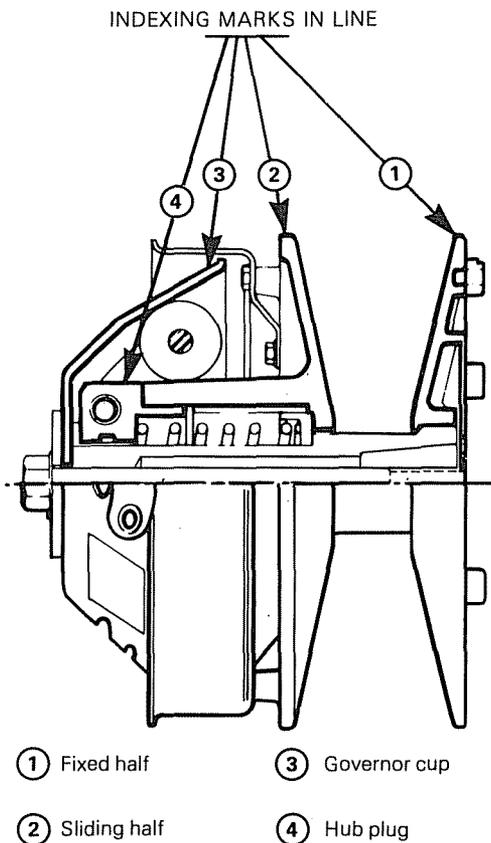


- |                              |                                 |
|------------------------------|---------------------------------|
| 1. Fixed half                | 12a. Elite model                |
| 2. Sliding half              | 13. Locking tab                 |
| 3. Guard                     | 14. Retaining bolt              |
| 4. Bolt                      | 15. Counterweight ass'y         |
| 5. Spring seat               | 16. Ring gear (electric models) |
| 6. Spring                    | 17. Screw                       |
| 7. Allen screw               | 18. Counterweight               |
| 8. Hub plug                  | 19. Bushing                     |
| 9. Internal tooth lockwasher | 20. Shouldered pin              |
| 10. Bolt                     | 21. Nut                         |
| 11. "Duralon" bushing        | 22. Roller                      |
| 12. Governor cup             |                                 |

◆ **WARNING:** Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

## REMOVAL

Some pulley components are marked to insure proper assembly. If components lack such marks, marking should be done manually before disassembly, as per illustration.



With engine cold, remove spark plugs then bring P.T.O. (Power Take Off) piston at T.D.C. (Top Dead Center) position. Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

Open tab lock and remove retaining bolt. Remove sliding half assembly and governor cup.

It is necessary to remove fixed half, use drive pulley puller (See Tool Section).

○ **NOTE:** On Citation model, fixed half is screwed in. To remove it, use a 1 1/8" wrench on the square section, closely held against hub.

Remove starter rope blocking piston, then reblock piston after having turned 45° counter-clockwise from T.D.C. position.

Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

## DISASSEMBLY & ASSEMBLY

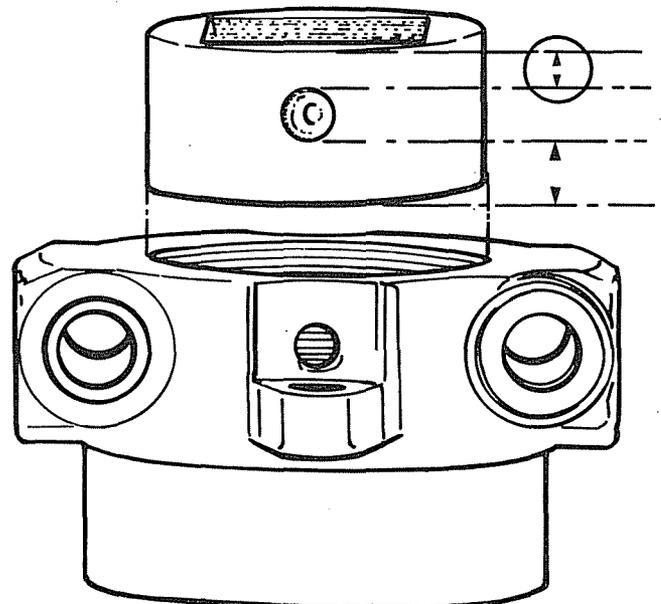
Some bolts of the drive pulley having "Loctite" on their threads, it is advisable to use a tool such as an impact to break the "Loctite" seal before attempting to unscrew.

④ Torque to 7 N•m (5 ft-lbs).

⑦ Apply "Loctite 242" on threads then screw in until head is flush with hub plug. Do not allow head to bite into hub plug.

⑧ ⑨ ⑩ At disassembly, hold hub plug firmly against sliding half until the two (2) bolts are completely removed. This will prevent damage of the sliding half threads. At assembly, apply "Loctite 242" on threads of bolts then torque to 16 N•m (12 ft-lbs).

⑪ To install or remove "Duralon" bushing from hub plug use a suitable pusher and hammer or press. Install bushing as per illustration.



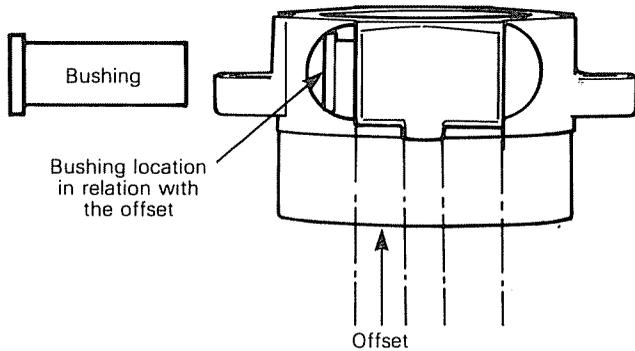
▼ **CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

⑭ Torque to 85 N•m (63 ft-lbs).

⑰ Apply "Loctite 242" on threads.

## SECTION 02 SUB-SECTION 03 (DRIVE PULLEY)

⑱ ⑧ Some **drive pulleys** have an offset in the hub plug. Shouldered pin bushings with shoulder must be installed in these hub plugs.



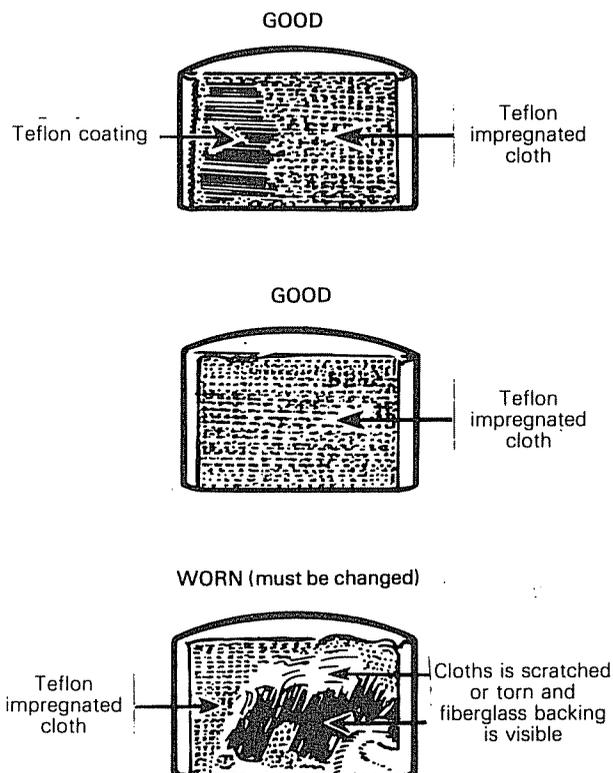
⑳ ㉑ Apply "Loctite 242" on threads and torque to 14 N•m (10 ft-lbs).

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

### INSPECTION & CLEANING

Drive pulley should be inspected annually.

Check general condition of pulley and inspect "Duralon" bushing faces, as per illustrations.



Inside of sliding half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

### INSTALLATION

Clean crankshaft extension using fine steel wool and a clean cloth.

▼ **CAUTION:** When installing drive pulley on engine, reference mark on fixed half, sliding half and governor cup must be in line.

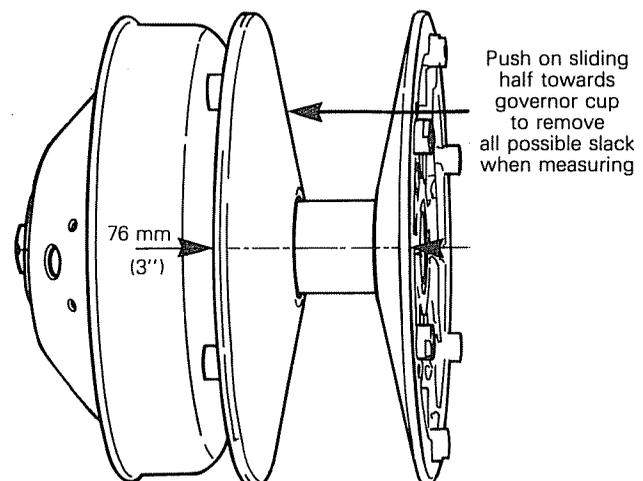
Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope.

Install fixed half on crankshaft extension then position sliding half assembly on fixed half square shaft.

▼ **CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

Install governor cup making sure that the shaft end rests in governor cup seating. Position retaining bolt with a new locking tab then torque to 85 N•m (63 ft-lbs).

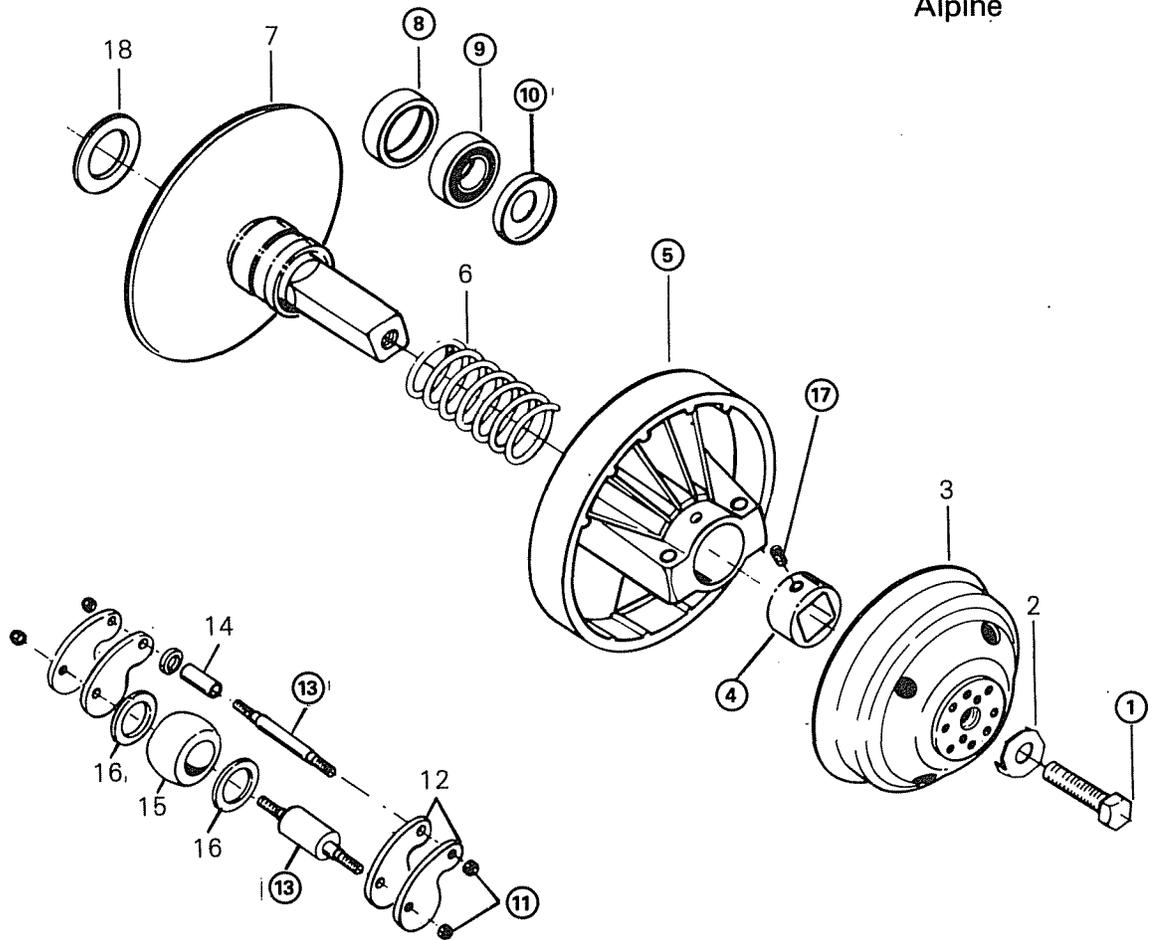
▼ **CAUTION:** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 76 mm (3").



Lift rear of vehicle off the ground. Install drive belt and pulley guard then start engine and apply throttle and brake, 2-3. times. Stop engine and **retorque** retaining bolt. Bend one side of locking tab over governor bolt.

**ROLLER SQUARE SHAFT BEARING TYPE  
WITH DURALON BUSHING**

Alpine



COUNTERWEIGHT ASS'Y

- 1. Retaining bolt
- 2. Tab washer
- 3. Governor cup
- 4. "Duralon" bushing
- 5. Sliding half
- 6. Spring
- 7. Fixed half
- 8. Ring
- 9. Bearing

- 10. Spring seat
- 11. Stop nut
- 12. Counterweight
- 13. Shouldered pin
- 14. Bushing
- 15. Roller
- 16. Spacer
- 17. Set screw
- 18. Shim

## SECTION 02

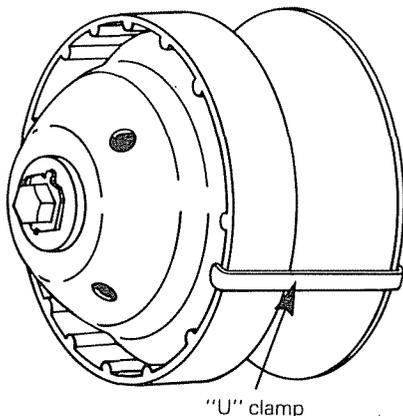
### SUB-SECTION 03 (DRIVE PULLEY)

**WARNING:** Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

## REMOVAL

With engine cold, remove spark plugs then bring P.T.O. (Power Take Off) piston at T.D.C. (Top Dead Center) position.

Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely. Install "U" clamp (See Tools Section) over pulley halves. Open locking tab and remove retaining bolt.



Push and turn drive pulley to disengage "U" clamp then carefully remove sliding half.

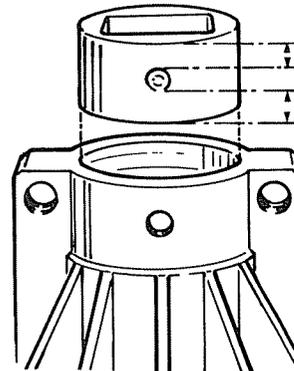
**WARNING:** Spring pressure can force assembly apart; therefore, it is imperative that the governor cup be held firmly during sliding half removal.

If it is necessary to remove half, use a 1 1/8" open-end wrench on the square section, closely held against hub.

## DISASSEMBLY & ASSEMBLY

Some bolts of the drive pulley having "Loctite" on their threads, it is advisable to use a tool such as an impact to break the "Loctite" seal before attempting to unscrew.

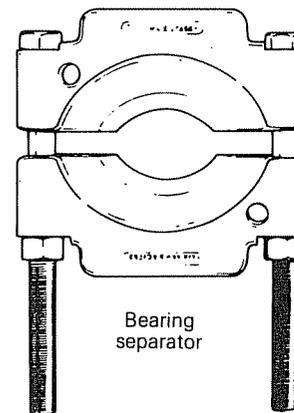
- ① Torque to 118 N•m (87 ft-lbs).
- ④ ⑤ To install or remove "Duralon" bushing from hub plug use a suitable pusher and hammer or press. Install bushing as per illustration.



**CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

⑧ ⑨ ⑩ To remove and install use a bearing separator and afterwards a standard puller and pusher.

○ **NOTE:** Items ⑧ ⑨ should be press-fitted together. Do not remove inner half bearing unless damaged and replacement is necessary.



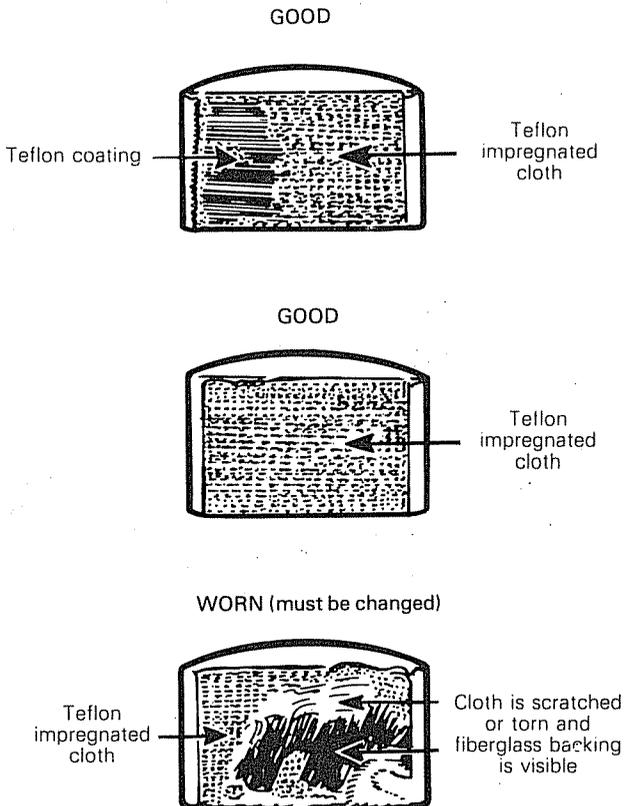
Torque shouldered pin lock nut to 14 N•m (10 ft-lbs) after having applied "Loctite 242" or equivalent on threads.

**CAUTION:** Do not disassemble counterweights unless replacement is necessary.

⑰ Apply "Loctite 242" on threads then screw in until head is flush with sliding half.

## INSPECTION & CLEANING

Drive pulley should be inspected annually.  
Check general condition of pulley and inspect "Duralon" bushing faces, as per illustrations.



Inside of sliding half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

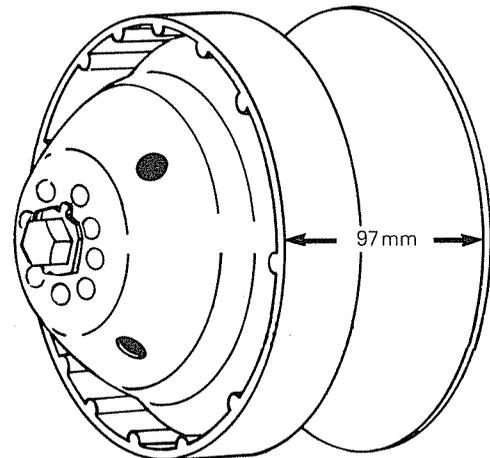
## INSTALLATION

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with starter rope.

Install fixed half on crankshaft extension then position sliding half assembly on fixed half square shaft.

▼ **CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

Install governor cup making sure that the shaft end rests in governor cup seating.



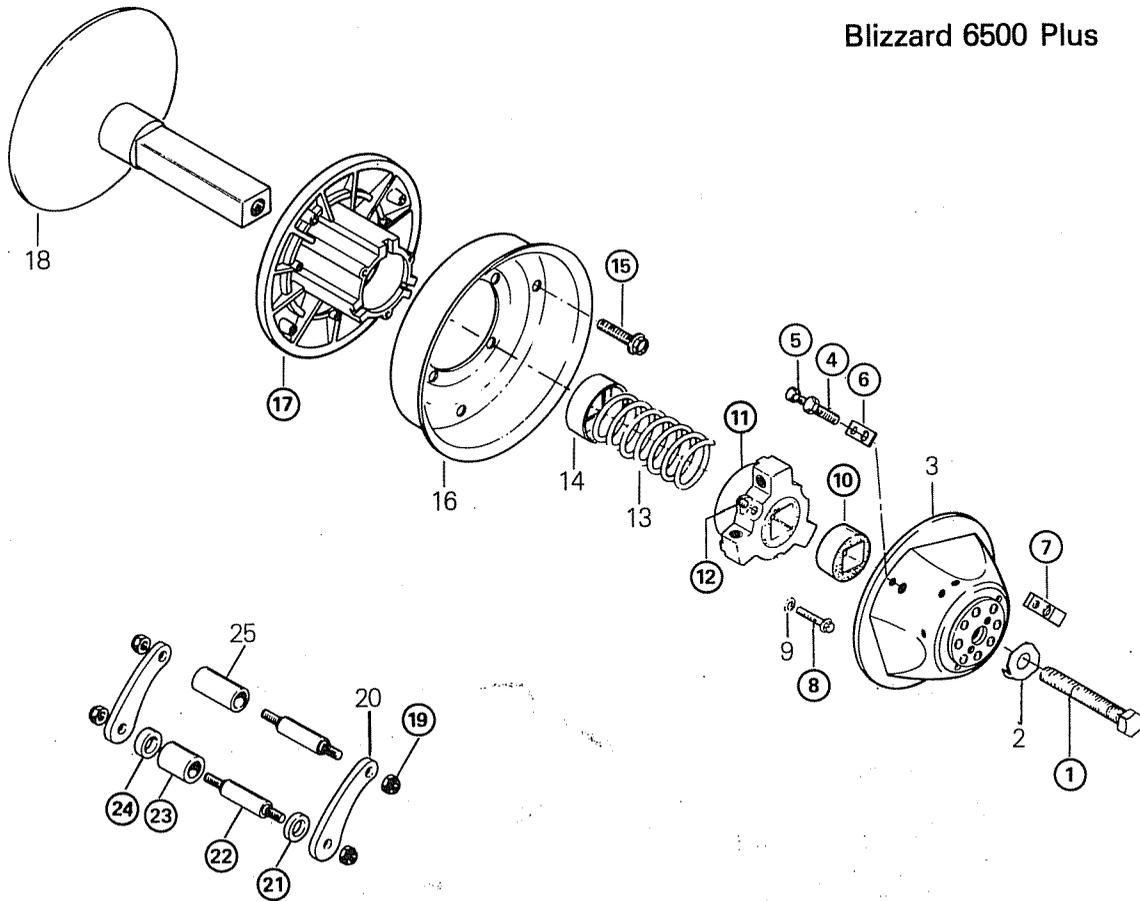
▼ **CAUTION:** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 97 mm (3 3/16").

Lubricate threads of retaining bolt with antiseizing lubricant. Position retaining bolt with a new locking tab then torque to 118 N•m (87 ft-lbs). Bend one side of locking tab over retaining bolt head.

SECTION 02  
 SUB-SECTION 03 (DRIVE PULLEY)

**SQUARE SHAFT WITH THREE COUNTERWEIGHT ASSEMBLIES**

Blizzard 6500 Plus

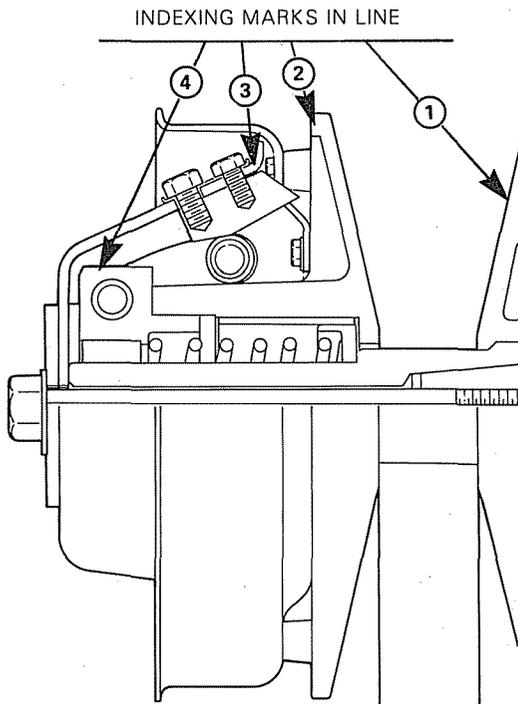


- |                              |                                 |
|------------------------------|---------------------------------|
| 1. Retaining bolt            | 14. Spring seat                 |
| 2. Locking tab               | 15. Bolt                        |
| 3. Governor cup              | 16. Guard (rollers)             |
| 4. Bolt                      | 17. Sliding half                |
| 5. Bolt                      | 18. Fixed half                  |
| 6. Locking tab               | 19. Nut                         |
| 7. Ramp                      | 20. Counterweight               |
| 8. Bolt                      | 21. Nylon washer 5.1 mm (.200") |
| 9. Internal tooth lockwasher | 22. Shouldered pin              |
| 10. "Duralon" bushing        | 23. Roller                      |
| 11. Hub plug                 | 24. Nylon washer 3.3 mm (.130") |
| 12. Allen screw              | 25. Bushing                     |
| 13. Spring                   |                                 |

◆ **WARNING:** Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

## REMOVAL

Some pulley components are marked to insure proper assembly. If components lack such marks, marking should be done manually before disassembly, as per illustration.



- |                |                |
|----------------|----------------|
| ① Fixed half   | ③ Governor cup |
| ② Sliding half | ④ Hub plug     |

With engine cold, remove spark plugs then bring P.T.O. (Power Take Off) piston at T.D.C. (Top Dead Center) position.

Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

Open tab lock and remove retaining bolt.

Remove sliding half assembly with governor cup.

To remove fixed pulley half, use drive pulley puller. (See Tools Section).

○ **NOTE:** Remove starter rope blocking piston, then reblock piston after having turned 45° counter-clockwise from T.D.C. position.

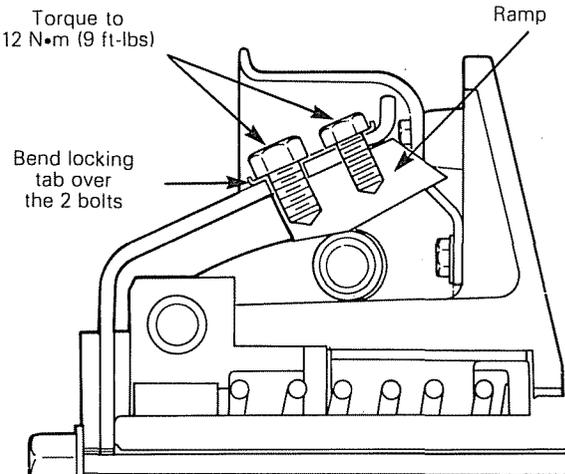
Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

## DISASSEMBLY & ASSEMBLY

Some bolts of the drive pulley having "Loctite" on their threads, it is advisable to break the "Loctite" seal before attempting to unscrew.

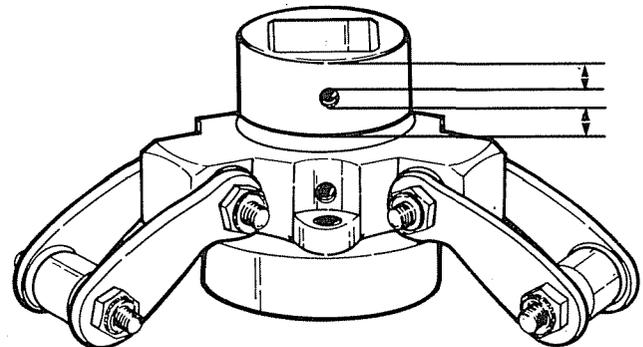
① Torque to 85 N•m (63 ft-lbs).

④⑤⑥⑦ Install ramps and torque bolts as per illustration.

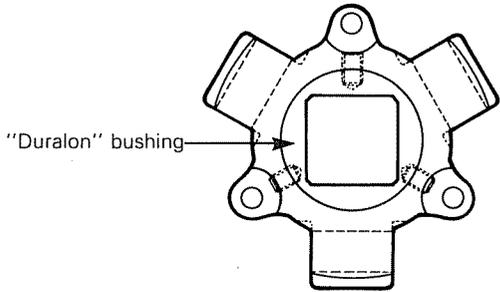


⑧⑩⑰ At disassembly, hold hub plug firmly against sliding half until the three (3) bolts are completely removed. This will prevent damage of the sliding half threads. At assembly, apply "Loctite 242" on threads of bolts then torque to 16 N•m (12 ft-lbs).

⑩⑪⑫ To install or remove "Duralon" bushing from hub plug, use a suitable pusher and hammer or press. Install bushing as per illustration.



SECTION 02  
SUB-SECTION 03 (DRIVE PULLEY)



Apply "Loctite 242" on threads, then tighten until screw slightly rests against bottom of "Duralon" bushing hole.

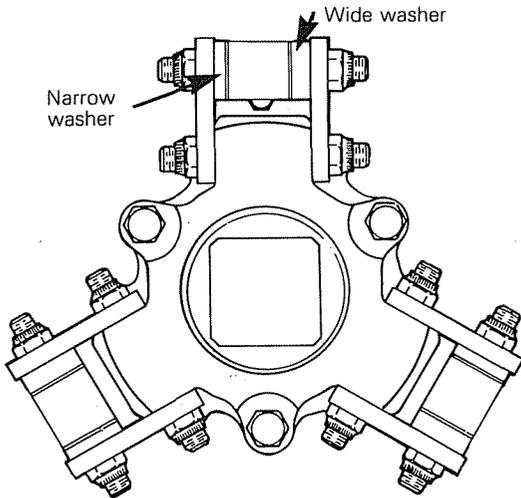
▼ **CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

⑮ Torque to 5 N•m (4 ft-lbs).

⑲ ⑳ At reassembly, apply "Loctite 242" on threads and torque to 16 N•m (12 ft-lbs).

▼ **CAUTION:** Do not disassembly counterweight unless replacement is necessary.

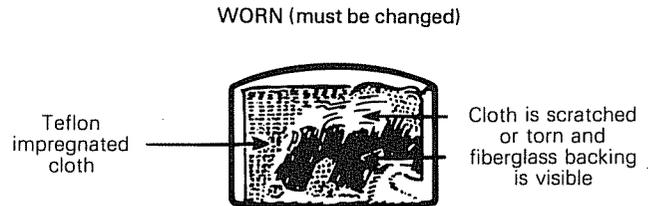
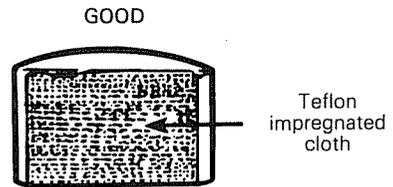
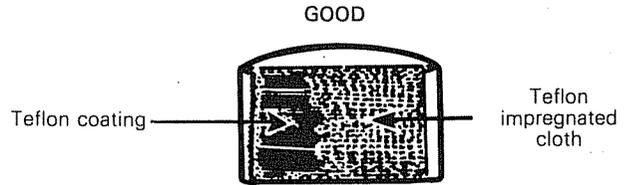
㉑ ㉒ ㉓ Rollers and nylon washers must move freely; install them as per illustration.



## INSPECTION & CLEANING

Drive pulley should be inspected annually.

Check general condition of pulley and inspect "Duralon" bushing faces, as per illustration.



Inside of sliding half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

## INSTALLATION

Clean crankshaft extension using fine steel wool and a clean cloth.

▼ **CAUTION:** When installing drive pulley on engine, reference mark on fixed half, sliding half and governor cup must be in line.

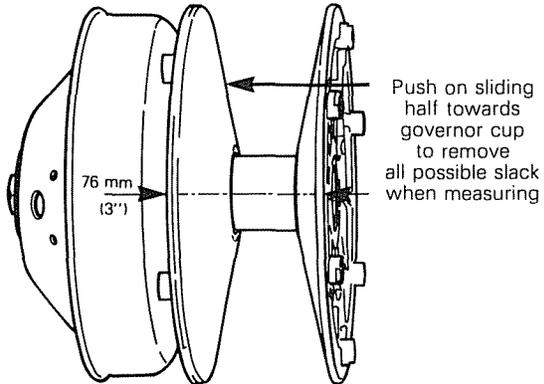
Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope.

Install fixed half on crankshaft extension then position sliding half assembly on fixed half square shaft.

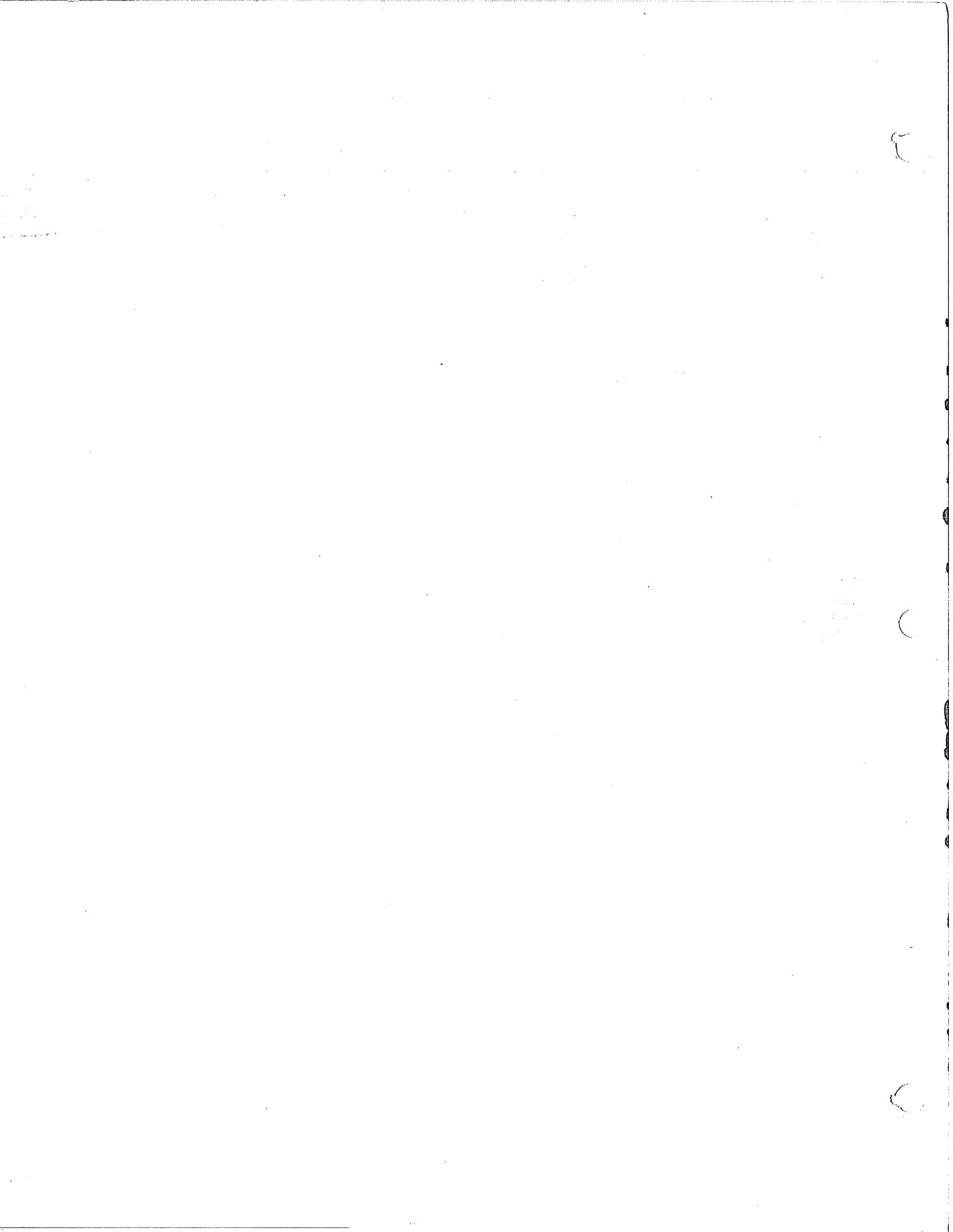
▼ **CAUTION:** Be careful when installing sliding half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

Install governor cup making sure that the shaft end rests in governor cup seating. Position retaining bolt with a new locking tab then torque to 85 N•m (63 ft-lbs).

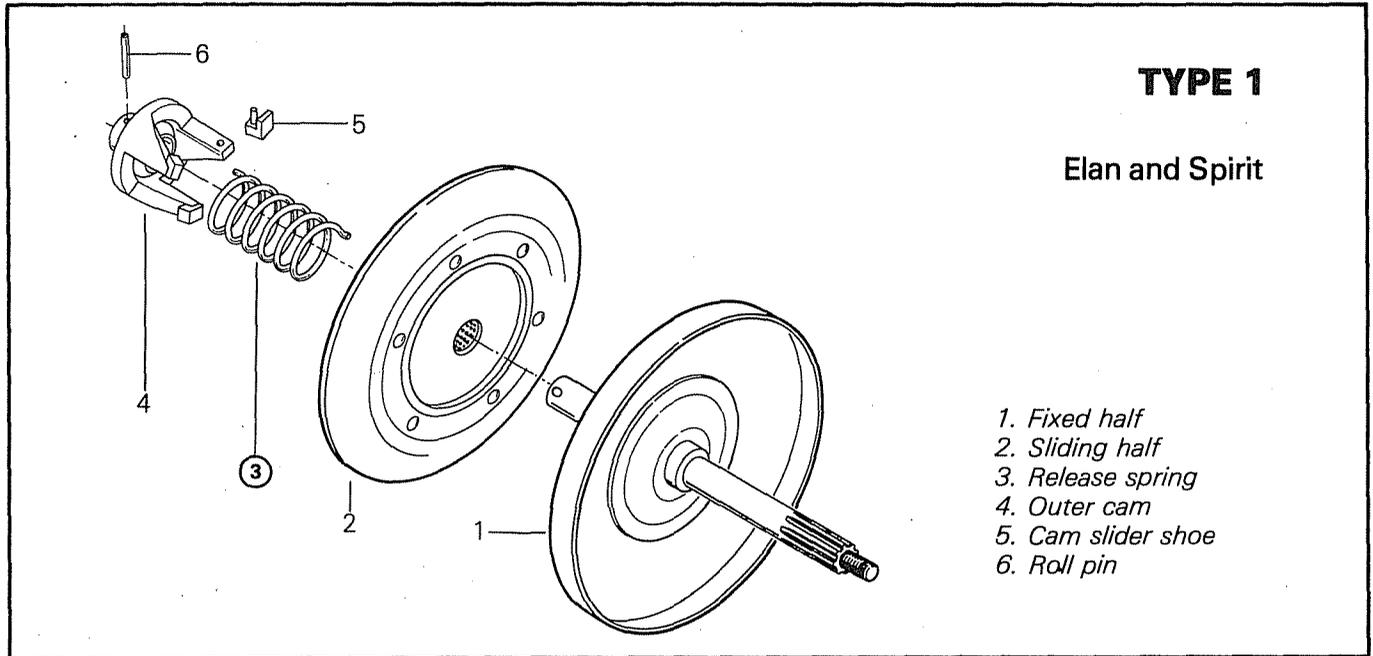
▼ CAUTION: Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 76 mm (3").



Lift rear of vehicle off the ground. Install drive belt and pulley guard then start engine and apply throttle and brake, 2-3 times. Stop engine and **retorque** retaining bolt. Bend one side of locking tab over governor bolt.



## DRIVEN PULLEY



### REMOVAL

Remove pulley guard, drive belt and muffler.  
Slacken steering column bolts.

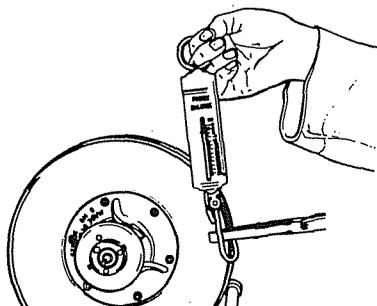
Release chain tension. Remove cotter pin and nut securing pulley drive shaft to chaincase.

○ **NOTE:** Attach to frame to prevent it falling inside of chaincase.

Pull driven pulley toward engine and remove from vehicle.

### DISASSEMBLY & ASSEMBLY

③ In order to measure driven pulley spring tension, pulley halves must be separated. To do this, insert length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle.



(Refer to Technical Data for correct spring tension).

To correct spring tension, either relocate spring end in sliding pulley half or gradually rotate outer cam.

### INSTALLATION

With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.

Install spring washer and castellated nut.

Tighten castellated nut fully then back off nut 1/6 of a turn.

Lock in position with a new cotter pin.

▼ **CAUTION:** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

Apply chain tension.

Install muffler and tighten steering column bolts.

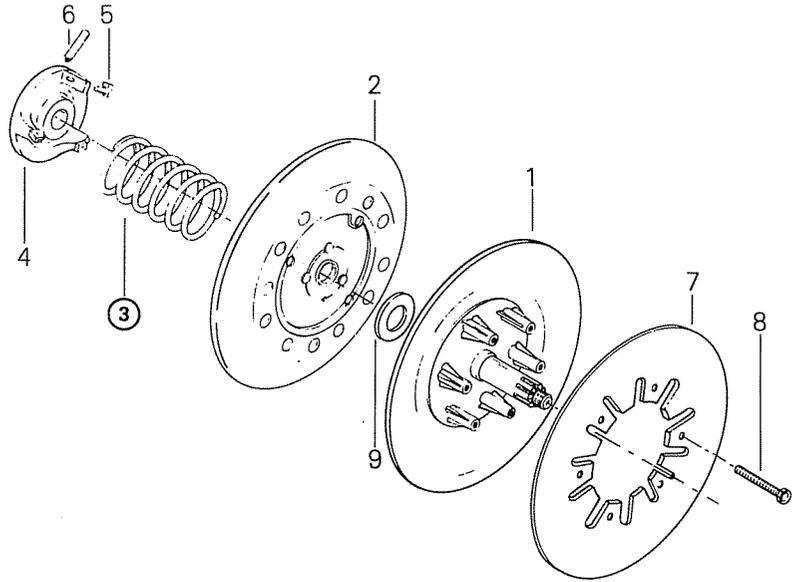
Install drive belt and pulley guard.

SECTION 02  
SUB-SECTION 04 (DRIVEN PULLEY)

**TYPE 2**

Olympique, Nuvik,  
Citation

1. Fixed half
2. Sliding half
3. Release spring
4. Outer cam
5. Cam slider shoe
6. Roll pin
7. Disc
8. Bolt
9. Spacer

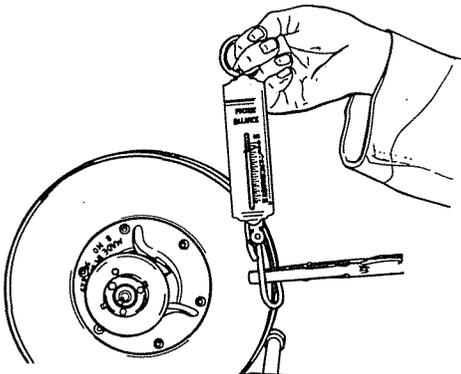


**REMOVAL**

- Remove pulley guard and drive belt.
- Remove brake assembly and tool box.
- Remove chaincase cover.
- Remove air silencer box and carburetor.
- Release chain tension then remove cotter pin and castellated nut securing driven pulley to chaincase. Pull out driven pulley assembly.

**DISASSEMBLY & ASSEMBLY**

③ In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle (Refer to Technical Data for correct spring tension).



To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

**INSTALLATION**

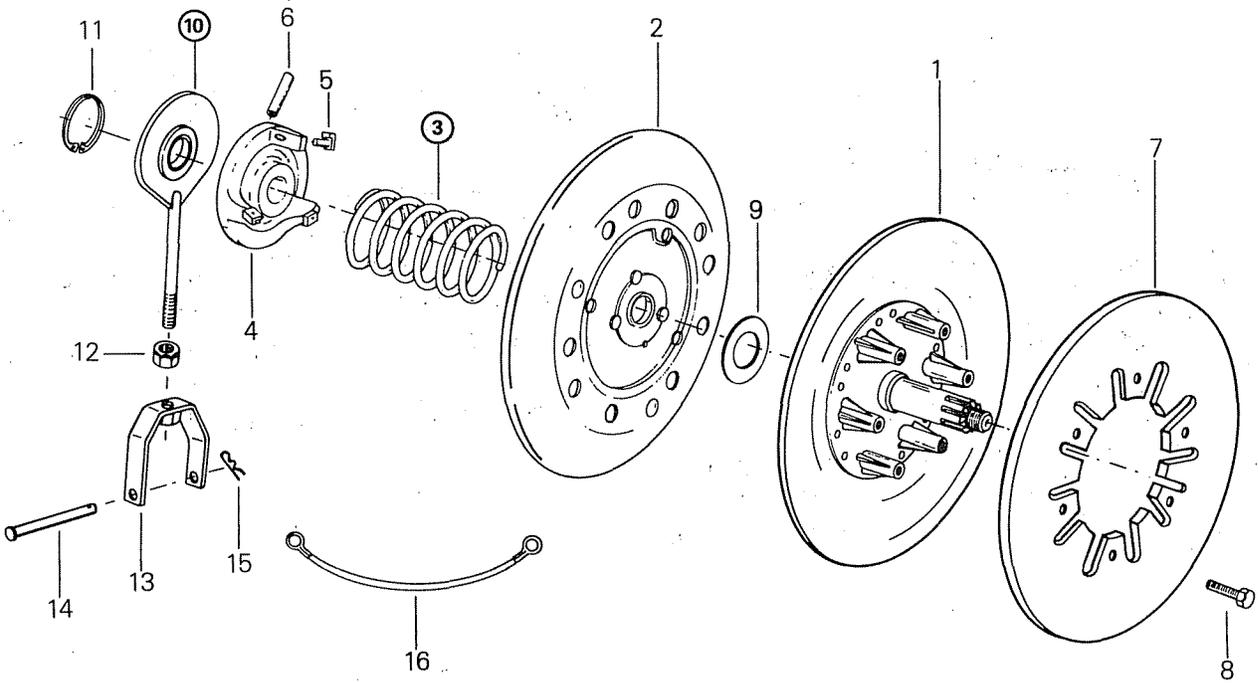
- With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.
- Install spring washer and castellated nut.
- Tighten castellated nut fully then back off nut 1/6" of a turn.
- Lock in position with a new cotter pin.

▼ **CAUTION:** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

- Apply chain tension. Position chaincase cover and replenish with chaincase oil.
- Install brake assembly and tool box.
- Install carburetor and air silencer box.
- Install drive belt and pulley guard.

**TYPE 3**

Everest, Futura, T'NT,  
 RV, Sonic



- 1. Fixed half
- 2. Sliding half
- 3. Release spring
- 4. Outer cam
- 5. Cam slider shoe
- 6. Roll pin
- 7. Disc
- 8. Bolt

- 9. Spacer (Everest, Futura and T'NT)
- 10. Support
- 11. Snap ring
- 12. Nut
- 13. Bracket
- 14. Retainer pin
- 15. Hair pin cotter
- 16. Hair pin retaining wire.

**REMOVAL**

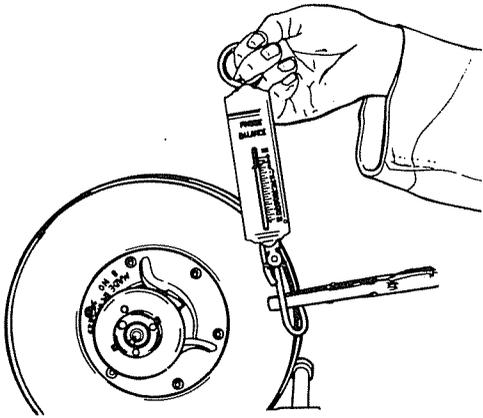
Remove pulley guard and drive belt.  
 Detach driven pulley support from upper column bracket.  
 Remove brake assembly and tool box or battery.  
 Remove chaincase cover.

Remove air silencer box and carburetor.  
 Release chain tension then remove cotter pin and castellated nut securing driven pulley to chaincase. Pull out driven pulley assembly.

SECTION 02  
SUB-SECTION 04 (DRIVEN PULLEY)

## DISASSEMBLY & ASSEMBLY

③ In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle. (Refer to Technical Data for correct spring tension).



To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

⑩ To remove driven pulley support it may be necessary to use a puller.

## INSTALLATION

With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.

Install spring washer and castellated nut.

Tighten castellated nut fully then back off nut 1/6 of a turn.

Lock in position with a new cotter pin.

▼ **CAUTION:** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

Apply chain tension. Position chaincase cover and replenish with chaincase oil.

Install brake assembly and tool box or battery.

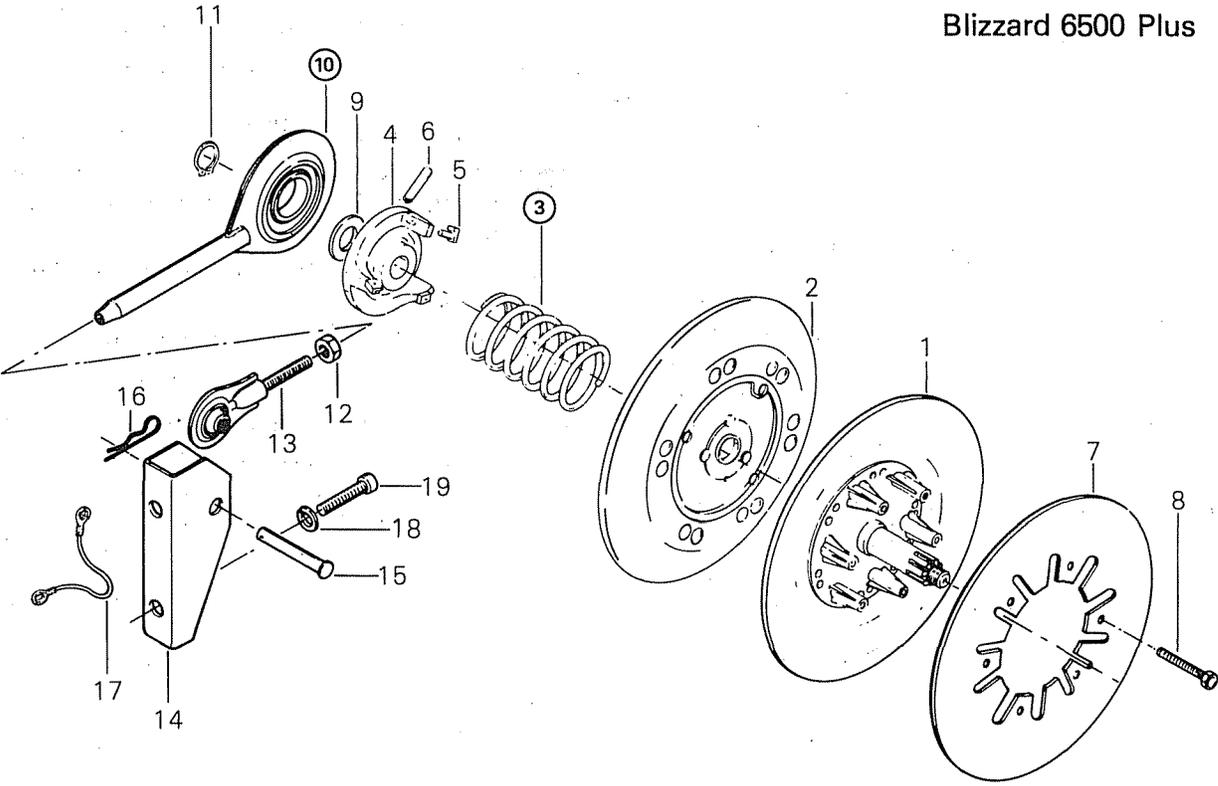
Install carburetor and air silencer box.

Connect driven pulley support to steering upper column.

Install drive belt and pulley guard.

**TYPE 4**

Blizzard 6500 Plus



- |                     |                        |
|---------------------|------------------------|
| 1. Fixed half       | 11. Snap ring          |
| 2. Sliding half     | 12. Nut                |
| 3. Release spring   | 13. Ball joint         |
| 4. Outer cam        | 14. Bracket            |
| 5. Cam slider shoe  | 15. Retainer pin       |
| 6. Roll pin         | 16. Hair pin cotter    |
| 7. Disc             | 17. Hair pin retaining |
| 8. Bolt             | 18. Lock washer        |
| 9. Spacer (support) | 19. Bolt               |
| 10. Support         |                        |

## SECTION 02

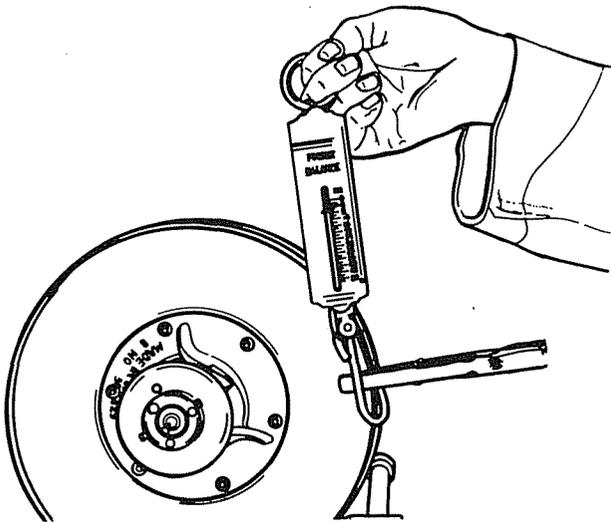
### SUB-SECTION 04 (DRIVEN PULLEY)

#### REMOVAL

- Remove pulley guard and drive belt.
- Detach driven pulley support from engine bracket.
- Remove brake assembly and tool box.
- Remove chaincase cover.
- Remove air silencer box and carburetors.
- Release chain tension then remove cotter pin and castellated nut securing driven pulley to chaincase. Pull out driven pulley assembly.

#### DISASSEMBLY & ASSEMBLY

- ③ In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle. (Refer to Technical Data for correct spring tension).



To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

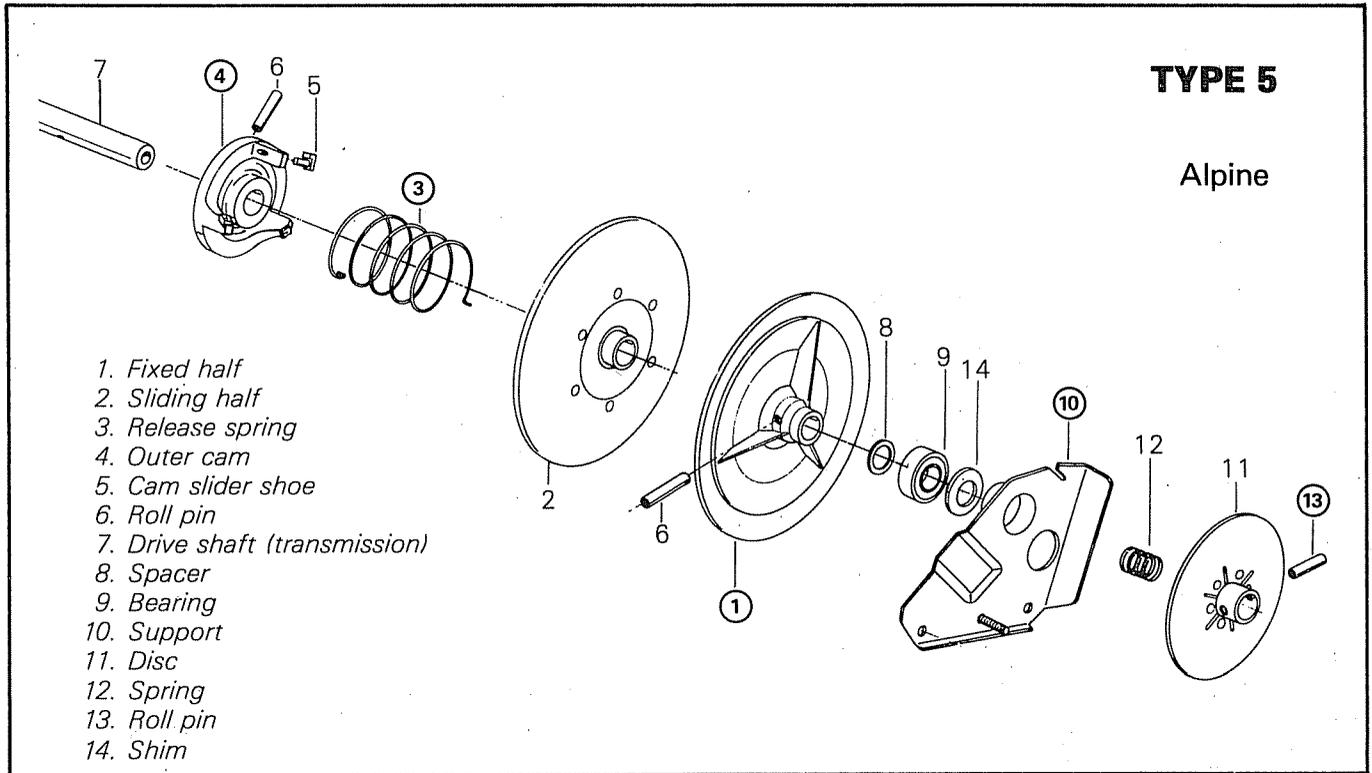
- ⑩ To remove driven pulley support it may be necessary to use a puller.

#### INSTALLATION

- With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.
- Install spring washer and castellated nut.
- Tighten castellated nut fully then back off nut 1/6 of a turn.
- Lock in position with a new cotter pin.

▼ **CAUTION:** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

- Apply chain tension. Position chaincase cover and replenish chaincase oil.
- Install disc brake assembly and tool box.
- Install carburetor and air silencer box.
- Connect driven pulley support to engine bracket.
- Install drive belt and pulley guard.



## REMOVAL

Remove pulley guard and drive belt.

Remove disc brake assembly.

Position a wooden block under the drive shaft then using a hammer and a pin punch, remove roll pin (13) locking disc in position. Tap on inner side of brake and bracket assembly (10) to disengage it from bearing.

Remove exhaust manifold from engine.

Remove lower bracket of steering column attached to the gearbox. Slacken upper bracket of steering column. Disconnect transmission rod from gearbox.

Remove gearbox upper housing.

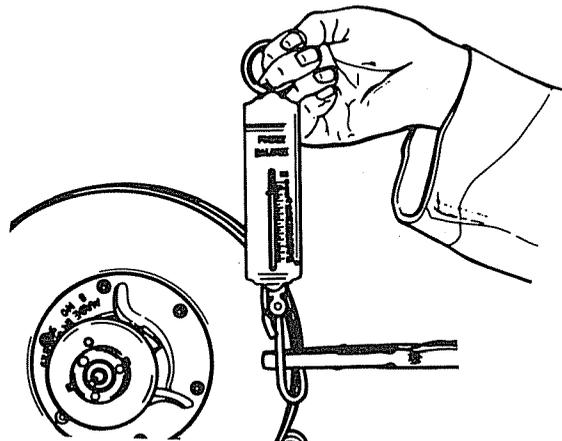
Release chain tension then separate chain at connecting link.

Withdraw driven pulley.

## DISASSEMBLY & ASSEMBLY

①④ If necessary heat hub of fixed pulley and outer cam to facilitate removal.

In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle. (Refer to Technical Data for correct spring tension).

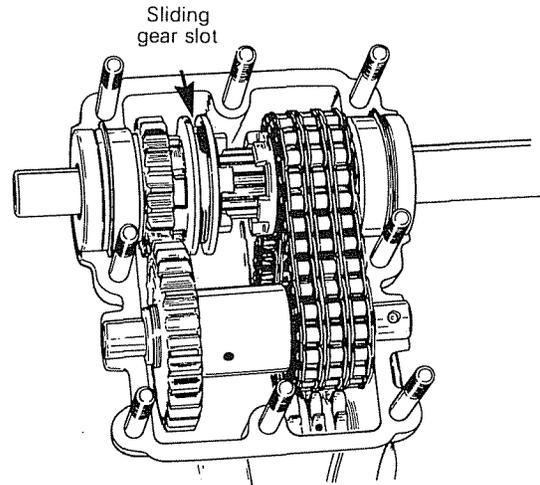
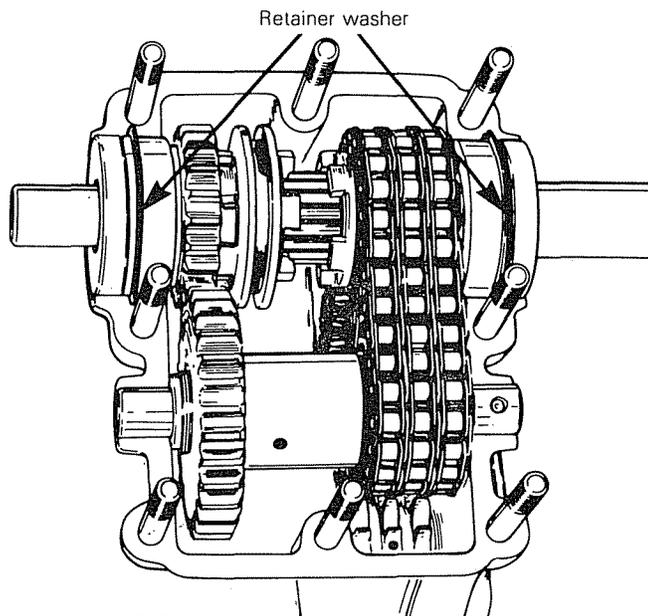


To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

SECTION 02  
SUB-SECTION 04 (DRIVEN PULLEY)

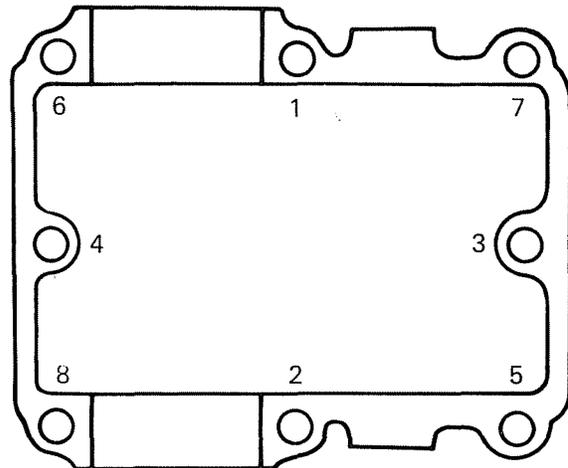
INSTALLATION

Position drive shaft of assembled driven pulley so that retainer washers align with slots of gearbox casing.

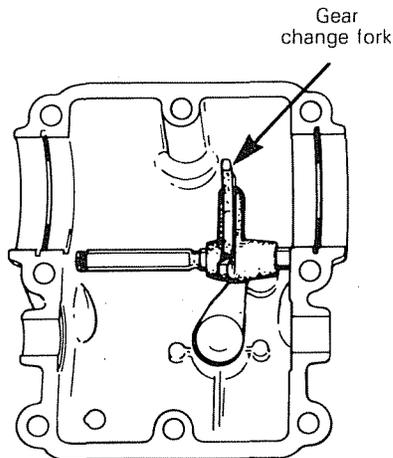


Apply a thin coat of "Loctite crankcase sealant", or equivalent, on contact surface of gearbox casing.

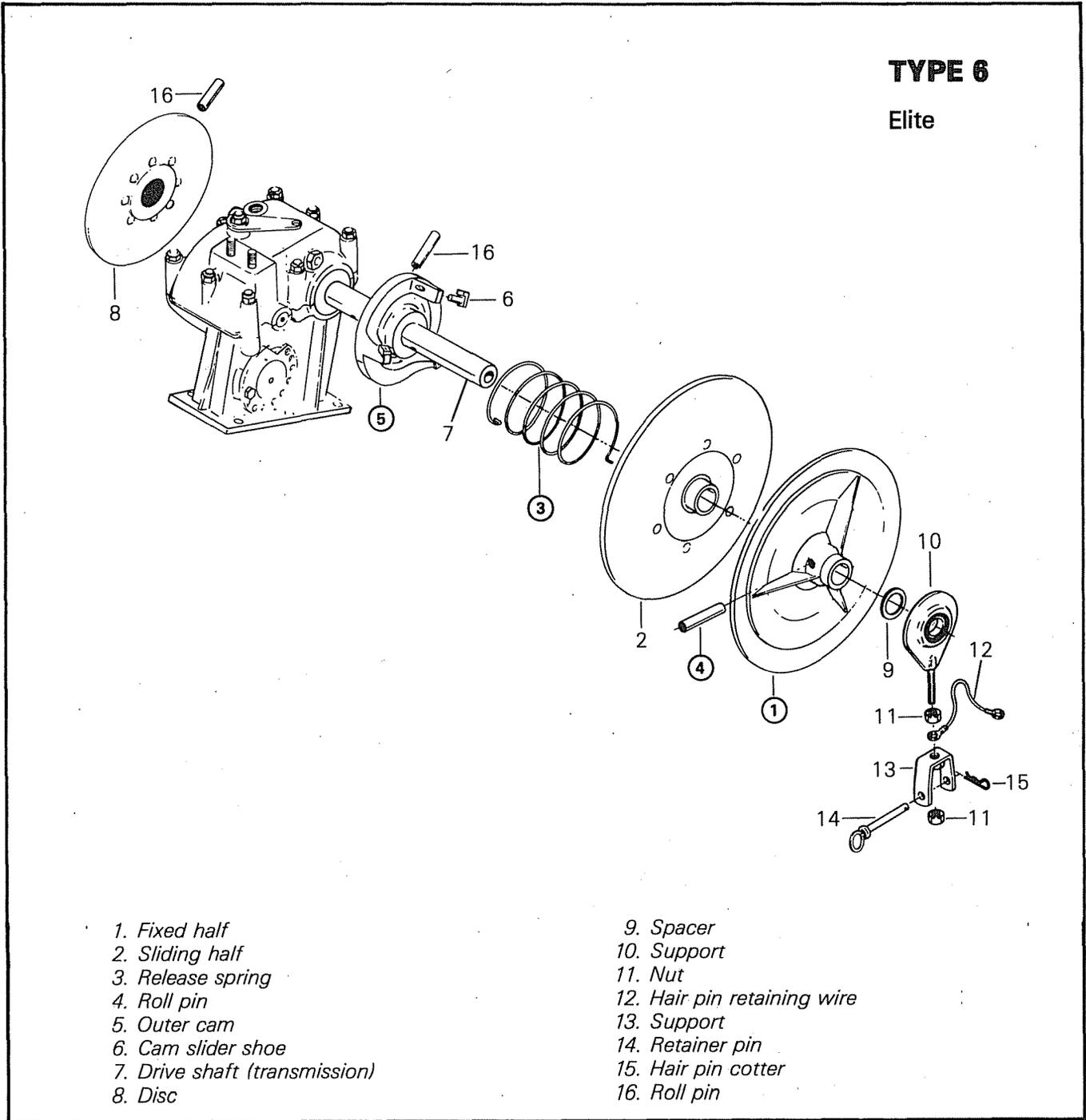
Install gearbox cover and secure with eight nuts. Torque nuts to 27 N•m (20 ft-lbs) in the following sequence:



Connect drive chain using a connecting link.  
The locking clip should be installed oppositely to driven pulley.  
Position gear change fork in gearbox cover so that it aligns with slot of sliding gear in gear housing.



Install gearbox rod and adjust. (See Section 02-07).  
Install steering column.  
Install drive belt and exhaust manifold.  
Install brake assembly and bracket. Install roll pin securing disc to shaft.  
Adjust chain tension. Check gearbox oil level.  
Check pulley guard.



## REMOVAL

Remove pulley guard and drive belt.  
Detach driven pulley support.  
Remove exhaust manifold from engine.

Disconnect transmission rod from gearbox.

Remove gearbox upper housing.

Release chain tension then separate chain at connecting link.

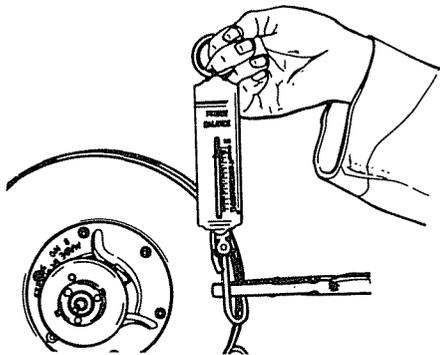
Withdraw driven pulley with drive shaft.

**SECTION 02**  
**SUB-SECTION 04 (DRIVEN PULLEY)**

**DISASSEMBLY & ASSEMBLY**

①⑤ If necessary heat hub of fixed pulley and outer cam to facilitate removal.

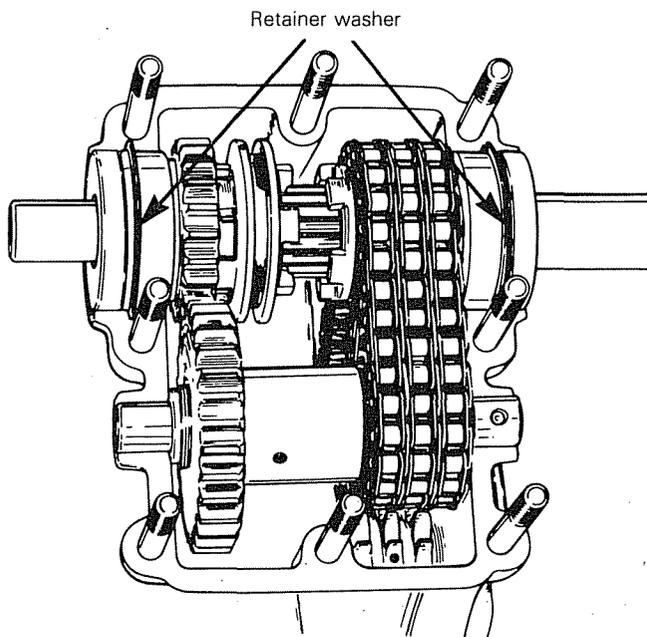
④ In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle. (Refer to Technical Data for correct spring tension).



To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

**INSTALLATION**

Position drive shaft of assembled driven pulley so that retainer washers align with slots of gearbox casing.

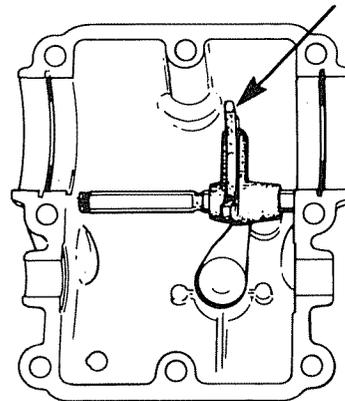


Connect drive chain using a connecting link.

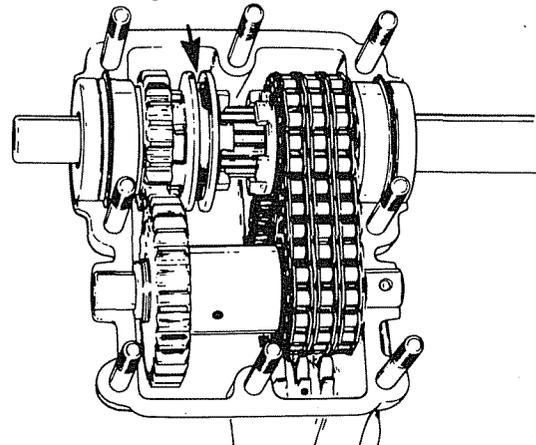
The locking clip should be installed oppositely to driven pulley.

Position gear change fork in gearbox cover so that it aligns with slot of sliding gear in gear housing.

Gear change fork



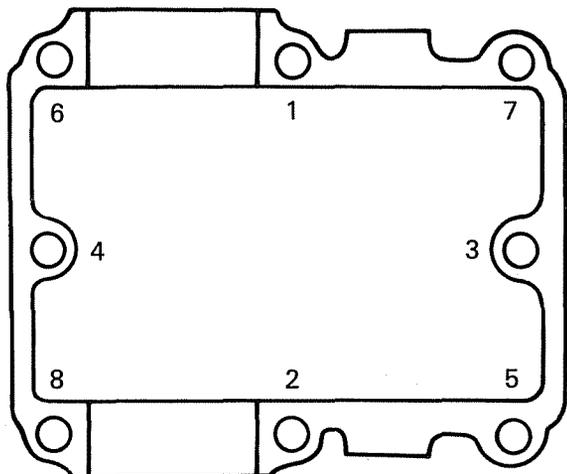
Sliding gear slot



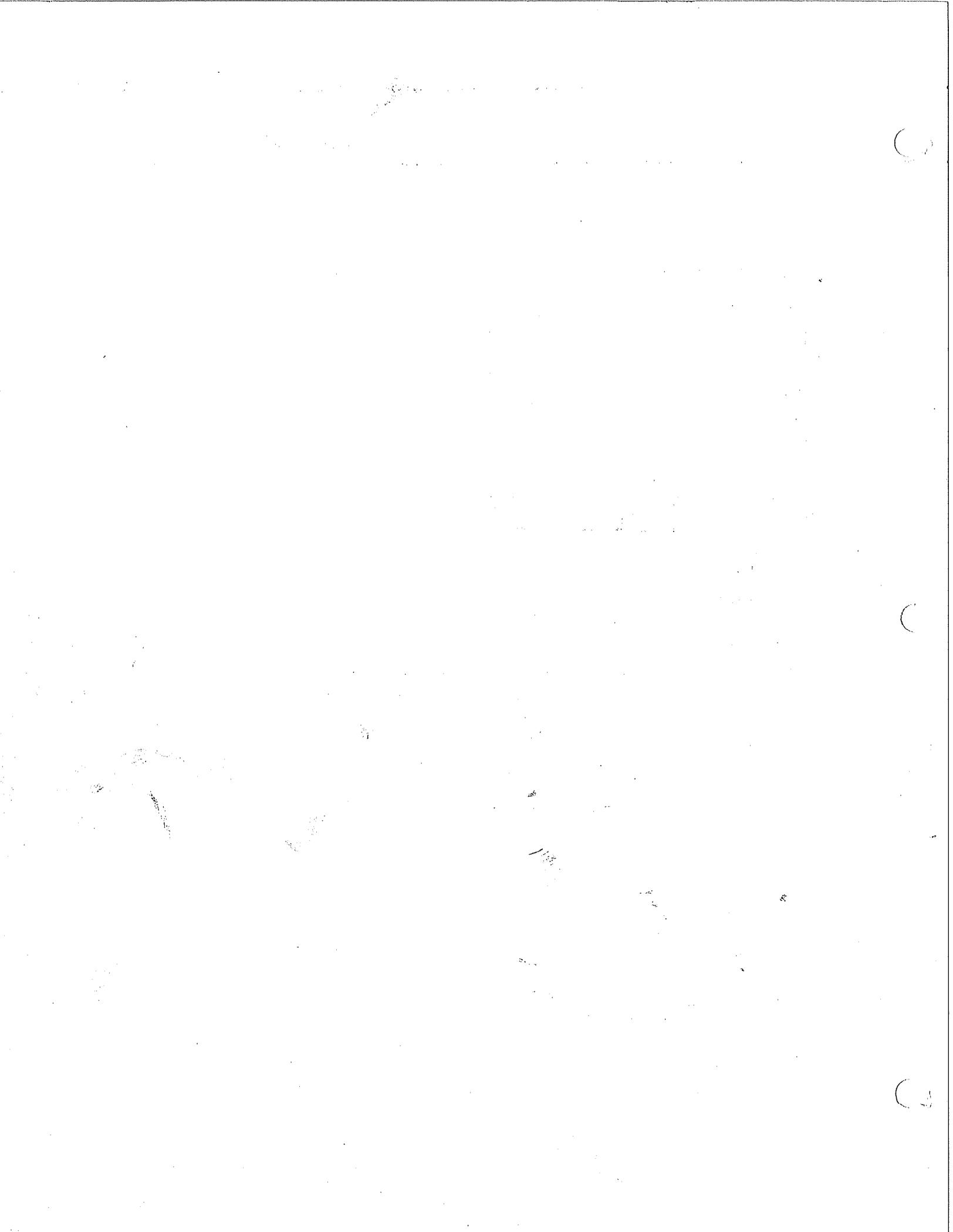
Apply a thin coat of "Loctite crankcase sealant", or equivalent, on contact surface of gearbox casing.

SECTION 02  
SUB-SECTION 04 (DRIVEN PULLEY)

Install gearbox cover and secure with eight nuts. Torque nuts to 27 N•m (20 ft-lbs) in the following sequence:



- Adjust chain tension. Check gearbox oil level.
- Install gearbox rod and adjust. (See Section 02-07).
- Install exhaust manifold to engine.
- Install driven pulley support.
- Install drive belt and check pulley alignment.
- Install pulley guard.

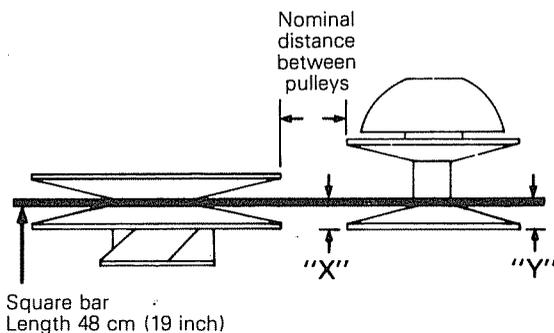


## PULLEY ALIGNMENT

Remove pulley guard and drive belt. Check tightness of engine mounts nuts.

### OFFSET ADJUSTMENT

Insert a 48 cm (19 inch) length of 3/8" to 5/8" square bar between driven pulley halves.



- Dimension "X" must never exceed dimension "Y".
- Dimension "Y" can exceed dimension "X" by 1.6 mm (1/16").

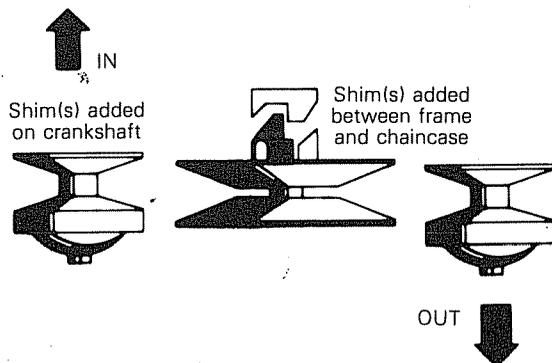
(Refer to Technical Data for dimension value).

### Elan, Spirit, Citation, Alpine

If drive pulley is too far in, remove drive pulley and add shim(s) on crankshaft.

**CAUTION:** Never use more than 5 shims on crankshaft.

If drive pulley is too far out, Alpine model excluded, add shim(s) between frame and chaincase.



On Alpine model, check tightness of gearbox attaching bolts. If necessary, remove shim(s) from crankshaft. The engine can also be slid on either side by slackening the engine bracket from the support, for better adjustment.

**WARNING:** Always torque drive pulley bolt within specifications. (See Technical Data).

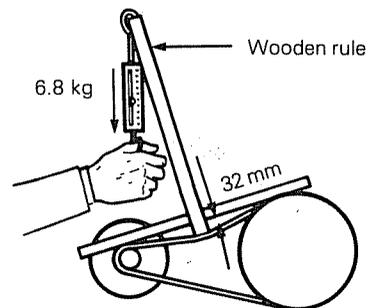
### All other models

If the drive pulley is too far in or too far out, it can be corrected by sliding the slotted engine support toward appropriate side.

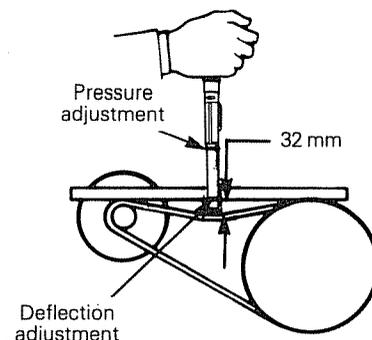
### DISTANCE ADJUSTMENT

To obtain maximum vehicle performance, adjust pulley distance as follows:

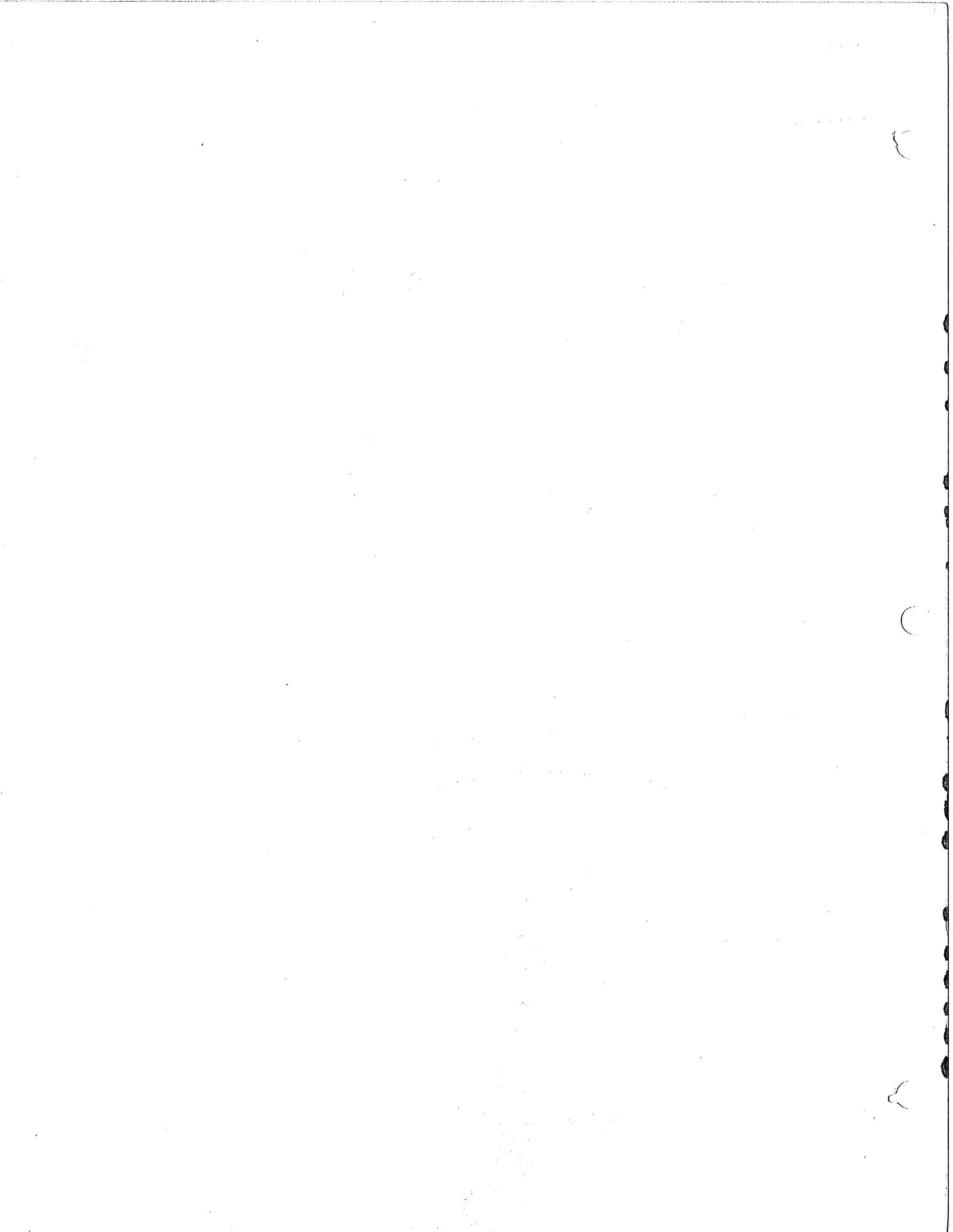
1. Adjust pulley distance to nominal distance. (Refer to Technical Data).
2. Install a **new** drive belt on vehicle.  
Prior to final adjustment, the drive belt **must** have a break-in period time of one to two minutes.
3. The final adjustment of pulley distance should be performed by using the belt deflection method as follows:
  - Position reference rule on drive belt. Using wooden rule and fish scale, apply 6.8 kg (15 pounds) pressure on drive belt.
  - Deflection must be 32 mm (1 1/4").



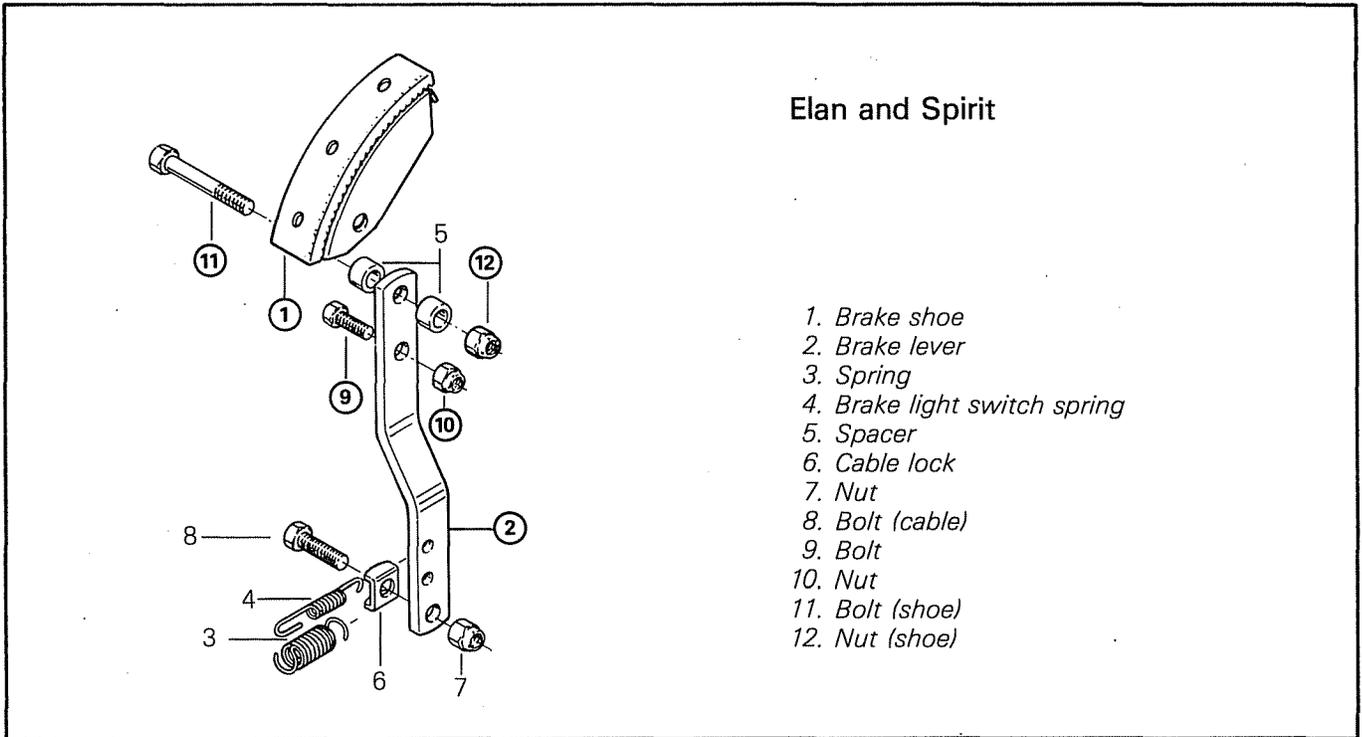
Or using No. 414 3482 Tool



To correct, decrease or increase distance between pulleys.



## DRUM BRAKE



### DISASSEMBLY & ASSEMBLY

① ⑪ ⑫ At assembly, torque shoe retaining nut. However shoe must be able to pivot when slight pressure is applied.

② ⑨ ⑩ When attaching brake lever assembly to chaincase bracket, tighten nut until lever pivots freely and all side play is eliminated.

○ **NOTE:** Lubricate all moving metal parts of brake with light machine oil.

◆ **WARNING:** Avoid getting oil on brake shoe.

### INSPECTION

Check brake lining for wear. If necessary, replace.

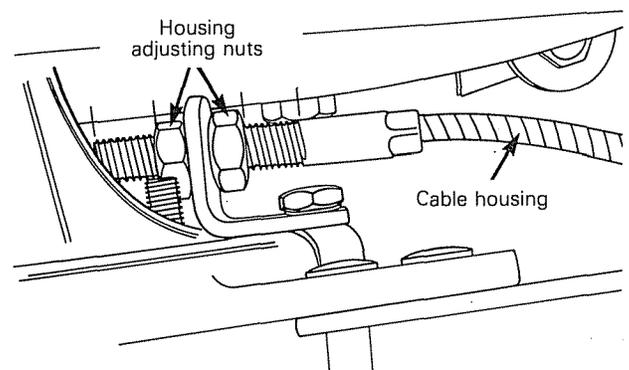
○ **NOTE:** If oil traces are found on lining or drum, check chaincase oil seal for correct installation position or damage. Replace as needed. Wipe oil from pulley and replace brake shoe.

### INSTALLATION & ADJUSTMENT

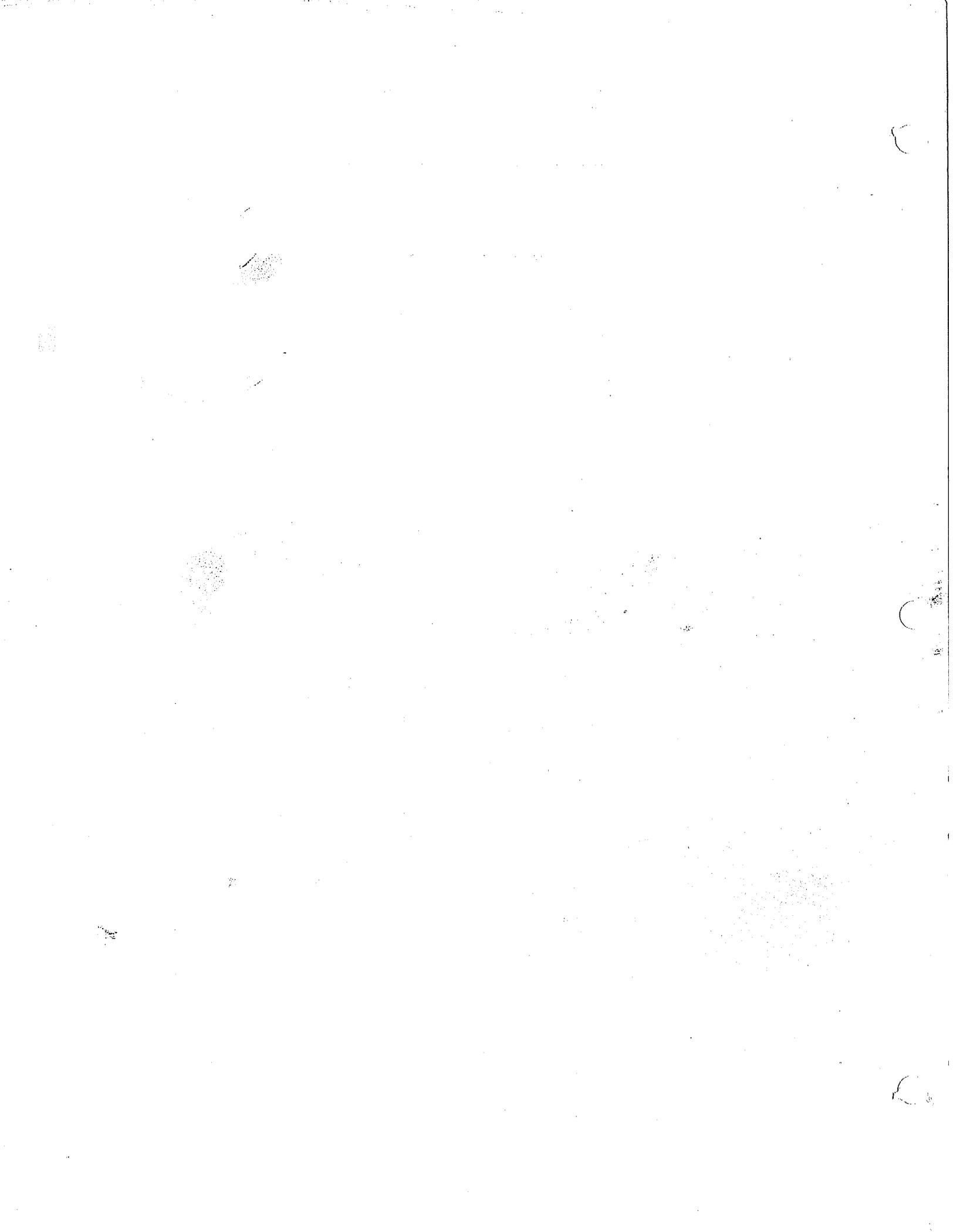
Connect brake cable to brake lever and adjust so that brake applies fully when lever is 25 mm (1") from handlebar grip.

○ **NOTE:** Prior to cable installation, make sure cable housing adjusting nuts are located half way on adjuster threads.

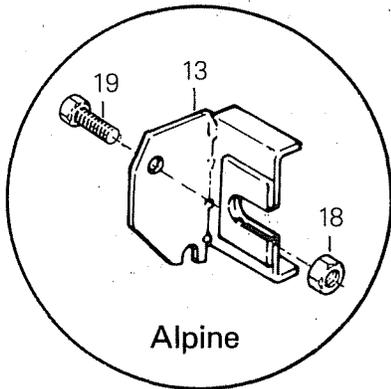
If a final adjustment is indicated, use housing adjusting nuts.



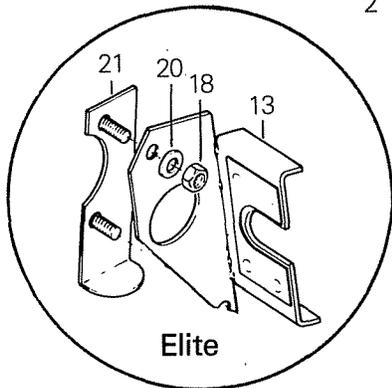
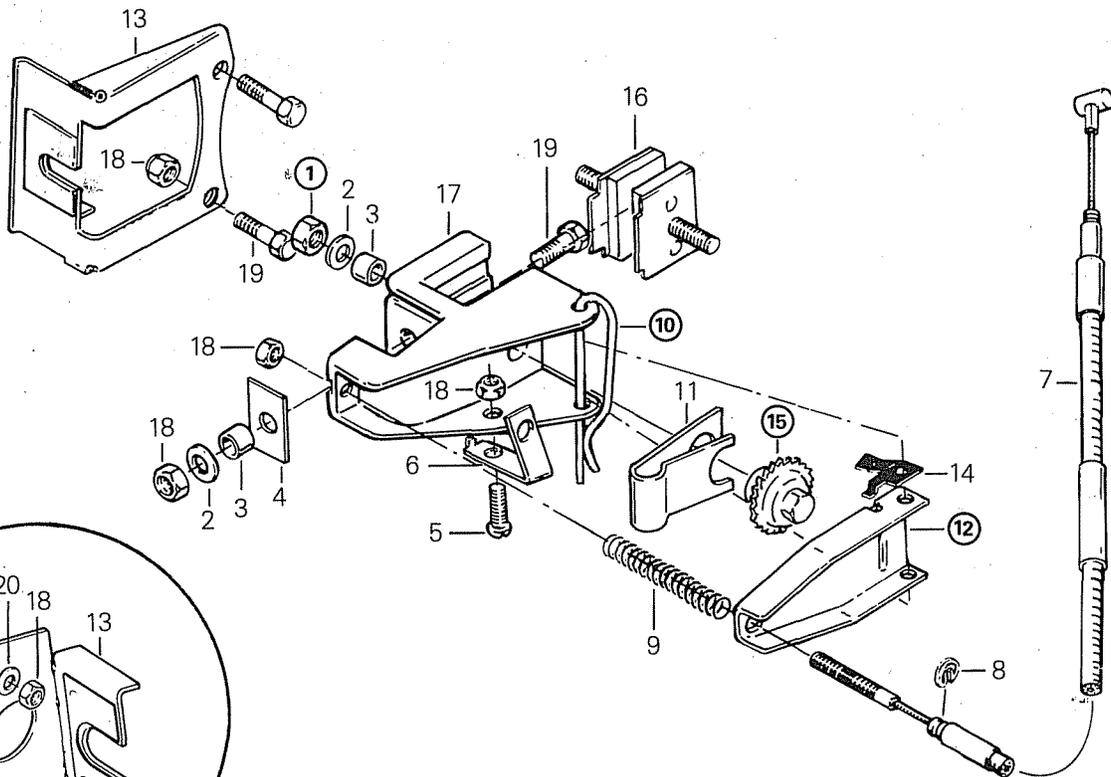
Check brake light operation. If necessary, loosen brake light switch lock nuts and adjust.



# BOMBARDIER SELF-ADJUSTING TYPE



1. Nut (nylon)
2. Washer
3. Spacer
4. Square washer
5. Bolt
6. Brake switch support
7. Brake cable and housing
8. Circlip
9. Spring
10. Hair pin cotter
11. Release spring
12. Lever



13. Brake support
14. Ratchet spring
15. Ratchet wheel
16. Brake pad
17. Caliper
18. Nut
19. Bolt
20. Washer
21. Retaining plate

## SECTION 02 SUB-SECTION 06 (BRAKE)

### REMOVAL

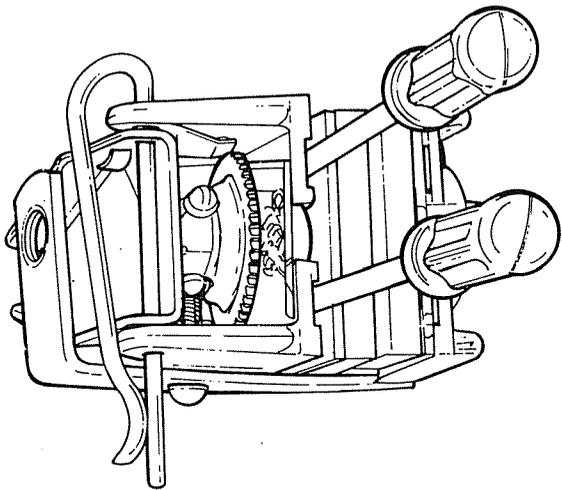
Disconnect brake switch and brake cable.

Remove nuts and/or bolts securing brake support to chaincase.

Slide brake caliper ass'y from brake support.

### DISASSEMBLY & ASSEMBLY

⑩⑫ To ease hair pin cotter assembly, activate lever and wedge two (2) screwdriver blades between caliper and brake pad to release lever tension.



⑮ Apply low temperature grease on threads and spring seat prior to installation. At assembly, fully tighten then back off 1/2 turn.

① At assembly, torque to 20 N•m (15 ft-lbs).

### CLEANING & INSPECTION

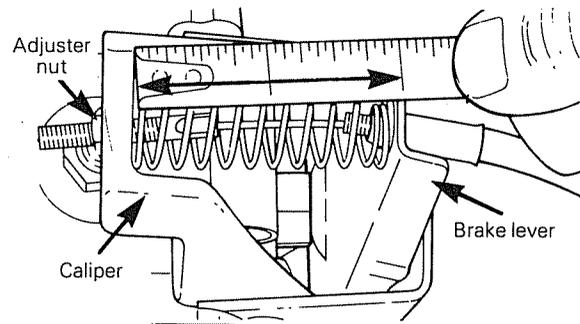
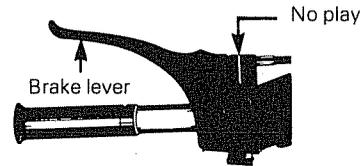
Measure thickness of brake pad. If less than 3 mm (1/8"), the pad should be replaced.

Clean all metal components in a general purpose solvent. Dry using clean cloth.

### INSTALLATION & ADJUSTMENT

Slide caliper ass'y onto its support then secure support to vehicle.

- Activate lever by hand until ratchet click is no longer heard.
- Secure brake cable housing to lever, slide spring over cable then attach cable to housing with adjuster nut.
- Using adjuster nut, adjust until there is no free-play between the brake lever and its housing, and there is
- a gap of 50 mm  $\pm$  3 (2"  $\pm$  1/8") between lever and caliper.

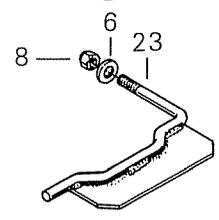
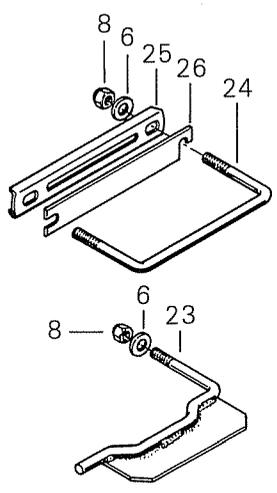
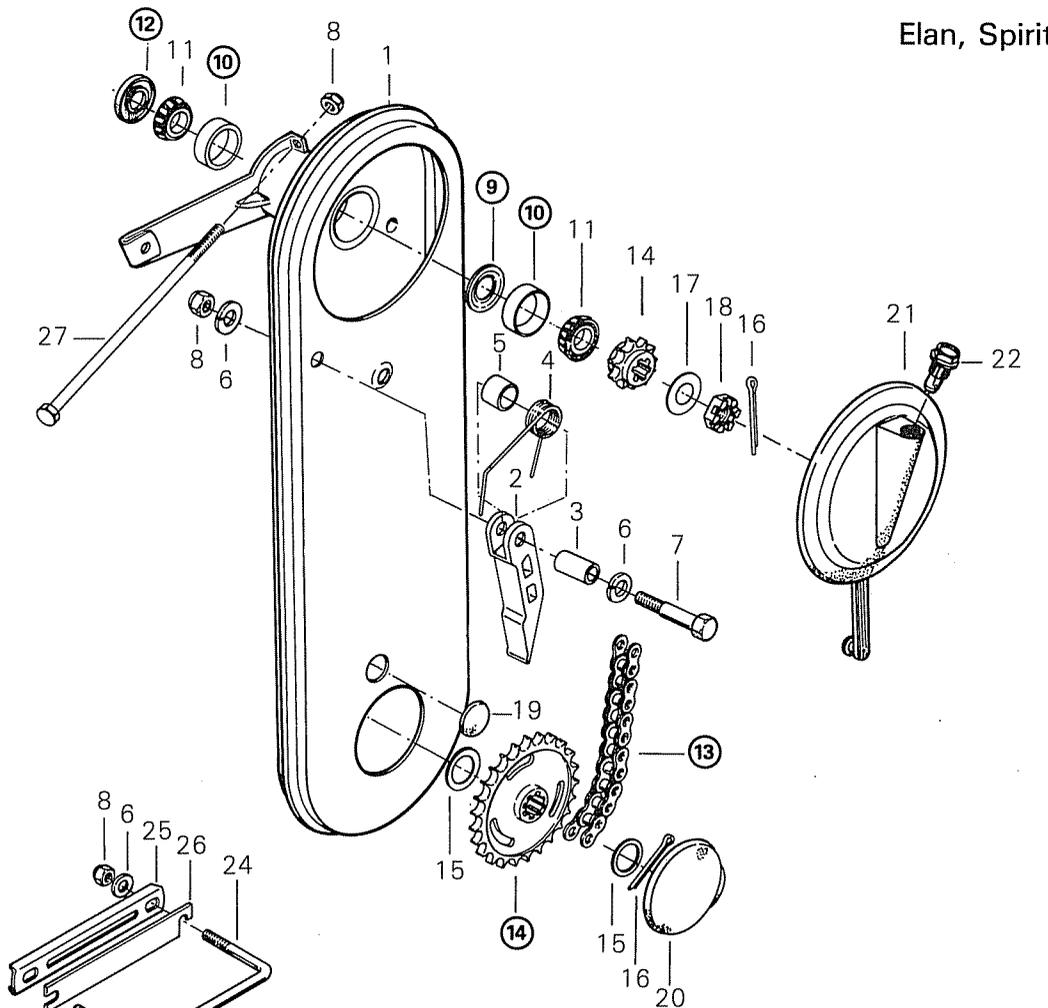


○ **NOTE:** It may be necessary to change brake light switch support position to obtain recommended gap between lever and caliper housing.

Connect brake light switch and check operation. Adjust if necessary using two (2) adjuster nuts.

# STEEL CHAINCASE

Elan, Spirit

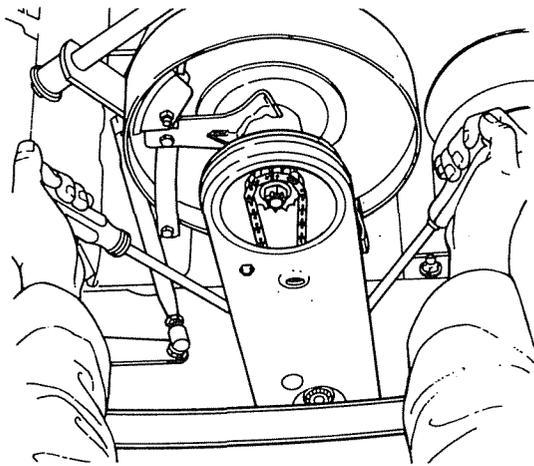


- |                      |                         |
|----------------------|-------------------------|
| 1. Chaincase         | 15. Spacer              |
| 2. Chain tensioner   | 16. Cotter pin          |
| 3. Bushing           | 17. Spring washer       |
| 4. Spring            | 18. Castellated nut     |
| 5. Spacer            | 19. Oil level plug      |
| 6. Washer            | 20. Access plug (lower) |
| 7. Bolt              | 21. Access plug (upper) |
| 8. Nut               | 22. Breather            |
| 9. Oil retainer ring | 23. Bracket             |
| 10. Bearing cup      | 24. "U" clamp           |
| 11. Cone bearing     | 25. Spacer plate        |
| 12. Oil seal         | 26. Shim                |
| 13. Chain            | 27. Hinge rod           |
| 14. Sprocket         |                         |

**SECTION 02**  
**SUB-SECTION 07 (CHAINCASE)**

**REMOVAL**

- Remove pulley guard, drive belt and inspection cover.
- Release chain tension.
- Release track tension.
- Pry oil seal from chaincase (lower part) and drain oil.
- Disconnect brake cable.
- Pry out lower access plug. Remove cotter pin and spacer.
- Remove nut on hinge rod at chaincase bracket.
- From the inner side of frame, remove the nut securing chaincase lower bracket. Remove bracket.
- Remove nuts, washers and "U" clamp holding the chaincase to the frame.
- Remove chaincase shim(s) if applicable. Move chaincase towards drive pulley to disengage hinge rod.
- Remove drive axle.
- Using two (2) large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

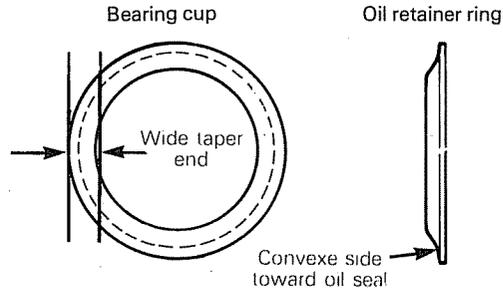


**INSPECTION**

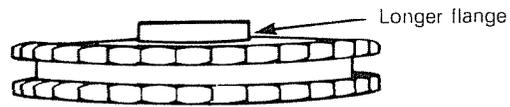
Visually inspect chain for cracked, damaged or missing link rollers. Inspect for defective bearing cones, bearing cups and oil retainer ring. Inspect sprockets for damage, wear.

**DISASSEMBLY & ASSEMBLY**

⑨⑩ Position oil retainer ring then sit bearing cup in chaincase aperture. Cup must be seated so that wide taper end is facing oil retainer ring.



- ⑫ Using an appropriate pusher, press oil seal into chaincase hub. Oil seal must sit flush with case hub edge.
- ⑬⑭ Place lower sprocket with longer flange toward track side of chaincase. (For proper sprocket and chain use, see Technical Data.)

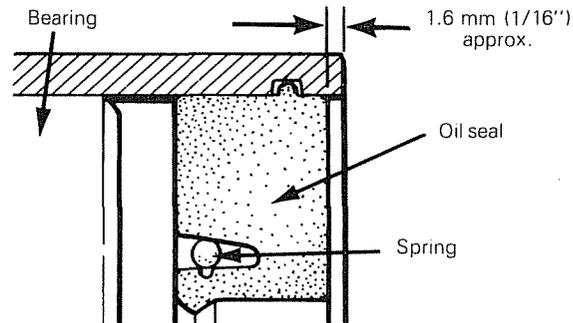


**INSTALLATION**

Position assembled chaincase and driven pulley in location. Install drive axle. (Ensure that spacer has remained on axle). Install spacer and cotter pin to secure lower sprocket to axle. Install lower access plug. Install hinge rod, lower bracket, "U" clamp and previously removed aligning shim(s).

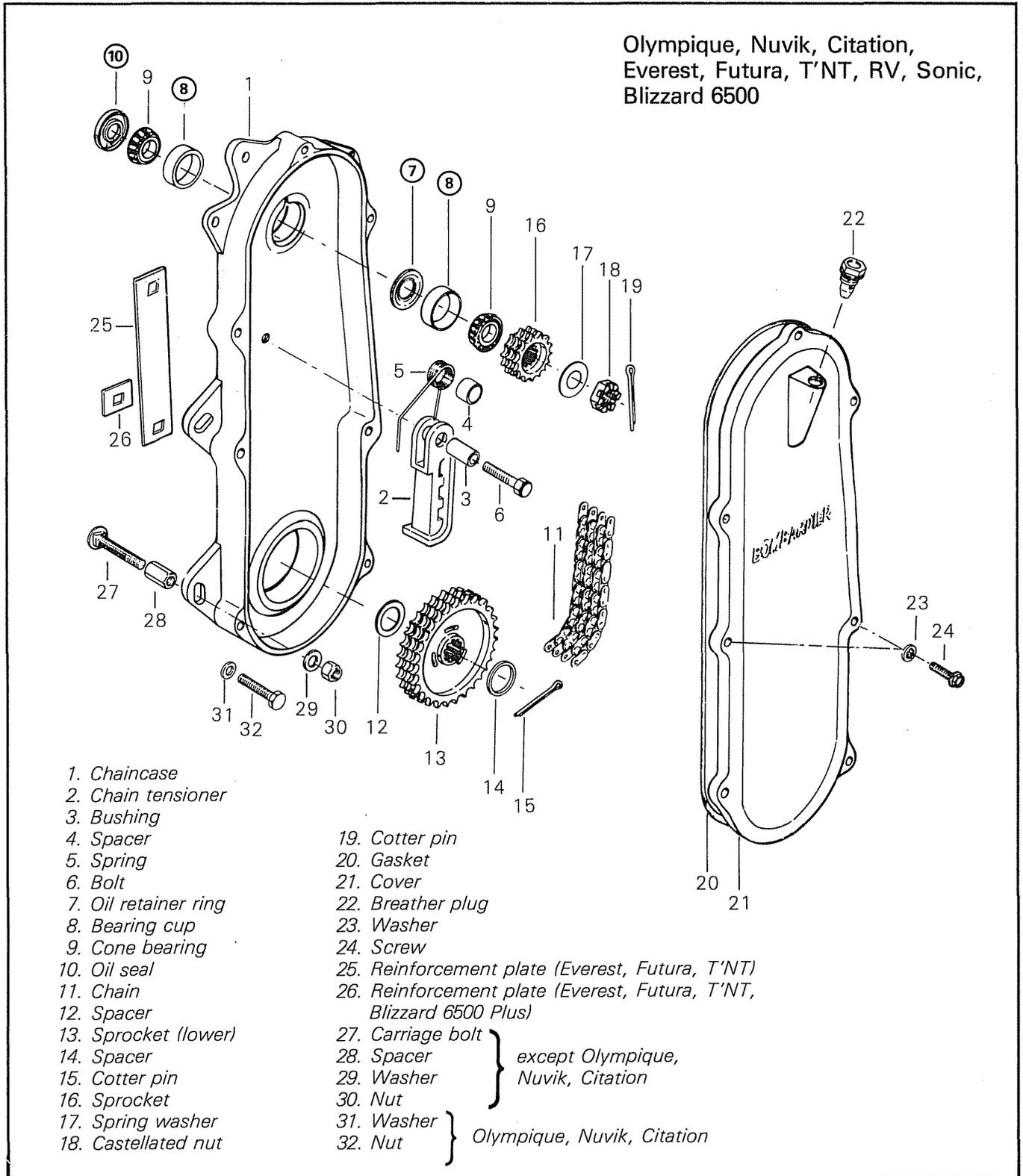
Install oil seal into chaincase flange.

○ **NOTE:** A gap of approximately 1.6 mm (1/16") should exist between the end chaincase flange and oil seal.



- Proceed with pulley alignment.
- Apply chain tension.
- Pour Bombardier chaincase oil into chaincase until flush with oil level plug.
- Connect and adjust brake.
- Apply track tension.
- Install drive belt and pulley guard.

# ALUMINUM CHAINCASE



**SECTION 02**  
**SUB-SECTION 07 (CHAINCASE)**

**REMOVAL**

- Remove pulley guard and drive belt.
- Release track tension and unbolt the end bearing housing.
- Unbolt brake assembly.
- Remove tool box or battery (if applicable).
- Remove chaincase cover and drain oil.
- Pry oil seal from chaincase.
- Release chain tension then remove cotter pin locking lower sprocket. Remove spacer.
- Remove bolts and/or nuts securing chaincase to frame. Remove aligning shim(s).
- Remove complete assembly from vehicle.

**INSPECTION**

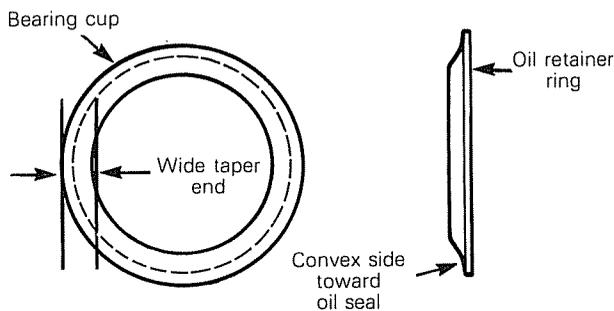
Visually inspect chain for cracked, damaged or missing link rollers. Inspect for defective cone bearings, bearing cups, sprockets and oil retainer ring.

**DISASSEMBLY & ASSEMBLY**

⑦ ⑧ To remove bearing cup and oil retainer ring from casing, first heat chaincase to 120°C (250°F). To install, heat chaincase to 120°C (250°F).

Position oil retainer ring with convex side toward oil seal.

Cup must be seated so that wide taper end is facing oil retainer ring.



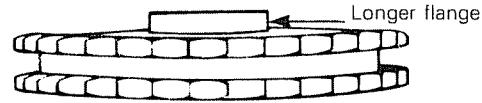
⑩ Using an appropriate pusher, press oil seal into chaincase hub. Oil seal must fit flush with case hub edge.

**INSTALLATION**

Install chaincase to frame (do not tighten). Position drive axle into location. Tighten the end bearing housing.

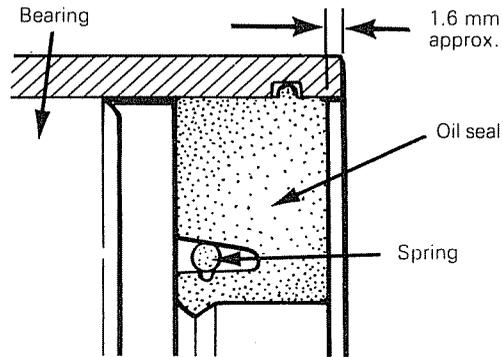
Prior to lower sprocket installation ensure that the spacer is on drive axle.

Position lower sprocket with longer flange facing inside of case. (For proper sprocket and chain use, see Technical Data).



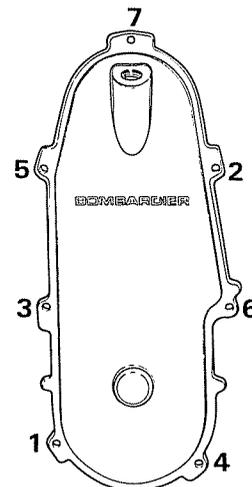
Install the other spacer and a new cotter pin.

Proceed with pulley alignment. Secure chaincase to frame. Install chaincase flange oil seal. A gap of approximately 1.6 mm (1/16") should exist between the end of chaincase flange and oil seal.



Apply chain tension.

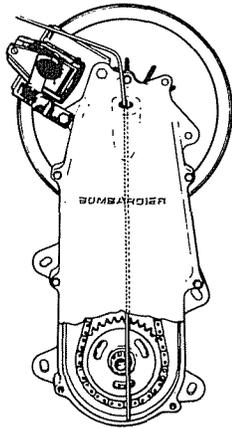
Install chaincase cover with a new gasket and silicone seal or equivalent. Torque cover bolts to 7 N•m (5 ft-lbs) in the following sequence.



Pour Bombardier chaincase oil into chaincase until flush.

SECTION 02  
SUB-SECTION 07 (CHAINCASE)

Using a rigid wire as a "dipstick", check oil level, the oil level on the "dipstick" should be 75-90 mm (3-3 1/2").



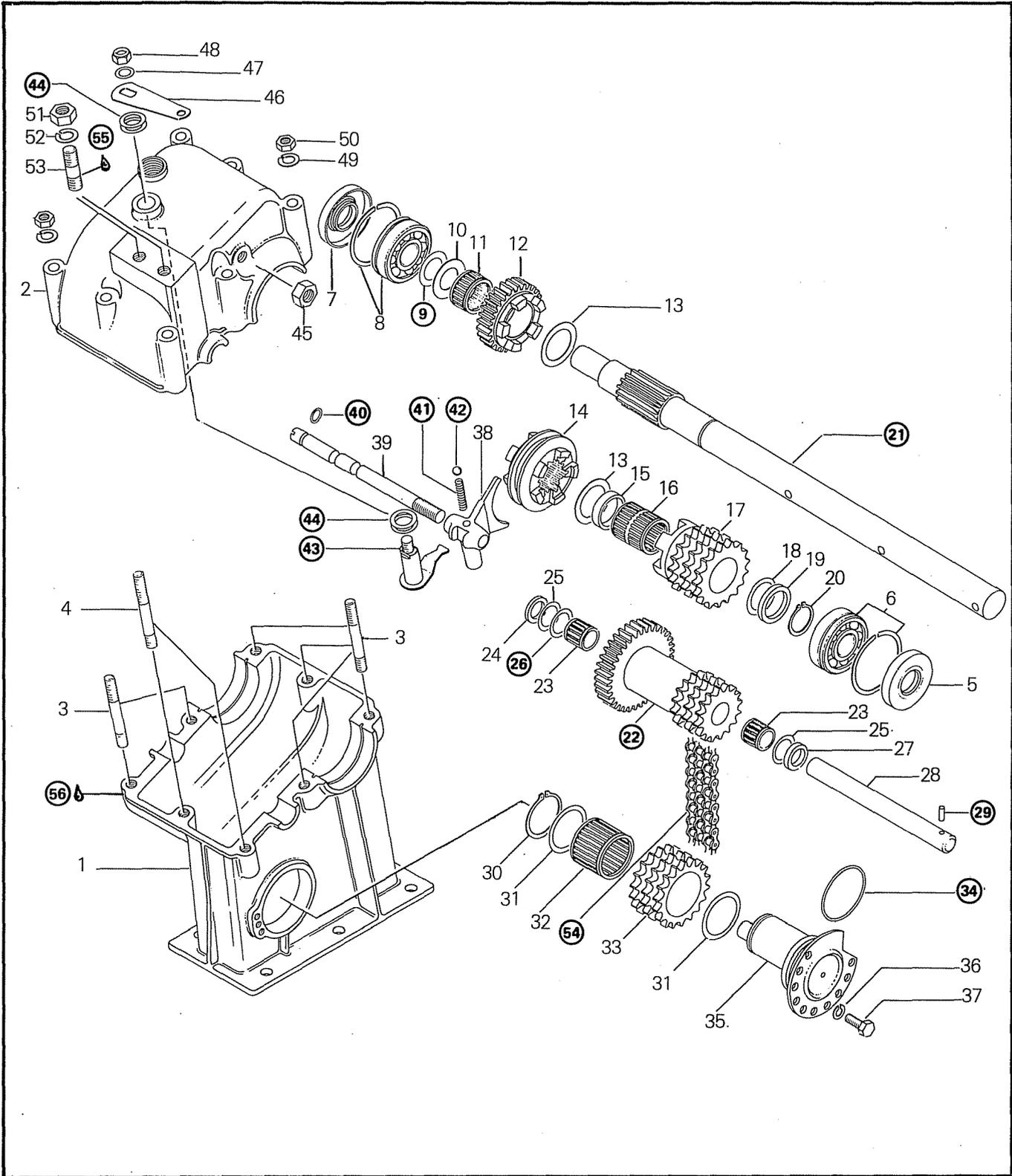
Install brake assembly, drive belt and pulley guard.  
Apply track tension.

( )

( )

( )

**GEARBOX (FORWARD, REVERSE)**



## SECTION 02

### SUB-SECTION 08 (GEARBOX)

1. Lower housing
2. Upper housing
3. Stud
4. Stud
5. Oil seal
6. Ball bearing/groove ring
7. Oil seal
8. Ball bearing/groove ring
9. Shim 0.15 to 0.80 mm
10. Washer 20.5 mm
11. Needle bearing
12. Reverse gear
13. Washer 30.2 mm
14. Gear shift sleeve
15. Distance sleeve
16. Needle bearing
17. Shift sprocket 17T
18. Washer 25.5 mm
19. Distance ring 3 mm
20. Circlip
21. Drive shaft
22. Layshaft gear ass'y
23. Needle bearing
24. Distance ring 2.9 mm
25. Shim 1 mm
26. Shim 0.15 to 1 mm
27. Distance ring 5.2 mm
28. Lay axle
29. Dowel tube
30. Circlip
31. Washer 32.2 mm
32. Needle bearing
33. Tensioner sprocket 18T
34. "O" ring
35. Tensioner axle ass'y
36. Lock washer
37. Bolt
38. Gear change fork
39. Index rod
40. "O" ring
41. Index spring
42. Ball 1/4 inch
43. Gear change shaft
44. Shim 0.3 to 1 mm
45. Nut
46. Gear change lever
47. Washer 8.4 mm
48. Lock nut
49. Lock washer
50. Nut
51. Nut
52. Lock washer
53. Stud
54. Chain
55. Loctite 242
56. Crankcase sealant

## REMOVAL

### Alpine

Remove cab, pulley guard, drive belt and exhaust manifold from vehicle.

Remove brake assembly and shifter mechanism.

Remove steering lower bracket from the gearbox.

Slacken upper bracket.

Release chain tension using tensioner.

Release track tension by unlocking link plate springs. Insert a pry bar between structural members of center bogie wheel sets and pry sets upward to reverse installation position. Reverse front then rear bogie wheel sets. Remove rear axles.

Remove oil seals from end bearing housings and center frame (to drain the oil).

Remove end bearing housings. (Pry out housings with two (2) screwdrivers inserted between housing and frame).

Release drive axle sprocket teeth from track notches while at the same time, pulling the drive axle towards end bearing side of frame. (This action will disengage the axle splines from the lower sprocket of the gearbox).

Allow drive axles to remain within the tracks.

Remove gearbox and gasket from frame.

### Elite

Remove pulley guard and drive belt.

Remove seat backs and seats then remove plates to allow access to engine compartment.

Remove engine from vehicle.

Remove brake assembly and detach driven pulley support.

Remove shifter mechanism.

Release track tension. Remove suspension systems.

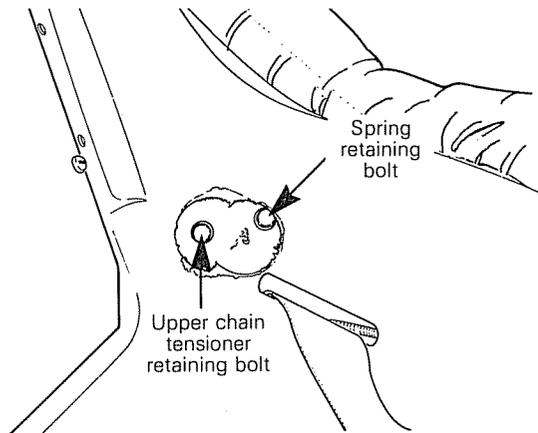
Drain oil from chaincase (incorporated with frame).

Remove end bearing housings.

Remove drive axle then pull back gearbox assembly until it is possible to enter the hand to remove the two (2) tensioners inside the housing between the track tunnels).

**SECTION 02**  
**SUB-SECTION 08 (GEARBOX)**

○ **NOTE:** It is necessary to cut a hole in fiberglass frame in order to be able to reach chain tensioner retaining bolts and nuts.



Remove gearbox, chain and lower sprocket from vehicle.

## INSPECTION

Check general condition of chain linkage. Visually inspect drive chain for cracked, damaged or missing link rollers. Inspect security of riveted heads of link pins.

Visually inspect oil seals for cuts or damage.

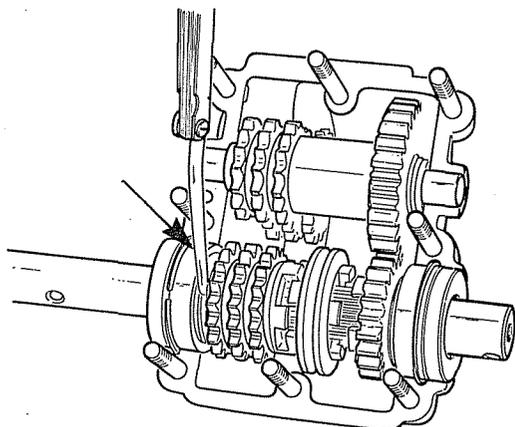
Inspect sprockets and gears for damage, worn teeth, or spline distortion.

Inspect general condition of bearings (pitted or missing roller bearings, freedom of movement and radial free-play).

Inspect drive shaft for deflection, worn or twisted splines.

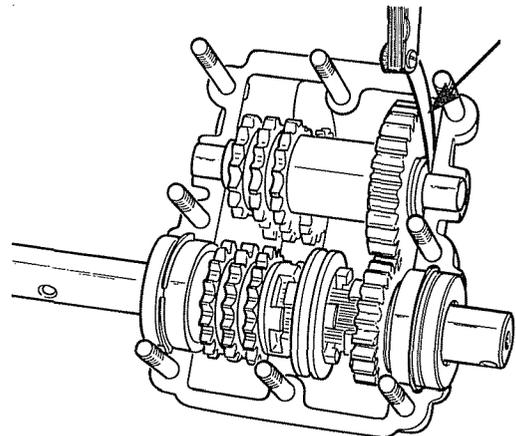
## DISASSEMBLY & ASSEMBLY

⑳ ⑨ Drive shaft free-play:



Install assembled drive shaft into lower housing then using a feeler gauge, check total free-play between components installed on the drive shaft side of sprocket ⑫. Free-play must not exceed 0.15-0.30 mm (.006 to .012"). If free-play is not within tolerance, shim ⑨ to correct tolerance.

㉒ ㉔ Layshaft gear free-play:



Place the assembled lay gear into the lower housing.

Using a feeler gauge, check end play between assembled layshaft and walls of lower housing. End play must be between 0.15-0.30 mm (.006 and .012"). If end play is not within tolerance, remove or add ㉔ shims.

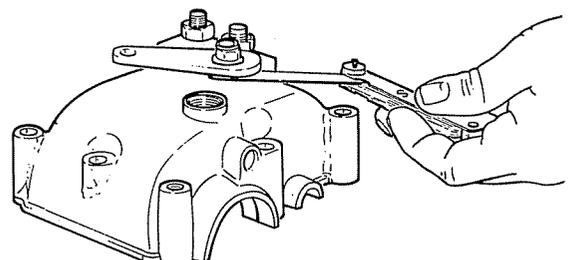
㉙ Do not remove the dowel tube from layshaft unless damaged and replacement is necessary.

㉛ When assembling, always position a new "O" ring into appropriate groove of tensioner axle.

㉜ When assembling gearbox, always position a new "O" ring on index rod.

㉝ ㉞ The gear change fork incorporates a spring loaded ball. Ensure that spring and ball do not fly out during removal of index rod.

㉟ ㊱ Gear change shaft free-play:



## SECTION 02 SUB-SECTION 08 (GEARBOX)

Install gear change shaft on upper housing then on outside of housing, position shim (44), gear change lever (46), washer (47) and nut (48). Torque to 23 N•m (17 ft-lbs).

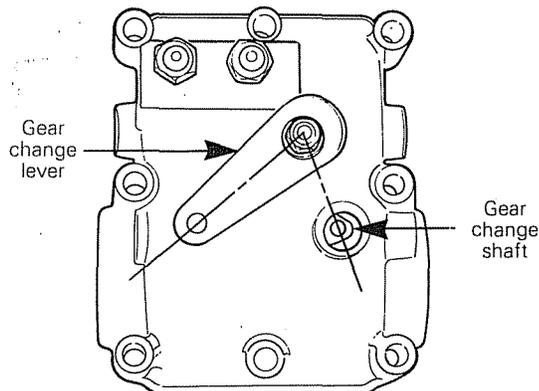
Using a feeler gauge, check that free-play of gear change shaft is within tolerance of 0.15-0.30 mm (.006 to .012"). If free-play is not within tolerance, record discrepancy. Remove nut, washer, gear change lever, shim, and gear change shaft.

Divide discrepancy by two and install that amount of shim (44) on gear change shaft (43). Install shaft into upper housing.

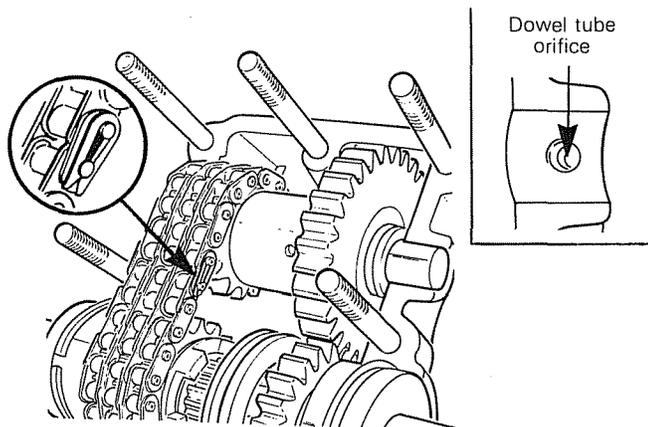
Install remaining shims (44) on gear change shaft.

Install gear change lever (46) as per following illustration.

Install washer (47) and nut (48). Torque to 23 N•m (17 ft-lbs).



(54) Chain locking clip must be installed as per following illustration, with its closed end towards the rotary motion direction when in "Forward" position.



For correct chain selection, see Technical data.

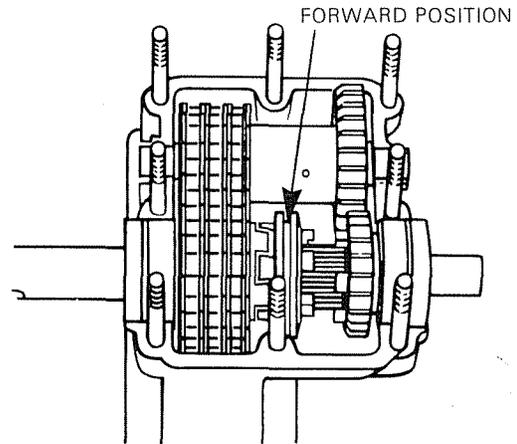
(55) At the installation of the studs in the gearbox upper housing, apply Loctite 242 on threads.

(56) Seal upper and lower gearbox housings with Loctite 515 or an equivalent such as silicone sealants.

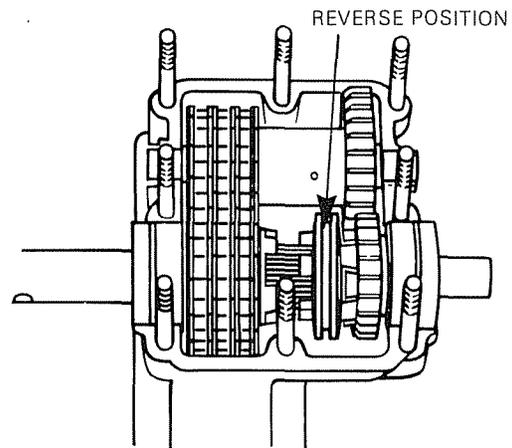
(GEARBOX WITH FORWARD & REVERSE), PAGE 4

## INSTALLATION

Prior to installation, with the gearbox removed, adjust gearbox to obtain correct engagement. At "forward" position, sleeve must be as shown,



At "reverse" position, sleeve must be as shown,



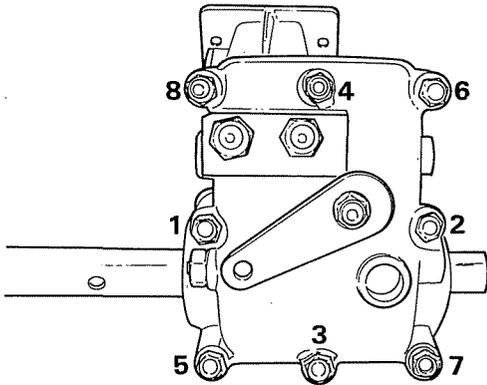
If any of these positions are unobtainable, use a screwdriver to turn index rod (39) and obtain proper meshing of teeth. Recheck sleeve engagement after adjusting index rod.

Lock index rod using a nut (45) with Loctite 242 on threads.

Position gear change fork in gearbox cover so that it aligns with slot of sleeve in gearbox housing.

**SECTION 02**  
**SUB-SECTION 08 (GEARBOX)**

Install gearbox cover on gearbox using "Loctite 515 crankcase sealant" or an equivalent such as silicone sealants. Torque nuts in the following sequence to 27 N•m (20 ft-lbs).



Install rear axle and bogie wheel sets to their original position.

Connect shifter mechanism to gearbox lever (46) and adjust. (See section 08-08, Shifter mechanism.)

Rotate the tensioner axle (35) to obtain 6 mm (1/4") maximum drive chain free-play.

Fill gearbox with 450 mL (16 Imp. ounces) of Bombardier chaincase oil.

Install exhaust manifold, drive belt and brake assembly. Proceed with pulley alignment.

Proceed with track tension and alignment.

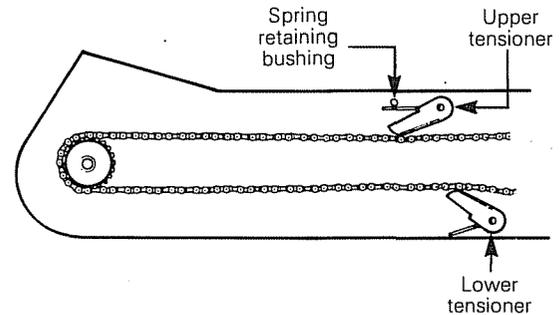
Install pulley guard and cab.

**Elite**

Position gaskets and spacer of gearbox on frame studs.

Place lower sprocket in drive chain and push it forward inside the housing (between the track tunnels).

Install chain tensioners.



**Alpine**

Position gasket on frame studs.

Place lower sprocket in drive chain.

Secure gearbox to frame. Torque nuts to 22 N•m (16 ft-lbs).

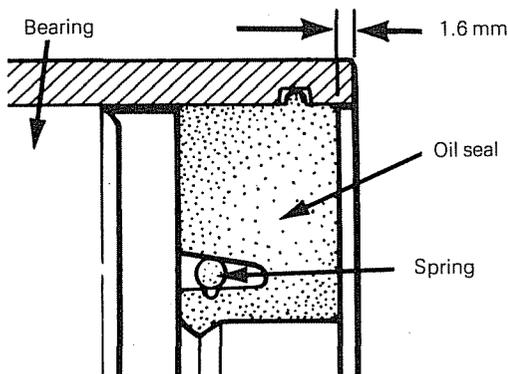
**CAUTION:** Check condition of drive axles oil seals; replace if necessary.

From the left side of vehicle, place the drive axle within the track. Push the end bearing side of axle through the orifice in left side of frame, then push the splined end of axle into gearbox lower sprocket. Install opposite drive axle.

Press each end bearing housing into frame and over axle bearing. Secure housings to frame.

Install oil seals.

**NOTE:** A gap of approximately 1.6 mm (1/16") should exist between the end of bearing housing and the oil seal.

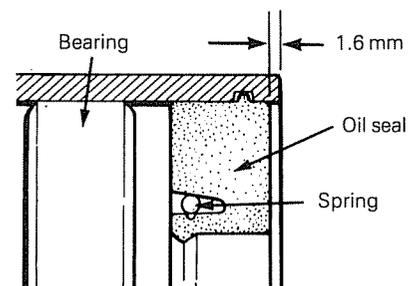


Secure gearbox to frame (torque nuts to 22 N•m (16 ft-lbs) and insert splined end of drive axles in the lower sprocket of the gearbox.

**CAUTION:** Check condition of drive axles oil seals; replace if necessary.

Press each end bearing housing into frame and over drive axle bearing. Secure housings to frame. Install oil seals.

**NOTE:** A gap of approximately 1.6 mm (1/16") should exist between the end of bearing housing and oil seal.



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## SECTION 02

### SUB-SECTION 08 (GEARBOX)

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Install shifter mechanism and adjust (see section 02-08, Shifter mechanism).

Install brake and driven pulley support.

Apply chain tension by rotating tensioner axle (35) to obtain 6 mm (1/4") maximum chain free-play.

Pour .625 mL (22 Imp. ounces) of Bombardier chaincase oil into gearbox.

Install engine and carry out pulley alignment.

Install suspension systems. Proceed with track tension and alignment.

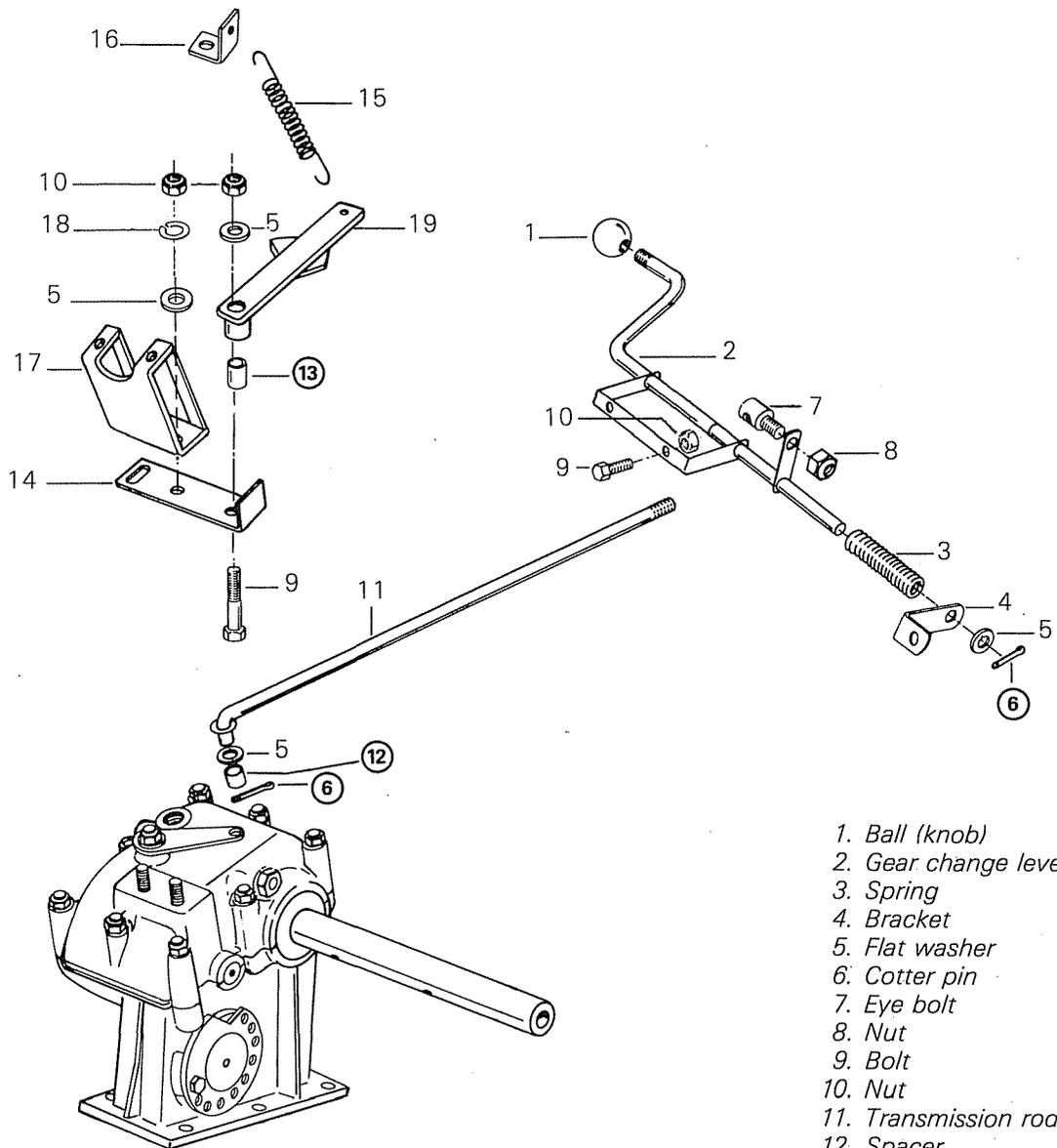
Install drive belt and pulley guard.

Install engine compartment access plates, seats and seat backs.

# SHIFTER MECHANISM

## TYPE 1

Alpine



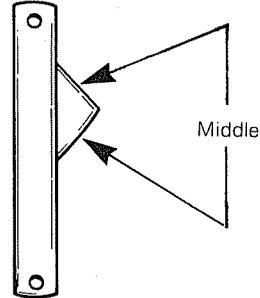
- 1. Ball (knob)
- 2. Gear change lever
- 3. Spring
- 4. Bracket
- 5. Flat washer
- 6. Cotter pin
- 7. Eye bolt
- 8. Nut
- 9. Bolt
- 10. Nut
- 11. Transmission rod
- 12. Spacer
- 13. Bushing
- 14. Cam plate
- 15. Spring
- 16. Spring bracket
- 17. Steering bracket
- 18. Lockwasher
- 19. Cam

SECTION 02  
SUB-SECTION 08 (GEARBOX)

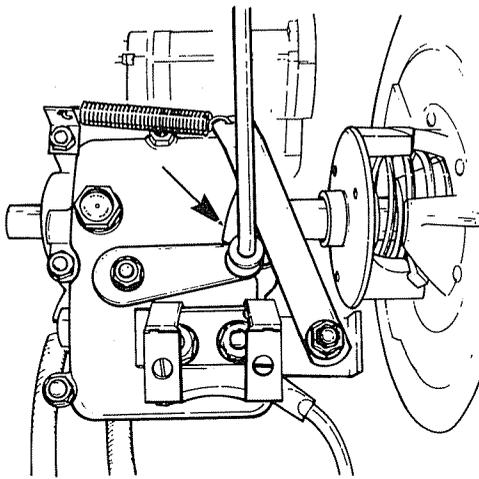
DISASSEMBLY & ASSEMBLY

- ⑥ When assembling shifter mechanism, always position new cotter pins.
- ⑫⑬ A layer of grease should be applied for smoother operation of the mechanism.

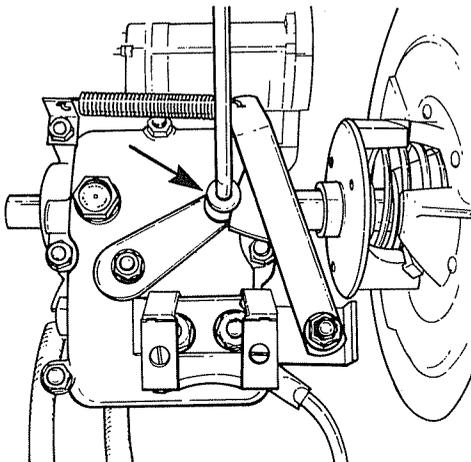
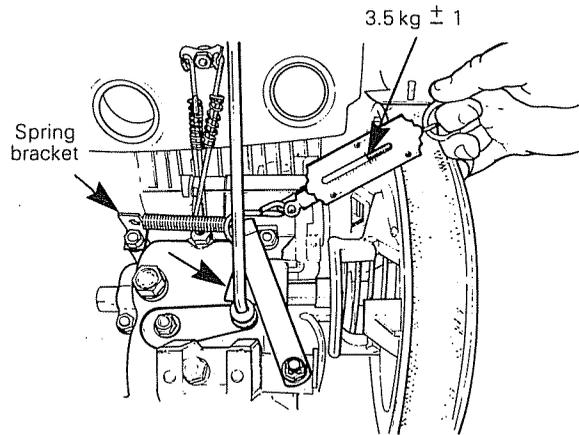
SHIFTER MECHANISM  
ADJUSTMENT



Using a fish scale, adjust spring bracket to obtain a spring tension of  $3.5 \text{ kg} \pm 1$  ( $8 \text{ lbs} \pm 2$ ), when in forward position.



FORWARD POSITION



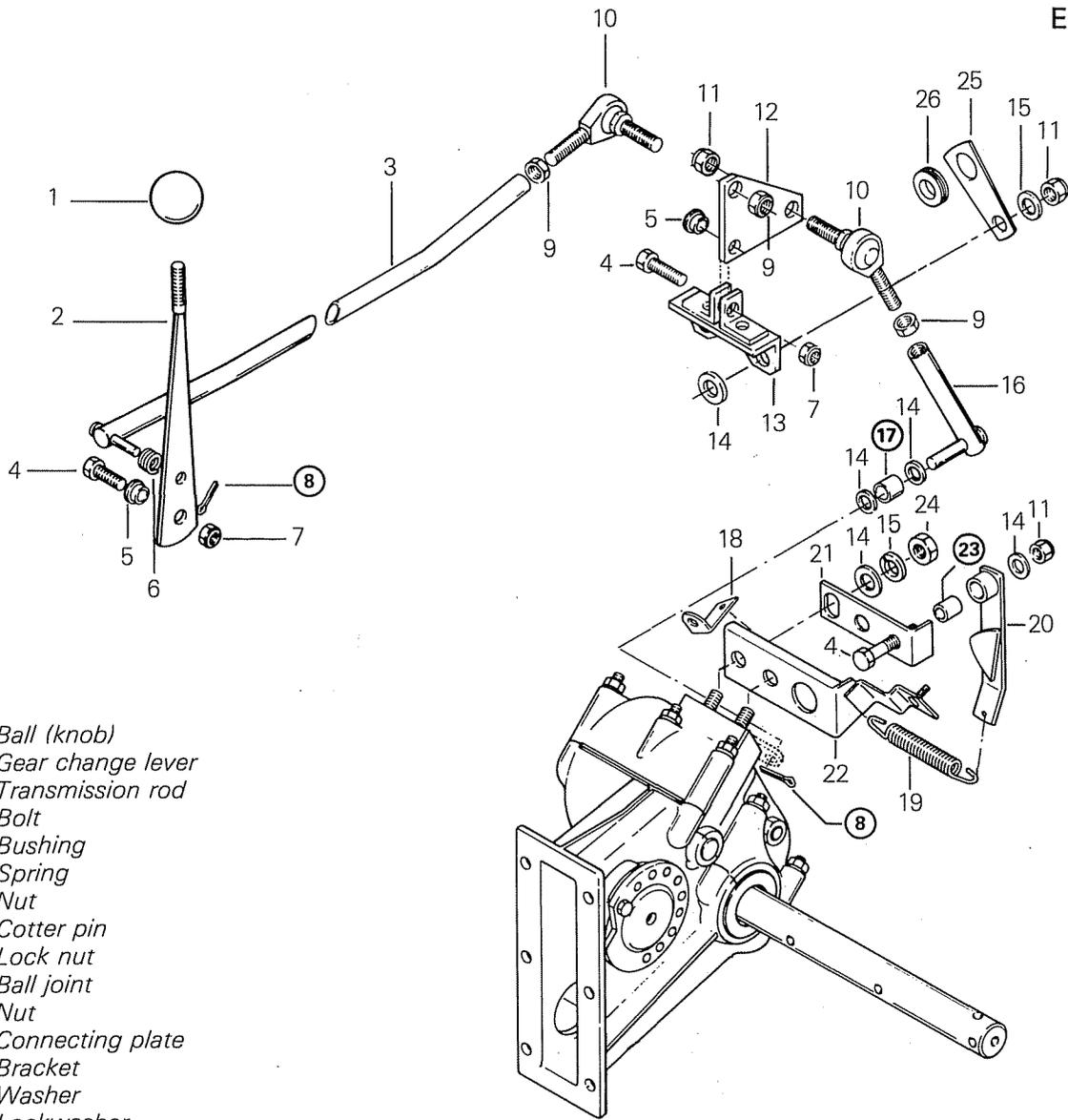
REVERSE POSITION

To adjust cam position as per above illustrations, move cam plate one side or the other: in the 2 cases, transmission rod bushing must rest in the middle of the cam.

SECTION 02  
SUB-SECTION 08 (GEARBOX)

**TYPE 2**

Elite



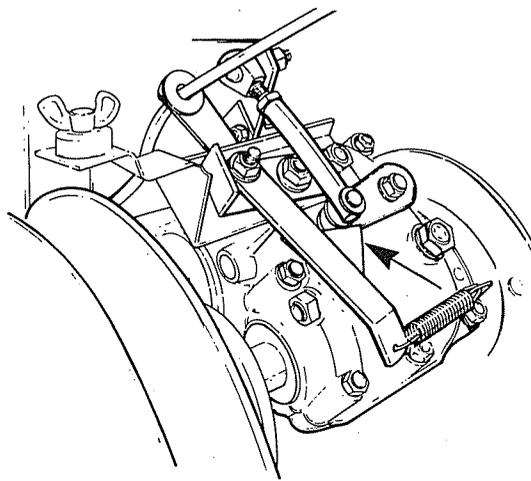
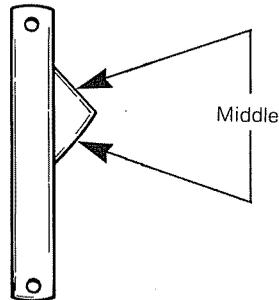
1. Ball (knob)
2. Gear change lever
3. Transmission rod
4. Bolt
5. Bushing
6. Spring
7. Nut
8. Cotter pin
9. Lock nut
10. Ball joint
11. Nut
12. Connecting plate
13. Bracket
14. Washer
15. Lockwasher
16. Tie rod
17. Spacer
18. Spring bracket
19. Spring
20. Cam
21. Cam plate
22. Pulley guard bracket
23. Bushing
24. Nut
25. Cable bracket
26. Cable grommet

SECTION 02  
SUB-SECTION 08 (GEARBOX)

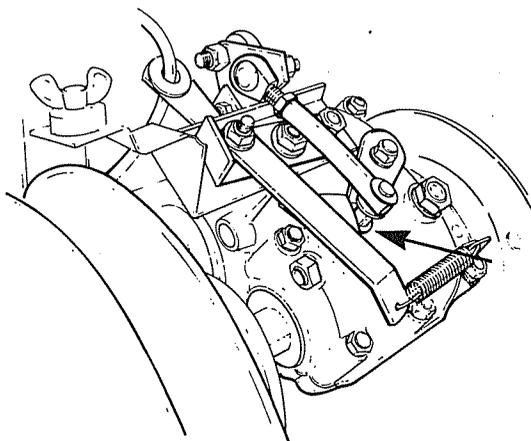
DISASSEMBLY & ASSEMBLY

- ⑧ When assembling shifter mechanism, always position new cotter pins.
- ⑰⑲ A layer of grease should be applied for smoother operation of the mechanism.

SHIFTER MECHANISM  
ADJUSTMENT

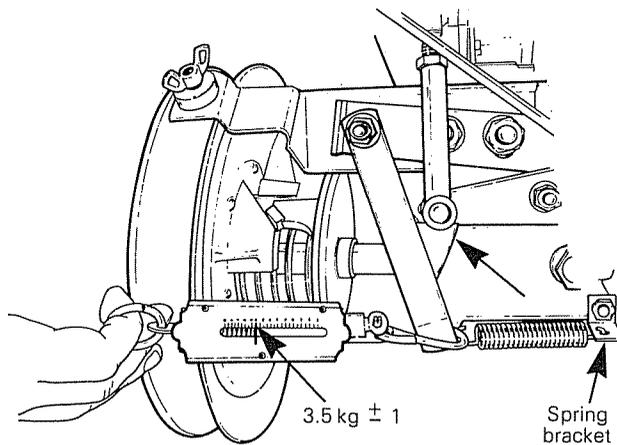


FORWARD POSITION



REVERSE POSITION

Using a fish scale, adjust spring bracket to obtain a spring tension of  $3.5 \text{ kg} \pm 1$  ( $8 \text{ lbs} \pm 2$ ), when in forward position.

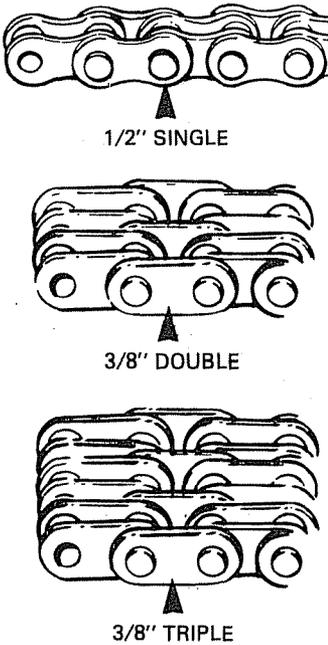


To adjust cam position as per above illustrations, move cam plate on one side or the other: in the 2 cases, transmission rod bushing must rest in the middle of the cam.

# DRIVE CHAIN

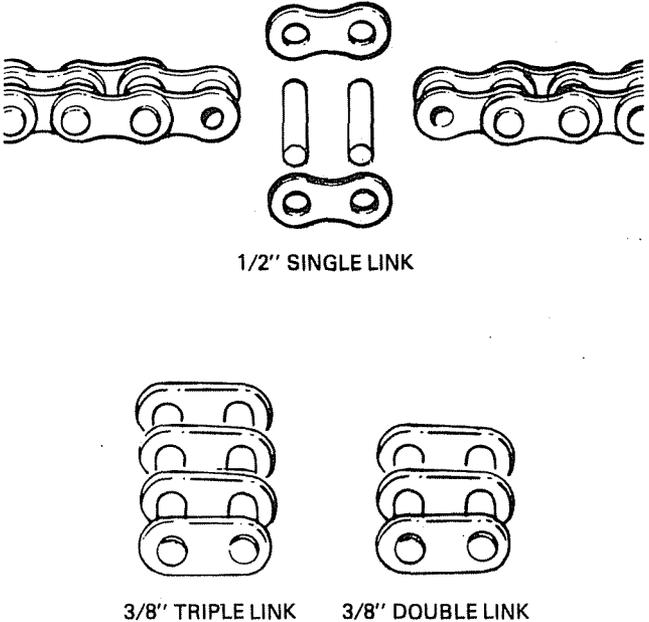
## GENERAL

There are three (3) types of the Bombardier drive chains; a **single 1/2" pitch**, a **double 3/8" pitch**, and a **triple 3/8" pitch**. For proper use refer to Technical Data.



## CHAIN SEPARATION

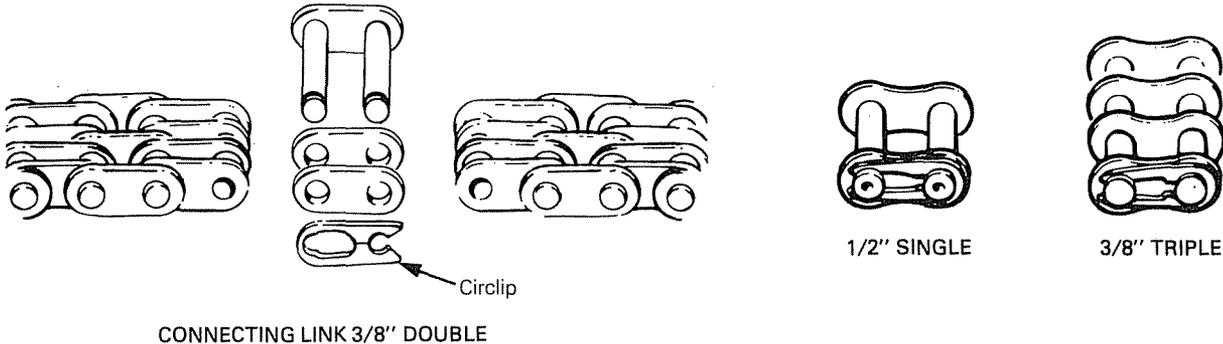
When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



There are two (2) variations of chains; detachable and endless.

## CHAIN ATTACHMENT

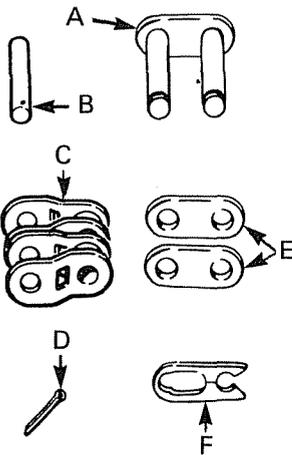
When joining chain ends, the **open end of the circlip must be on opposite side of chain rotation**. The circlip should also be facing the **outer side of chaincase**.



SECTION 02  
SUB-SECTION 09 (DRIVE CHAIN)

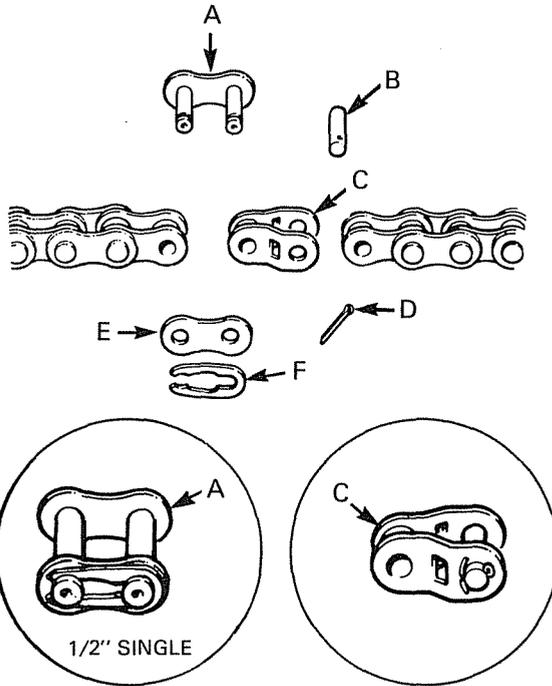
**LENGTHENING 1/2 LINK**

3/8" DOUBLE

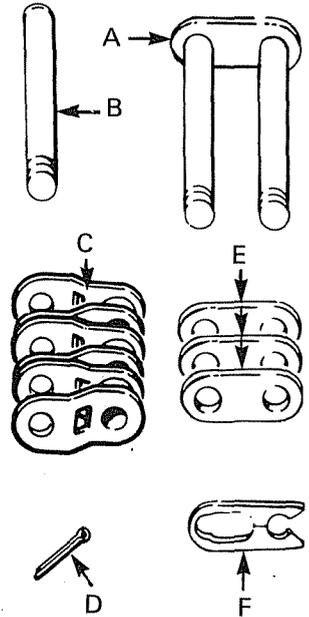


- A. Connecting link
- B. Link pin
- C. Cranked link
- D. Cotter pin
- E. Outer link
- F. Circlip

1/2" SINGLE

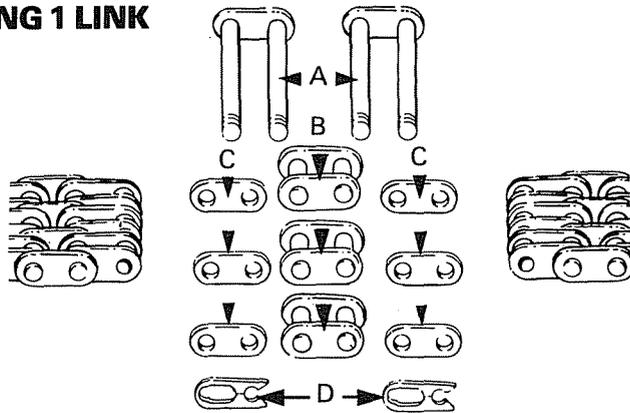


3/8" TRIPLE

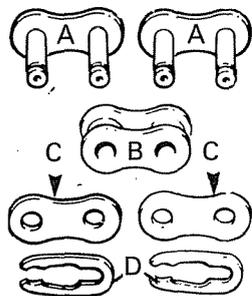


**LENGTHENING 1 LINK**

3/8" TRIPLE

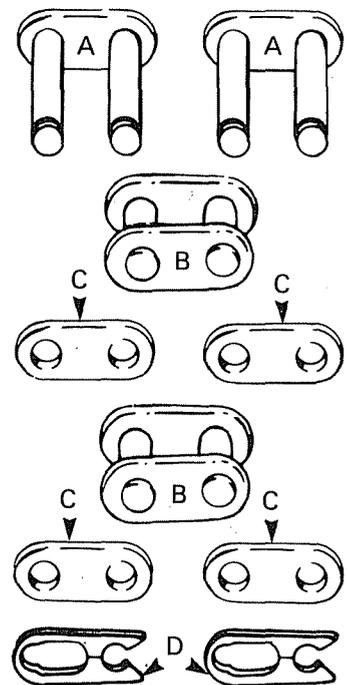


1/2" SINGLE



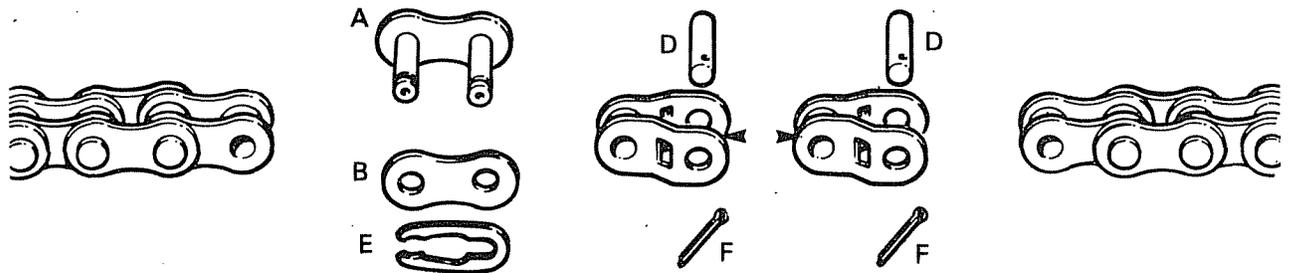
- A. Connecting link
- B. Inner link
- C. Outer link
- D. Circlip

3/8" DOUBLE

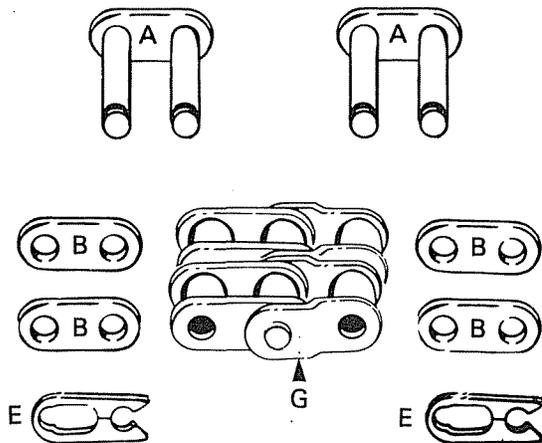


**LENGTHENING 1 1/2 LINK**

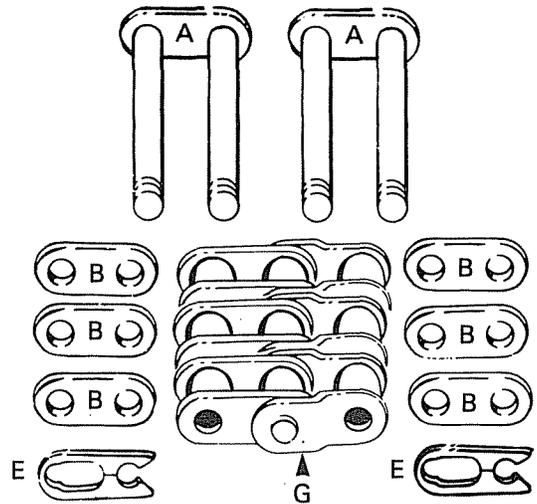
1/2" SINGLE



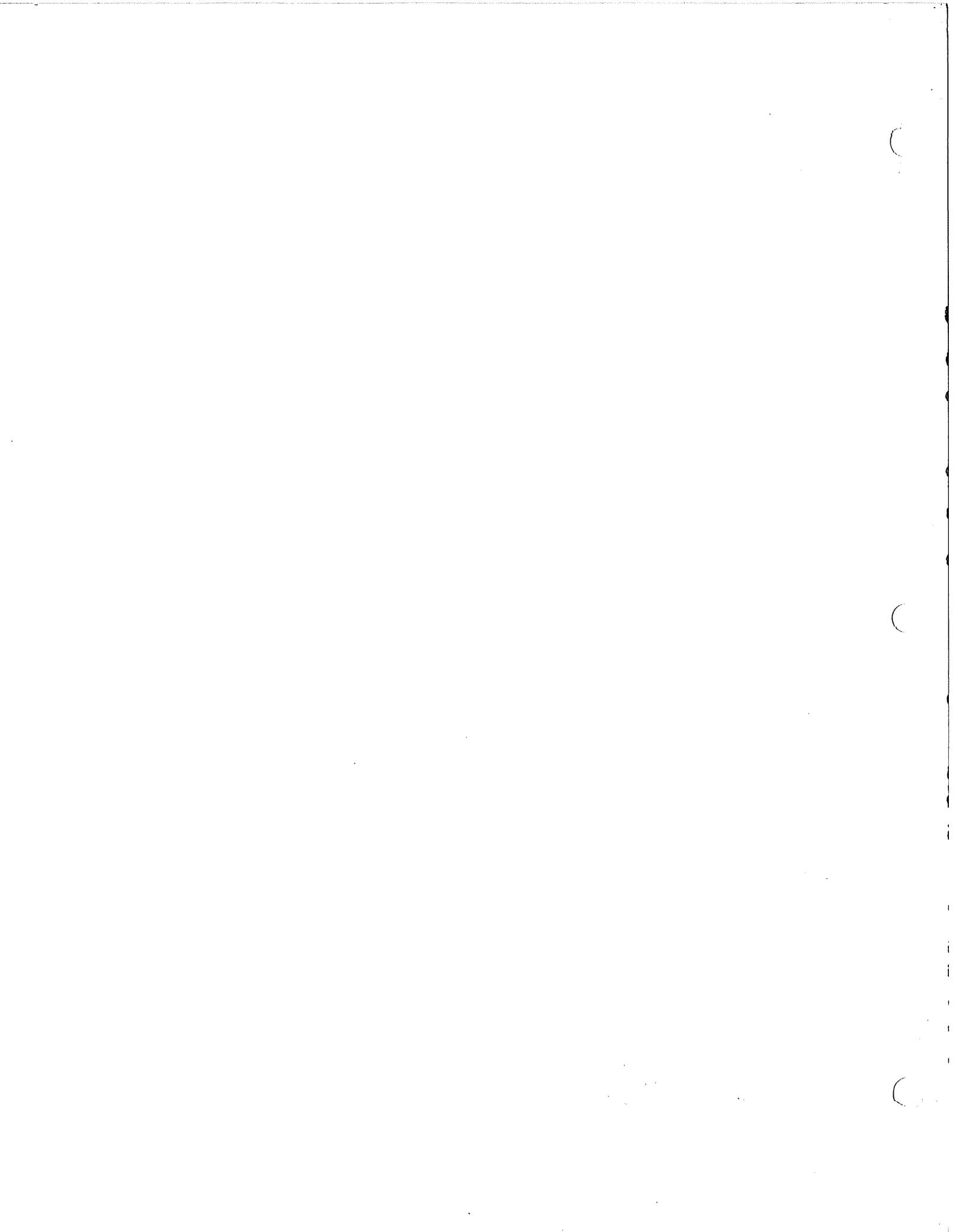
3/8" DOUBLE



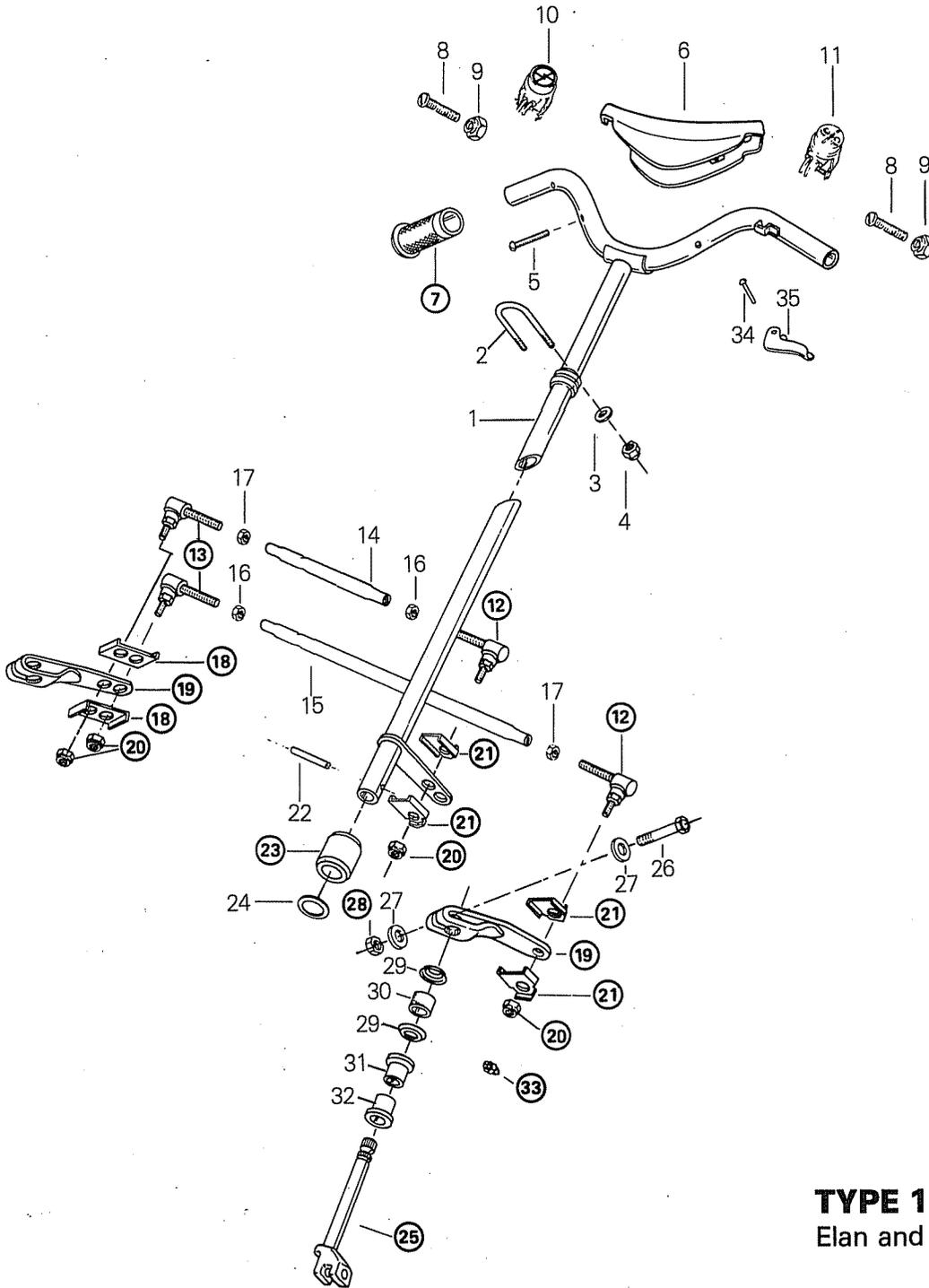
3/8" TRIPLE



- A. Connecting link
- B. Outer link
- C. Cranked link
- D. Link pin
- E. Circlip
- F. Cotter pin
- G. Double cranked link

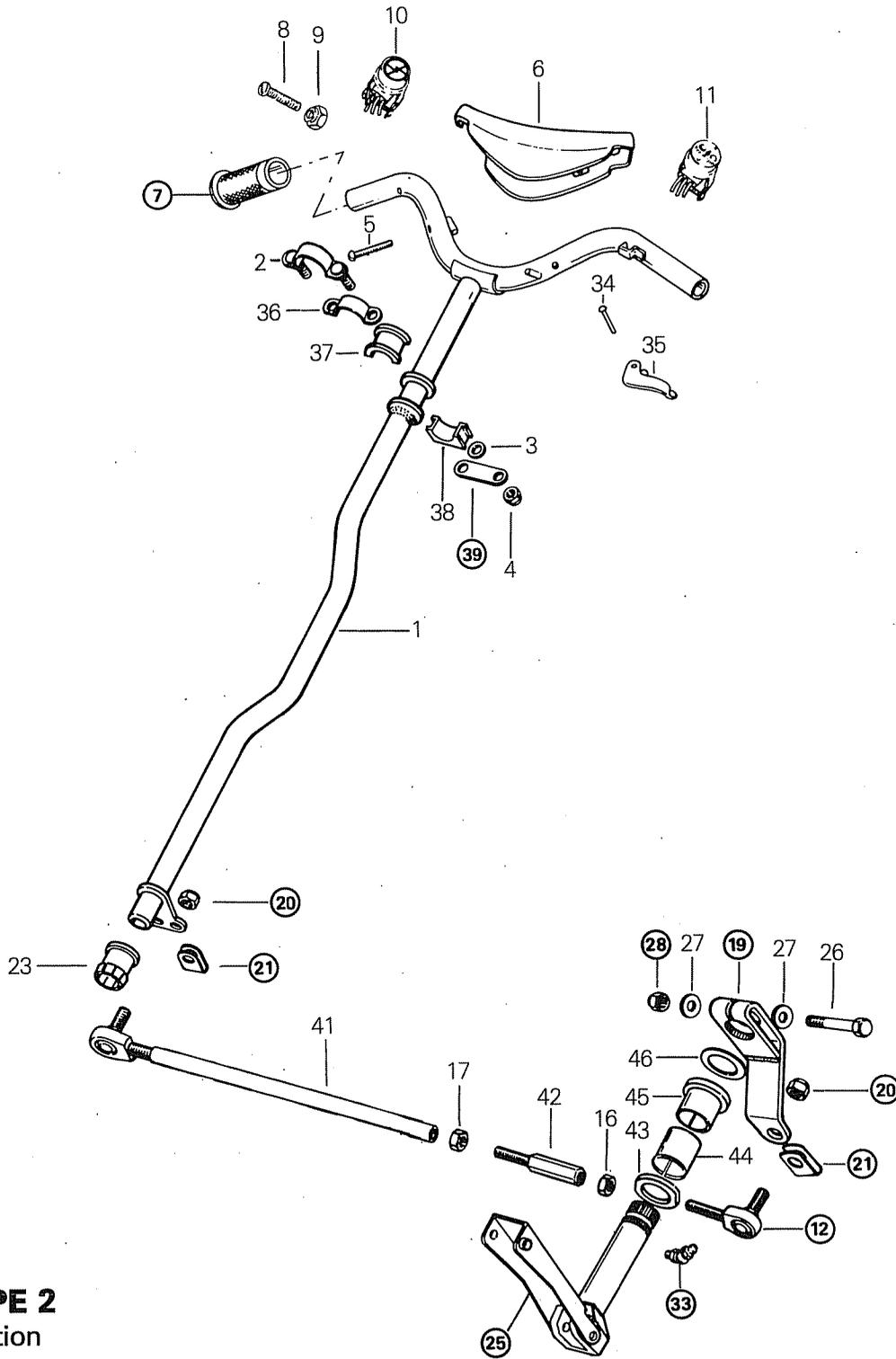


# STEERING SYSTEM



**TYPE 1**  
Elan and Spirit

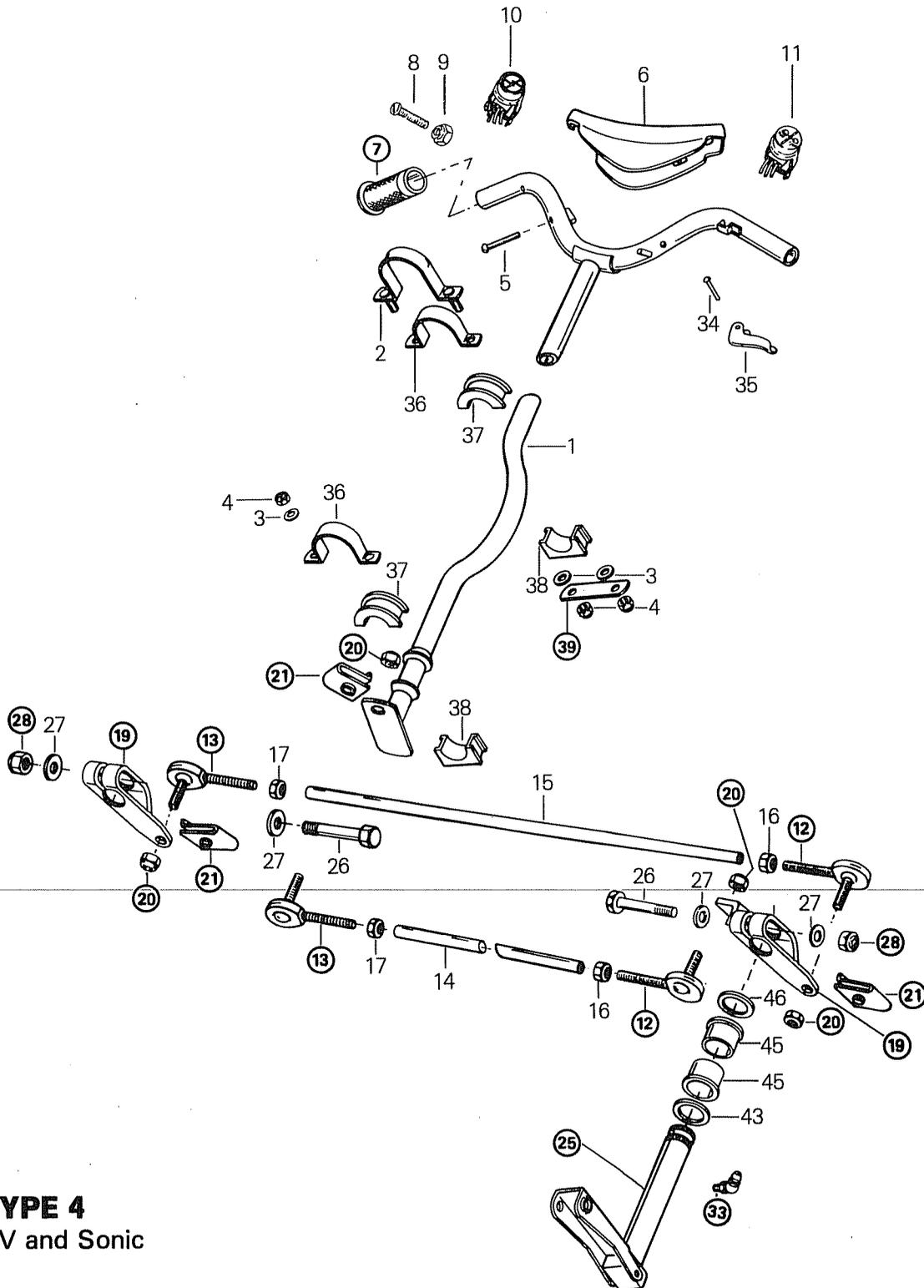
SECTION 03  
SUB-SECTION 01 (STEERING SYSTEM)



**TYPE 2**  
Citation



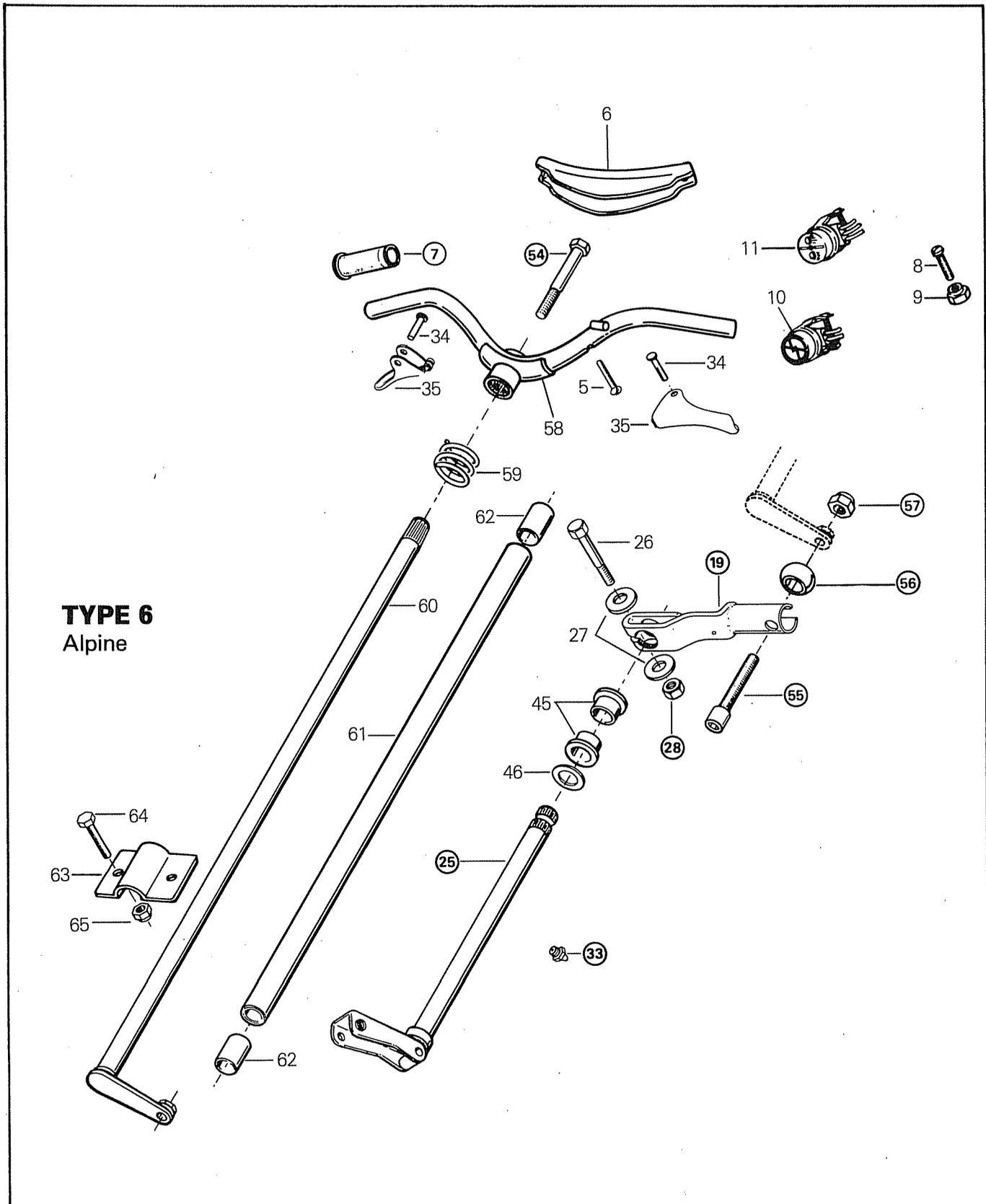
SECTION 03  
SUB-SECTION 01 (STEERING SYSTEM)



**TYPE 4**  
RV and Sonic



SECTION 03  
SUB-SECTION 01 (STEERING SYSTEM)





## SECTION 03

### SUB-SECTION 01 (STEERING SYSTEM)

1. Handlebar
2. Clamp
3. Washer
4. Nut
5. Screw
6. Steering padding
7. Grip
8. Bolt
9. Nut
10. Cut-out button
11. Dimmer switch
12. Tie rod end (R.H. threads)
13. Tie rod end (L.H. threads)
14. Tie rod (short)
15. Tie rod (long)
16. Jam nut (R.H. threads)
17. Jam nut (L.H. threads)
18. Tab lock
19. Steering arm
20. Nut
21. Tab lock
22. Spirol pin
23. Steering bushing
24. Washer
25. Ski leg
26. Bolt
27. Washer
28. Nut
29. Washer (cup)
30. Rubber spacer
31. Upper bushing
32. Lower bushing
33. Grease fitting
34. Rivet
35. Handle
36. Retainer bracket
37. Bushing (upper half)
38. Bushing (lower half)
39. Tab lock
40. Heating grip (Everest & Futura L/C & Elite)
41. Tie rod
42. Turnbuckle
43. Washer
44. Bushing
45. Bushing
46. Shim
47. Throttle handle housing
48. Brake handle housing
49. Pin
50. Stop washer
51. Throttle cable retainer
52. Clip
53. Bombardier label
54. Bolt (handlebar)
55. Allen bolt
56. Ball bushing
57. Nut
58. Handlebar
59. Spring
60. Steering shaft (main)
61. Steering column
62. Bushing
63. Retainer bracket
64. Bolt
65. Nut
66. Screw
67. Cap
68. Retaining ring
69. Collar
70. Allen screw
71. Bushing
72. Block
73. Washer
74. Lockwasher
75. Bolt
76. Steering shaft (secondary)

## INSPECTION

Check skis and runner shoes for excessive wear, replace if necessary. (See section 03-02.)

Make sure steering arm and ski leg splines interlock.

Check general condition of steering system.

Check general condition of steering system, components for wear and replace if necessary.

## DISASSEMBLY & ASSEMBLY

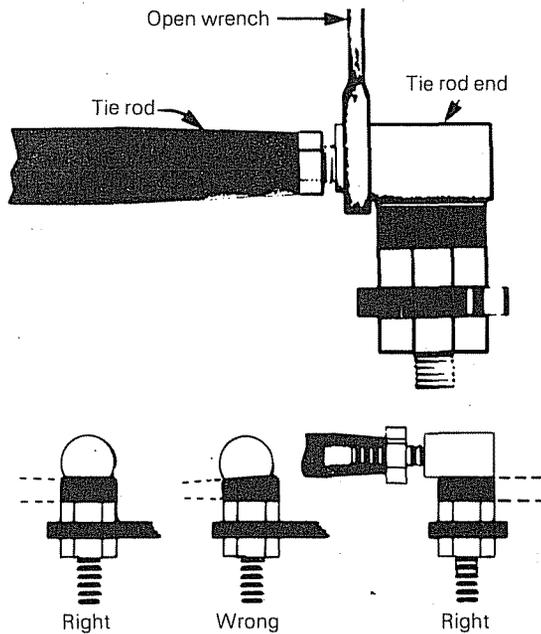
⑦④ Grips can be removed and installed without any damage by injecting compressed air into the handlebar.

Another way to install grips consists in soaking them in soapy water (detergent for dishes) and in pushing them onto the handlebar with a soft hammer.

⑫⑬ Inspect tie rod ends for wear or looseness, if excessive, replace.

○ NOTE: Screw the longer threaded end of tie rod into the tie rod, ensure that half of the total number of threads are inserted into the tie rod.

The cut-off section of the tie rod end must run parallel with the horizontal line of the steering arm when assembled on vehicle. The tie rod end should be restrained when tightening tie rod end lock nut. For torque specifications see Technical Data.



18 21 39 When assembling components, always position new tab locks.

19 The steering arm angles should be equal on both sides when skis are parallel with vehicle.

20 21 Tighten to 27 N•m (20 ft-lbs) and bend locking tabs over nuts.

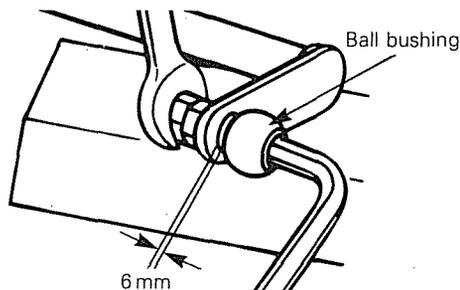
23 On Elan and Spirit, do not remove steering bushing unless it is damaged and must be replaced.

25 Grease ski leg at grease fitting 33.

28 On Elan and Spirit, torque to 27 N•m (20 ft-lbs). On all other vehicles, torque to 42 N•m (31 ft-lbs).

54 Torque to 42 N•m (31 ft-lbs).

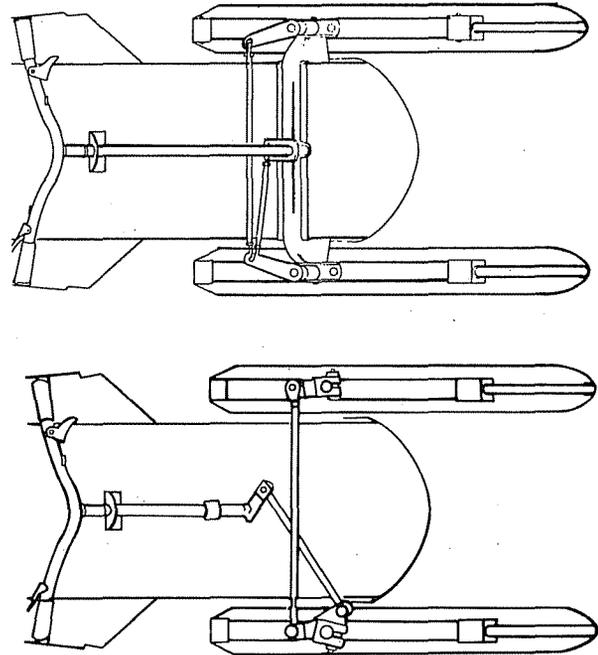
55 56 57 Affix the ball bushing to steering shaft using appropriate Allen head bolt. Tighten bolt until there is approximately 6 mm (1/4") free-play existing between ball bushing and steering shaft.



Torque nut to 61 N•m (45 ft-lbs).

## STEERING ADJUSTMENT (SKIS)

Types 1, 4, 5



Skis should have a toe out of 3 mm (1/8"). To check, measure distance between each ski at front and rear of spring leaves. The front distance should be 3 mm (1/8") more than the rear when the handlebar is horizontal. If adjustment is required:

Loosen the jam nuts locking the longer tie rod in place. Turn tie rod manually until alignment is correct. Tighten jam nuts firmly.

**IMPORTANT:** Close front of skis manually to take all slack from steering mechanism.

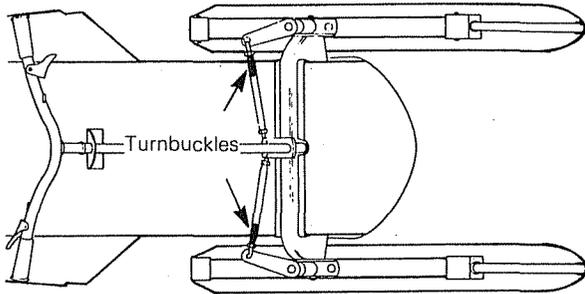
Check that handlebar is horizontal. To correct, loosen shorter tie rod jam nuts.

Turn tie rod manually until handlebar is horizontal.

Tighten jam nuts firmly.

SECTION 03  
SUB-SECTION 01 (STEERING SYSTEM)

Types 2, 3



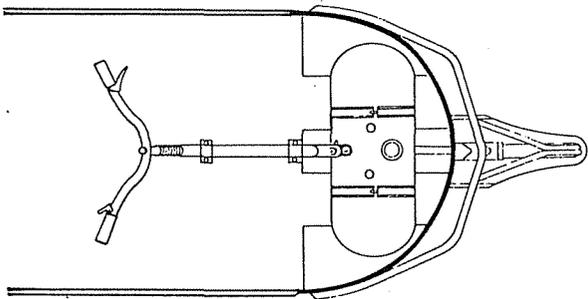
Skis should have a toe out of 3 mm (1/8"). To check, measure distance between each ski at front and rear of spring leaves. The front distance should be 3 mm (1/8") more than the rear when the handlebar is horizontal. If adjustment is required:

Loosen the tie rod jam nuts. Turn one or both turnbuckles manually until alignment is correct.

**IMPORTANT:** Close front of skis manually to take all slack from steering mechanism.

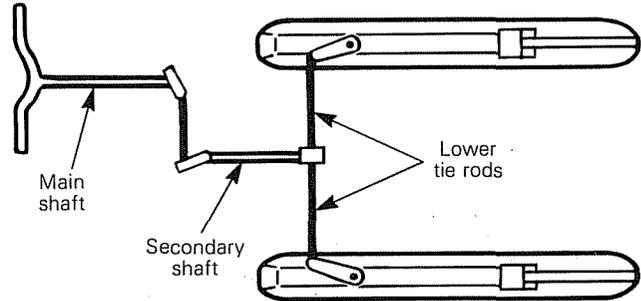
Tighten the jam nuts firmly.

Type 6



When assembling steering arm (19) and ski leg (25), the handlebar must be horizontal with the ski parallel with vehicle.

Type 7



Skis should have a toe out of 3 mm (1/8"). To check, measure distance between each ski at front and rear of leaf springs. The front distance should be 3 mm (1/8") more than the rear when the handlebar is horizontal. If adjustment is required:

Loosen the lower tie rod jam nuts. Turn one or both tie rods manually until alignment is correct.

**IMPORTANT:** Close front of skis manually to take all slack from steering mechanism.

Tighten the jam nuts firmly.

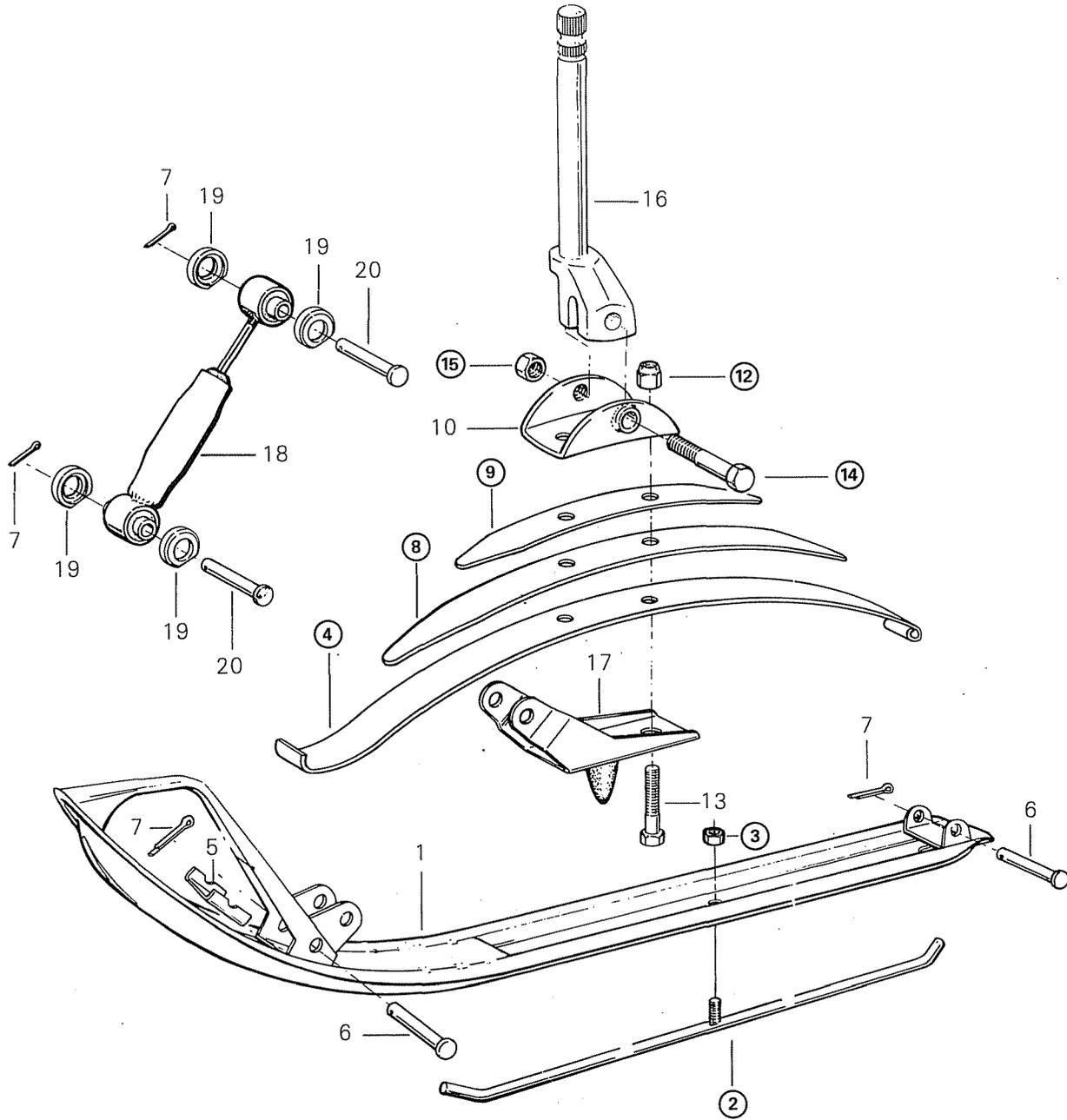
Check that handlebar is horizontal while skis are parallel with vehicle.

To correct handlebar position, loosen the jam nuts of the tie rod located between steering main shaft and steering secondary shaft. Turn tie rod until handlebar is horizontal. Tighten the jam nuts firmly.

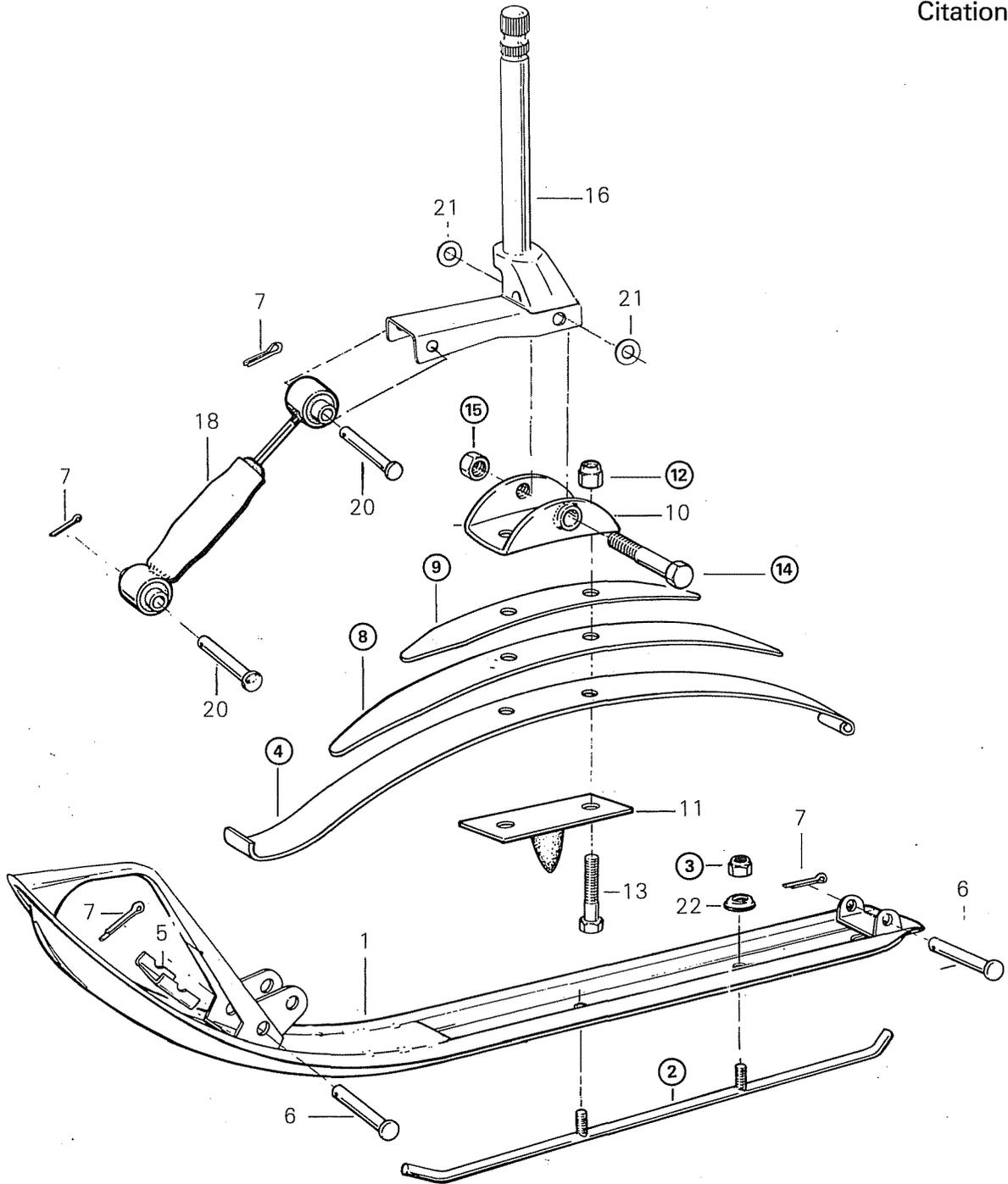


**TYPE 2**

Elan Deluxe

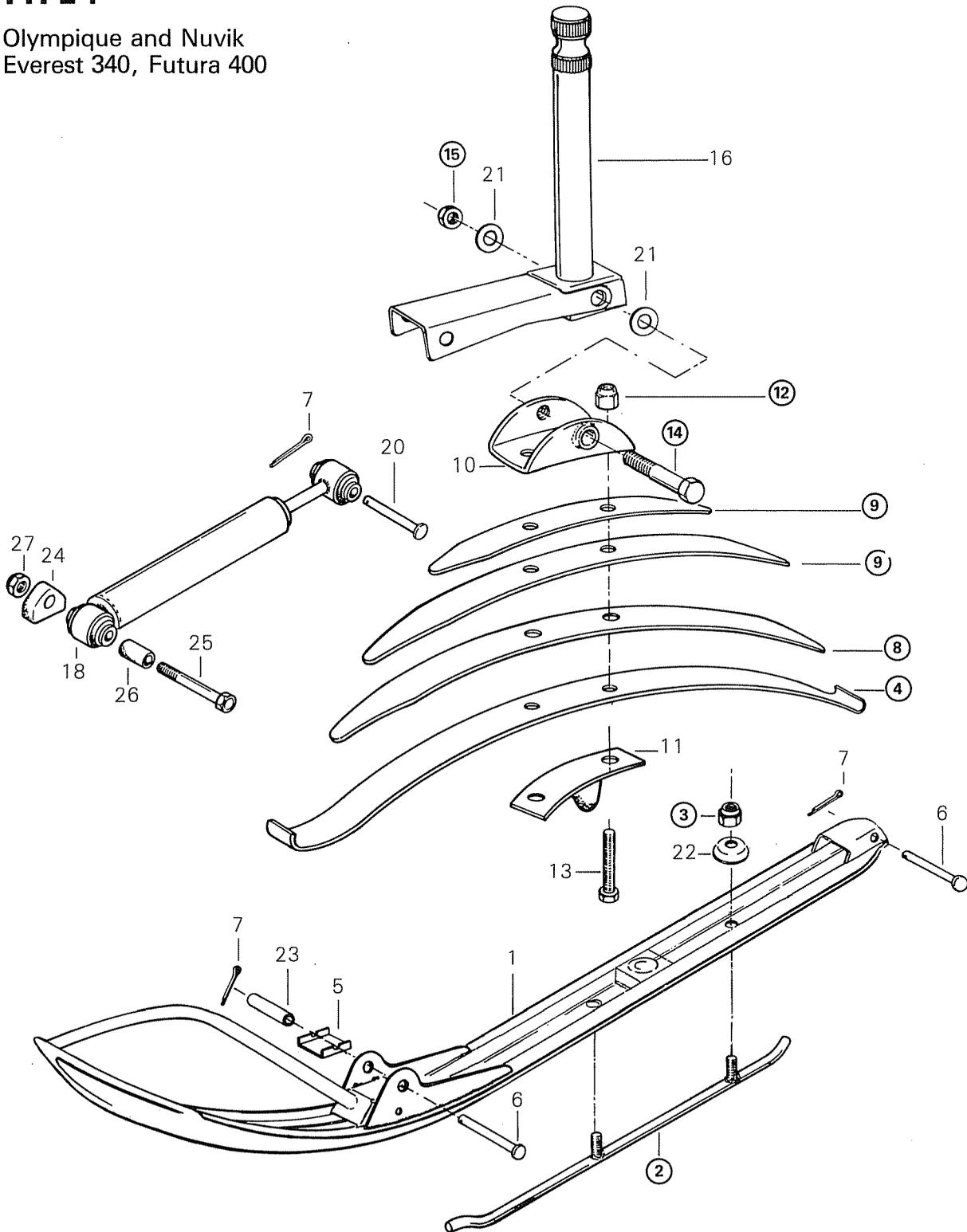


**TYPE 3**  
Citation



**TYPE 4**

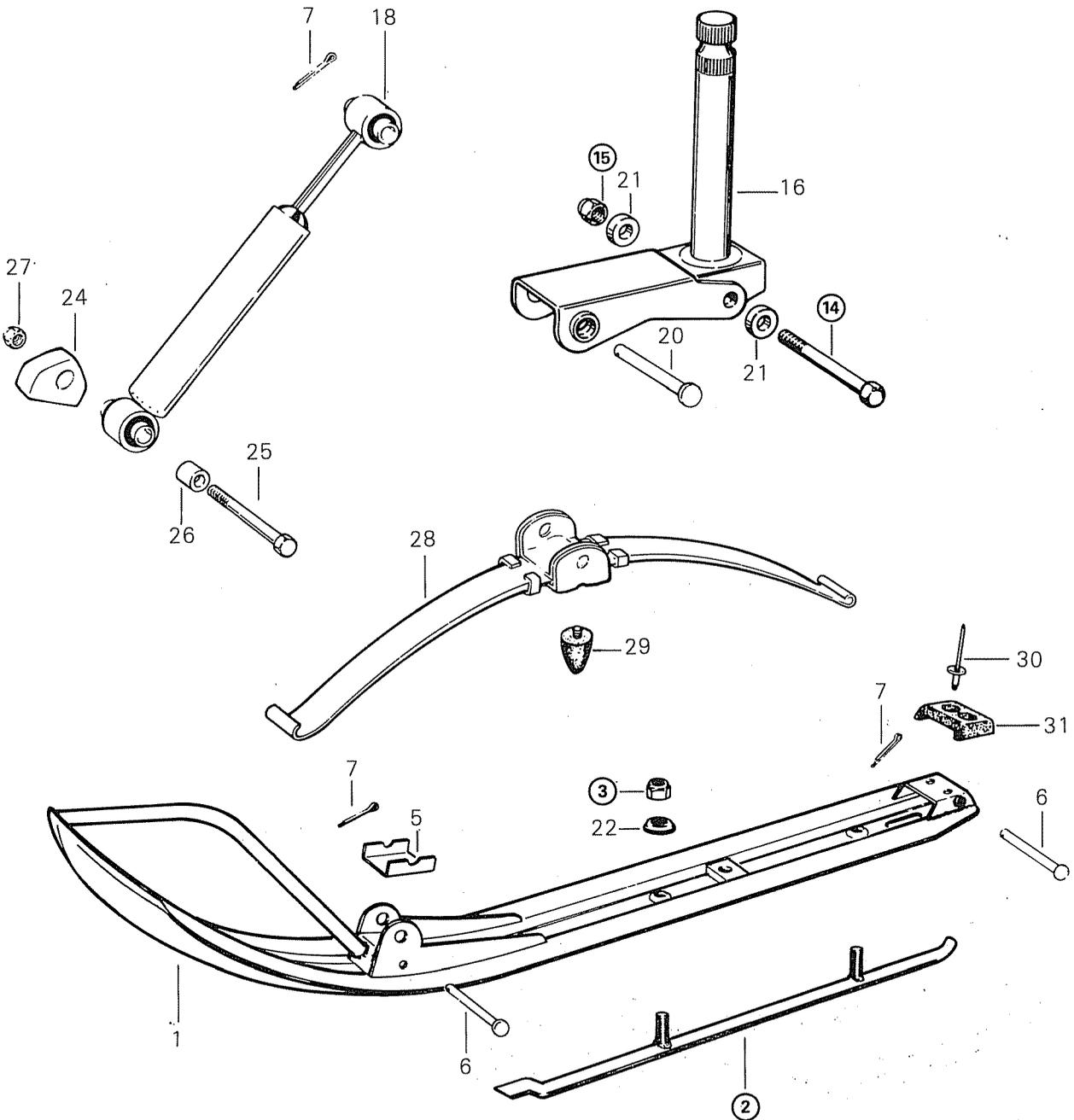
Olympique and Nuvik  
Everest 340, Futura 400



SECTION 03  
SUB-SECTION 02 (SKI SYSTEM)

**TYPE 5**

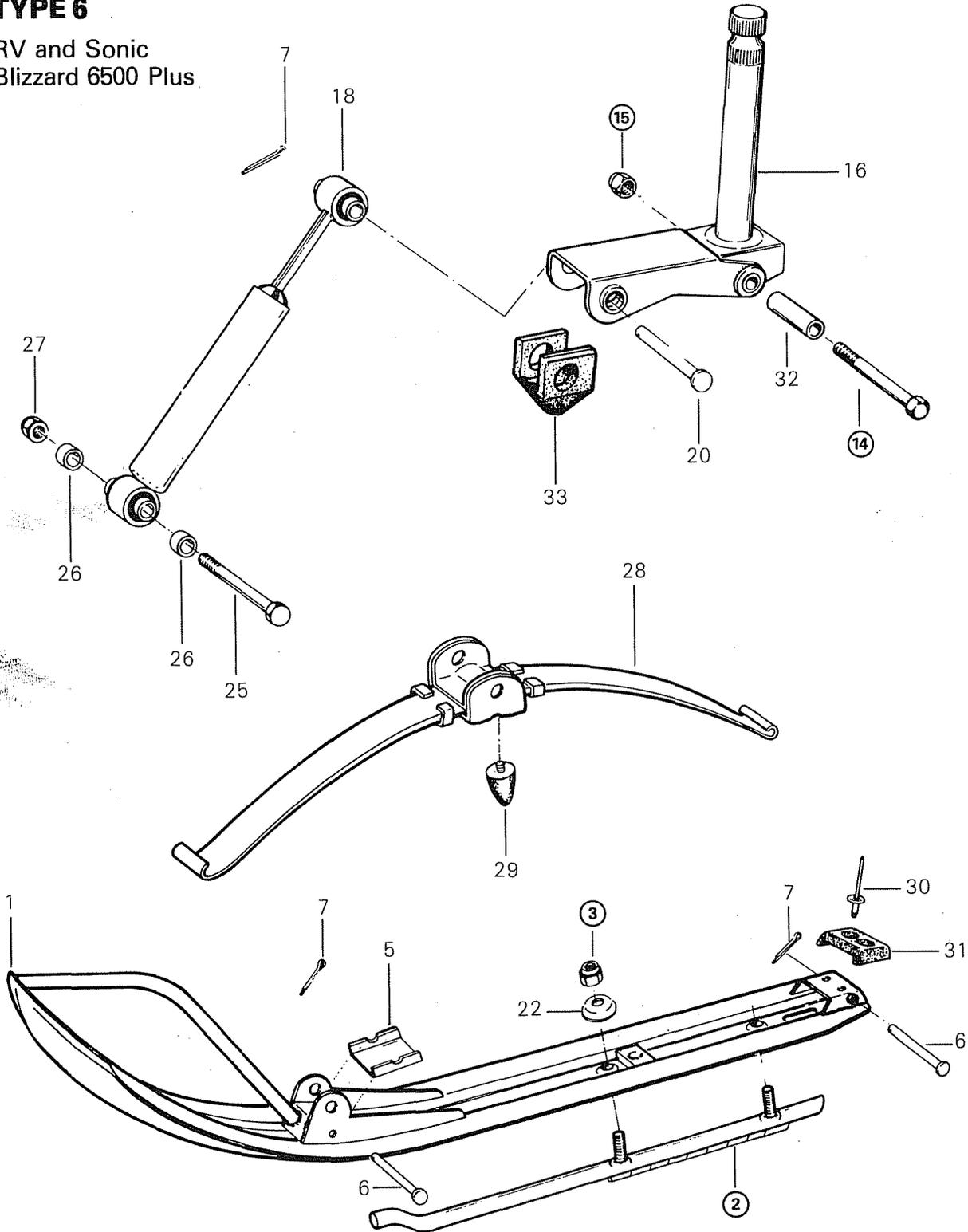
Everest & Futura  
440 and 444 L/C  
T'NT



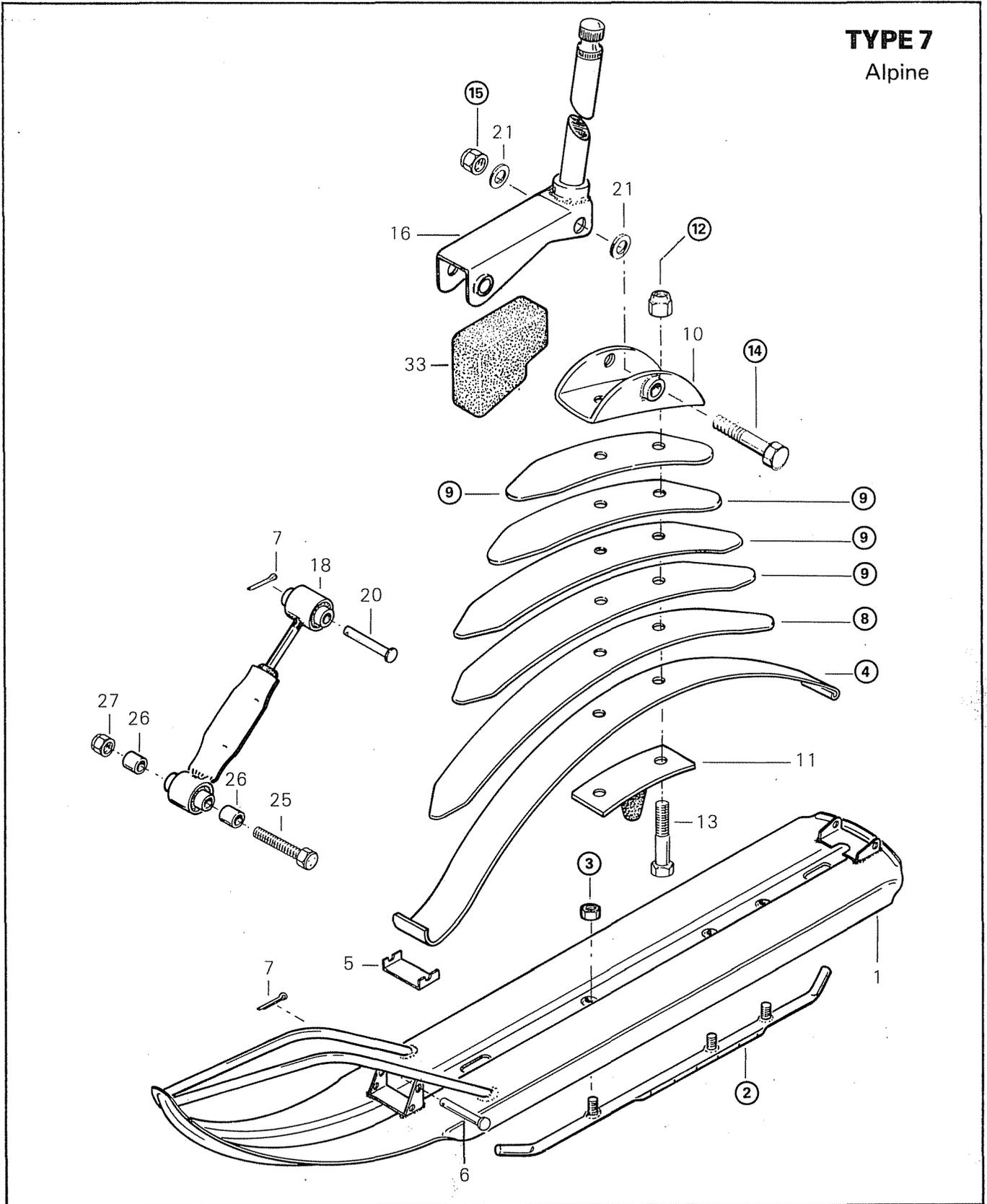
SECTION 03  
SUB-SECTION 02 (SKI SYSTEM)

**TYPE 6**

RV and Sonic  
Blizzard 6500 Plus



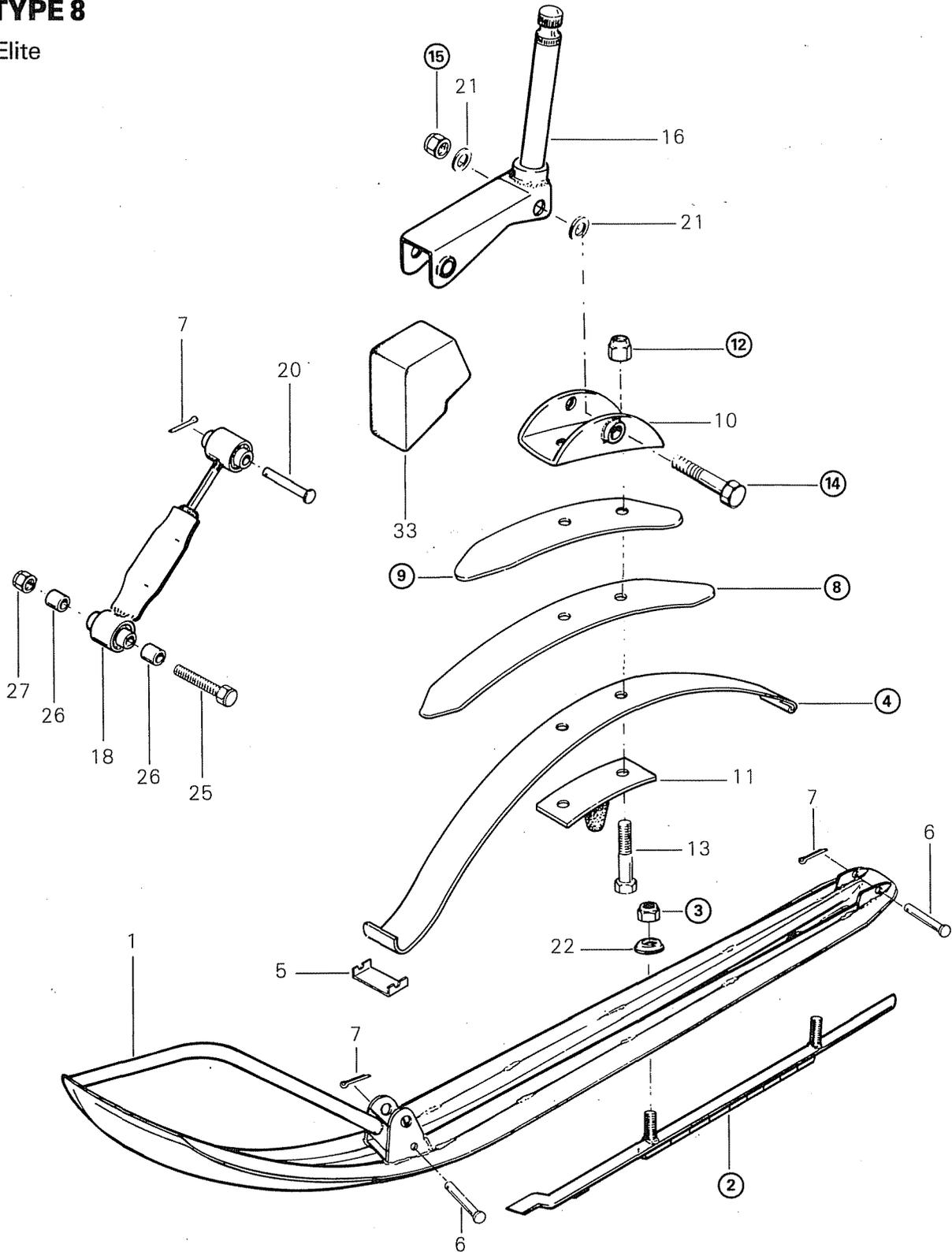
**TYPE 7**  
Alpine



SECTION 03  
SUB-SECTION 02 (SKI SYSTEM)

**TYPE 8**

Elite



- |                          |                            |   |
|--------------------------|----------------------------|---|
| 1. Ski                   | 18. Shock                  |   |
| 2. Runner shoe           | 19. Spacer                 |   |
| 3. Nut                   | 20. Retainer pin           |   |
| 4. Main spring leaf      | 21. Spacer                 |   |
| 5. Spring slider cushion | 22. Cup                    |   |
| 6. Retainer pin          | 23. Bushing                |   |
| 7. Cotter pin            | 24. Rubber spacer          |   |
| 8. Auxiliary spring leaf | 25. Bolt                   |   |
| 9. Auxiliary spring leaf | 26. Spacer                 |   |
| 10. Spring leaf coupler  | 27. Nut                    |   |
| 11. Rebound leaf         | 28. Spring leaf            |   |
| 12. Nut                  | 29. Rubber bumper          |   |
| 13. Bolt                 | 30. Rivet                  | } Everest and Futura 444 L/C<br>RV and Sonic, Blizzard 6500 |
| 14. Bolt                 | 31. Bottom plate protector |   |
| 15. Nut                  | 32. Bushing                |   |
| 16. Ski leg              | 33. Ski bumper             |   |
| 17. Shock bracket        |                            |   |

## INSPECTION

Check skis and runner shoes for excessive wear, replace if necessary.

Make sure steering arm and ski leg splines interlock.

Check general condition of steering system components for wear and replace if necessary.

⑫ Torque to 50 N•m (37 ft-lbs).

⑭⑮ Torque bolt and move ski by hand to check that it pivots on ski leg. Torque locking nut to 61 N•m (45 ft-lbs).

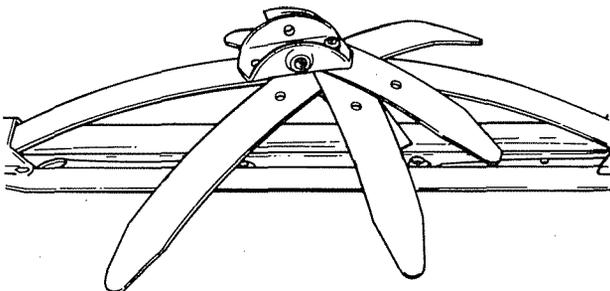
## DISASSEMBLY & ASSEMBLY

◆ ② **WARNING:** Observe caution while prying or removing steel runner shoes from ski slots as the shoes are under tension. Check that ski runner shoes are not worn more than half of their original thickness.

③ On Elan and Spirit vehicles, torque to 7 N•m (5 ft-lbs). On all other vehicles, torque to 14 N•m (10 ft-lbs).

▼ ④⑧⑨ **CAUTION:** When disassembling leaf coupler from spring leaves be careful of the leaves tension.

When assembling spring leaves, cross the spring leaves and temporarily insert one (1) nut and bolt then position the spring leaves parallel to each other and install remaining bolt and nut. Tighten fully.



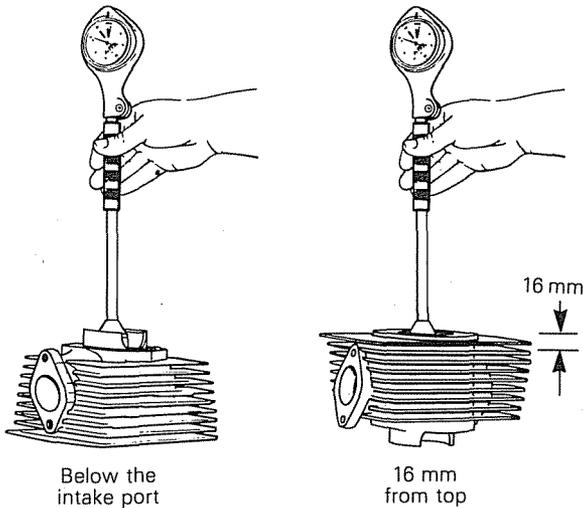
## ENGINE TOLERANCES MEASUREMENT

### CYLINDER TAPER

**Maximum: 0.08 mm (.003")**

Compare cylinder diameter 16 mm (5/8") from top of cylinder with down to just below the intake port.

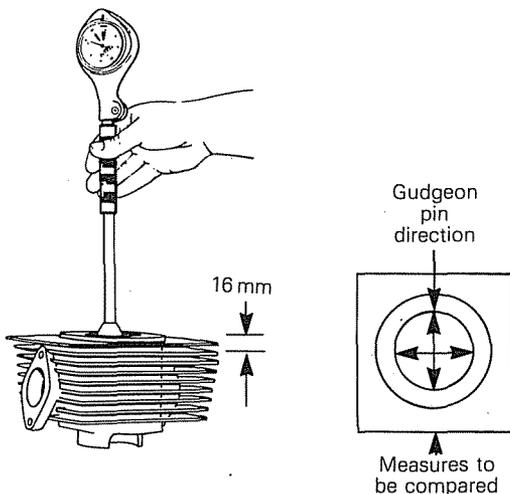
On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds 0.08 mm (.003") the cylinder should be rebored and honed or should be replaced.



### CYLINDER OUT OF ROUND

**Maximum: 0.05 mm (.002")**

Measuring 16 mm (5/8") from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than 0.05 mm (.002"). If larger, cylinder should be rebored and honed or should be replaced.



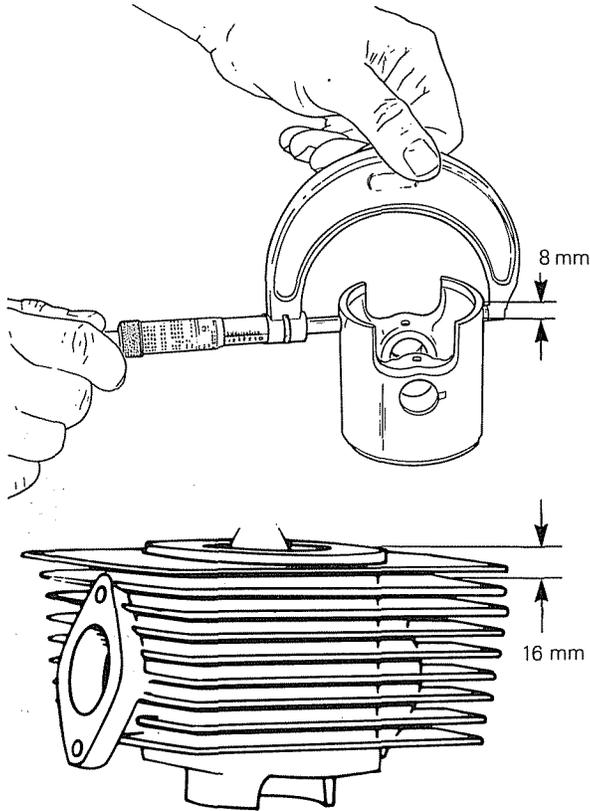
### PISTON TO WALL CLEARANCE

1978 ENGINE TYPE	PISTON TO WALL CLEARANCE	
	MACHINING TOLERANCES	WEAR LIMIT
247	0.063-0.099 mm (.0025-.0039")	0.162 mm (.0064")
248	0.048-0.083 mm (.0019-.0033")	0.132 mm (.0052")
294	0.050-0.085 mm (.0020-.0033")	0.135 mm (.0053")
305	0.068-0.104 mm (.0027-.0041")	0.173 mm (.0068")
343	0.078-0.114 mm (.0031-.0045")	0.198 mm (.0078")
345	0.048-0.083 mm (.0019-.0033")	0.132 mm (.0052")
346	0.099-0.134 mm (.0039-.0053")	0.233 mm (.0092")
354	0.080-0.115 mm (.0032-.0045")	0.195 mm (.0077")
402	0.068-0.104 mm (.0027-.0041")	0.172 mm (.0068")
440	0.070-0.105 mm (.0028-.0041")	0.175 mm (.0069")
444	0.070-0.105 mm (.0028-.0041")	0.175 mm (.0069")
640	0.068-0.104 mm (.0027-.0041")	0.173 mm (.0068")

**SECTION 04**  
**SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENT)**

**Accurate measurement**

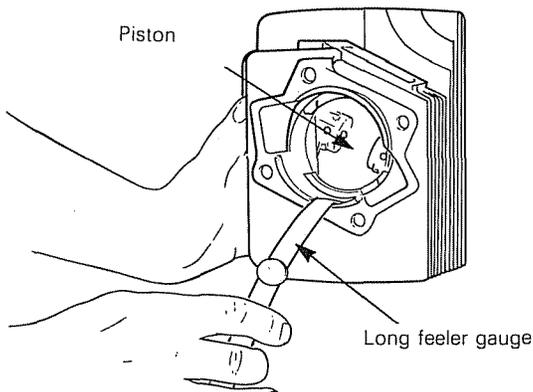
To determine piston to wall clearance, the piston should be measured 8 mm (5/16") above its bottom edge and the cylinder should be measured 16 mm (5/8") below its top edge.



The difference between these two measurements should be within specified tolerance.

**Quick measurement**

Place cylinder upside down on a work-bench and press a feeler gauge against the cylinder wall (intake side) while trying to insert the piston without any ring in its usual position.



The thickest possible to use feeler gauge will determine the piston to wall clearance.

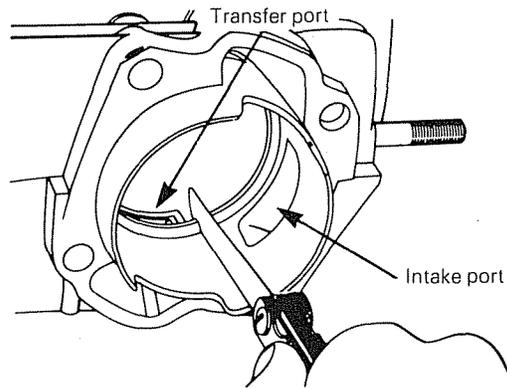
**RING END GAP**

ENGINE TYPE	RING END GAP
248, 294, 305, 343, 346, 354,	0.15-0.35 mm (.006-.014")
247, 345, 402, 440, 444	0.20-0.40 mm (.008-.016")
640	0.25-0.45 mm (.010-.018")

Position ring half way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

○ **NOTE:** In order to correctly position the ring in the cylinder, use piston as a pusher.

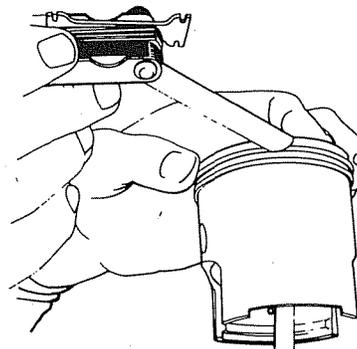
Using a feeler gauge, check ring end gap. If gap exceeds specified tolerance the ring should be replaced.



**PISTON RING/GROOVE CLEARANCE**

**Maximum: 0.20 mm (.008")**

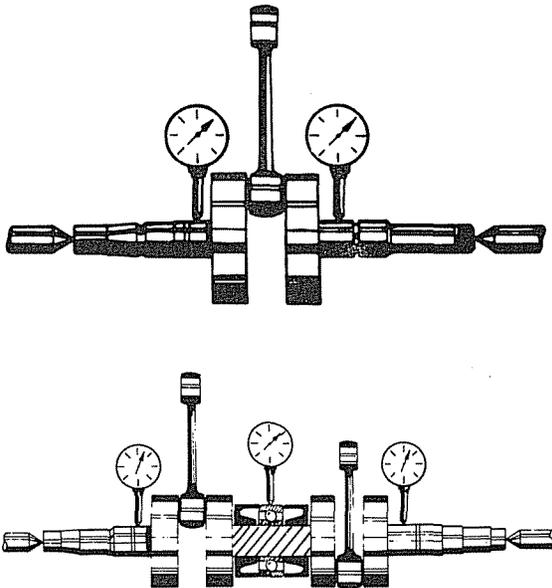
Using a feeler gauge check clearance between rectangular ring and groove. If clearance exceeds 0.20 mm (.008"), replace piston.



### CRANKSHAFT DEFLECTION

**Maximum: 0.06 mm (.0024")**

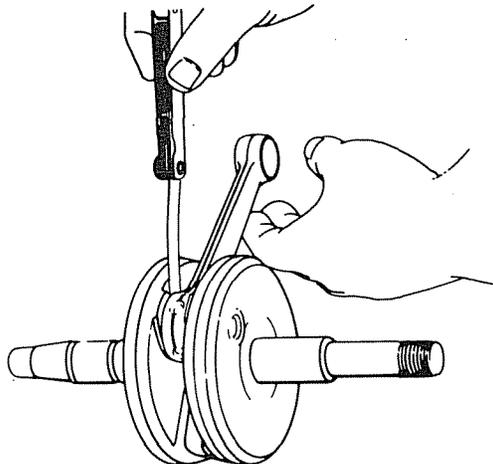
With the crankshaft positioned between a center lathe, install a dial indicator as close as possible to crankshaft blade then measure deflection on each side. If deflection exceeds 0.06 mm (.0024") the crankshaft should be repaired by a specialized shop or it should be replaced.



### CONNECTING ROD BIG END AXIAL PLAY

**Maximum: 0.5 mm (.020")**

Using a feeler gauge measure distance between connecting rod and thrust washer. If axial play exceeds 0.5 mm (.020"), the crankshaft should be replaced.



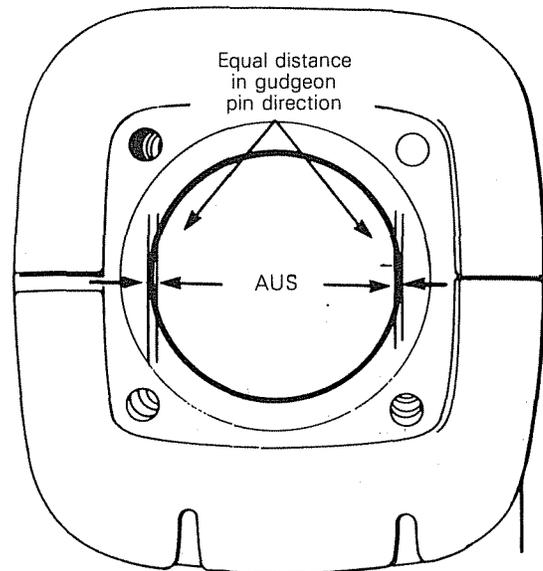
### CONNECTING ROD ALIGNMENT

Check if connecting rod is bent as follows:

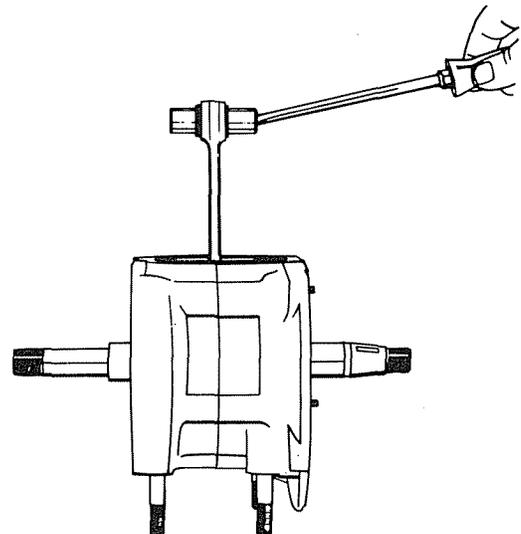
- Once engine crankcase is assembled with the piston mounted on connecting rod without its piston rings, position cylinder on piston.

○ **NOTE:** The cylinder/crankcase gasket must not be installed.

- Rotate crankshaft slowly and at the same time observe piston movement within the cylinder. If piston bear against one side (PTO or mag. side), the connecting rod is bent.



- To correct, position needle bearing and gudgeon pin on connecting rod then pry connecting rod as illustrated.



## SECTION 04

### SUB-SECTION 01 (ENGINE TOLERANCES| MEASUREMENT)

## CRANKSHAFT END-PLAY

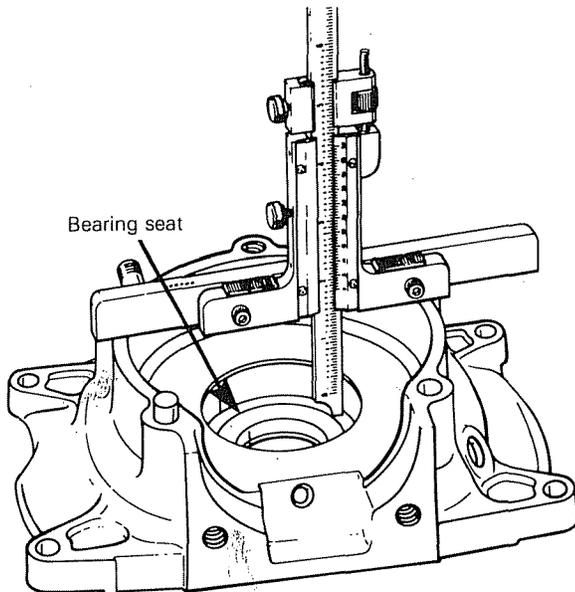
Maximum: 0.10 mm (.004")

○ NOTE: Crankshaft end-play is adjusted only when crankshaft and/or crankcase is replaced.

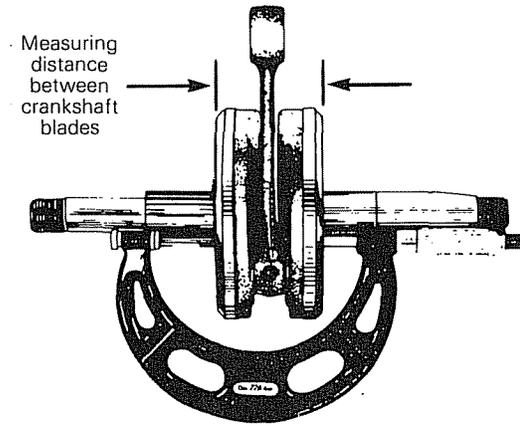
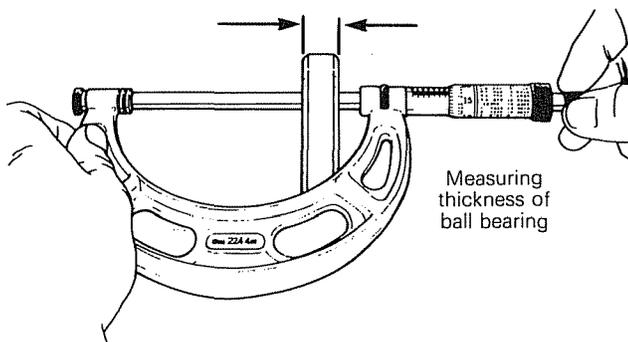
### One cylinder engine (247)

Maximum crankshaft end-play should be 0.10 mm (.004"). To determine necessary correction:

- a) Measure crankcase. To do this first measure each half from mating surface to bottom of bearing seat. Add measurements of both halves then add 0.15 mm (.006") for gasket displacement. Equals A.



- b) Measure thickness of each ball bearing. Measure distance between crankshaft blades. Add measurements. Total equals B.



- c) Subtract measurement B from measurement A minus tolerance of 0.10 mm (.004") maximum. Total balance is distance to be shimmed. Shim(s) must be located between magneto side bearing and crankshaft blade.

### Two cylinder engines

(248, 294, 305, 343, 402, 440, 640)

ENGINE TYPE	BEARING SIMULATOR NO.	AVAILABLE SHIMS
248, 294	420 876 380	0.1 mm (.004"), 0.2 mm (.008"), 0.3 mm (.012"), 0.5 mm (.020"), 1 mm (.040")
305, 343, 402, 440	420 876 155	0.15 mm (.006"), 0.2 mm (.008"), 0.3 mm (.012")
640	420 876 160	0.15 mm (.006"), 0.2 mm (.008"), 0.3 mm (.012")

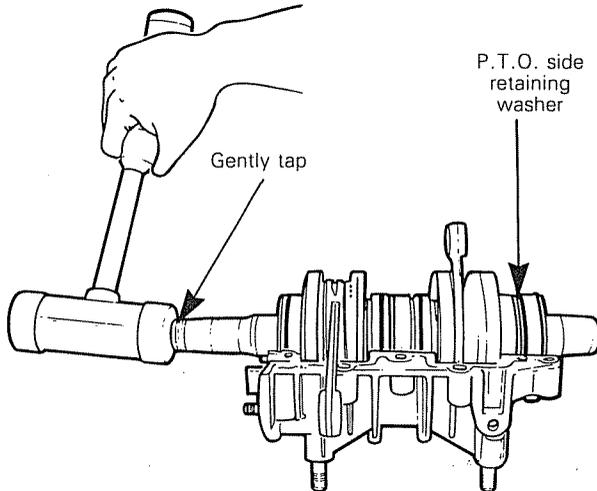
Crankshaft end-play (0.1 mm (.004") maximum) is adjusted with a shim(s) located between crankshaft and magneto side bearing. To determine correct amount of shims, proceed as follows.

Remove magneto side bearing(s) and existing shim(s). Slide the appropriate bearing simulator and retaining washers onto the crankshaft.

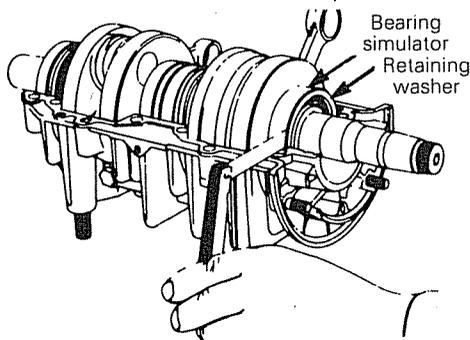
SECTION 04  
SUB-SECTION 01 (ENGINE TOLERANCES MEASUREMENT)

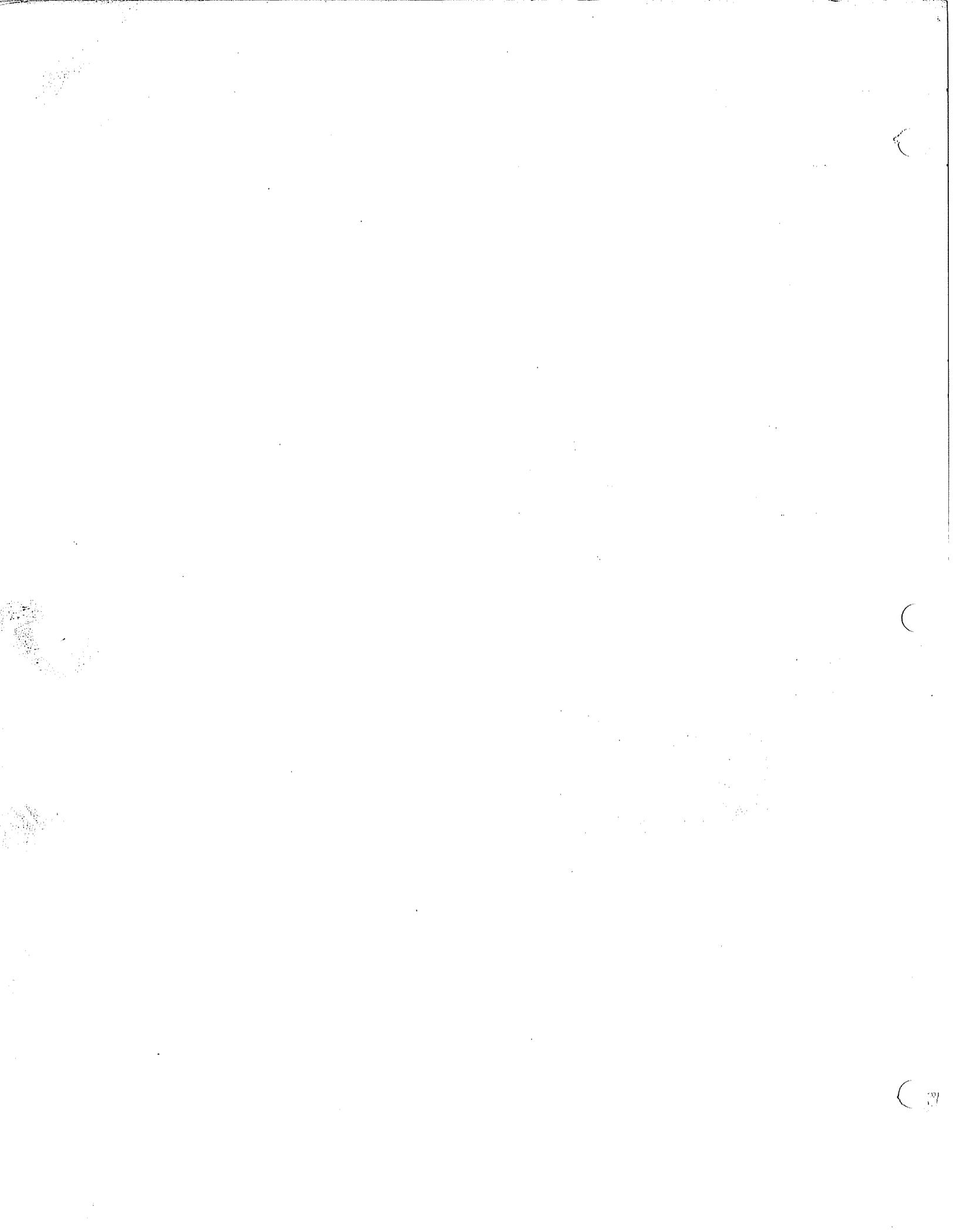
Position crankshaft assembly into crankcase lower half, making sure that retaining washers are correctly seated into the grooves.

Gently tap crankshaft mag. side blade until P.T.O. side bearing bears against retaining washer.



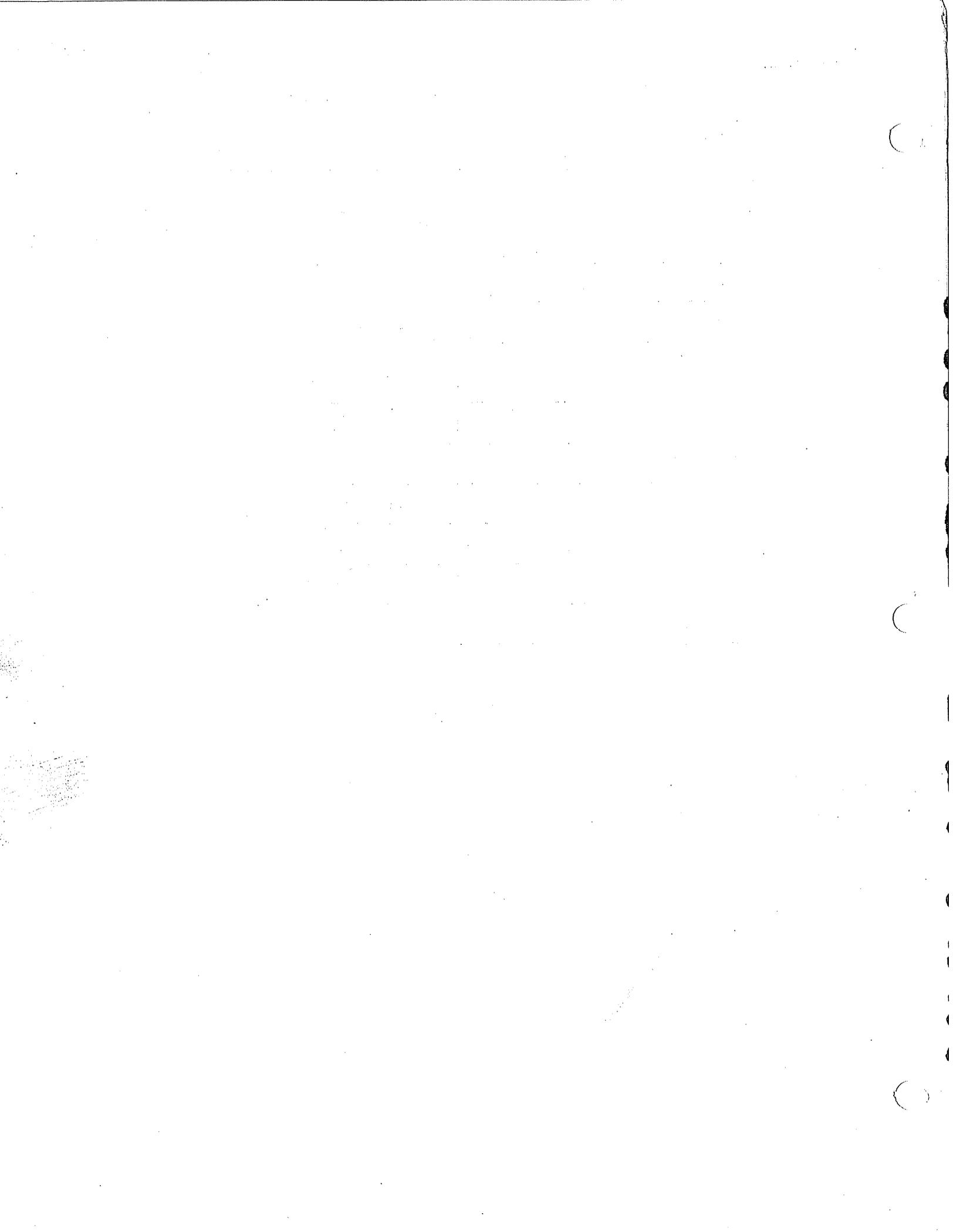
Any free-play between the bearing simulator and mag-  
neto side retaining washer, minus 0.1 mm (.004") max-  
imum end-play is the distance to be covered by shim(s).  
Shims are available in variable thickness according to  
engine type.



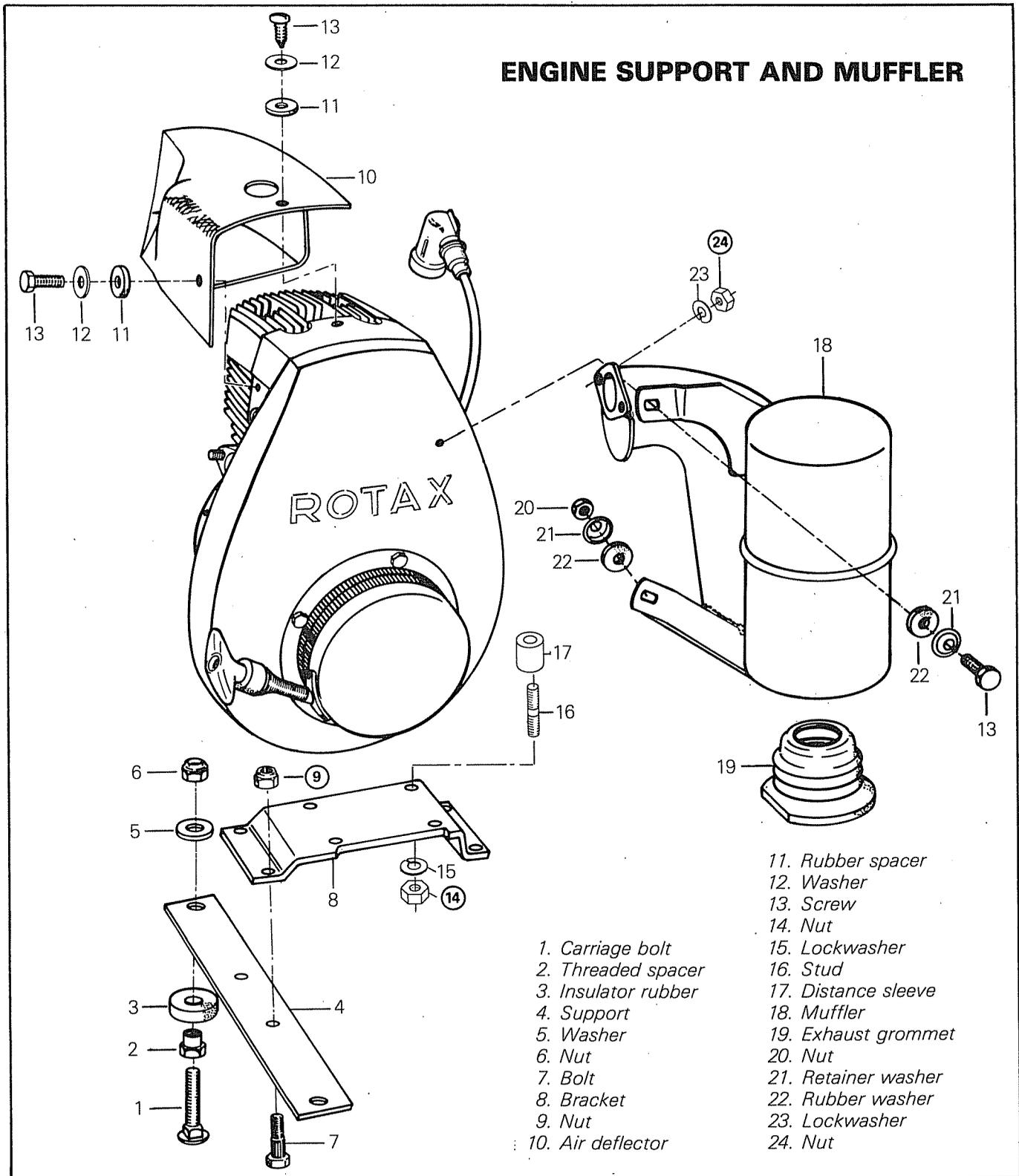


## LIST OF ENGINE SECTIONS

247	Elan et Spirit 250
248-294	Elan Deluxe (248), Citation 300(294)
305-343-402	Olympique 300T(305), Olympique and Nuvik 340(343), Everest 340(343), Futura 400(402)
345	RV and Sonic 340
346	T'NT 340 F/A
354	Blizzard 6500 Plus
440	Everest and Futura 440, T'NT 440 F/C
444	Everest and Futura 444 LC and Elite 450 LC
640	Alpine 640ER



## 247 ENGINE TYPE



SECTION 04  
SUB-SECTION 02 (ENGINES)

## ENGINE SUPPORT AND MUFFLER

### REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle.

- Pulley guard.
- Drive belt.
- Muffler.
- Choke knob.
- Decompressor.
- Throttle cable.
- Fuel lines.
- Electrical connector.
- Separate steering column support at upper column.
- Engine mount nuts.

### DISASSEMBLY & ASSEMBLY

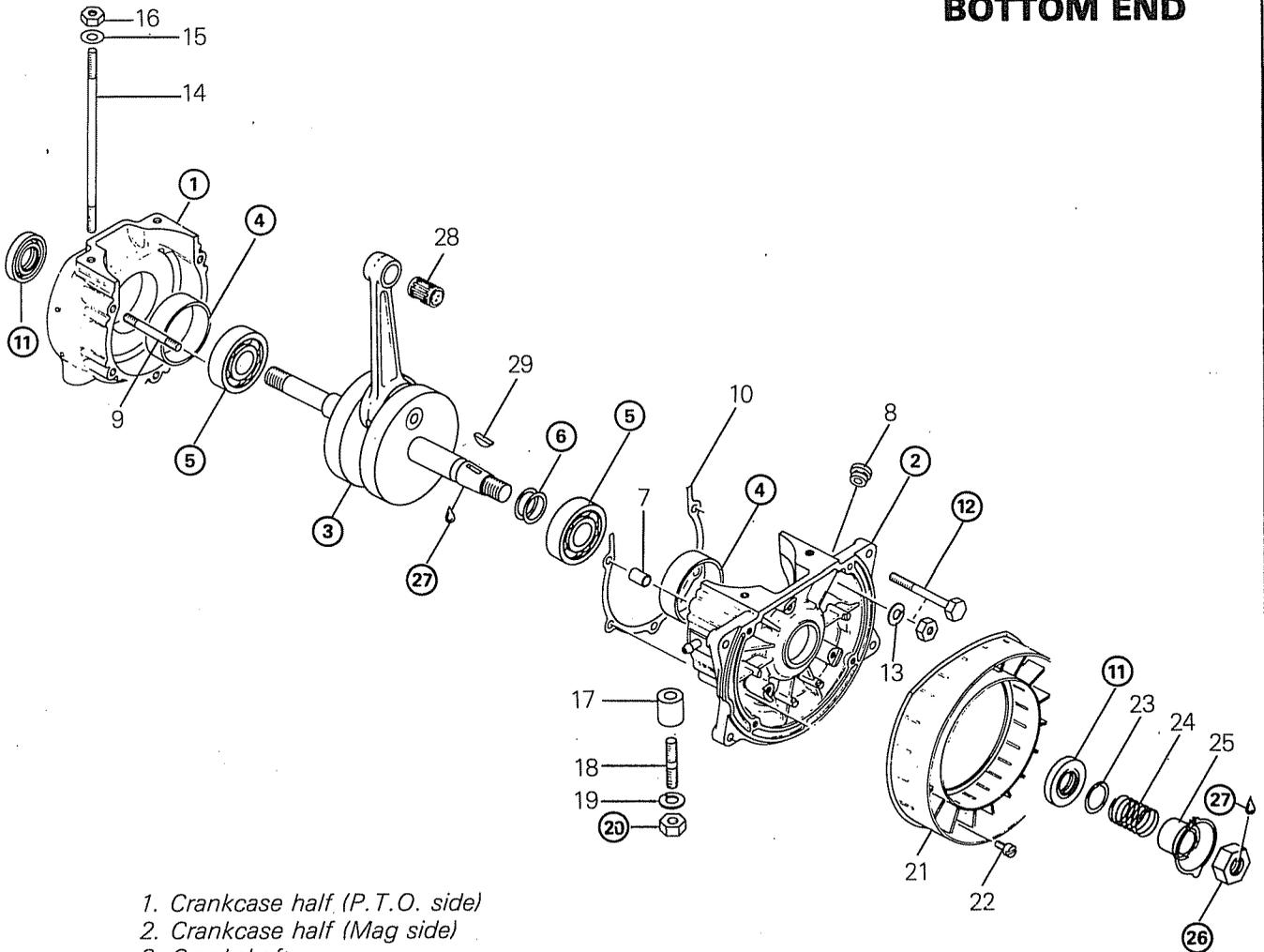
- ⑨ Torque to 31 N•m (23 ft-lbs).
- ⑭ Torque to 35 N•m (26 ft-lbs).
- ⑳ Torque to 22 N•m (16 ft-lbs).

### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following.

- Check tightness of engine mount nuts, and drive pulley bolt.
- After throttle cable installation, check carburetor maximum throttle opening.
- Check pulley alignment.

**BOTTOM END**



- |                                 |                                   |
|---------------------------------|-----------------------------------|
| 1. Crankcase half (P.T.O. side) | 21. Labyrinth ring (fan)          |
| 2. Crankcase half (Mag side)    | 22. Screw                         |
| 3. Crankshaft                   | 23. Shim                          |
| 4. Polyamid ring                | 24. Spring                        |
| 5. Bearing                      | 25. Breaker point cam             |
| 6. Shim(s)                      | 26. Nut                           |
| 7. Dowel tube                   | 27. Loctite Lock'n Seal (no. 242) |
| 8. Wire grommet                 | 28. Needle bearing                |
| 9. Stud                         | 29. Woodruff key                  |
| 10. Gasket                      |                                   |
| 11. Oil seal                    |                                   |
| 12. Bolt or nut                 |                                   |
| 13. Lockwasher                  |                                   |
| 14. Stud (cylinder)             |                                   |
| 15. Washer (head)               |                                   |
| 16. Nut (head)                  |                                   |
| 17. Distance sleeve             |                                   |
| 18. Stud                        |                                   |
| 19. Lockwasher                  |                                   |
| 20. Nut                         |                                   |

## BOTTOM END

### CLEANING

Discard all oil seals and gaskets.

Clean all metal components in a non-ferrous metal cleaner.

### DISASSEMBLY & ASSEMBLY

#### General

Refer to Technical Data Section for component fitted tolerance and wear limit. If necessary, refer to Drive Pulley Section to remove drive pulley.

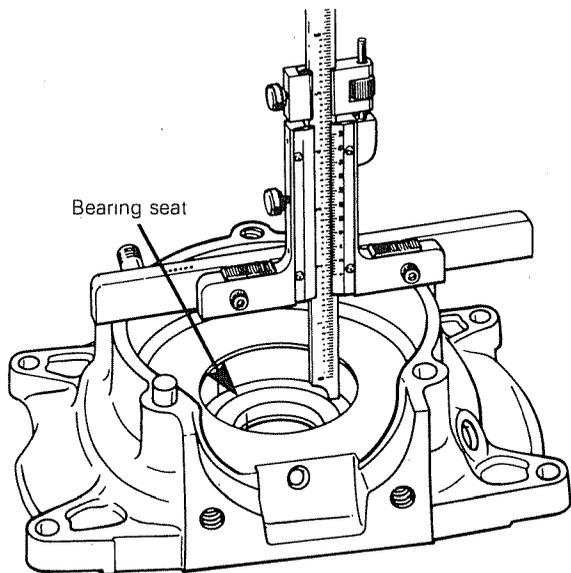
① ② When disassembling/assembling crankcase halves, do not heat the crankcase. If heat is necessary, temperature must not exceed 55°C (130°F).

③ ⑥ Crankshaft maximum end-play should be 0.10 mm (.004").

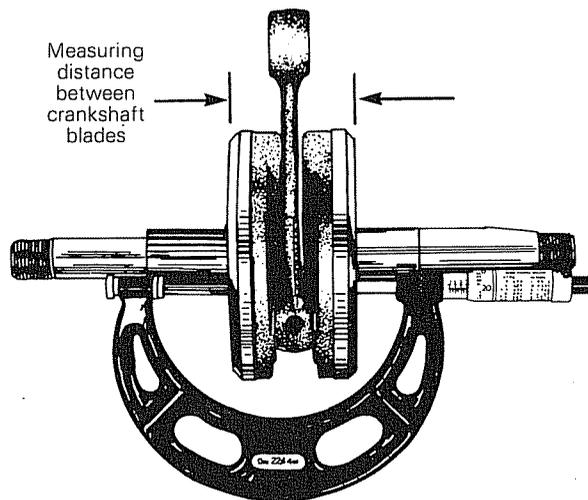
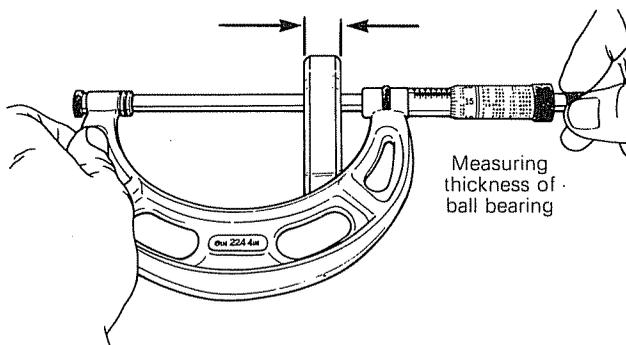
○ **NOTE:** Crankshaft end-play is adjusted only when crankshaft and/or crankcase is replaced.

To determine necessary correction:

a) Measure crankcase. To do this first measure each half from mating surface to bottom of bearing seat. Add measurements of both halves then add 0.15 mm (.006") for gasket displacement. Equals A.



b) Measure thickness of each ball bearing. Measure distance between crankshaft blades. Add measurements. Total equals B.

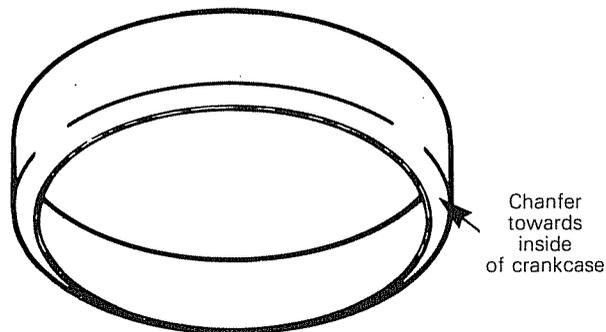


c) Subtract measurement B from measurement A minus maximum tolerance of 0.10 mm (.004"). Total balance is distance to be shimmed. Shim(s) must be located between magneto side bearing and crankshaft blade.

④ Do not remove unless necessary.

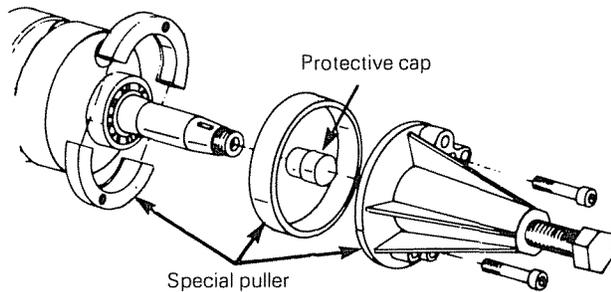
To remove, heat slightly with a butane torch then pry out using a screwdriver.

To install, apply oil on outside diameter then use a suitable pusher.



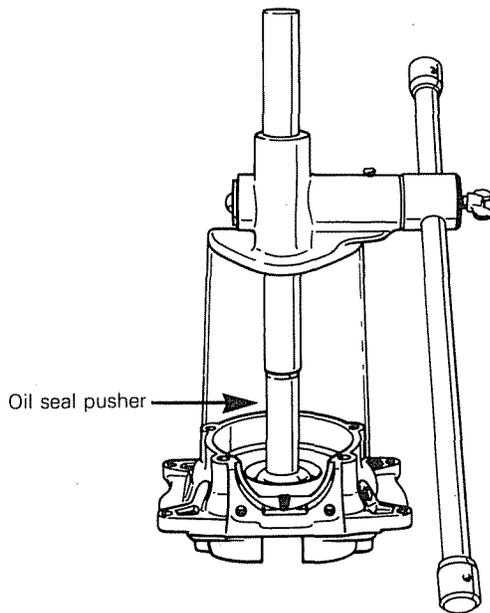
SECTION 04  
SUB-SECTION 02 (ENGINES)

⑤ To remove bearings from crankshaft use a protective cap and special puller as illustrated. (See Tool Section).



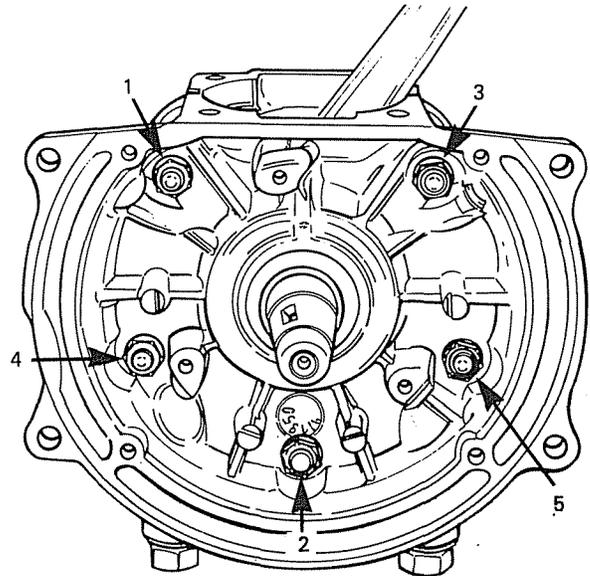
○ NOTE: Prior to magneto side bearing installation, install required shim(s) (crankshaft end play) on crankshaft extension. At assembly, place bearings into an oil container and heat the oil to 100°C (210°F) for 5 to 10 min. This will expand the bearings and permit them to slide easily on the shaft.

⑪ To remove or install new seal into crankcase use an appropriate oil seal pusher as illustrated. (See Tool Section).



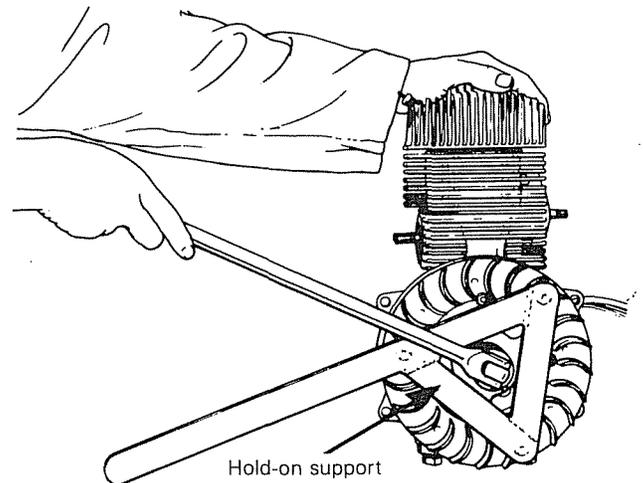
Also, prior to crankcase adjoining, install a protector sleeve on each crankshaft extension to prevent oil seal damage (See Tool Section). Apply a light coat of lithium grease on seal lip. Seal outer surface should be flush with crankcase.

⑫ At assembly, torque to 22 N•m (16 ft-lbs) following illustrated sequence.



⑳ Torque to 35 N•m (26 ft-lbs).

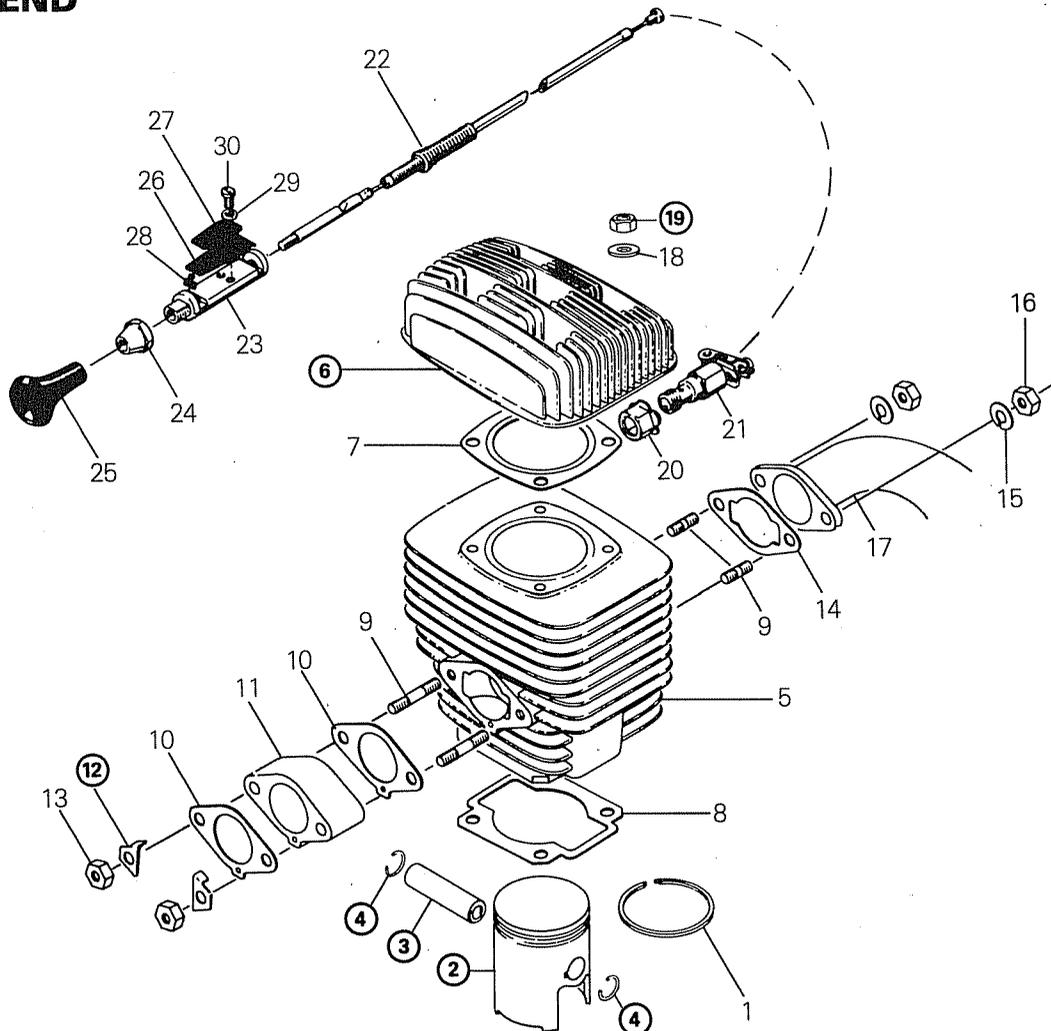
⑳ ㉓ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support. (See Tool Section).



At assembly clean thoroughly and apply Loctite Lock'n Seal 242 on threads then torque retaining nut to 73 N•m (54 ft-lbs).

SECTION 04  
SUB-SECTION 02 (ENGINES)

**TOP END**



- |                                |                                |
|--------------------------------|--------------------------------|
| 1. Piston ring                 | 19. Nut (head)                 |
| 2. Piston                      | 20. Locking sleeve             |
| 3. Gudgeon pin                 | 21. Decompressor               |
| 4. Circlip                     | 22. Cable                      |
| 5. Cylinder                    | 23. Switch housing             |
| 6. Cylinder head               | 24. Cap nut                    |
| 7. Gasket (head/cylinder)      | 25. Knob                       |
| 8. Gasket (cylinder/crankcase) | 26. Spring plate               |
| 9. Stud                        | 27. Spring plate reinforcement |
| 10. Gasket                     | 28. Spring lock                |
| 11. Isolating flange           | 29. Lockwasher                 |
| 12. Locking tab                | 30. Screw                      |
| 13. Nut                        |                                |
| 14. Exhaust gasket             |                                |
| 15. Lockwasher                 |                                |
| 16. Nut                        |                                |
| 17. Muffler                    |                                |
| 18. Flat washer                |                                |

## TOP END

### CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

### DISASSEMBLY & ASSEMBLY

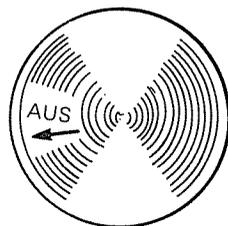
○ **NOTE:** Refer to Technical Data for component fitted tolerance and wear limit.

②③④ Place a clean cloth over crankcase to prevent circlip from falling into crankcase. Use a pointed tool to remove circlips from piston.

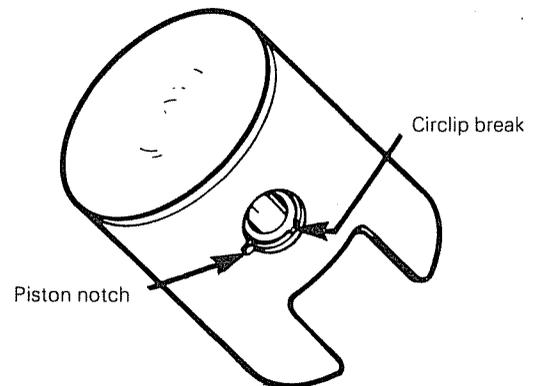
▼ **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the piston over the connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.

EXHAUST



○ **NOTE:** Once the circlips are installed turn each circlip so the circlip break is not directly on piston notch. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



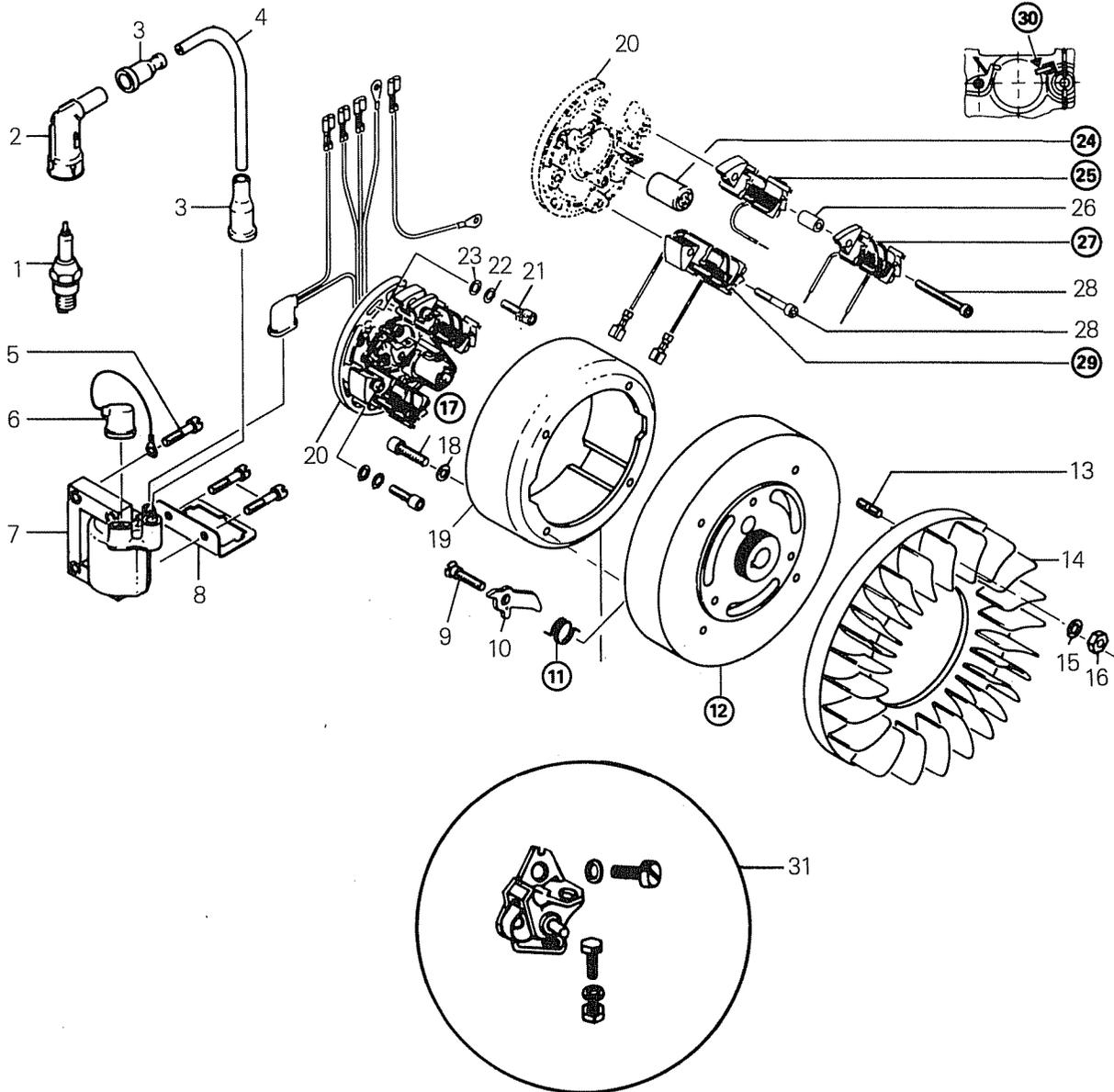
⑥⑱ Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 20 N•m (15 ft-lbs).

⑫ Tab washer should be replaced if bent more than three (3) times. If in doubt, replace.

⑩ At assembly, torque to 22 N•m (16 ft-lbs).

SECTION 04  
SUB-SECTION 02 (ENGINES)

**MAGNETO**



- |                          |                     |                             |
|--------------------------|---------------------|-----------------------------|
| 1. Spark plug            | 12. Magneto housing | 23. Flat washer             |
| 2. Protector             | 13. Stud            | 24. Condenser               |
| 3. Protection cap        | 14. Fan             | 25. Generator coil          |
| 4. H.T. cable            | 15. Lockwasher      | 26. Distance sleeve         |
| 5. Screw                 | 16. Nut             | 27. Brake light coil        |
| 6. Ground connector      | 17. Screw           | 28. Screw                   |
| 7. Ignition coil         | 18. Lockwasher      | 29. Lighting coil           |
| 8. Junction block gasket | 19. Magneto ring    | 30. Lubricating wick        |
| 9. Screw                 | 20. Armature plate  | 31. Breaker point set ass'y |
| 10. Centrifugal weight   | 21. Screw           |                             |
| 11. Return spring        | 22. Lockwasher      |                             |

## MAGNETO

### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

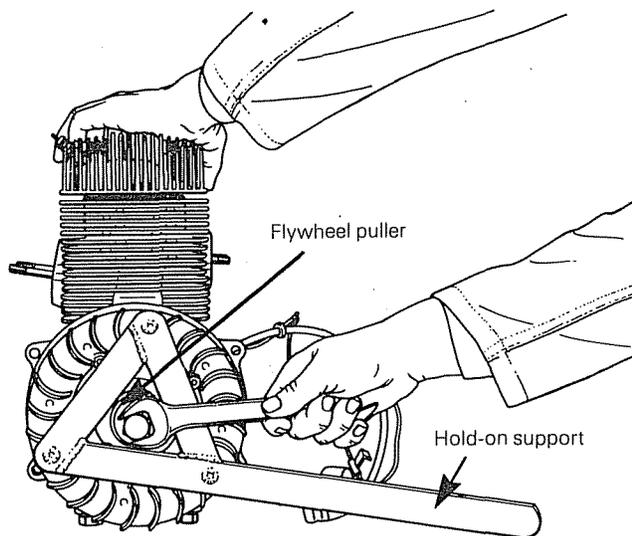
▼ **CAUTION:** Clean armature using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

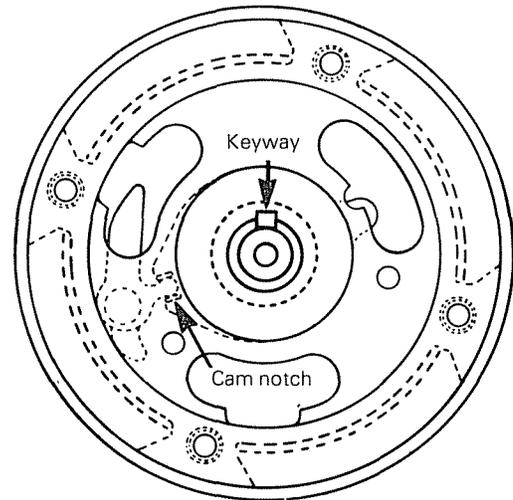
⑪ At assembly, apply a small amount of grease into spring seating.

⑫ With magneto retaining nut removed and hold-on support in place, install special puller onto hub.

Tighten puller nut and, at same time, tap on nut head using a hammer to release magneto from its taper.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242, position magneto on crankshaft with the keyway and the cam notch positioned as illustrated.

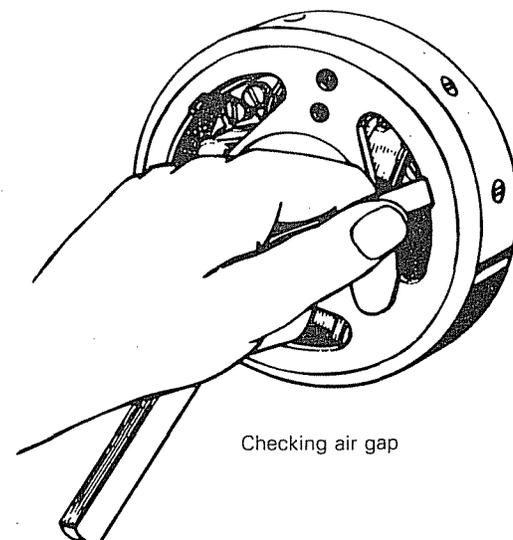


⑬ Apply Loctite Lock'n Seal 242 on threads.

⑭ To replace a condenser, it is first necessary to discontinue the two (2) black leads using a soldering iron. The condenser can then be driven out of the armature plate using a suitable pusher. To reinstall, inverse procedure.

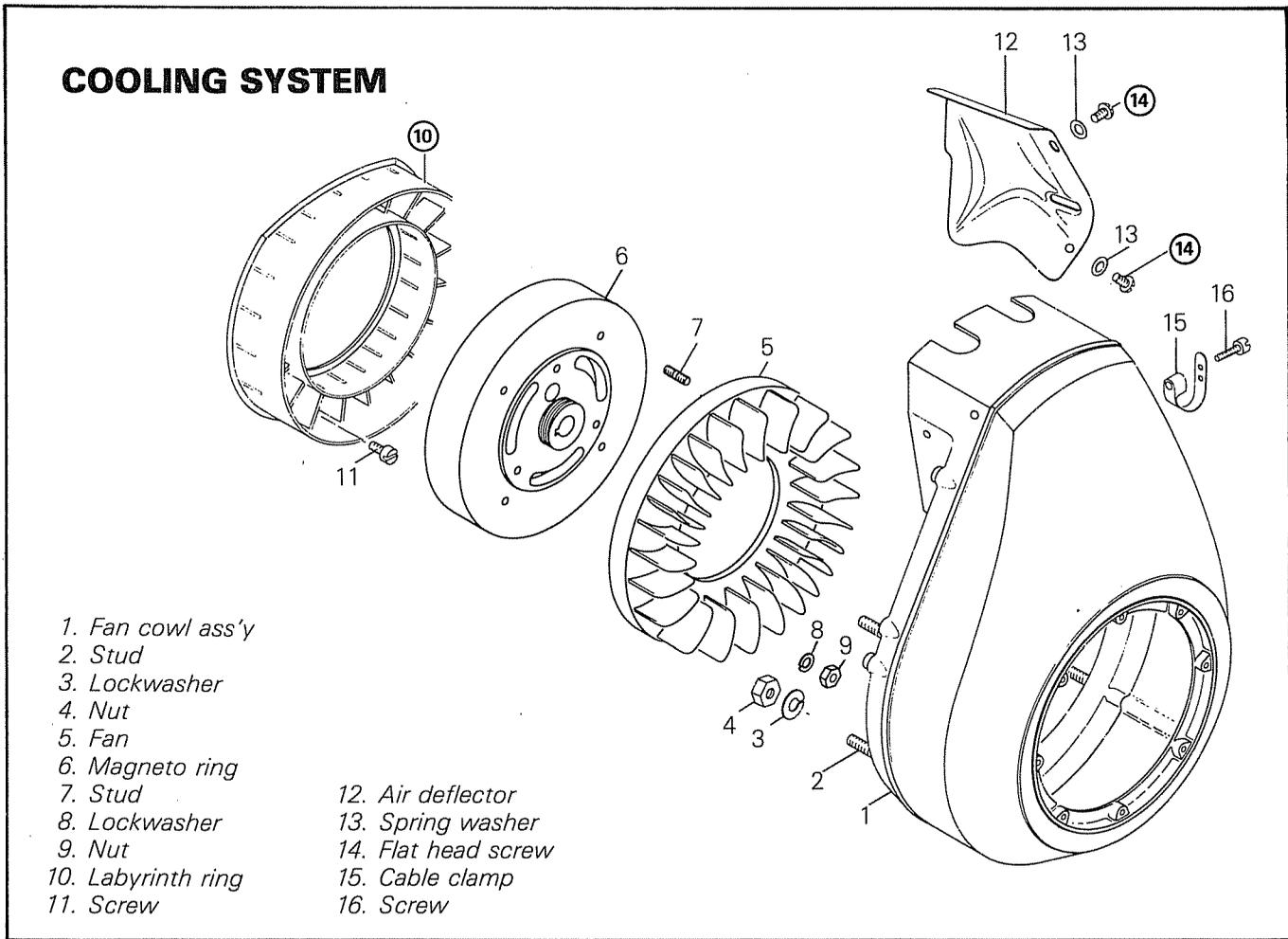
⑮ ⑲ Whenever a coil is replaced, the air gap (distance between magnet and coil end) must be adjusted.

To check air gap, insert a feeler gauge of 0.25-0.38 mm (.010"-.015") between magnet and coil ends. If necessary to adjust, slacken retaining screws and relocate coil.



⑳ When replacing breaker point set, apply a light coat of grease on lubricating wick.

SECTION 04  
SUB-SECTION 02 (ENGINES)



### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

○ **NOTE:** It should be noted that to correctly remove a Loctite locked screw, it is first necessary to tap on head of screw to break Loctite bond. This will eliminate the possibility of screw breakage.

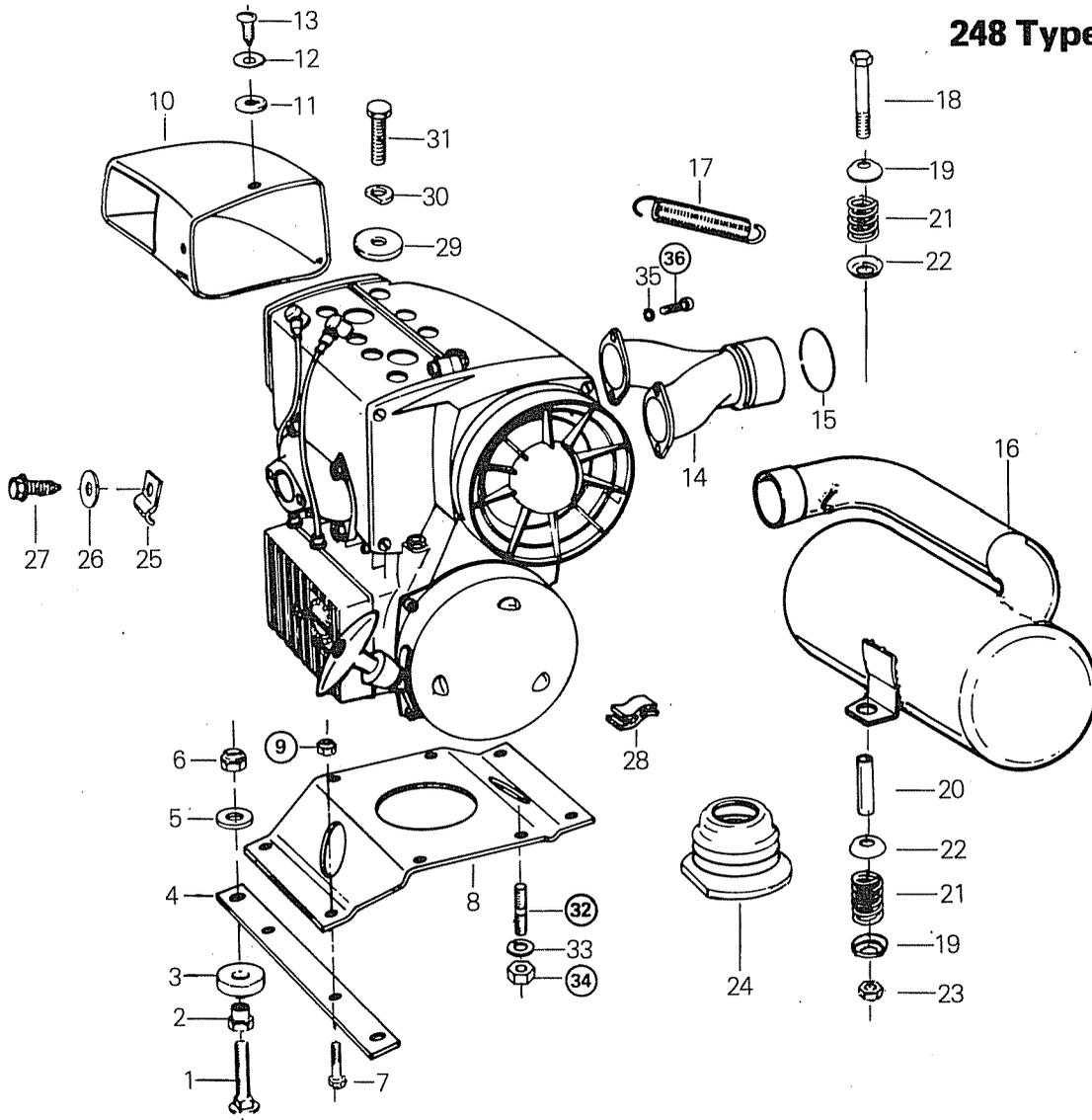
⑩ At assembly, position labyrinth ring with bevelled side on top.

⑭ At assembly, apply Loctite "Lock'n Seal 242" on screws threads.

## 248-294 ENGINE TYPES

### ENGINE SUPPORT AND MUFFLER

248 Type, Elan

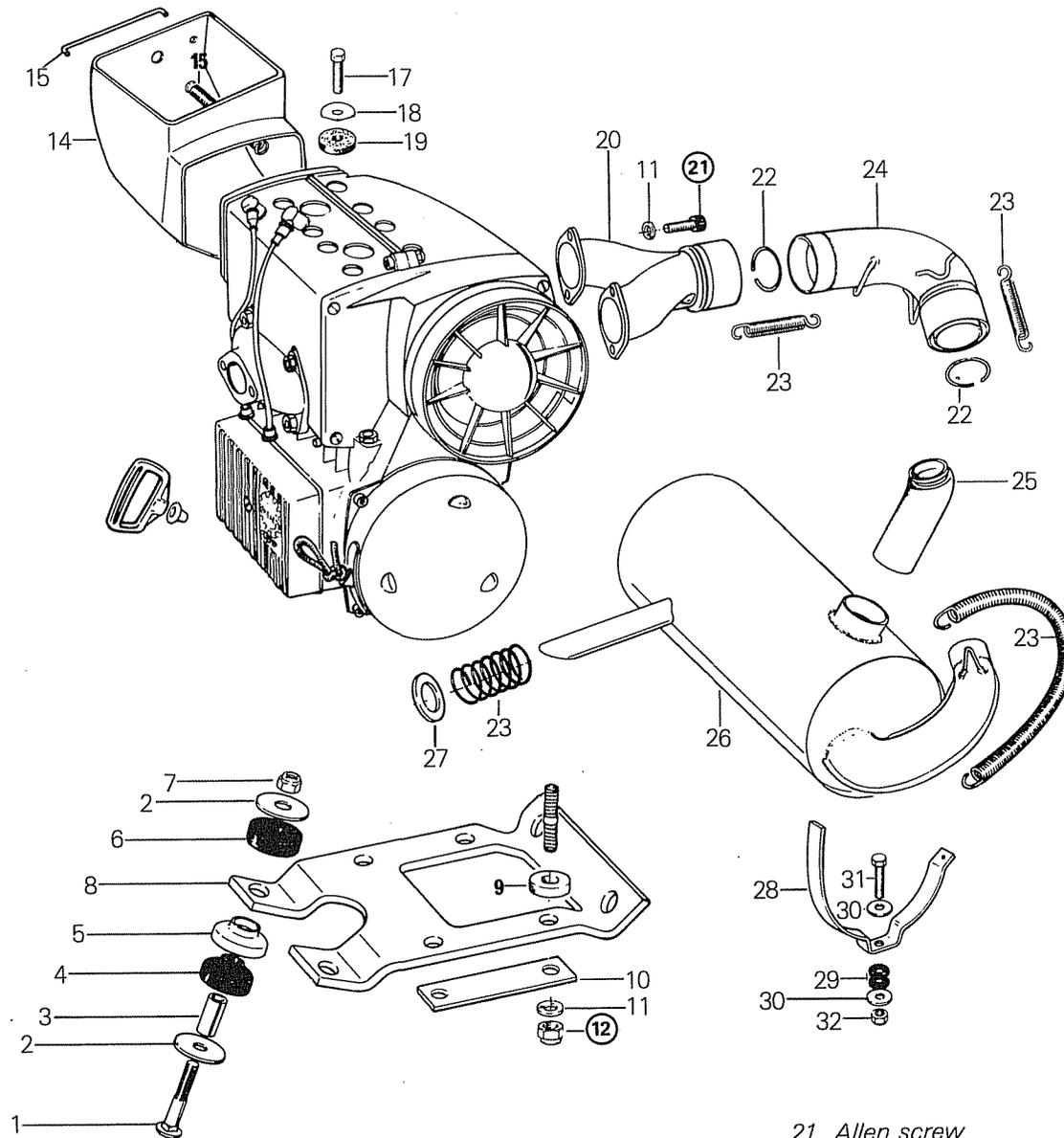


- 1. Carriage bolt
- 2. Threaded spacer bushing
- 3. Rubber insulator
- 4. Engine bracket
- 5. Washer
- 6. Nut
- 7. Bolt
- 8. Engine support
- 9. Nut
- 10. Air duct
- 11. Rubber spacer
- 12. Washer

- 13. Screw
- 14. Exhaust manifold
- 15. Sealing ring
- 16. Muffler
- 17. Spring
- 18. Bolt
- 19. Cup
- 20. Bushing
- 21. Spring
- 22. Cup
- 23. Nut
- 24. Exhaust grommet

- 25. Clip
- 26. Washer
- 27. Screw
- 28. Plug
- 29. Rubber washer
- 30. Washer
- 31. Screw
- 32. Stud
- 33. Lockwasher
- 34. Nut
- 35. Lockwasher
- 36. Allen screw

**ENGINE SUPPORT AND MUFFLER**  
**294 Type, Citation**



- 1. Carriage bolt
- 2. Washer
- 3. Bushing
- 4. Lower damper
- 5. Damper retainer
- 6. Upper damper
- 7. Nut
- 8. Engine support
- 9. Spacer
- 10. Reinforcement plate

- 11. Lockwasher
- 12. Nut
- 13. Stud
- 14. Air duct
- 15. Anchor rod
- 16. Spring
- 17. Screw
- 18. Washer
- 19. Rubber washer
- 20. Exhaust manifold

- 21. Allen screw
- 22. Sealing ring
- 23. Spring
- 24. Exhaust elbow
- 25. Elbow
- 26. Muffer
- 27. Washer
- 28. Muffer bracket
- 29. Rubber spacer
- 30. Washer
- 31. Bolt
- 32. Nut

## ENGINE SUPPORT & MUFFLER 248 Type, Elan

### REMOVAL FROM VEHICLE

Remove or disconnect the following, then lift engine from vehicle.

- Pulley guard
- Drive belt
- Muffler
- Choke knob
- Throttle cable
- Fuel lines
- Electrical connectors
- Steering column support at upper column
- Engine mount nuts

### DISASSEMBLY & ASSEMBLY

- ⑨ Torque to 31 N•m (23 ft-lbs).
- ⑩ Apply "Loctite Lock'n Seal 242" on threads.
- ⑪ Torque to 35 N•m (26 ft-lbs).
- ⑫ Torque to 22 N•m (16 ft-lbs).

### INSTALLATION

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- Torque engine mount nuts to 27 N•m (20 ft-lbs).
- After throttle cable installation, check carburetor maximum throttle opening.
- Check pulley alignment.

## ENGINE SUPPORT & MUFFLER 294 Type, Citation

### REMOVAL FROM VEHICLE

Remove or disconnect the following, then lift engine from vehicle.

- Pulley guard
- Drive belt
- Muffler
- Air silencer
- Throttle cable
- Fuel lines
- Electrical connectors
- Rewind starter
- Engine mount nuts

### DISASSEMBLY & ASSEMBLY

- ⑬ Torque to 35 N•m (26 ft-lbs).
- ⑭ Apply "Loctite Lock'n Seal 242" on threads.
- ⑮ Torque to 22 N•m (16 ft-lbs).

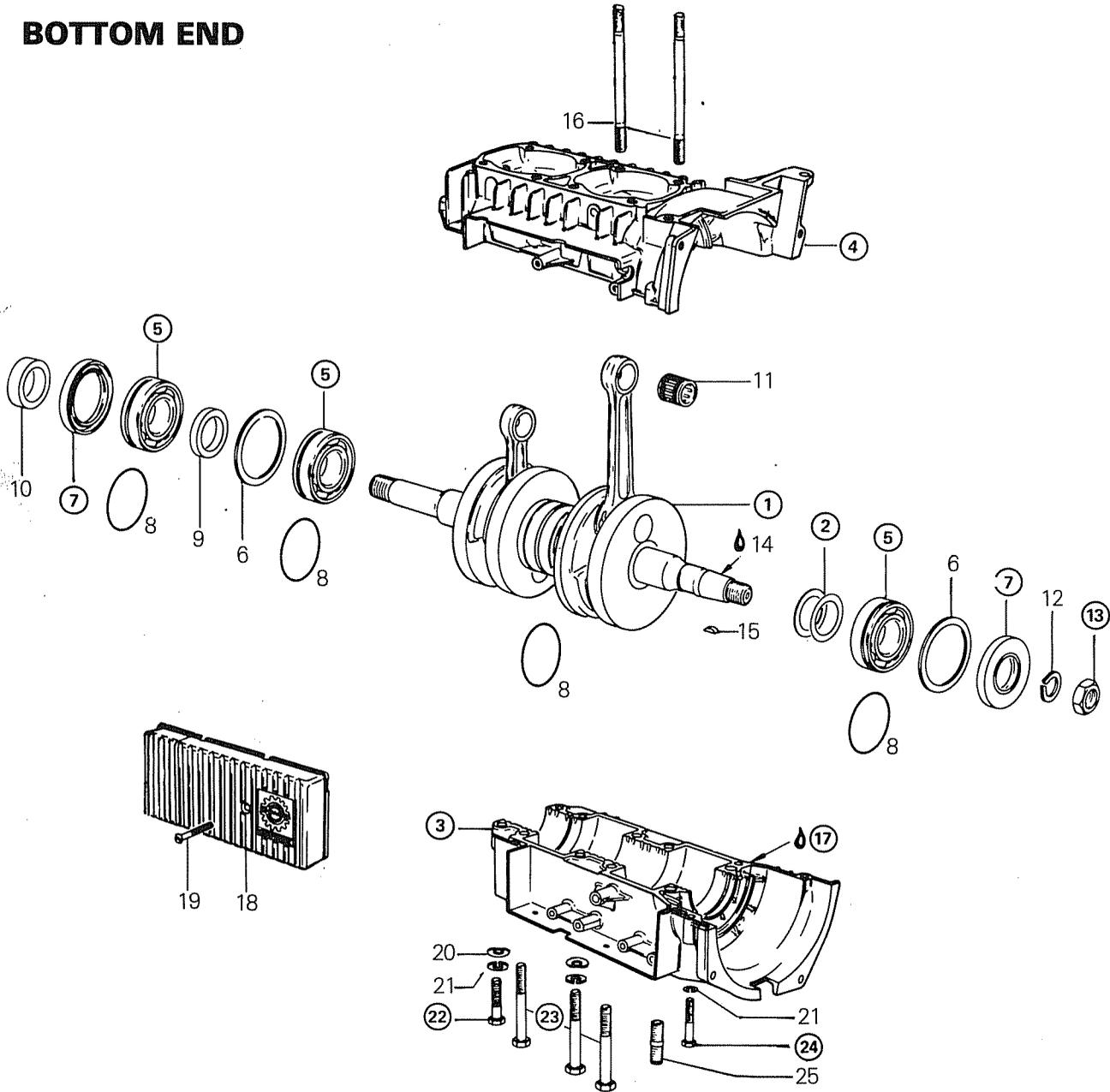
### INSTALLATION

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- After throttle cable installation, check carburetor maximum throttle opening.
- Check pulley alignment.

SECTION 04  
SUB-SECTION 02 (ENGINES)

**BOTTOM END**



- 1. Crankshaft
- 2. Shim(s)
- 3. Crankcase lower half
- 4. Crankcase upper half
- 5. Bearing
- 6. Retaining washer
- 7. Oil seal
- 8. "O" ring

- 9. Distance ring 6 mm
- 10. Distance ring 9.7 mm
- 11. Needle cage bearing
- 12. Lockwasher
- 13. Magneto ring nut
- 14. Loctite 242
- 15. Woodruff key
- 16. Stud (cylinder)

- 17. Crankcase sealant
- 18. Ignition coils cover
- 19. Screw
- 20. Spring washer
- 21. Lockwasher
- 22. Bolt or stud with nut
- 23. Bolt or stud with nut
- 24. Bolt or stud with nut
- 25. Stud

## BOTTOM END

### CLEANING

Discard all oil seals gaskets and "O" rings. Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

**CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

### DISASSEMBLY & ASSEMBLY

#### General

Refer to Technical Data Section for component fitted tolerance and wear limit. If necessary, refer to Drive Pulley Section to remove drive pulley.

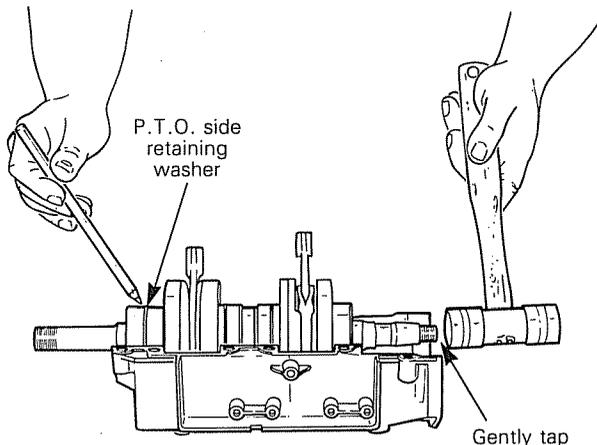
① ② Crankshaft end-play maximum 0.1 mm (.004") is adjusted between crankshaft and magneto side bearing. To determine correct amount of shims, proceed as follows.

**NOTE:** Crankshaft end-play is adjusted only when crankshaft and/or crankcase is replaced.

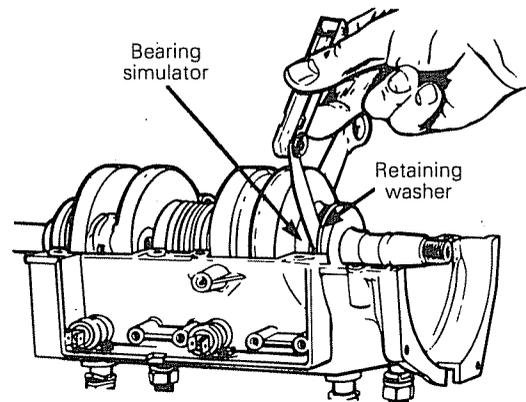
Remove magneto side bearing and existing shim(s). Slide the appropriate bearing simulator (no. 420 876 380) and retaining washer onto the crankshaft.

Position crankshaft assembly into crankcase lower half, making sure the retaining washers are correctly seated into the grooves.

Gently tap crankshaft mag. side until P.T.O. side bearing bears against retaining washer.



Any free-play between the bearing simulator and magneto side retaining washer, minus recommended end-play (maximum 0.1 mm (.004")) is the distance to be covered by shim(s). Shims are available in thickness of 0.1 mm (.004"), 0.2 mm (.008"), 0.3 mm (.012"), 0.5 mm (.020"), 1 mm (.039").



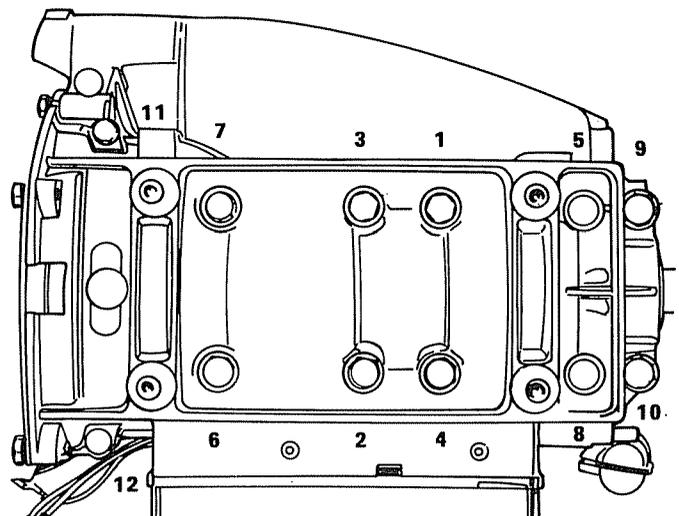
③ ④ ⑦ Crankcase halves are factory matched and therefore, are not interchangeable or available single halves.

Prior to joining of crankcase halves, prepare mating surfaces with "Loctite 515" (no. 413 7027).

Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

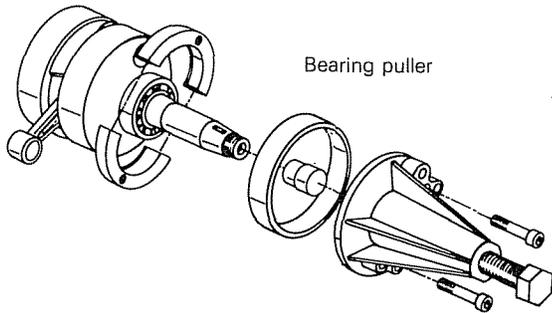
Torque nuts (or bolts) to 20 N•m (15 ft-lbs) following illustrated sequence.

**NOTE:** Torque the two smaller nuts on magneto side (no. 11 and 12) to 12 N•m (9 ft-lbs).



**SECTION 04**  
**SUB-SECTION 02 (ENGINES)**

⑥ To remove bearing from crankshaft use a protective cap and special puller as illustrated. (See Tool Section).

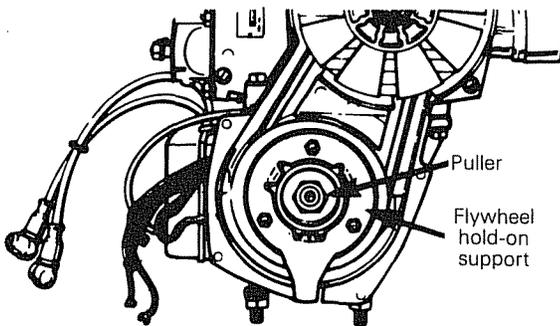


○ **NOTE:** Prior to magneto side bearing installation, determine crankshaft end-play and install required shim(s) on crankshaft extension.

At assembly, place bearings into an oil container and heat the oil to 100°C (210°F) for 5 to 10 min. This will expand the bearings and permit them to slide easily on the shaft. Install bearings with groove outward.

⑦ At assembly apply a light coat of lithium grease on seal lips then position oil seal with outer surface flush with crankcase.

⑬ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tool Section).



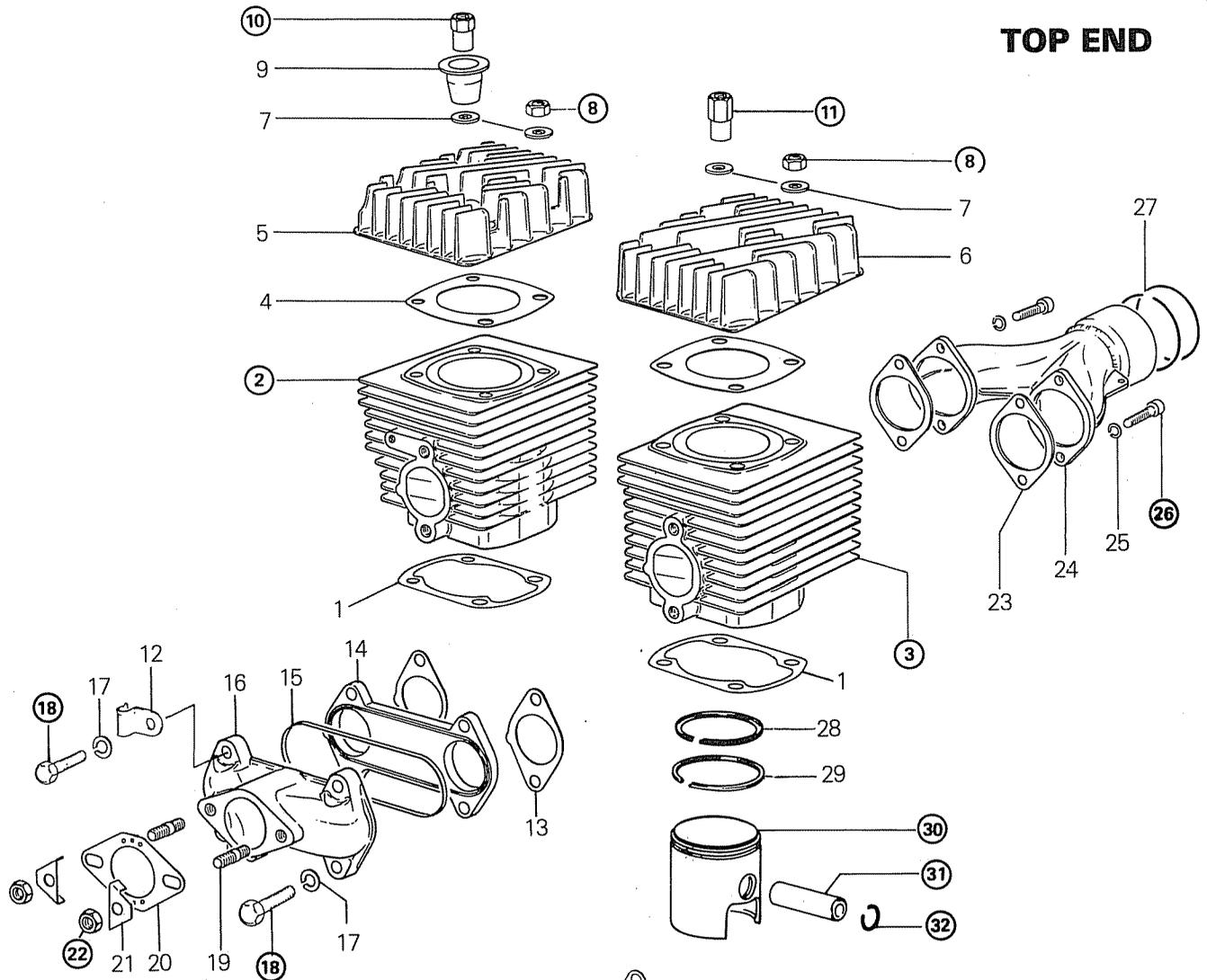
At assembly torque retaining nut to:

Engine type	
248	61 N•m (45 ft-lbs)
294	85 N•m (63 ft-lbs)

⑳㉓ Torque to 22 N•m (16 ft-lbs).

㉔ Torque to 12 N•m (9 ft-lbs).

**TOP END**



- 1. Gasket (cylinder/crankcase)
- 2. Cylinder (P.T.O.)
- 3. Cylinder (MAG)
- 4. Cylinder head gasket
- 5. Cylinder head (P.T.O.)
- 6. Cylinder head (MAG)
- 7. Flat washer

- 8. Nut (head)
- 9. Support sleeve
- 10. Distance nut
- 11. Distance nut (248 only)
- 12. Pincer
- 13. Gasket
- 14. Isolating flange

- 15. Rubber ring
- 16. Intake manifold
- 17. Lockwasher
- 18. Bolt
- 19. Stud
- 20. Gasket
- 21. Locking tab
- 22. Nut
- 23. Exhaust gasket
- 24. Exhaust manifold
- 25. Lockwasher
- 26. Allen screw
- 27. Sealing ring
- 28. Trapez ring
- 29. Rectangular ring
- 30. Piston
- 31. Gudgeon pin
- 32. Circlip

SECTION 04  
SUB-SECTION 02 (ENGINES) !

**TOP END**

**CLEANING**

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

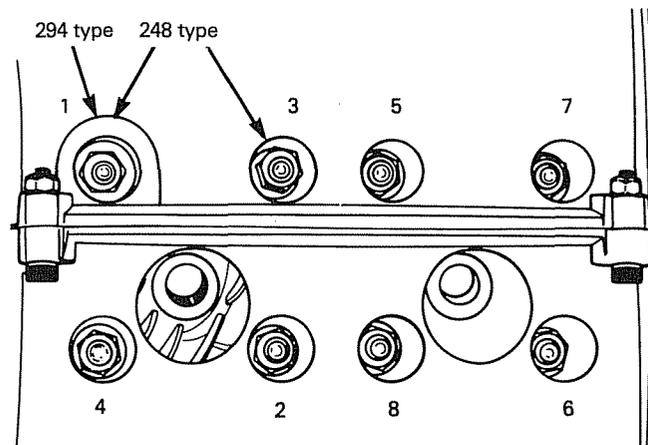
Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

**DISASSEMBLY & ASSEMBLY**

○ **NOTE:** Refer to Technical Data for components fitted tolerance and wear limit.

② ③ To insure correct cylinder alignment, install and secure intake and exhaust manifolds on cylinder prior to cylinder head tightening.

⑧ ⑩ ⑪ Torque nuts and distance nuts to 20 N•m (15 ft-lbs). Correct position for distance nuts is as following illustration.



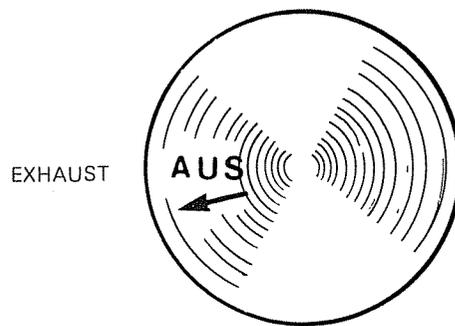
⑱ ⑳ ㉒ Torque to 20 N•m (15 ft-lbs).

⑳ ㉑ ㉓ Place a clean cloth over crankcase to prevent circlip from falling into crankcase. Use a pointed tool to remove circlip from piston.

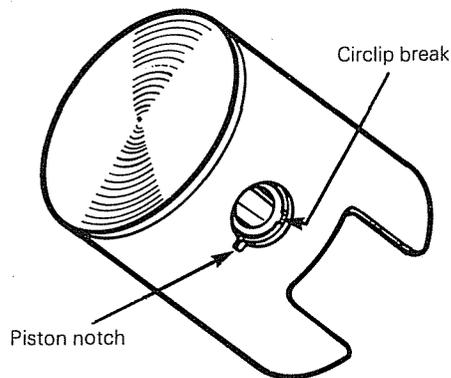
Drive the gudgeon pins in or out using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.

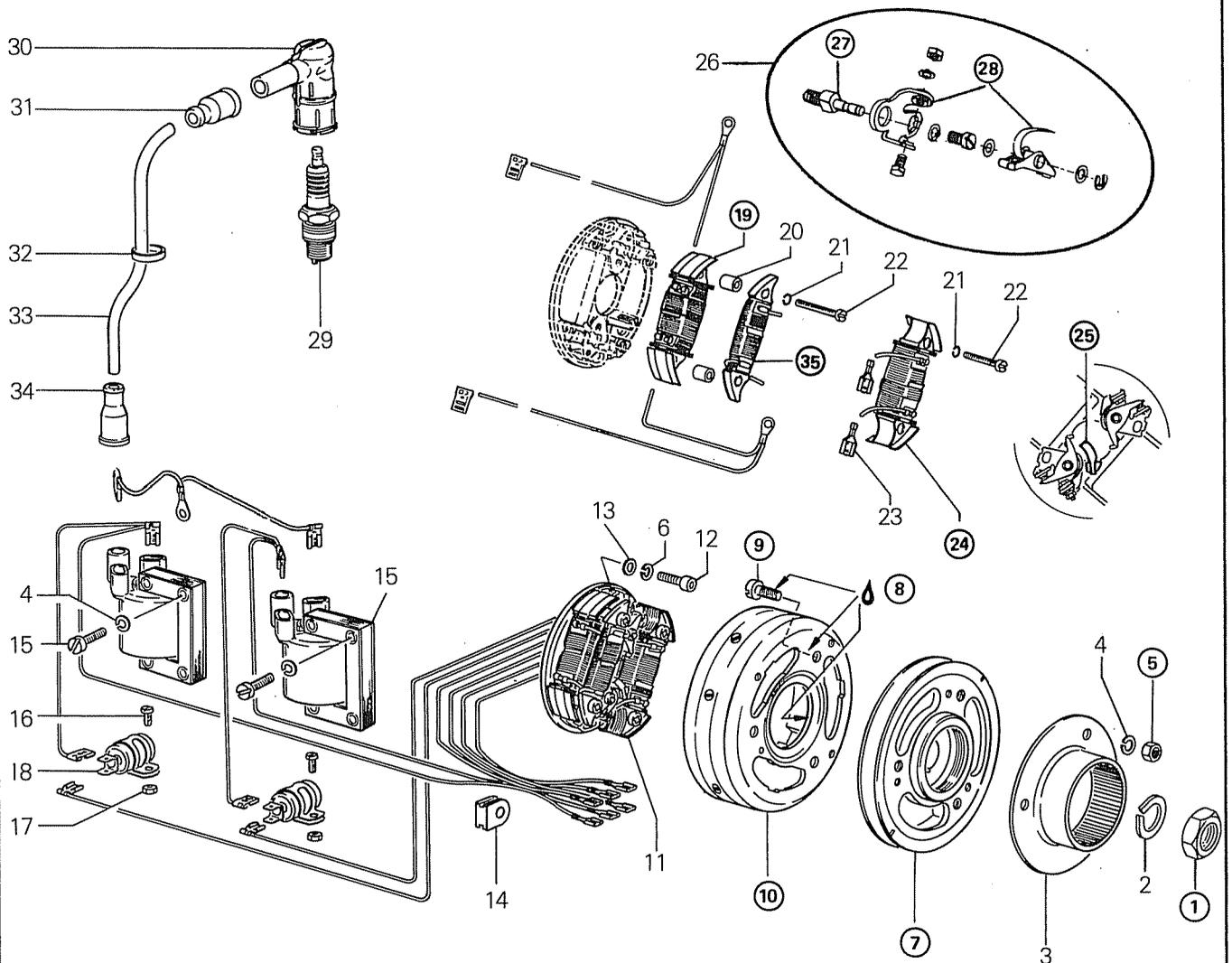


○ **NOTE:** Once circlips are installed, turn each circlip so that the circlip break is not directly on piston notch. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



SECTION 04  
SUB-SECTION 02 (ENGINES)

**MAGNETO**



- 1. Nut
- 2. Lockwasher
- 3. Starting pulley
- 4. Lockwasher
- 5. Nut
- 6. Lockwasher
- 7. Magneto housing
- 8. Loctite 242
- 9. Screw
- 10. Magneto ring
- 11. Armature plate ass'y
- 12. Allen capscrew

- 13. Flat washer
- 14. Wires grommet
- 15. Ignition coil
- 16. Screw
- 17. Nut
- 18. Condenser with clamp
- 19. Lighting coil
- 20. Distance sleeve
- 21. Lockwasher
- 22. Screw
- 23. Female connector
- 24. Generator coil

- 25. Lubricating wick
- 26. Breaker point set
- 27. Pivot pin
- 28. Breaker point
- 29. Spark plug
- 30. Protector
- 31. Protection cap
- 32. Rubber ring
- 33. H.T. cable
- 34. Protection cap
- 35. Brake light coil

SECTION 04  
SUB-SECTION 02 (ENGINES)

## MAGNETO

### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature ass'y using only a clean cloth.

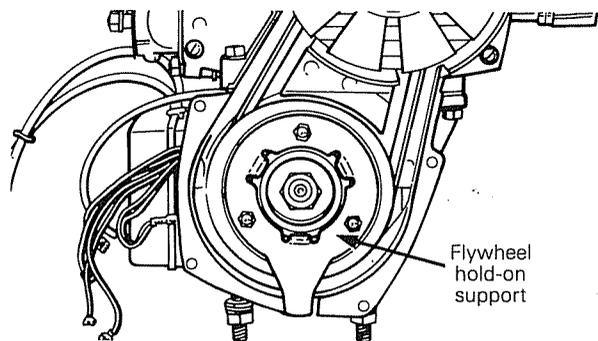
### DISASSEMBLY & ASSEMBLY

① Torque to:

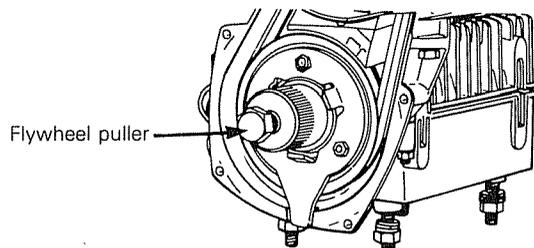
Engine type	
248	61 N•m (45 ft-lbs)
294	85 N•m (63 ft-lbs)

⑤ Torque to 12 N•m (9 ft-lbs).

⑦ ⑧ ⑨ ⑩ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tool Section).



With magneto retaining nut removed hold-on support in place, install special puller onto hub. Tighten puller bolt and at same time, tap bolt head using a hammer to release magneto from its taper. (See Tool Section).



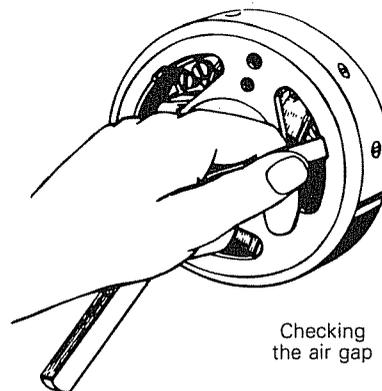
○ **NOTE:** Do not separate magneto housing from magneto ring unless necessary. At assembly, apply "Loctite Lock'n Seal" on magneto housing hub (where magneto ring center bore sits) and on retaining screws.

Prior to magneto installation, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242.

Install magneto retaining nut with lockwasher then torque to:

Engine type	
248	61 N•m (45 ft-lbs)
294	85 N•m (63 ft-lbs)

⑱ ⑲ ⑳ Whenever a coil is replaced, the air gap (distance between magnet and coil end) must be adjusted.

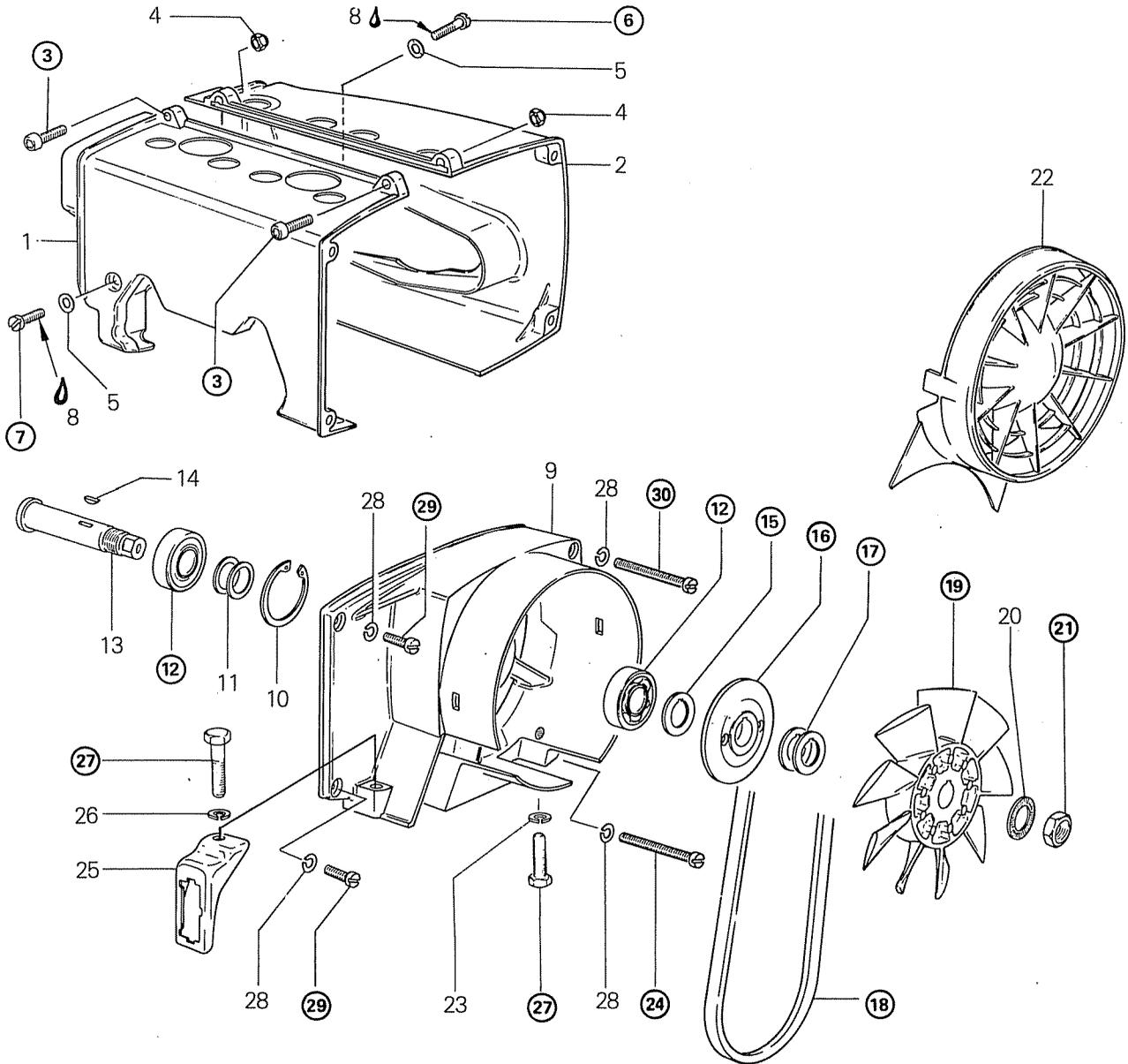


To check air gap, insert a feeler gauge of 0.25-0.38 mm (.010-.015") between magnet and coil ends. If necessary to adjust, slacken retaining screws and relocate coil.

㉑ Do not remove pivot pin unless replacement is needed. At assembly, apply "Loctite Lock'n Seal" on threads.

㉒ ㉓ When replacing breaker point set, apply a light coat of grease on pivot pin and lubricating wick.

**COOLING SYSTEM**



- 1. Air deflector (intake)
- 2. Air deflector (exhaust)
- 3. Screw
- 4. Nut
- 5. Spring washer
- 6. Screw
- 7. Screw
- 8. Loctite no. 242
- 9. Fan housing
- 10. Circlip

- 11. Shims
- 12. Bearing
- 13. Fan shaft
- 14. Woodruff key
- 15. Shim(s)
- 16. Pulley half
- 17. Shims
- 18. Belt
- 19. Fan
- 20. Locking washer

- 21. Nut
- 22. Fan cover
- 23. Lockwasher
- 24. Screw
- 25. Junction block bracket
- 26. Lockwasher
- 27. Bolt
- 28. Lockwasher
- 29. Screw

## COOLING SYSTEM

### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

### DISASSEMBLY & ASSEMBLY

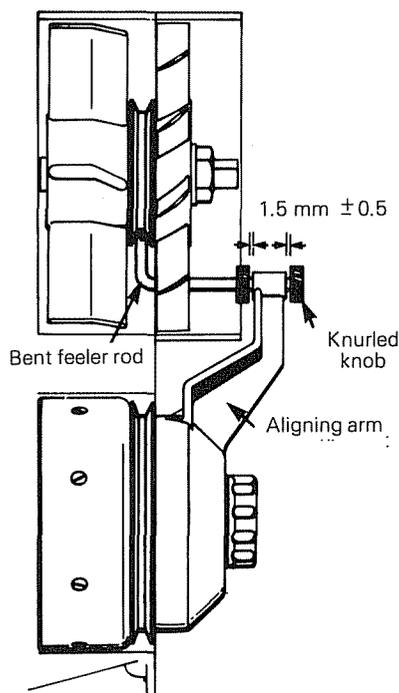
③⑥⑦②④②⑦②⑨ At assembly, apply "Loctite Lock'n Seal 242" or equivalent on threads to prevent loosening through vibration.

○ **NOTE:** To correctly remove a "Loctite" locked screw, it is necessary to slightly tap on head of screwdriver to break bond.

⑫ To remove or install bearing, heat bearing housing to 65°C (150°F).

#### ⑮ Fan belt pulleys alignment

Prior to checking alignment, check fan belt free-play. Position and secure aligning tool (See Tool Section) on magneto housing as illustrated.



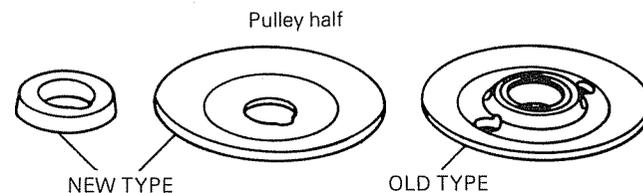
Turn knurled knob to center bent feeler rod between pulley halves. Insert a 1 mm (.040") feeler gauge between tool arm and knurled knobs. If gauge fits between both sides of the arms, the setting lies within tolerance.

If clearance is smaller than 1 mm (.040") on one side, shim(s) must be added or removed between bearing and inner pulley half to bring both gaps within tolerance of 1.5 mm ± 0.5 (.060" ± .020").

Excess shim(s) should be stored between outer pulley half and fan.

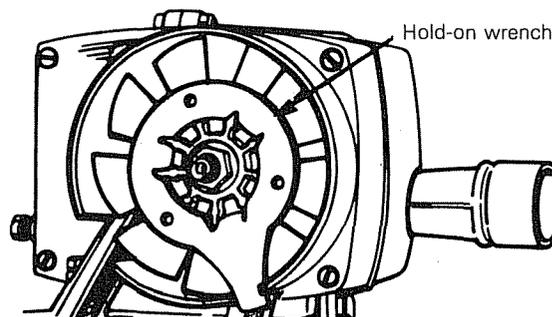
⑰⑱ Correct fan belt free-play is 6 mm (1/4"). To adjust, add or remove shim(s) ⑰ between inner and outer pulley halves. Excess shim(s) must be positioned between outer pulley half and fan.

⑮⑲ Newer pulley half does not have a shoulder on its inner face so it is installed with a 6 mm (0.236") spacer.



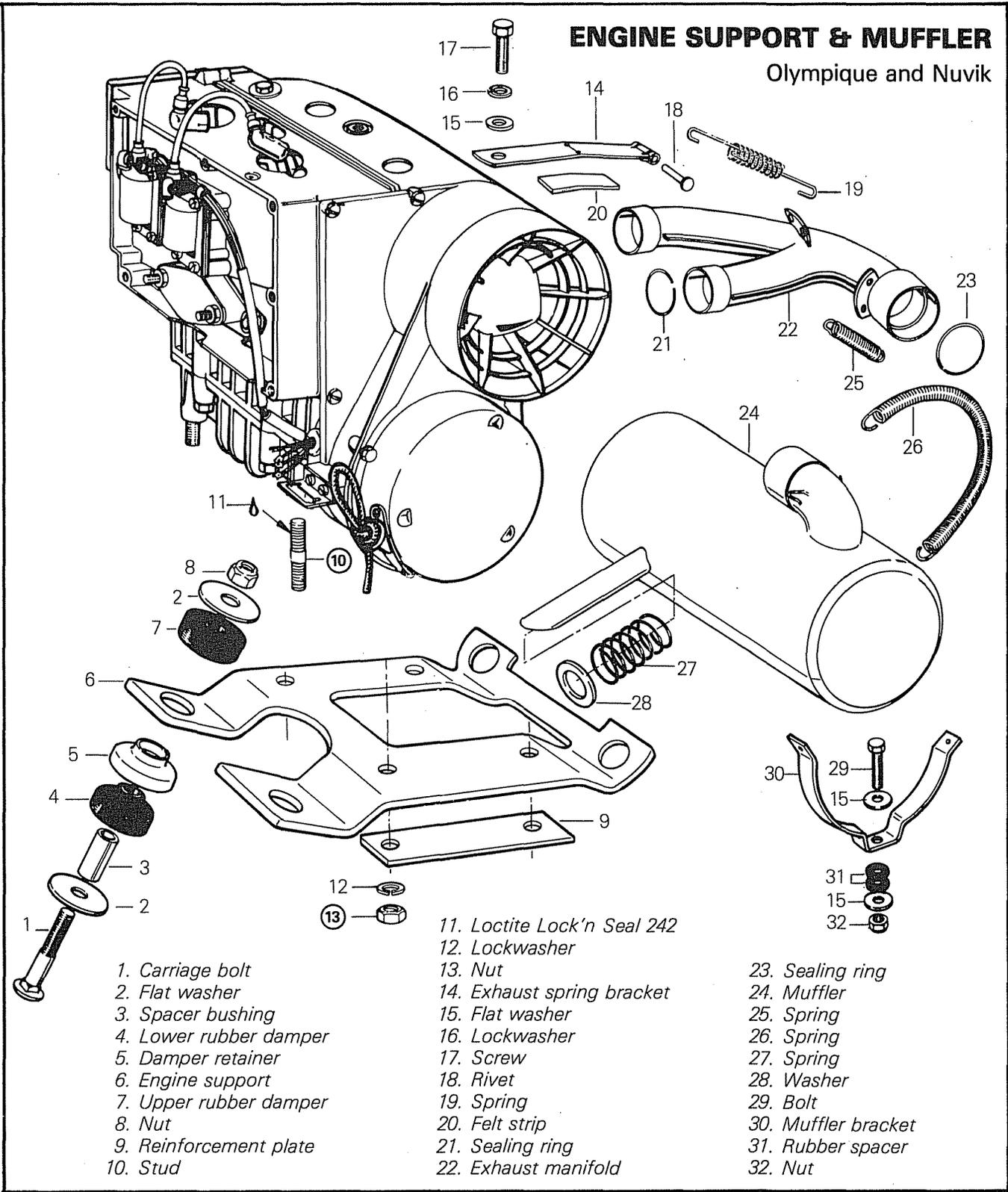
There are two interchangeable types of fan. The first type utilizes two pulley halves and the second type utilizes one pulley half (the second half being part of the fan itself).

⑳ To remove or install fan retaining nut, lock fan in position with fan holder wrench. (See Tool Section).



At assembly, torque retaining nut to 62 N•m (46 ft-lbs). Make sure that belt is not squeezed between pulley halves.

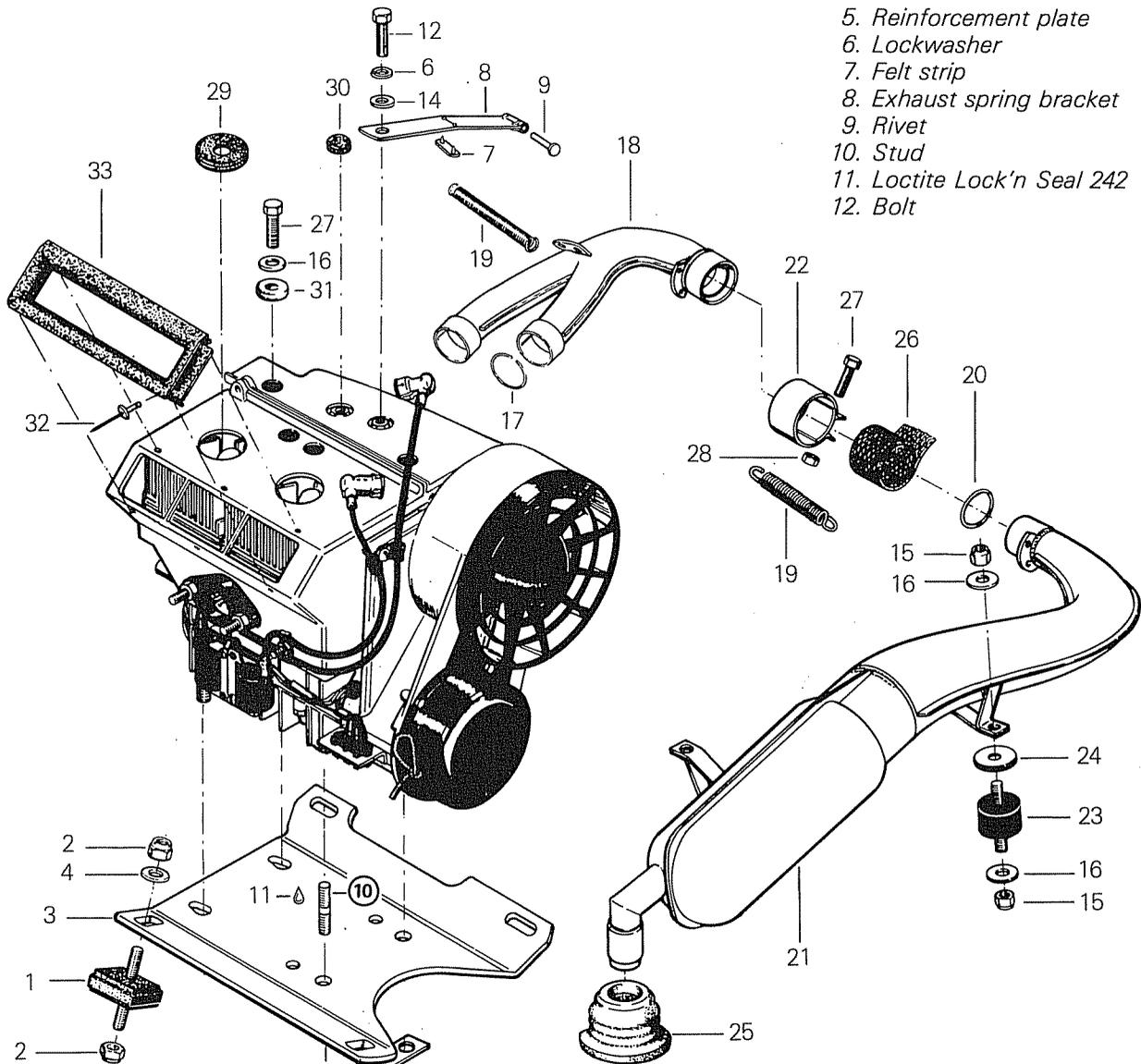
**305-343-402 ENGINE TYPES**



SECTION 04  
SUB-SECTION 02 (ENGINES)

**ENGINE SUPPORT & MUFFLER**

Everest 340 and Futura 400



- 1. Anchor pad
- 2. Nut
- 3. Engine support
- 4. Washer
- 5. Reinforcement plate
- 6. Lockwasher
- 7. Felt strip
- 8. Exhaust spring bracket
- 9. Rivet
- 10. Stud
- 11. Loctite Lock'n Seal 242
- 12. Bolt

- 13. Nut
- 14. Flat washer
- 15. Nut
- 16. Washer
- 17. Sealing ring
- 18. Exhaust manifold
- 19. Exhaust spring
- 20. Sealing ring
- 21. Muffler
- 22. Exhaust clamp

- 23. Rubber anchor pad
- 24. Washer
- 25. Exhaust grommet
- 26. Asbestos tape
- 27. Bolt
- 28. Nut
- 29. Spark plug insulating ring
- 30. Plug
- 31. Rubber washer
- 32. Pop rivet
- 33. Air deflector gasket

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle.

- Pulley guard and drive belt
- Muffler and air duct
- Cab retaining cable
- Air intake silencer
- Fuel lines at carburetor, impulse line
- Throttle cable
- Electrical junction block.

 **CAUTION:** On electric start model, disconnect negative cable (ground) from battery **before** disconnecting other wires.

- Rewind starter
- Engine mount nuts

### DISASSEMBLY & ASSEMBLY

⑩ At assembly on crankcase, apply Loctite Lock'n Seal 242 on threads.

⑬ Torque to 35 N•m (26 f t-lbs).

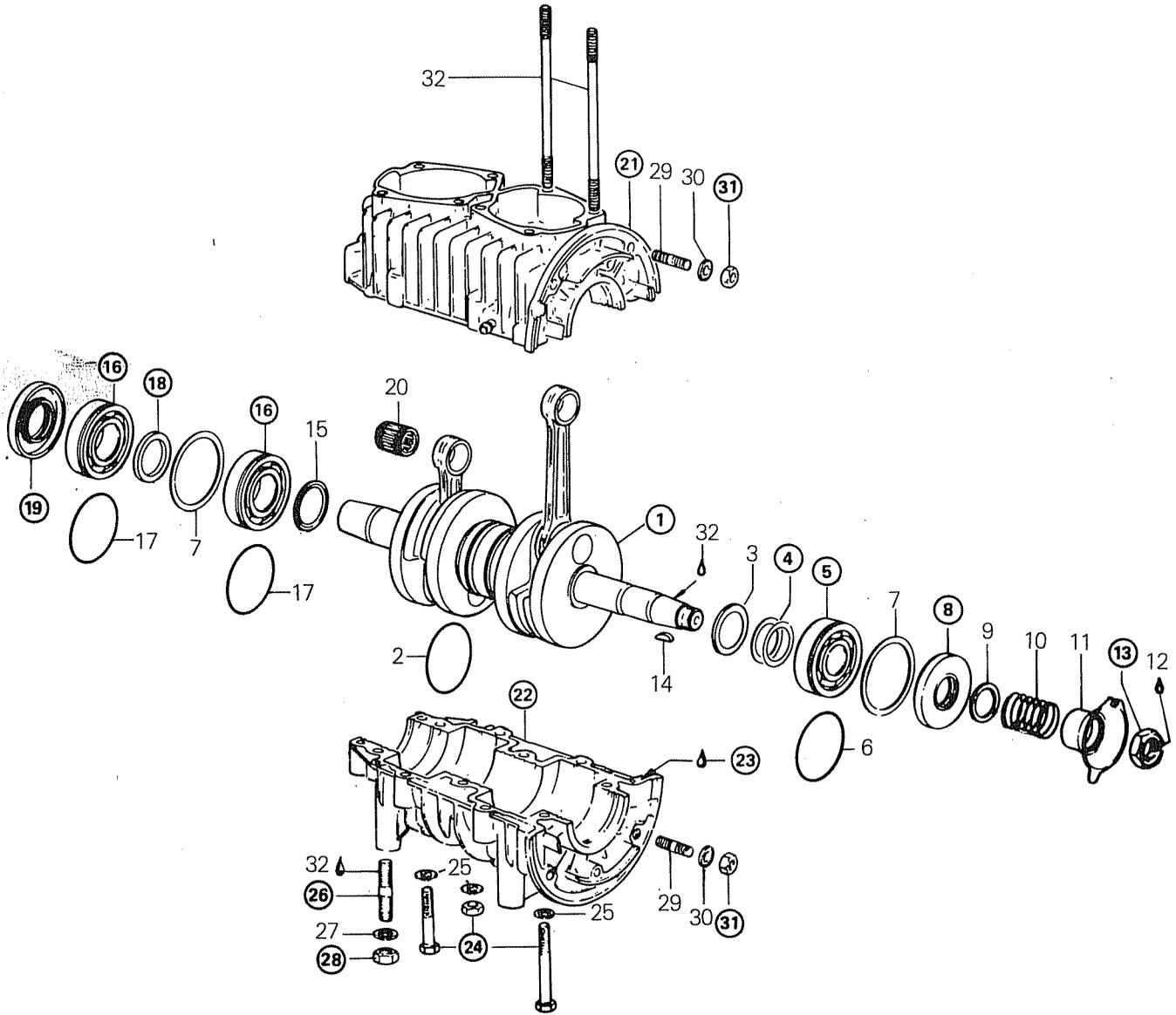
### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle opening.
- Check pulley alignment.

SECTION 04  
SUB-SECTION 02 (ENGINES)

**BOTTOM END**



- |                       |                             |                             |
|-----------------------|-----------------------------|-----------------------------|
| 1. Crankshaft         | 12. Loctite Lock'n Seal 242 | 23. Crankcase sealant       |
| 2. "O" ring           | 13. Magneto nut             | 24. Bolt or nut with stud   |
| 3. Distance ring 1 mm | 14. Woodruff key            | 25. Lockwasher              |
| 4. Shim               | 15. Distance ring 2 mm      | 26. Stud                    |
| 5. Bearing (MAG)      | 16. Bearing (P.T.O.)        | 27. Lockwasher              |
| 6. "O" ring           | 17. "O" ring                | 28. Nut                     |
| 7. Retainer washer    | 18. Distance ring 3 mm      | 29. Stud                    |
| 8. Oil seal (MAG)     | 19. Oil seal (P.T.O.)       | 30. Washer                  |
| 9. Washer             | 20. Needle cable bearing    | 31. Nut                     |
| 10. Spring            | 21. Crankcase upper half    | 32. Loctite Lock'n Seal 242 |
| 11. Breaker point cam | 22. Crankcase lower half    |                             |

## BOTTOM END

### CLEANING

Discard all oil seals, gaskets and "O" rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

**CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

### DISASSEMBLY

#### General

Refer to Technical Data Section for component fitted tolerance and wear limit.

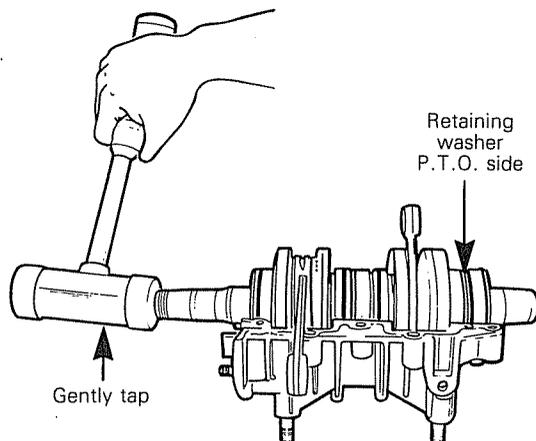
①④ **Crankshaft end-play** (maximum 0.1 mm (.004")) is adjusted with shim(s) located between crankshaft and magneto side bearing. To determine correct amount of shim(s), proceed as follows.

○ **NOTE:** Crankshaft end-play requires adjustment only when crankshaft and/or crankcase is replaced.

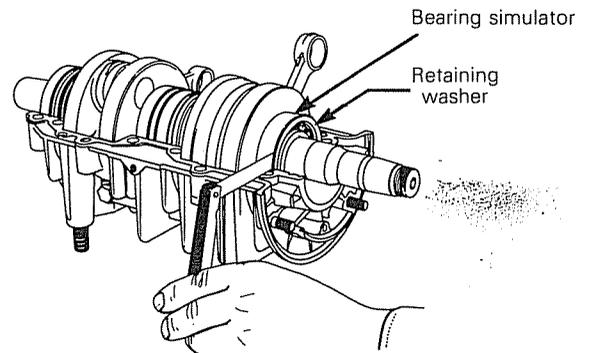
Remove magneto side bearings and existing shim(s). Slide the appropriate bearing simulator (no. 420 876 155) and the retaining washers on the crankshaft.

Position crankshaft assembly into crankcase lower half. Make sure that retaining washers are correctly seated in the grooves.

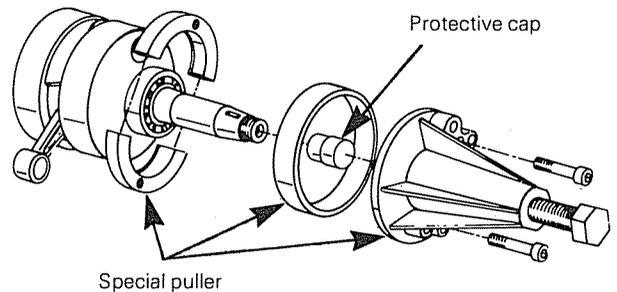
Gently tap crankshaft counterweight until P.T.O. side inner bearing bears against retaining washer.



Any free-play between the bearing simulator and magneto side retaining washer, minus maximum 0.1 mm (.004") end-play, is the distance to be covered by shim(s). Shims are available in the thickness of 0.15 mm (.006"), 0.20 mm (.008") and 0.30 mm (.012").



⑤⑩ To remove bearing from crankshaft use a protector cap and special puller, as illustrated. (See Tool Section).



Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F) for 10 min. This will expand bearings and ease installation.

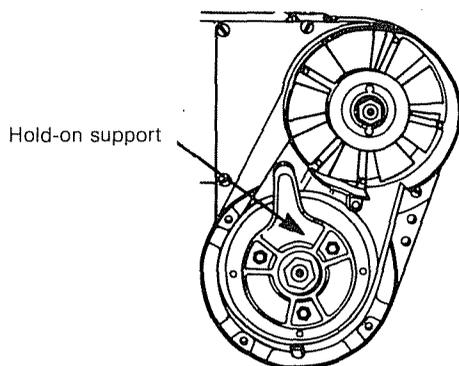
Install bearings with groove outward.

○ **NOTE:** Prior to magneto side bearing installation, determine crankshaft end-play and install required shim(s) on crankshaft extension.

⑧⑱ At assembly apply a light coat of lithium grease on seal lip. Seal outer surface should be flush with crankcase.

**SECTION 04**  
**SUB-SECTION 02 (ENGINES)**

⑬ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tool Section).



⑭ Torque to 20 N•m (15 ft-lbs).

⑮ At assembly on crankcase apply Loctite Lock'n Seal 242 on threads.

⑯ Torque to 35 N•m (26 ft-lbs).

⑰ Torque to 20 N•m (15 ft-lbs).

At assembly apply Loctite Lock'n Seal 242 or equivalent on threads then torque to 81 N•m (60 ft-lbs).

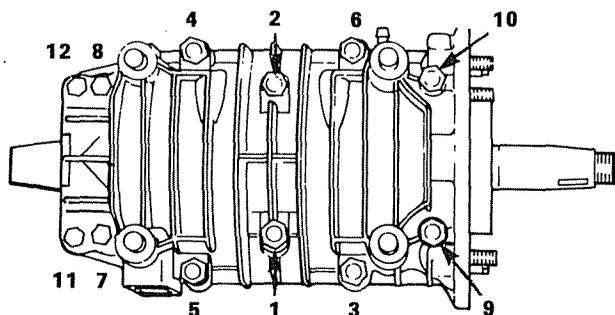
⑱ A 4 mm (0.160") distance ring is used on P.T.O. side with crankcase upper half having the oil passage between the two bearings. When the oil passage is between the oil seal and outer bearing, a 3 mm (0.120") must be used.

⑳㉑㉒ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

Prior to joining of crankcase halves, prepare mating surface with "Loctite 515" (no. 413 7027).

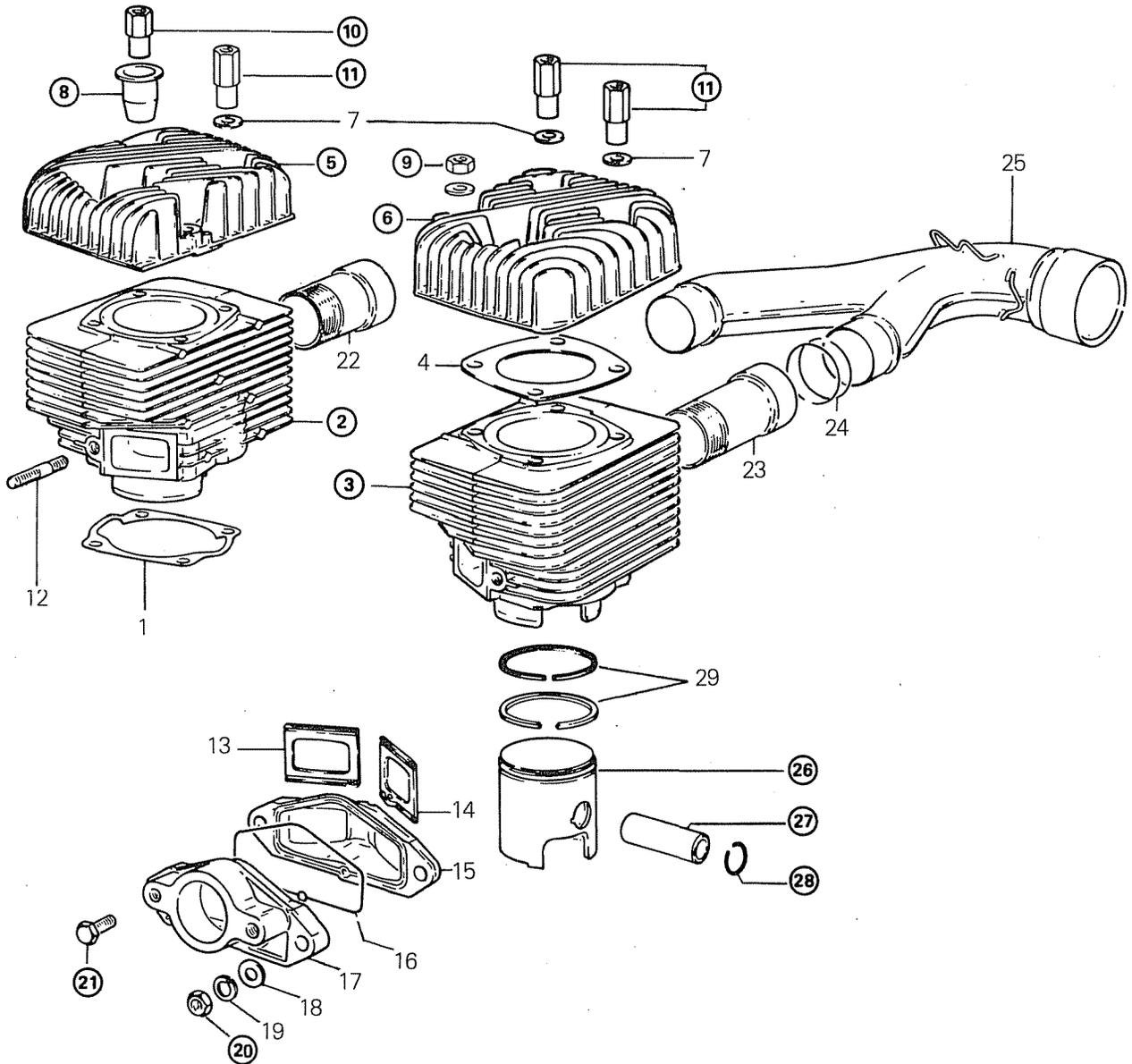
Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque bolts or nuts to 20 N•m (15 ft-lbs) following illustrated sequence.



SECTION 04  
SUB-SECTION 02 (ENGINES)

TOP END



- 1. Gasket (cylinder/crankcase)
- 2. Cylinder (P.T.O.)
- 3. Cylinder (MAG)
- 4. Cylinder head gasket
- 5. Cylinder head (P.T.O.)
- 6. Cylinder head (MAG)
- 7. Flat washer
- 8. Support sleeve
- 9. Nut
- 10. Distance nut (short)

- 11. Distance nut (long)
- 12. Stud
- 13. Gasket (intake P.T.O.)
- 14. Gasket (intake MAG)
- 15. Intake manifold
- 16. Gasket
- 17. Intake cover
- 18. Flat washer
- 19. Lockwasher
- 20. Nut

- 21. Bolt
- 22. Exhaust socket (P.T.O.)
- 23. Exhaust socket (MAG)
- 24. Sealing ring
- 25. Exhaust manifold
- 26. Piston
- 27. Gudgeon pin
- 28. Circlip
- 29. Ring

SECTION 04  
SUB-SECTION 02 (ENGINES)

TOP END

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

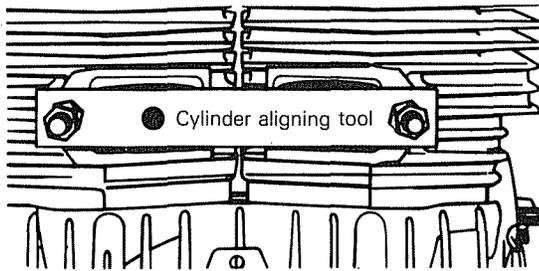
Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY & ASSEMBLY

○ **NOTE:** Refer to technical data for component fitted tolerance and wear limit.

②③⑤⑥ When installing cylinder and/or cylinder head, the cylinder aligning tool must be used to ensure sealing of intake manifold and cylinders. (See Tool Section).

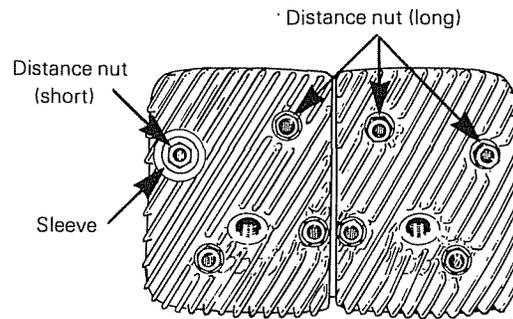
With exhaust manifold and aligning tool installed, you can then cross torque cylinder head nuts to 20 N•m (15 ft-lbs).



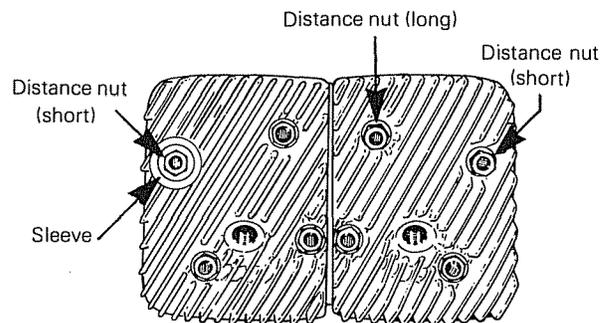
⑧⑨⑩⑪ Position nuts and distance nuts as per illustration then cross torque to 20 N•m (15 ft-lbs).

○ **NOTE:** Torque each cylinder head individually (exhaust manifold & aligning tool installed).

Olympique, Nuvik and Everest



Futura 400

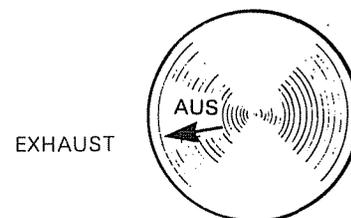


⑳㉑ Apply Loctite Lock'n Seal 242 on threads then torque to 20 N•m (15 ft-lbs).

㉒㉓㉔ Place a clean cloth over crankcase to prevent circlip from falling into crankcase. Use a pointed tool to remove circlips from piston.

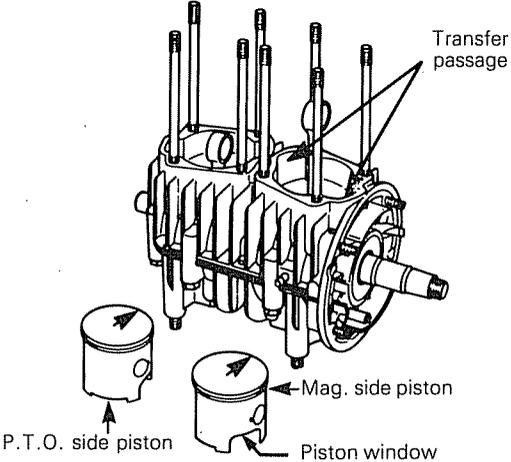
▼ **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.

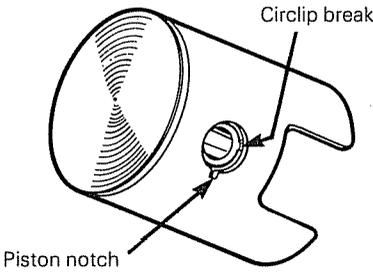


SECTION 04  
SUB-SECTION 02 (ENGINES)

Also make sure that the piston window is aligned with the crankcase transfer passage when the gudgeon pin orifice is in-line with the connecting rod bore.

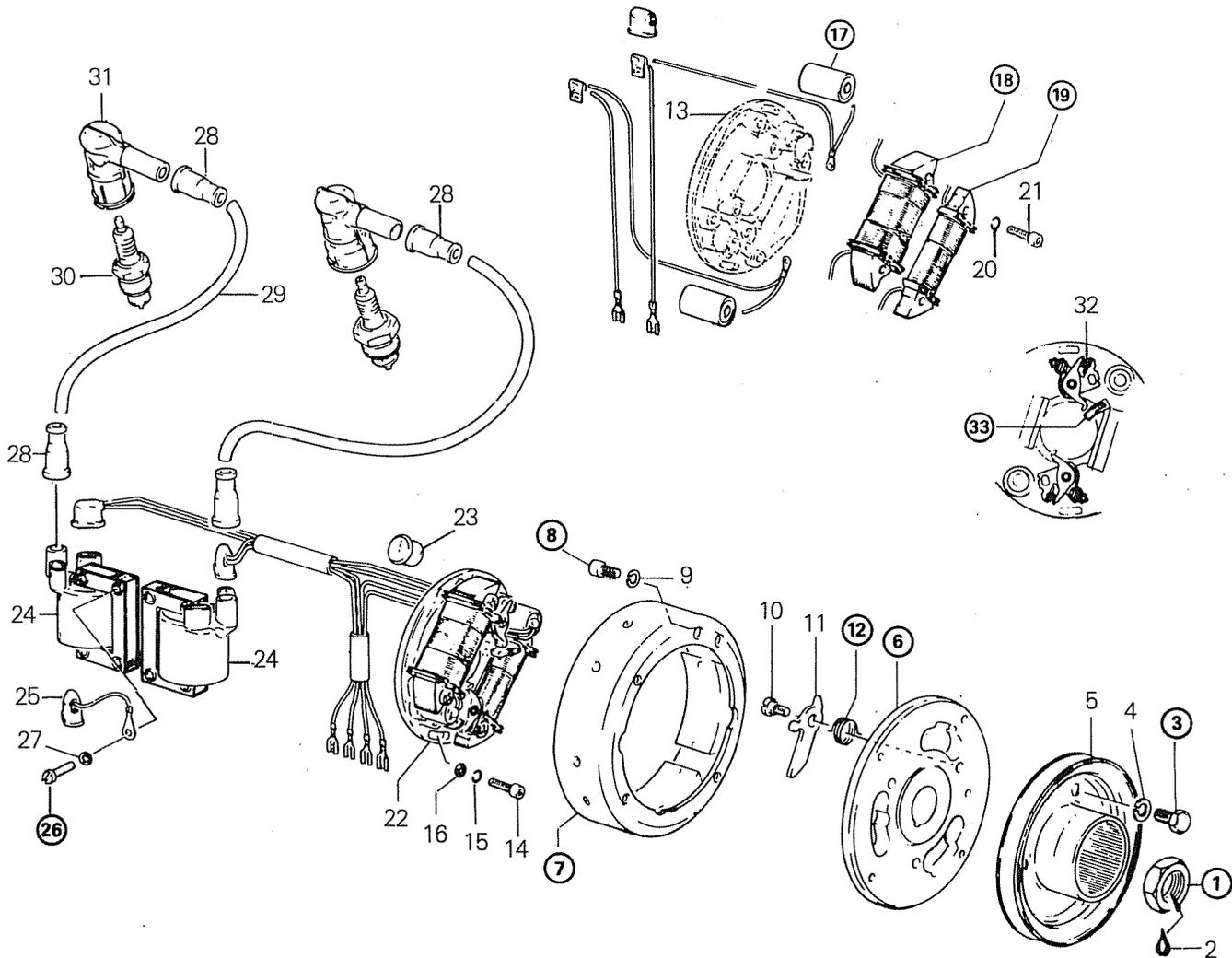


○ **NOTE:** Once the circlips are installed turn each circlip so it is not directly on piston notch. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



SECTION 04  
SUB-SECTION 02 (ENGINES)

**MAGNETO**



- |                            |                          |                          |
|----------------------------|--------------------------|--------------------------|
| 1. Magneto nut             | 12. Spring               | 23. Wire grommet         |
| 2. Loctite Lock'n Seal 242 | 13. Armature plate       | 24. H.T. coil            |
| 3. Bolt                    | 14. Screw                | 25. Ground wire          |
| 4. Lockwasher              | 15. Lockwasher           | 26. Screw                |
| 5. Starting pulley         | 16. Flat washer          | 27. Lockwasher           |
| 6. Magneto housing         | 17. Capacitor            | 28. Protector            |
| 7. Magneto ring            | 18. Lighting coil        | 29. H.T. cable           |
| 8. Screw                   | 19. Generator coil       | 30. Spark plug           |
| 9. Lockwasher              | 20. Washer               | 31. Spark plug protector |
| 10. Screw                  | 21. Screw                | 32. Breaker point set    |
| 11. Centrifugal lever      | 22. Armature plate ass'y | 33. Lubricating wick     |

## MAGNETO

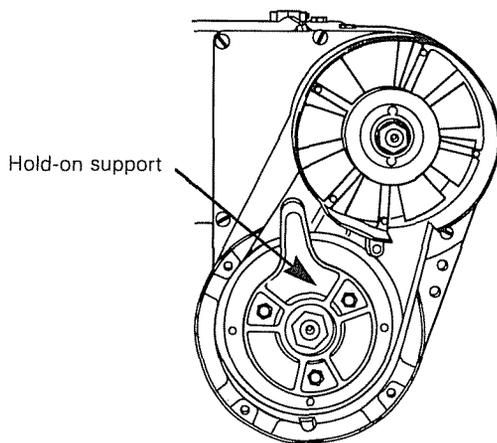
### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

**CAUTION:** Clean armature ass'y and magneto using only a clean cloth.

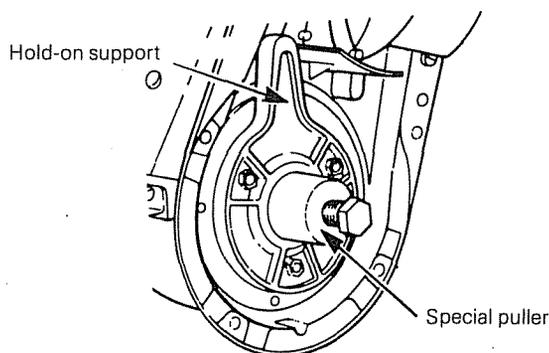
### DISASSEMBLY & ASSEMBLY

①⑥⑦ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tool Section).

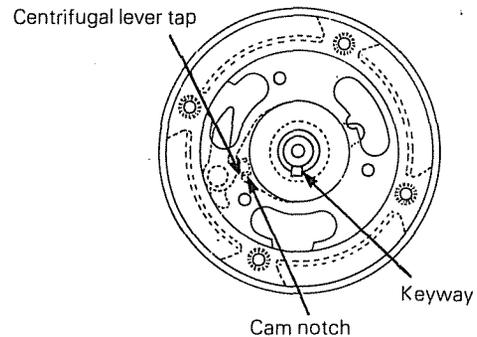


With magneto retaining nut removed and hold-on support in place, install special puller onto hub.

Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 or equivalent, position magneto on crankshaft with the keyway and the cam notch positioned as illustrated.



Install magneto retaining nut (with Loctite Lock'n Seal 242) on threads and torque to 81 N•m (60 ft-lbs).

③ Torque to 22 N•m (16 ft-lbs).

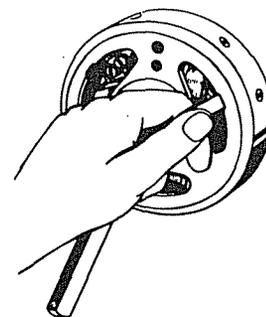
⑧ Apply Loctite Lock'n Seal 242 on threads.

⑫ At assembly apply a small amount of low temperature grease into spring seating.

⑰ To replace a capacitor, it is first necessary to unsolder the two (2) black leads using a soldering iron. The capacitor can then be driven out of the armature plate using a suitable pusher. To reinstall, inverse procedure.

⑱ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted.

To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.

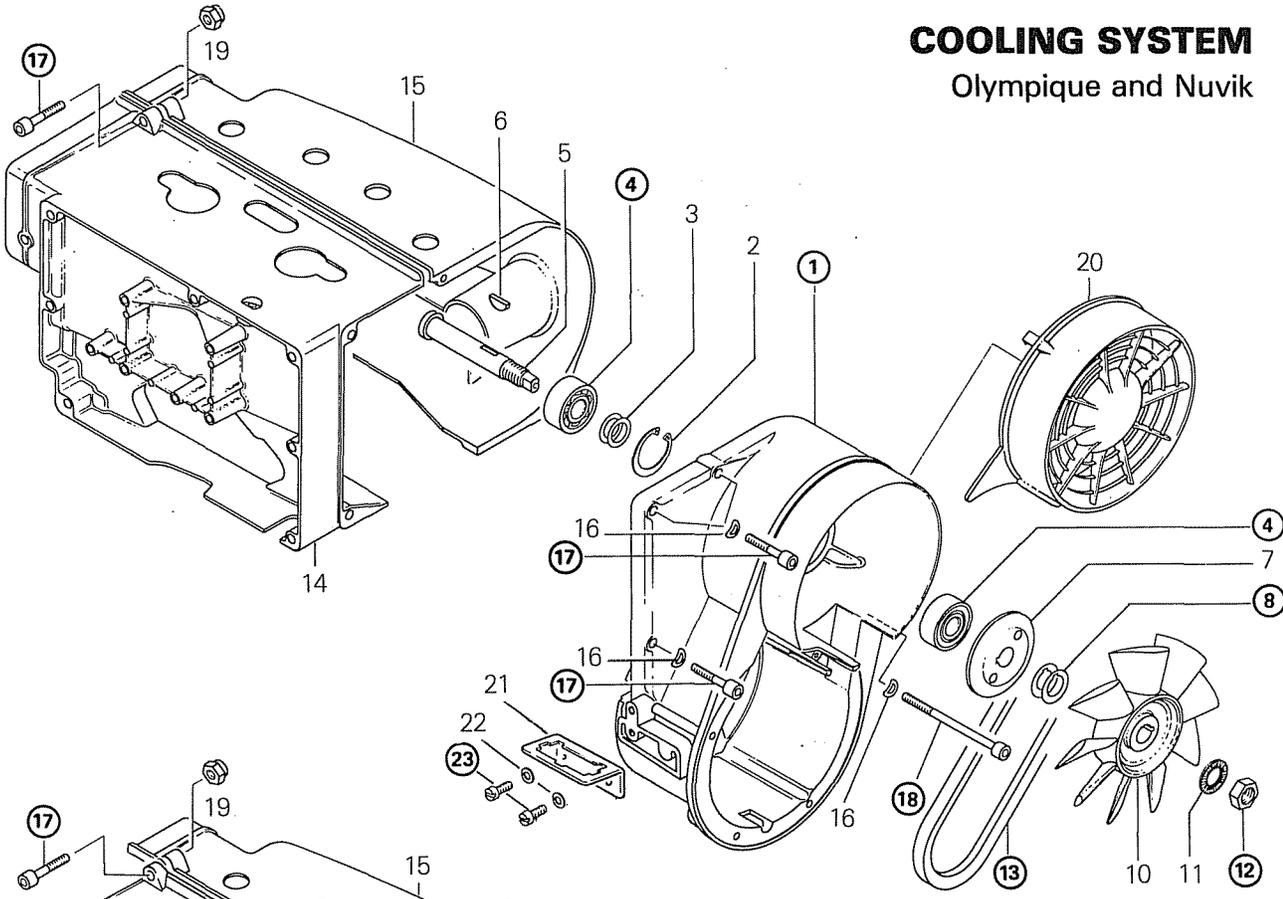


⑳ Apply Loctite Lock'n Seal 242 on threads.

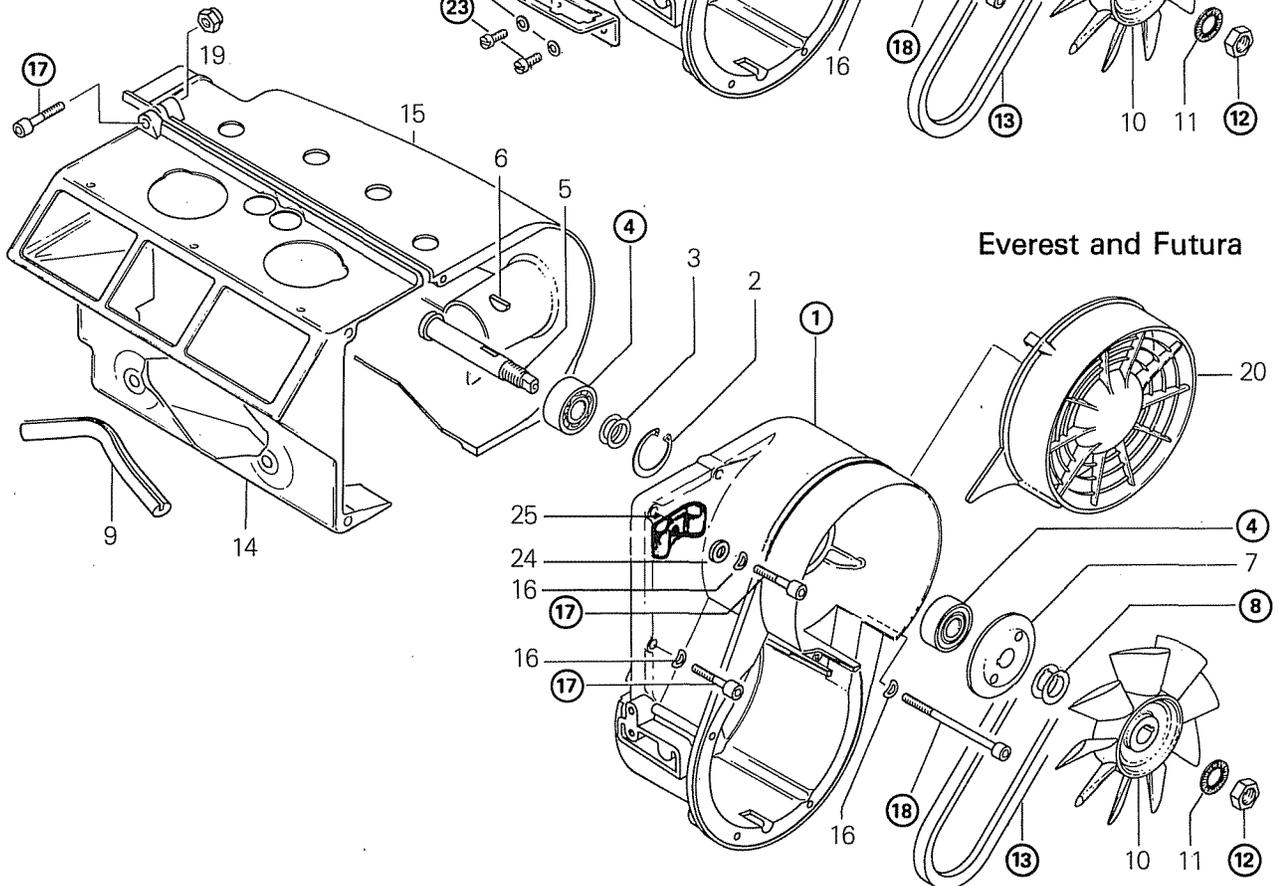
㉓ When replacing breaker point set, apply a light coat of grease on lubricating wick.

SECTION 04  
SUB-SECTION 02 (ENGINES)

**COOLING SYSTEM**  
Olympique and Nuvik



**Everest and Futura**



- |                 |                            |
|-----------------|----------------------------|
| 1. Fan housing  | 14. Fan cowl (intake)      |
| 2. Circlip      | 15. Fan cowl (exhaust)     |
| 3. Shim(s)      | 16. Spring washer          |
| 4. Bearing      | 17. Screw                  |
| 5. Fan shaft    | 18. Screw                  |
| 6. Woodruff key | 19. Nut                    |
| 7. Pulley half  | 20. Fan cover              |
| 8. Shim         | 21. Junction block bracket |
| 9. Joint        | 22. Lockwasher             |
| 10. Fan         | 23. Screw                  |
| 11. Washer      | 24. Washer                 |
| 12. Nut         | 25. Clip                   |
| 13. Belt        |                            |

## COOLING SYSTEM

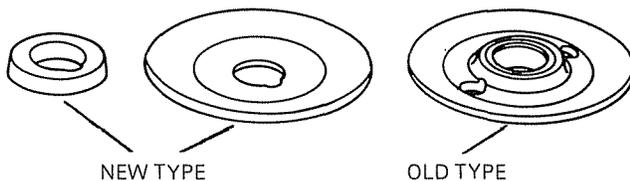
### CLEANING

Clean all components in a non-ferrous metal cleaner.

### DISASSEMBLY & ASSEMBLY

①④ Heat bearing housing to 70°C (160°F) prior to bearing removal or installation.

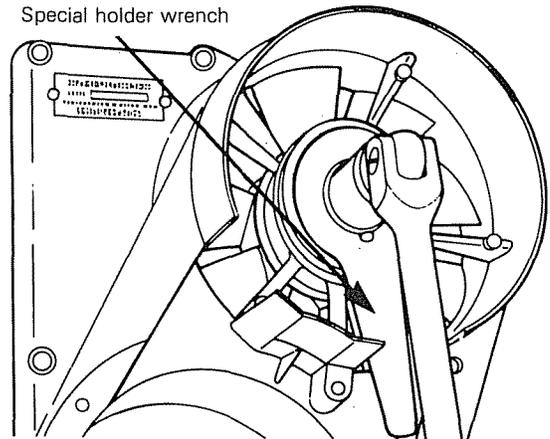
⑦ Newer pulley half does not have a shoulder on its inner face so it is installed with a 6 mm (0.230") spacer.



⑧⑬ Shim(s) located between pulley halves are used to adjust fan belt free-play. Correct free-play is 6 mm (1/4"). If necessary to adjust install or remove shim(s) between pulley halves. Install excess shim(s) between fan and retaining nut washer.

⑫ Lock fan with special holder wrench to remove or install pulley retaining nut. (See Tool Section).

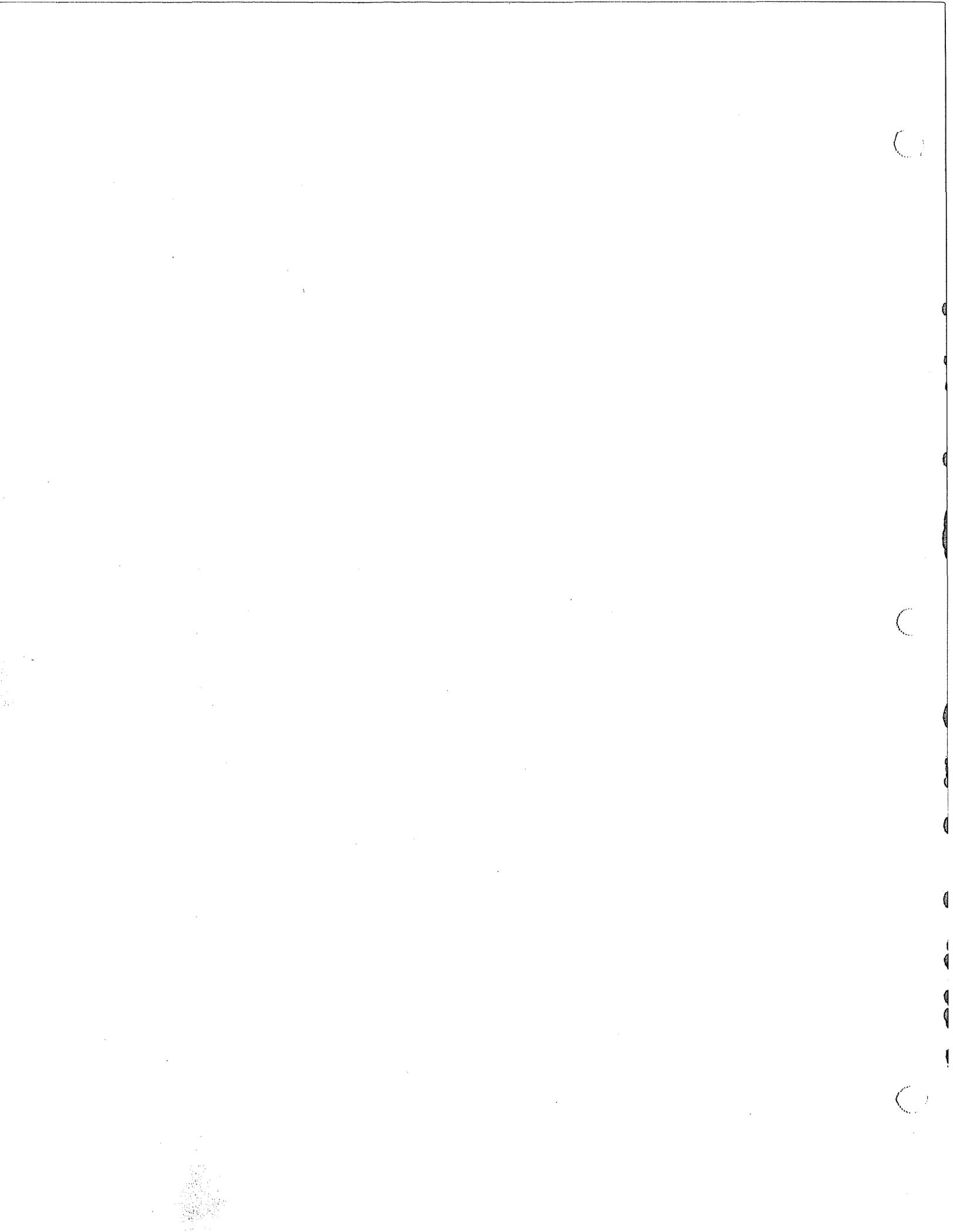
Special holder wrench



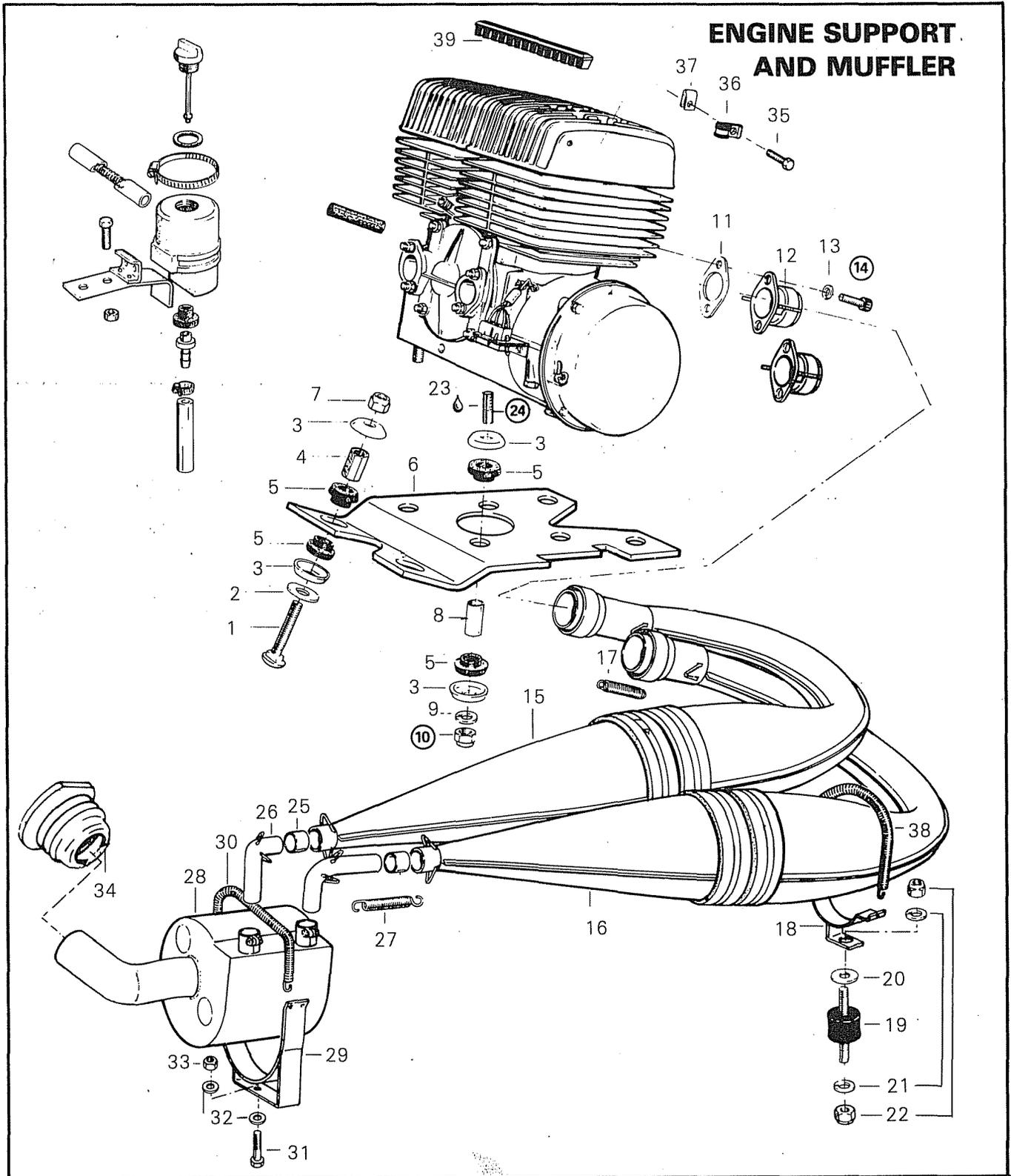
At assembly, torque nut to 62 N•m (46 ft-lbs).

⑰⑱⑲ Apply Loctite Lock'n Seal 242 on threads.

○ **NOTE:** It should be noted that to correctly remove a Loctite locked screw, it is first necessary to tap on head of screw to break Loctite bond. This will eliminate the possibility of screw breakage.



**345 ENGINE TYPE**



## SECTION 04 SUB-SECTION 02 (ENGINES)

1. Carriage bolt
2. Washer
3. Cup washer
4. Spacer bushing
5. Rubber damper
6. Engine support
7. Nut
8. Spacer bushing
9. Washer
10. Nut
11. Exhaust gasket
12. Exhaust socket
13. Lockwasher
14. Bolt
15. Tuned pipe (P.T.O.)
16. Tuned pipe (Mag.)
17. Spring
18. Support
19. Rubber shear mount
20. Washer
21. Lockwasher
22. Nut
23. Loctite 242
24. Stud
25. Coupler
26. Tail pipe
27. Spring
28. Swirl chamber
29. Support
30. Spring
31. Bolt
32. Washer
33. Nut
34. Exhaust grommet
35. Bolt
36. High tension cable clip
37. Speed nut
38. Spring
39. Noise damper

### ENGINE SUPPORT & MUFFLER

#### REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- Pulley guard and drive belt.
- Air silencer.
- Throttle cable.
- Fuel lines, primer lines and impulse line.
- Electrical wires.
- Muffler.
- Rewind starter

Disconnect oil line from bottom of oil reservoir then drain oil from reservoir and crankcase. Disconnect upper oil line from vent elbow.

Remove engine mount nuts then lift engine from vehicle.

#### DISASSEMBLY & ASSEMBLY

- ⑩ Torque to 35 N•m (26 ft-lbs).
- ⑭ Torque to 20 N•m (15 ft-lbs).
- ⑳ At assembly on crankcase apply Loctite Lock'n Seal 242 on threads.

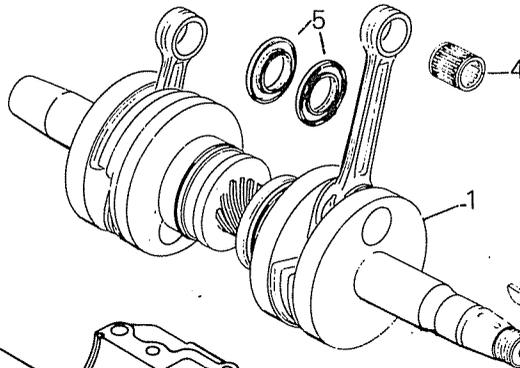
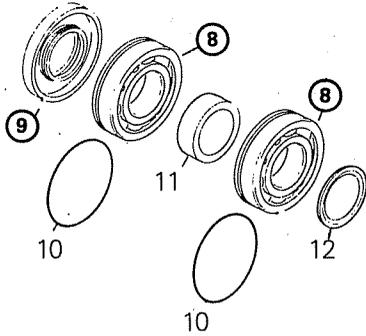
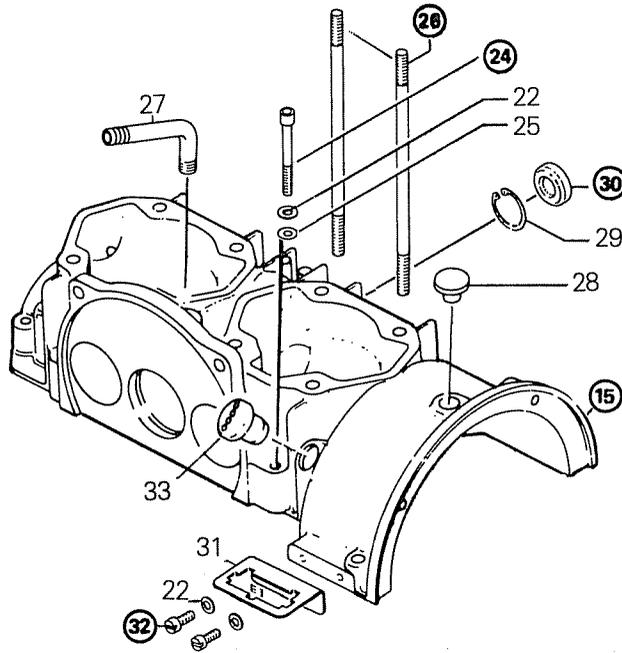
#### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

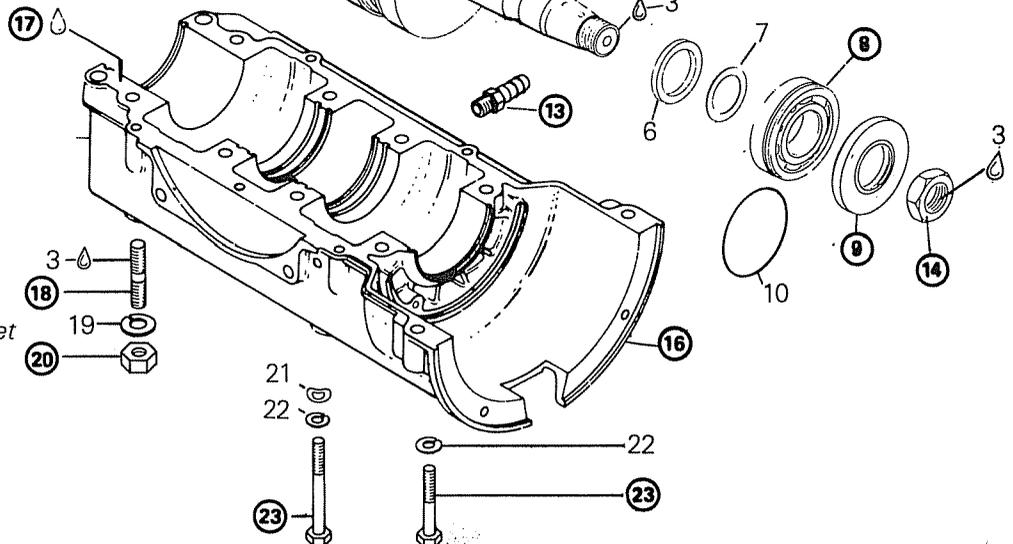
- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetors maximum throttle slide opening.
- Check pulley alignment.

**BOTTOM END**

1. Crankshaft
2. Woodruff key
3. Loctite 242
4. Needle cage bearing
5. Oil seal
6. Distance ring 1 mm
7. Shim 0.5 mm
8. Bearing
9. Oil seal
10. "O" ring
11. Distance sleeve 9.7 mm
12. Distance ring 2 mm
13. Oil line connector
14. Magneto ring nut
15. Crankcase upper half
16. Crankcase lower half
17. Crankcase sealant
18. Stud (support)
19. Lockwasher
20. Nut
21. Spring washer



22. Lockwasher
23. Bolt
24. Allen cap screw
25. Washer
26. Cylinder stud
27. Oil line elbow
28. Plug
29. Circlip
30. End cap
31. Junction block bracket
32. Screw
33. Wire grommet



SECTION 04  
SUB-SECTION 02 (ENGINES)

**BOTTOM END**

**CLEANING**

Discard all oil seals, gaskets and "O" rings.

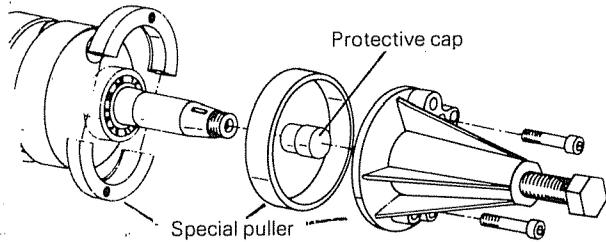
Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

**CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

**DISASSEMBLY & ASSEMBLY**

⑧ To remove bearings from crankshaft, use a protective cap and special puller as illustrated. (See Tools Section).



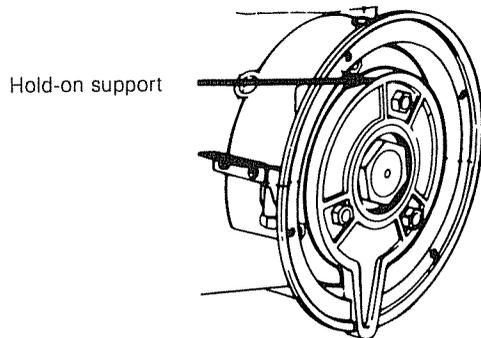
Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F) for 10 min. This will expand bearing and ease installation.

Install bearings with groove outwards.

⑨ At assembly apply a light coat of lithium grease on seal lips. To insure adequate oil supply to the bearings it is imperative that the oil seals outer surface be flush with crankcase.

⑬ Apply Loctite Lock'n Seal 242 on threads prior to assembly.

⑭ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support, as illustrated. (See Tools Section).



At assembly, apply Loctite Lock'n Seal 242 on threads and torque to 73 N•m (54 ft-lbs).

⑮⑯⑰ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

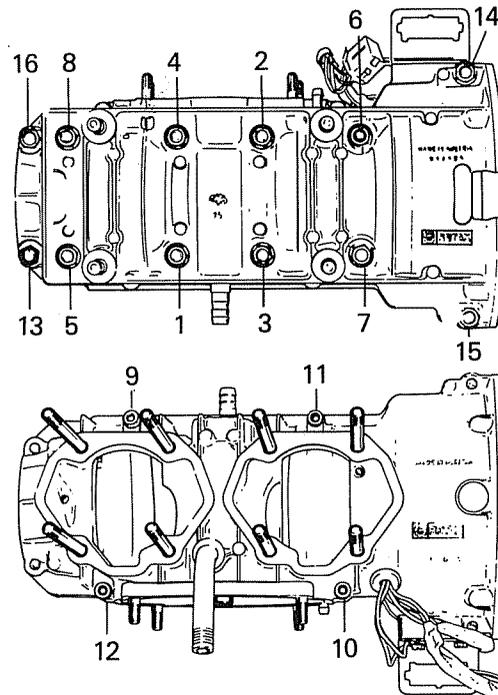
Prior to joining of crankcase halves, apply "Loctite 515" (no. 413 7027) on mating surfaces.

**CAUTION:** Before joining of crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque nuts to 20 N•m (7 ft-lbs) and Allen cap screws to 10 N•m (7 ft-lbs) following illustrated sequence.

**NOTE:** There is no spring washer installed on the last two (2) magneto side bolts (14 and 15 below).



⑱ At assembly on crankcase, apply Loctite Lock'n Seal 242 on threads.

⑳ Torque to 35 N•m (26 ft-lbs).

㉓ Torque to 22 N•m (16 ft-lbs).

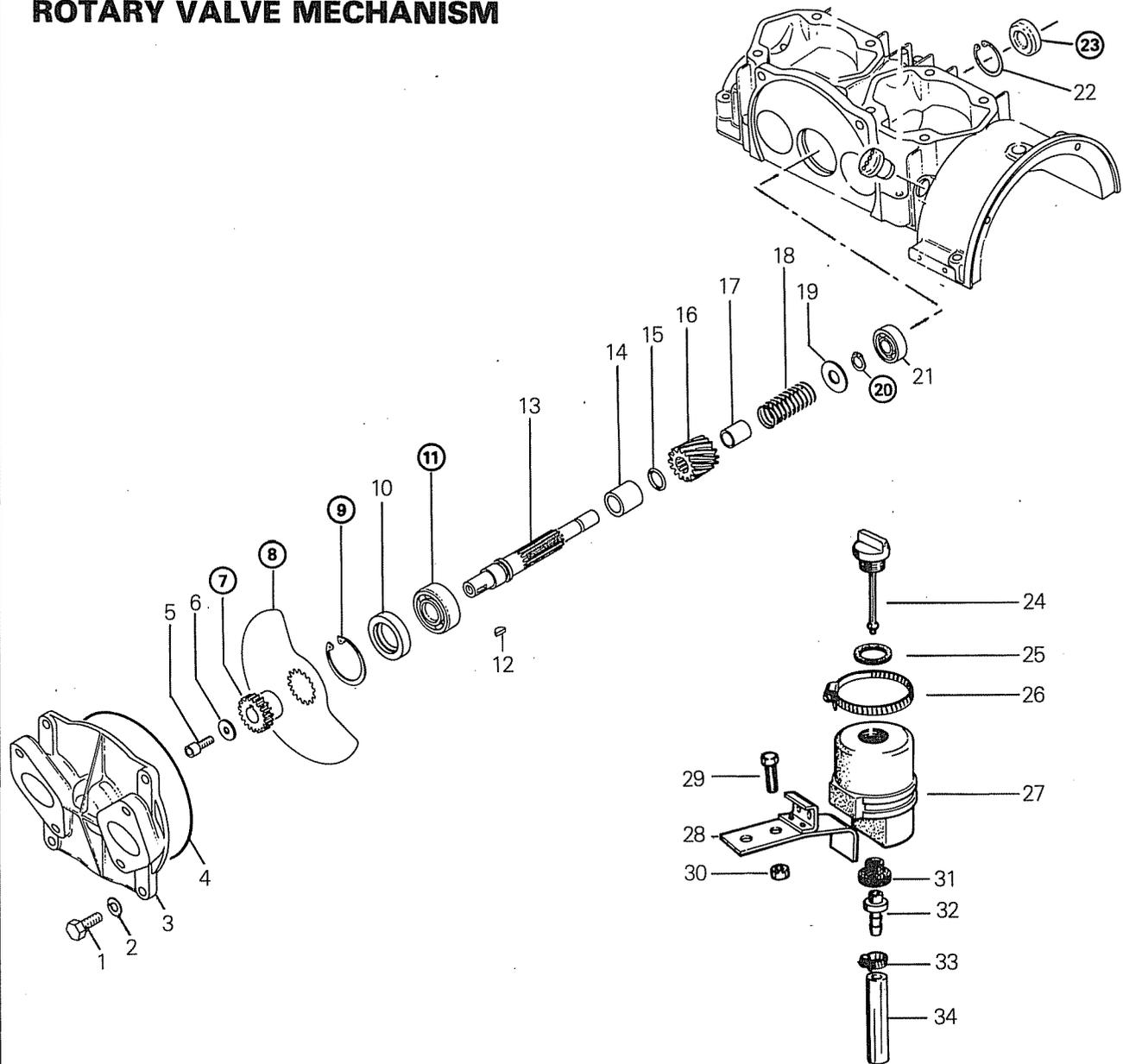
㉔ Torque to 10 N•m (7 ft-lbs).

㉖ Apply Loctite Lock'n Seal on the threads of the two studs, screwed into the crankcase, above the intake ports.

㉚ At assembly, apply a light coat of crankcase sealant (Loctite 515) on end cap sealing surface.

㉛ Apply Loctite Lock'n Seal 242 on threads.

### ROTARY VALVE MECHANISM



- 1. Bolt
- 2. Lockwasher
- 3. Rotary valve cover
- 4. "O" ring
- 5. Allen cap screw
- 6. Washer
- 7. Rotary valve gear
- 8. Rotary valve disc
- 9. Circlip
- 10. Oil seal
- 11. Bearing
- 12. Woodruff key

- 13. Rotary valve shaft
- 14. Distance sleeve
- 15. "O" ring
- 16. Pinion
- 17. Spring sleeve
- 18. Spring
- 19. Shim 1 mm
- 20. Circlip
- 21. Bearing
- 22. Circlip
- 23. End cap
- 24. Oil tank cap

- 25. Gasket
- 26. Clamp
- 27. Oil tank
- 28. Support
- 29. Bolt
- 30. Nut
- 31. Grommet
- 32. Male connector
- 33. Clamp
- 34. Oil line

SECTION 04  
SUB-SECTION 02 (ENGINES)

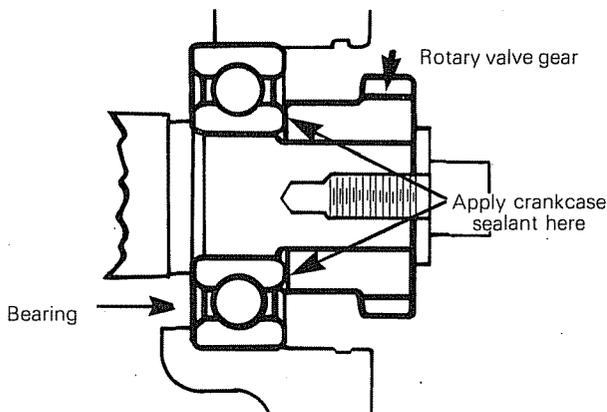
**ROTARY VALVE MECHANISM**

**CLEANING**

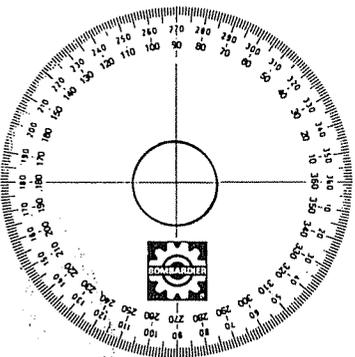
Discard all oil seals and "O" rings.  
Remove crankcase sealant traces on rotary valve gear, adjacent bearing and on end cap sealing surface.  
Clean all metal components in a non-ferrous metal cleaner.

**DISASSEMBLY & ASSEMBLY**

⑦ ⑪ At assembly, apply crankcase sealant (Loctite 515) on rotary valve gear and bearing mating surfaces.



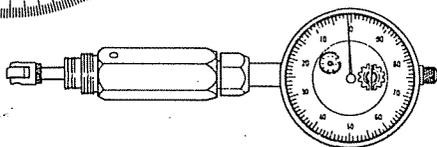
⑧ Disc valve adjustment with a replacement crankcase having no timing marks.



**REQUIRED TOOLS**

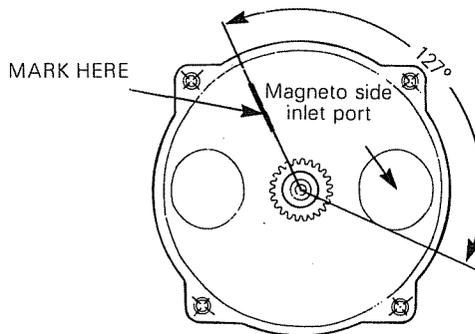
Angle finder  
(414 3529)

TDC gauge  
(414 1047)

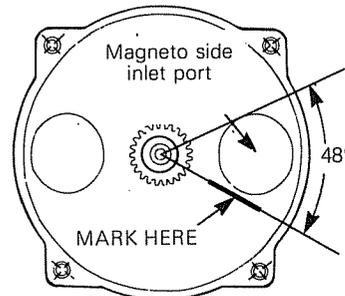


1978 345 type: 127° BTDC opening  
48° ATDC closing

Using angle finder, mark crankcase at 127° from bottom edge of magneto side inlet port.



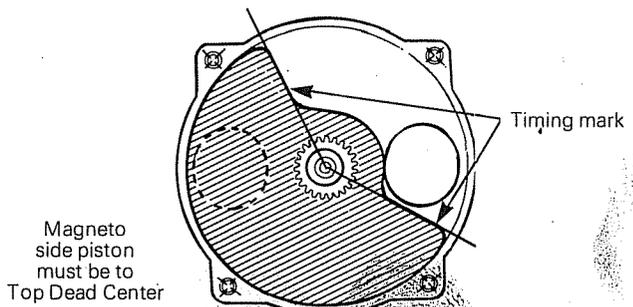
From top edge of magneto side inlet port, mark crankcase at 48°.



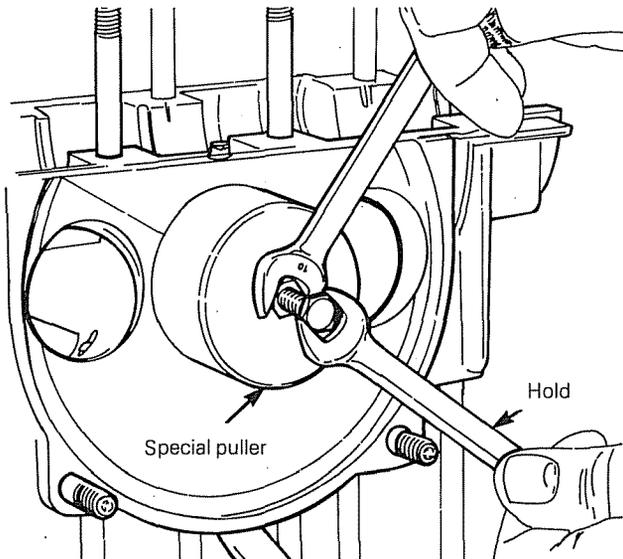
To correctly install the rotary valve disc proceed as follows:

- Turning crankshaft counter-clockwise, (drive pulley side) bring magneto side piston to Top Dead Center using a T.D.C. gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

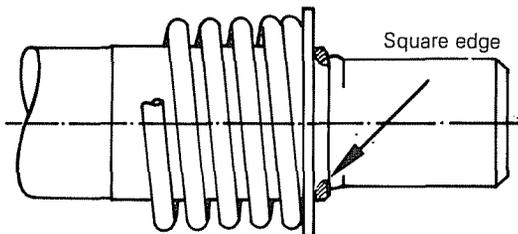
○ **NOTE:** The rotary valve disc is asymmetrical, therefore, at assembly try positioning each side of disc on gear to determine best installation position.



⑨ to ⑳ To remove rotary valve shaft assembly from crankcase a special puller is needed. (See Tools Section). First remove circlip ⑨ then position special puller over shaft bore and screw puller bolt into rotary valve shaft. While holding puller bolt, turn puller nut clockwise until shaft comes out.

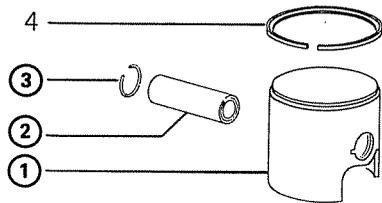
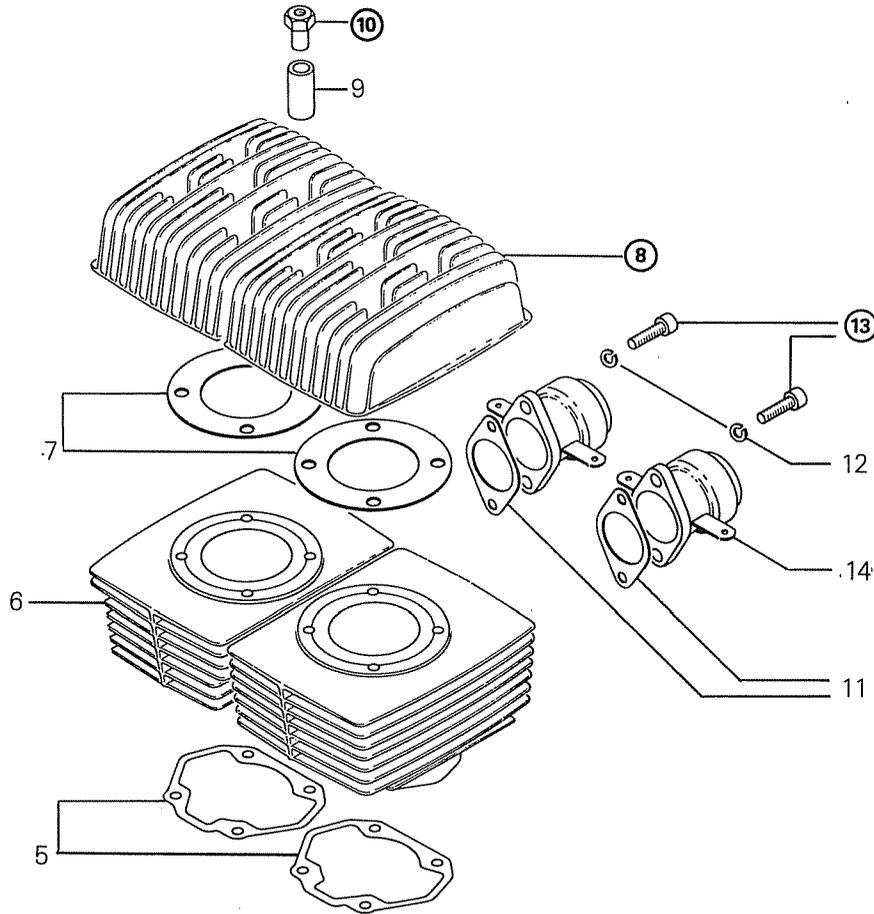


㉑ At assembly, position square edge of circlip against shaft shoulder as illustrated.



㉒ At assembly, apply a light coat of crankcase sealant (Loctite 515) on end cap sealing surface.

**TOP END**



1. Piston
2. Gudgeon pin
3. Circlip
4. Ring
5. Gasket (cylinder/crankcase)
6. Cylinder
7. Gasket (cylinder head)
8. Cylinder head
9. Expansion sleeve
10. Nut
11. Exhaust gasket
12. Lockwasher
13. Allen screw
14. Exhaust socket.

## TOP END

### CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

### DISASSEMBLY & ASSEMBLY

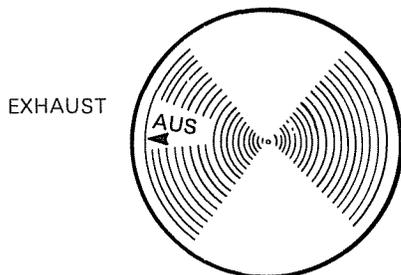
○ **NOTE:** Refer to Technical Data Section for component fitted tolerance and wear limit.

①②③ Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

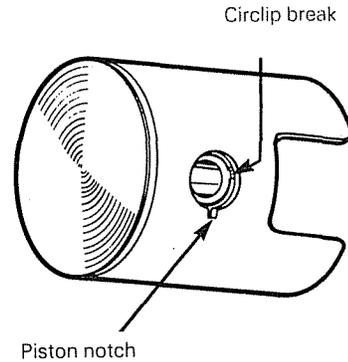
Drive the gudgeon pins in or out using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the pistons over the connecting rods with the letters AUS (over an arrow on the piston dome) facing the exhaust port.

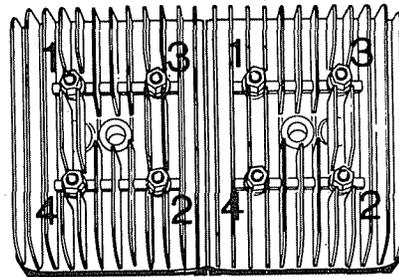


Once the circlips are installed, turn each circlip so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



○ **NOTE:** To prevent leakage, install exhaust manifold prior to cylinder head tightening.

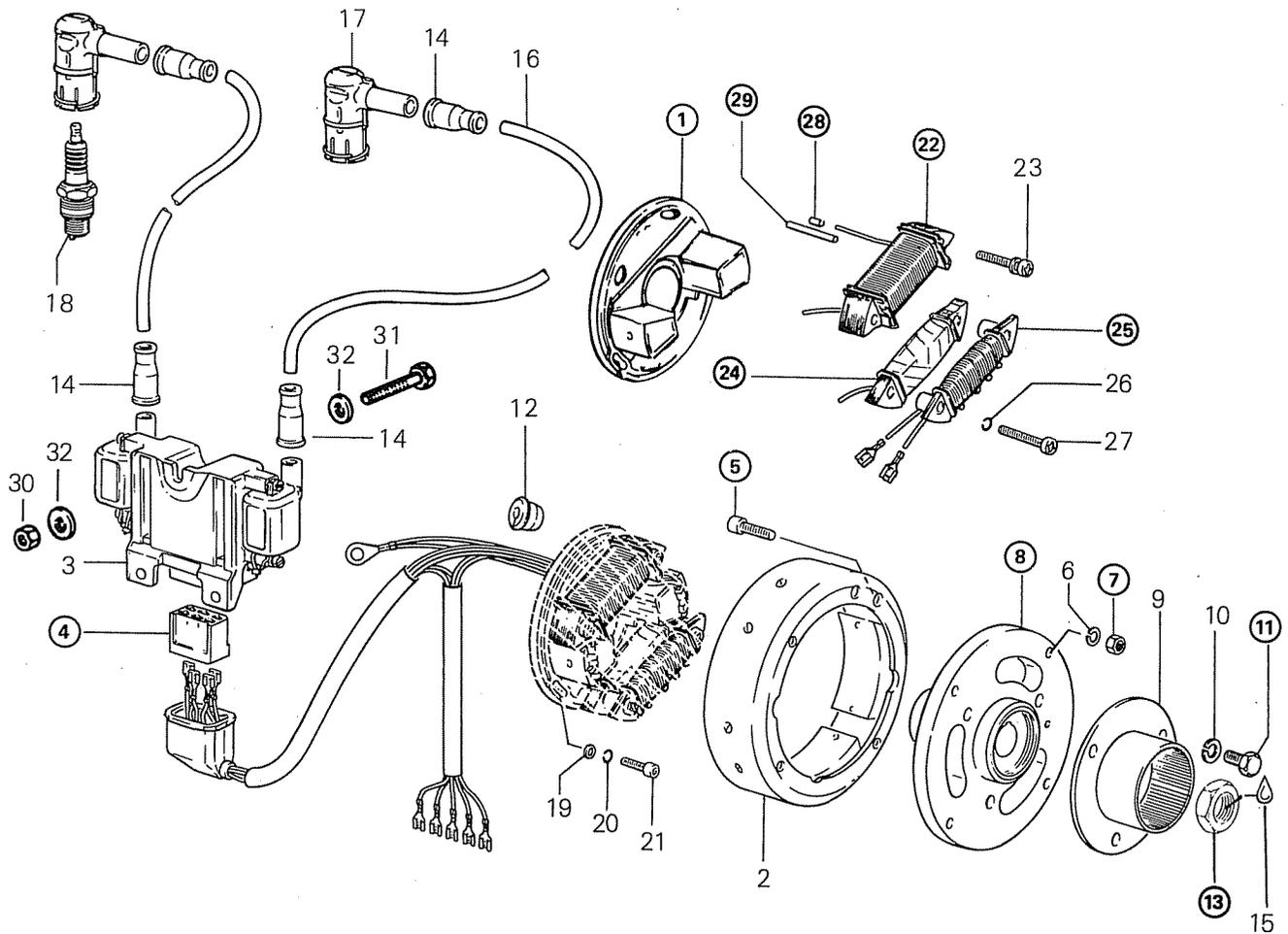
⑧⑩⑪ Torque cylinder head nuts to 16 N•m (12 ft-lbs) following illustrated sequence.



⑬ Torque to 22 N•m (16 ft-lbs).

SECTION 04  
SUB-SECTION 02 (ENGINES) :

**MAGNETO**



- 1. Armature plate
- 2. Magneto ring
- 3. Electronic box
- 4. Junction block
- 5. Screw
- 6. Lockwasher
- 7. Nut
- 8. Magneto housing
- 9. Starting pulley
- 10. Lockwasher
- 11. Screw
- 12. Wire grommet
- 13. Magneto nut
- 14. Protection cap
- 15. Loctite Lock'n Seal 242
- 16. H.T. wire

- 17. Spark plug protector
- 18. Spark plug
- 19. Flat washer
- 20. Lockwasher
- 21. Screw
- 22. Lighting coil 110W
- 23. Screw
- 24. Charging coil
- 25. Lighting coil 30W
- 26. Lockwasher
- 27. Screw
- 28. Cable connector
- 29. Protection sleeve
- 30. Nut
- 31. Bolt
- 32. Washer

## MAGNETO

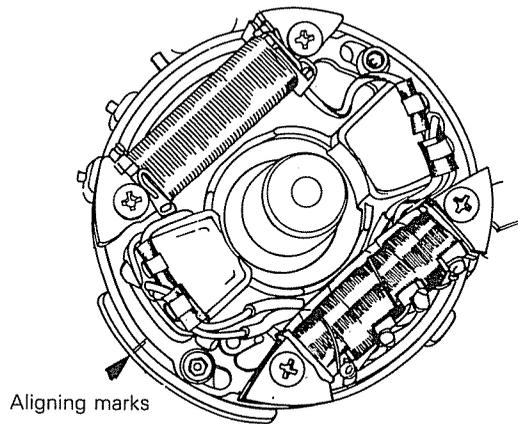
### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

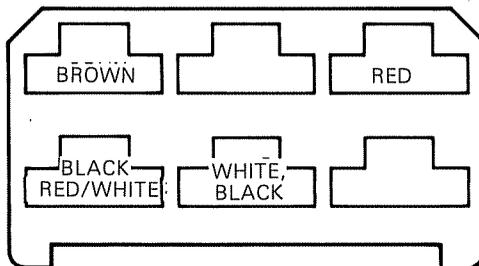
▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

To facilitate timing procedure, perform primary adjustment by matching crankcase and armature plate marks.

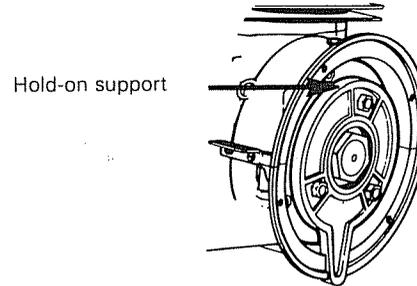


④ For exact wire position, refer to the following illustration:

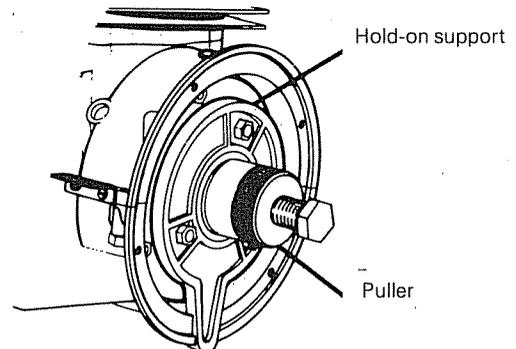


⑤ ⑦ Apply Loctite Lock'n Seal 242 on threads then torque to 12 N•m (9 ft-lbs).

⑧ ⑬ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support, as illustrated (See Tools Section).



With magneto retaining nut removed and hold-on support in place, install special puller onto hub. Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



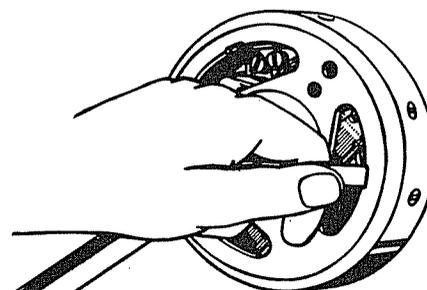
Prior to assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 on taper.

Install magneto retaining nut (with Loctite Lock'n Seal 242 on threads) and torque to 73 N•m (54 ft-lbs).

⑪ Torque to 22 N•m (16 ft-lbs).

⑫ ⑭ ⑮ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted.

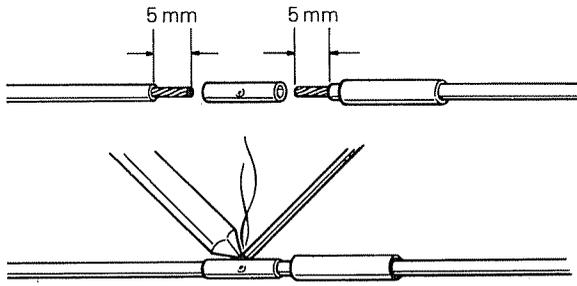
To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



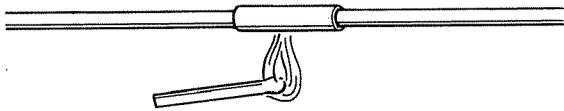
SECTION 04  
SUB-SECTION 02 (ENGINES)

ⓂⓂ Use a cable connector and protection sleeve as illustrated, whenever a coil or cable is replaced.

1. Strip 5 mm of insulation each end.



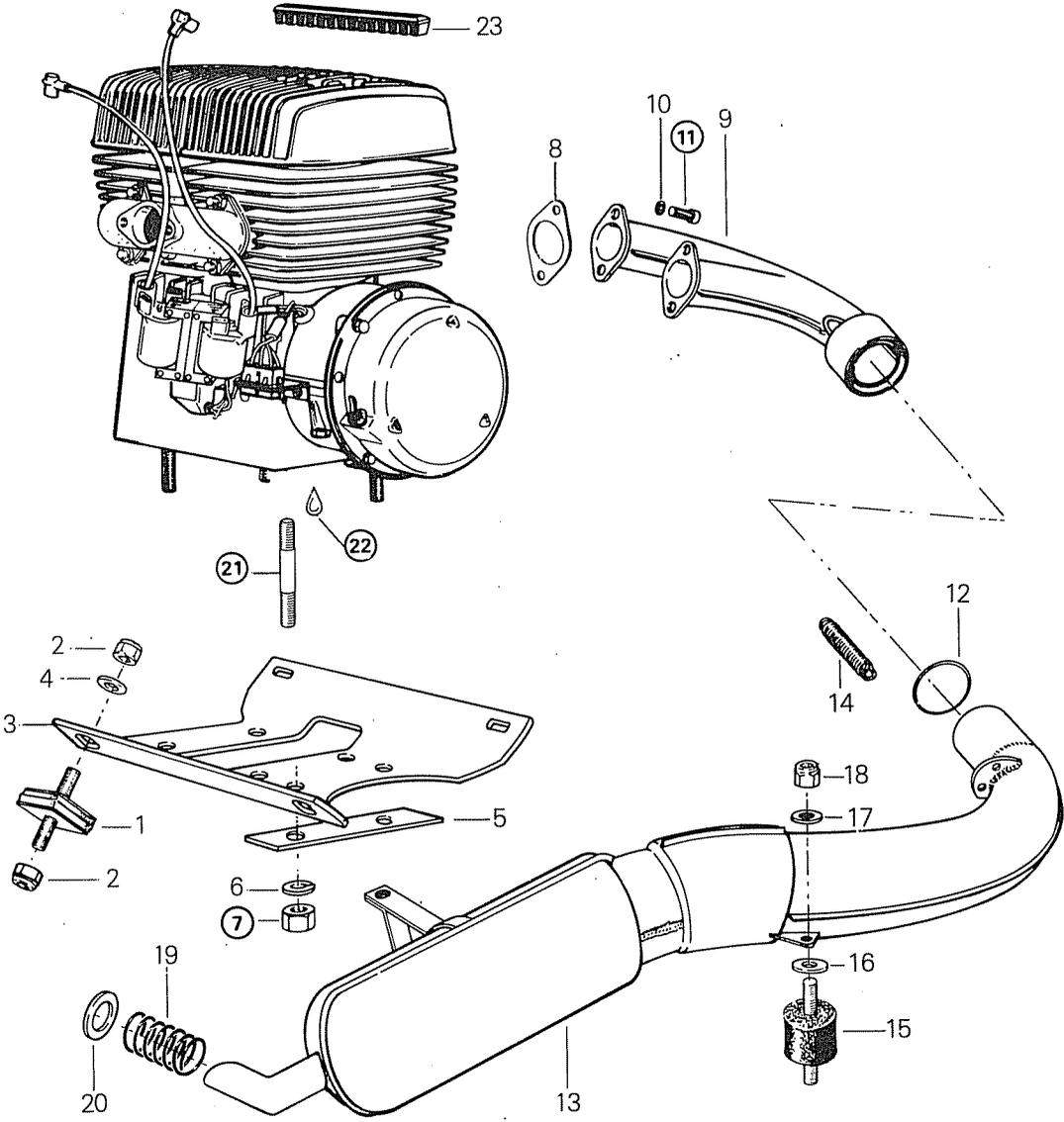
2. Solder wires into connector with resin core type solder.



3. Slide protection sleeve over connector then heat with a match to shrink sleeve.

**346 ENGINE TYPE**

**ENGINE SUPPORT & MUFFLER**



- |                        |                        |                  |
|------------------------|------------------------|------------------|
| 1. Shear mount         | 9. Exhaust manifold    | 17. Washer       |
| 2. Nut                 | 10. Lockwasher         | 18. Nut          |
| 3. Engine support      | 11. Bolt               | 19. Spring       |
| 4. Flat washer         | 12. Aluminum ring      | 20. Washer       |
| 5. Reinforcement plate | 13. Muffer             | 21. Stud         |
| 6. Lockwasher          | 14. Spring             | 22. Loctite 242  |
| 7. Nut                 | 15. Rubber shear mount | 23. Noise damper |
| 8. Exhaust gasket      | 16. Washer             |                  |

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle.

- Pulley guard & drive belt.
- Muffler.
- Cab retaining cable.
- Air intake silencer.
- Fuel lines at carburetor, impulse line.
- Throttle cable.
- Electrical junction block.
- Rewind starter.
- Engine mount nuts.

### DISASSEMBLY & ASSEMBLY

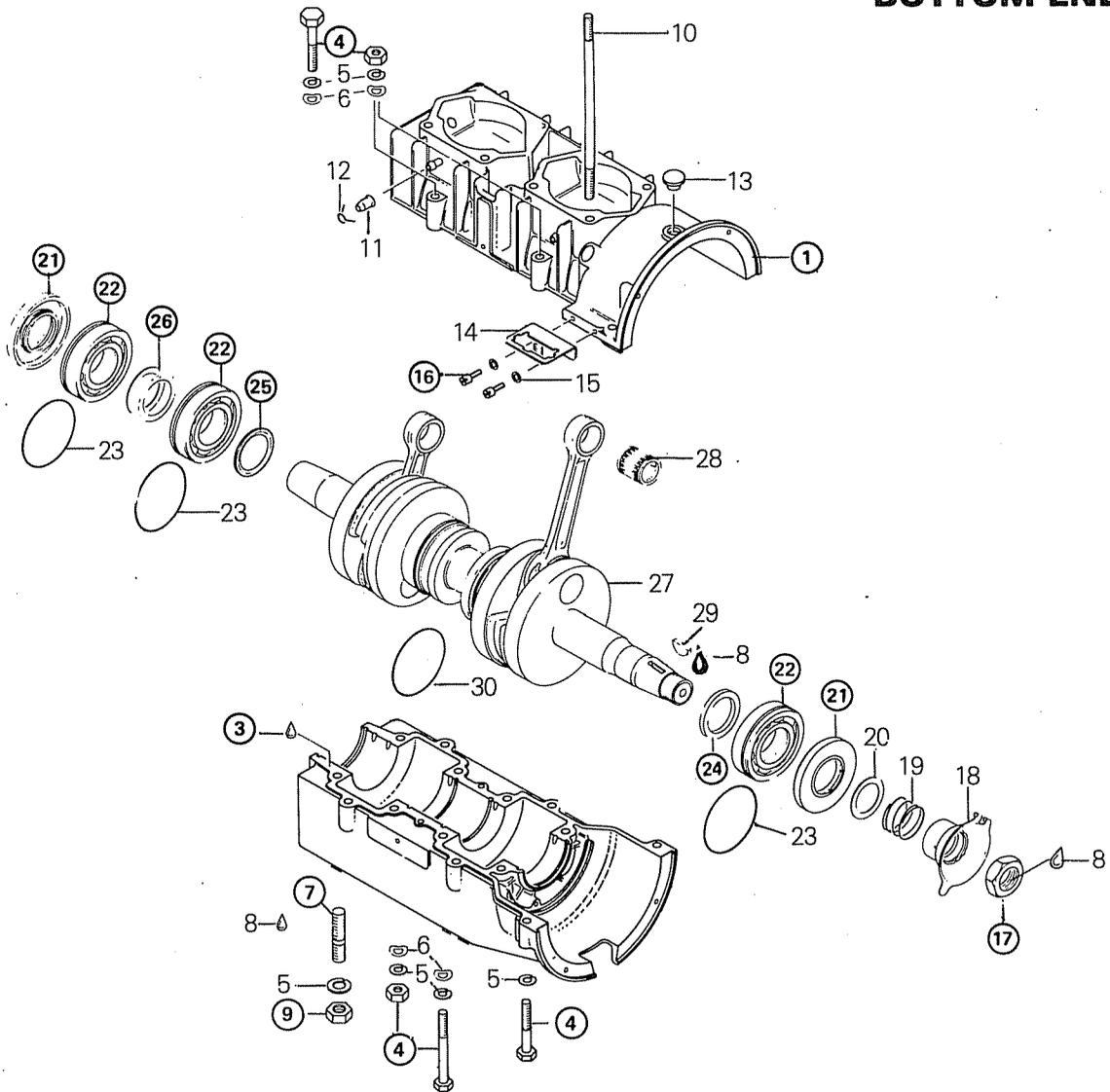
- ⑦ Torque to 43 N•m (32 ft-lbs).
- ⑪ Torque to 20 N•m (15 ft-lbs).
- ⑳ ㉓ At assembly on crankcase, apply Loctite Lock'n Seal 242 or equivalent on threads.

### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment.

**BOTTOM END**



- 1. Crankcase upper half
- 2. Crankcase lower half
- 3. Loctite 515
- 4. Bolt or stud with nut
- 5. Lockwasher
- 6. Spring washer
- 7. Stud (engine support)
- 8. Loctite Lock'n Seal 242
- 9. Nut
- 10. Stud (cylinder)
- 11. Cap
- 12. Hose clamp
- 13. Plug
- 14. Junction block bracket
- 15. Lockwasher

- 16. Screw
- 17. Magneto nut
- 18. Breaker point cam
- 19. Spring
- 20. Washer
- 21. Oil seal
- 22. Bearing
- 23. "O" ring
- 24. Distance ring 2 mm (mag. side)
- 25. Distance ring 1 mm (P.T.O. side)
- 26. Shim (2) 1 mm
- 27. Crankshaft
- 28. Needle cage bearing
- 29. Woodruff key
- 30. "O" ring

SECTION 04  
SUB-SECTION 02 (ENGINES)

**BOTTOM END**

**CLEANING**

Discard all oil seals, gaskets and "O" rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

**CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

**DISASSEMBLY & ASSEMBLY**

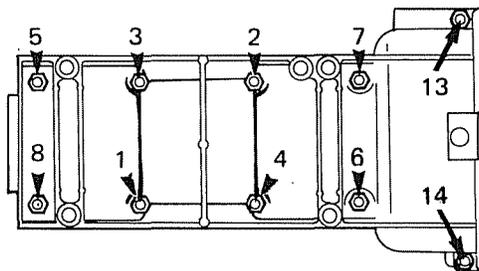
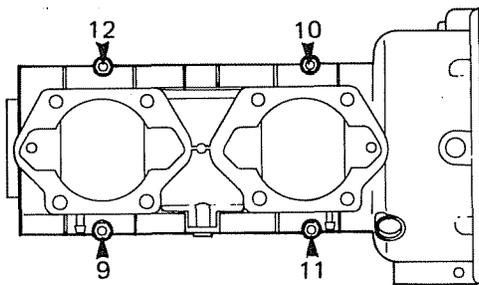
①②③ Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, apply Loctite 515 (no. 413 7027) on mating surfaces.

Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Position spring washers, lockwashers and nuts or bolts then torque to 20 N•m (15 ft-lbs) following illustrated sequence.

**NOTE:** There is no spring washer on the last two (2) magneto side studs (nos 13 and 14).



④ Torque to 20 N•m (15 ft-lbs).

⑦ At assembly on crankcase apply Loctite Lock'n Seal 242 or equivalent on threads.

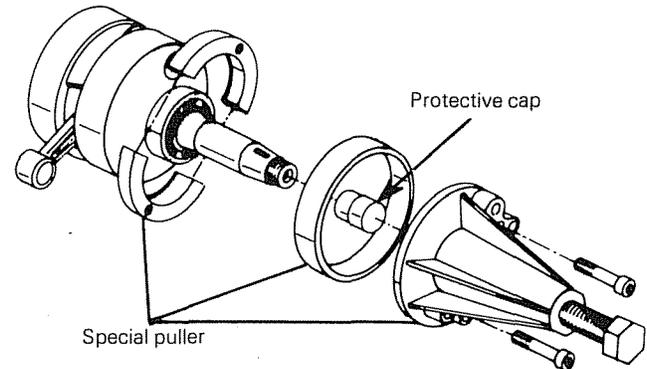
⑨ Torque to 43 N•m (32 ft-lbs).

⑯ Apply Loctite Lock'n Seal 242 or equivalent on threads.

⑰ Apply Loctite Lock'n Seal on threads then torque to 85 N•m (63 ft-lbs).

⑳ At assembly apply a light coat of lithium grease on seal lips then position oil seal with outer surface flush with crankcase.

㉒㉔㉕㉖ To remove bearing from crankshaft use a protective cap and special puller, as illustrated. (See Tools Section).



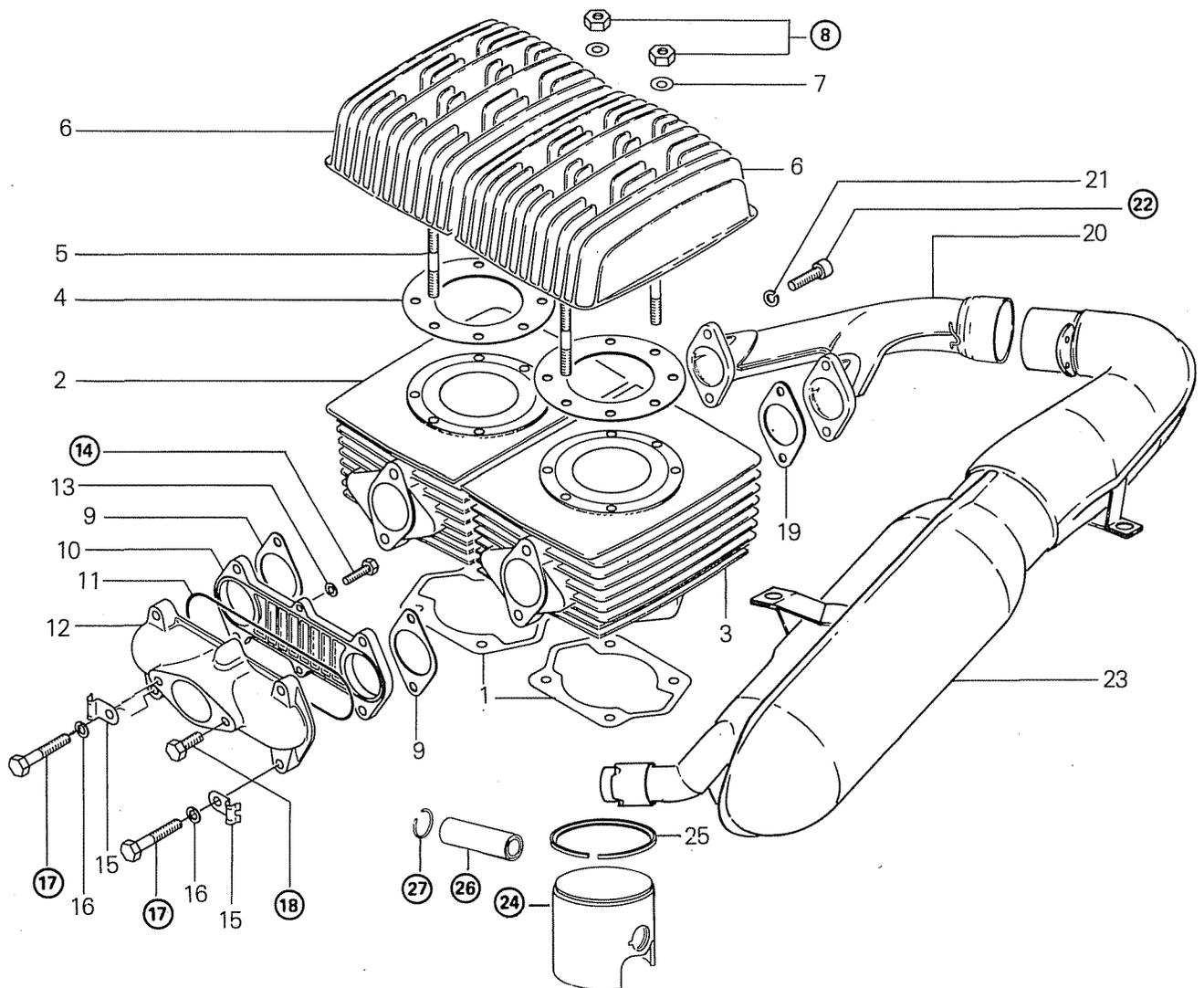
Prior to installation, place bearings into an oil container and heat the oil to 100°C (212°F) for 10 min. This will expand bearings and ease installation.

Before installation of bearing, slide the appropriate distance ring on crankshaft then install bearings with groove outward.

On P.T.O. side position two (2) 1 mm (.040") thick shims between the two bearings.

SECTION 04  
SUB-SECTION 02 (ENGINES)

TOP END



1. Gasket (crankcase/cylinder)
2. Cylinder (P.T.O.)
3. Cylinder (mag.)
4. Cylinder head gasket
5. Stud
6. Cylinder head
7. Flat washer
8. Nut
9. Gasket (intake/cylinder)
10. Intake cover
11. Gasket
12. Intake manifold
13. Lockwasher
14. Screw

15. Ignition cable bracket
16. Lockwasher
17. Bolt
18. Bolt
19. Exhaust gasket
20. Exhaust manifold
21. Lockwasher
22. Screw
23. Muffler
24. Piston
25. Ring
26. Gudgeon pin
27. Circlip

SECTION 04  
SUB-SECTION 02 (ENGINES)

**TOP END**

**CLEANING**

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

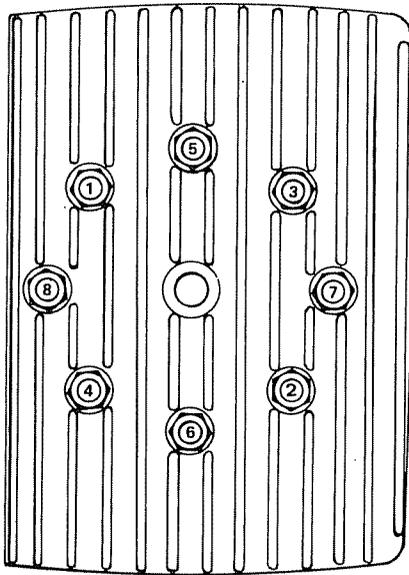
○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

**DISASSEMBLY & ASSEMBLY**

○ **NOTE:** Refer to Technical Data for component fitted tolerance and wear limit.

⑧ Torque to 20 N•m (15 ft-lbs) following illustrated sequence.



○ **NOTE:** To prevent leakage, install exhaust manifold prior to cylinder head tightening.

⑭ Torque to 14 N•m (10 ft-lbs).

⑰ Torque to 20 N•m (15 ft-lbs).

⑱ Torque to 5 N•m (4 ft-lbs).

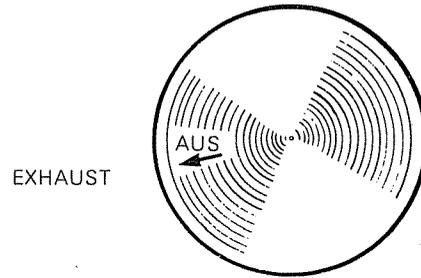
⑳ Torque to 20 N•m (15 ft-lbs).

⑳ ㉔ ㉕ Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

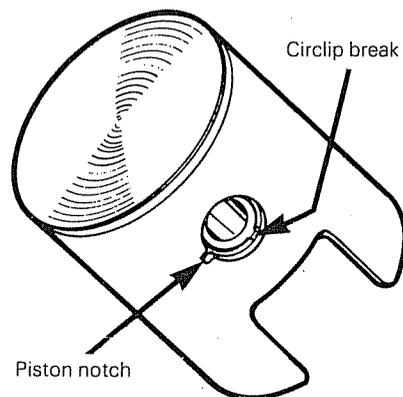
Drive the gudgeon pins in or out using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

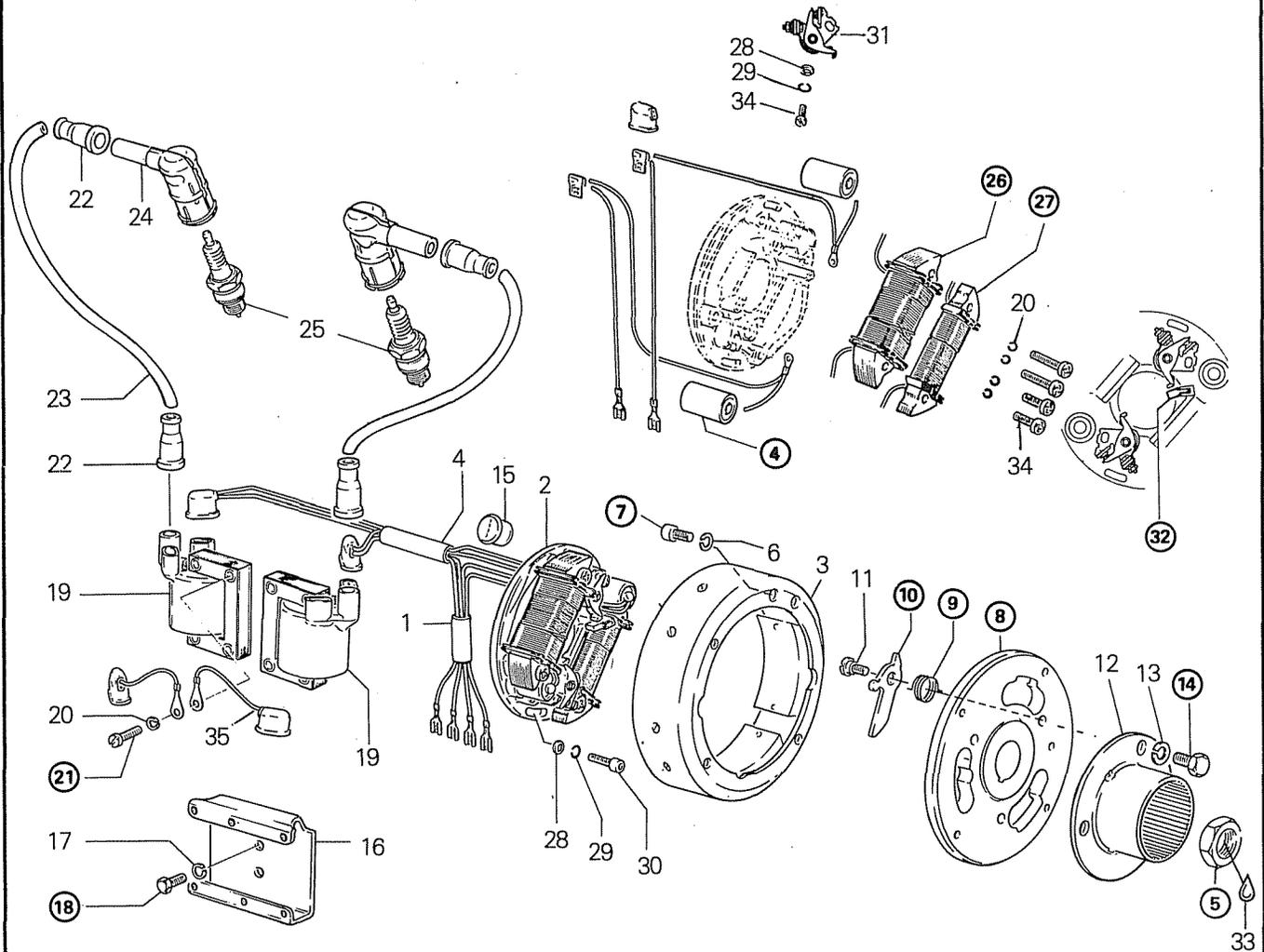
At assembly, place the pistons over the connecting rods with the letters AUS (over an arrow on the piston dome) facing direction of the exhaust port.



Once the circlips are installed, turn each circlip so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



**MAGNETO**



- |                          |                          |                             |
|--------------------------|--------------------------|-----------------------------|
| 1. Rubber sleeve         | 13. Lockwasher           | 25. Spark plug              |
| 2. Armature plate        | 14. Screw                | 26. Lighting coil           |
| 3. Magneto ring          | 15. Wire grommet         | 27. Generator coil          |
| 4. Capacitor             | 16. Coil bracket         | 28. Flat washer             |
| 5. Magneto retaining nut | 17. Lockwasher           | 29. Lockwasher              |
| 6. Lockwasher            | 18. Screw                | 30. Screw                   |
| 7. Screw                 | 19. Coil                 | 31. Breaker point set       |
| 8. Magneto housing       | 20. Lockwasher           | 32. Lubricating wick        |
| 9. Spring                | 21. Screw                | 33. Loctite Lock'n Seal 242 |
| 10. Centrifugal weight   | 22. Protection cap       | 34. Screw                   |
| 11. Screw                | 23. H.T. cable           | 35. Ground wire             |
| 12. Starting pulley      | 24. Spark plug protector |                             |

SECTION 04  
SUB-SECTION 02 (ENGINES)

## MAGNETO

### CLEANING

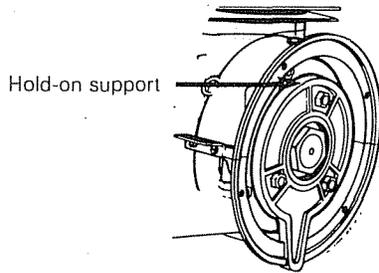
Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

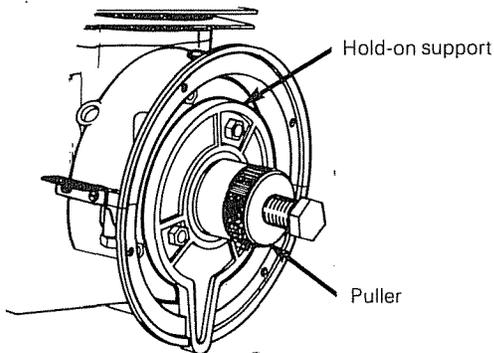
### DISASSEMBLY & ASSEMBLY

④ To replace a capacitor, it is first necessary to unsolder the two (2) black leads. The capacitor can then be driven out of the armature plate using a suitable pusher and hammer. To reinstall, inverse procedure.

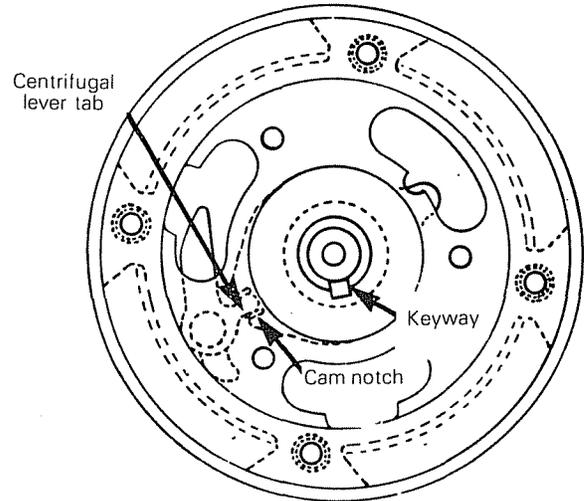
⑤ ⑧ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support, as illustrated. (See Tools Section).



With magneto retaining nut removed and hold-on support in place, install special puller onto hub. Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 or equivalent, position magneto on crankshaft with the keyway and the cam notch positioned as illustrated.



Install magneto retaining nut (with Loctite Lock'n Seal 242 on threads) and torque to 85 N•m (63 ft-lbs).

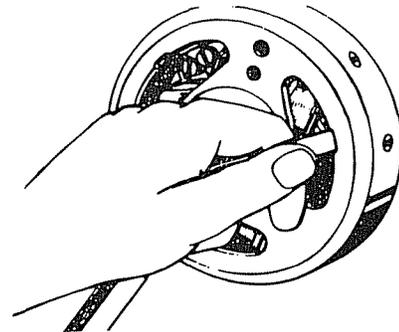
⑦ Apply Loctite Lock'n Seal 242 or equivalent on threads.

⑨ ⑩ At assembly, apply a small amount of low temperature grease into spring seating.

⑱ ⑳ Apply Loctite Lock'n Seal 242 or equivalent on threads.

⑳ ㉑ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted.

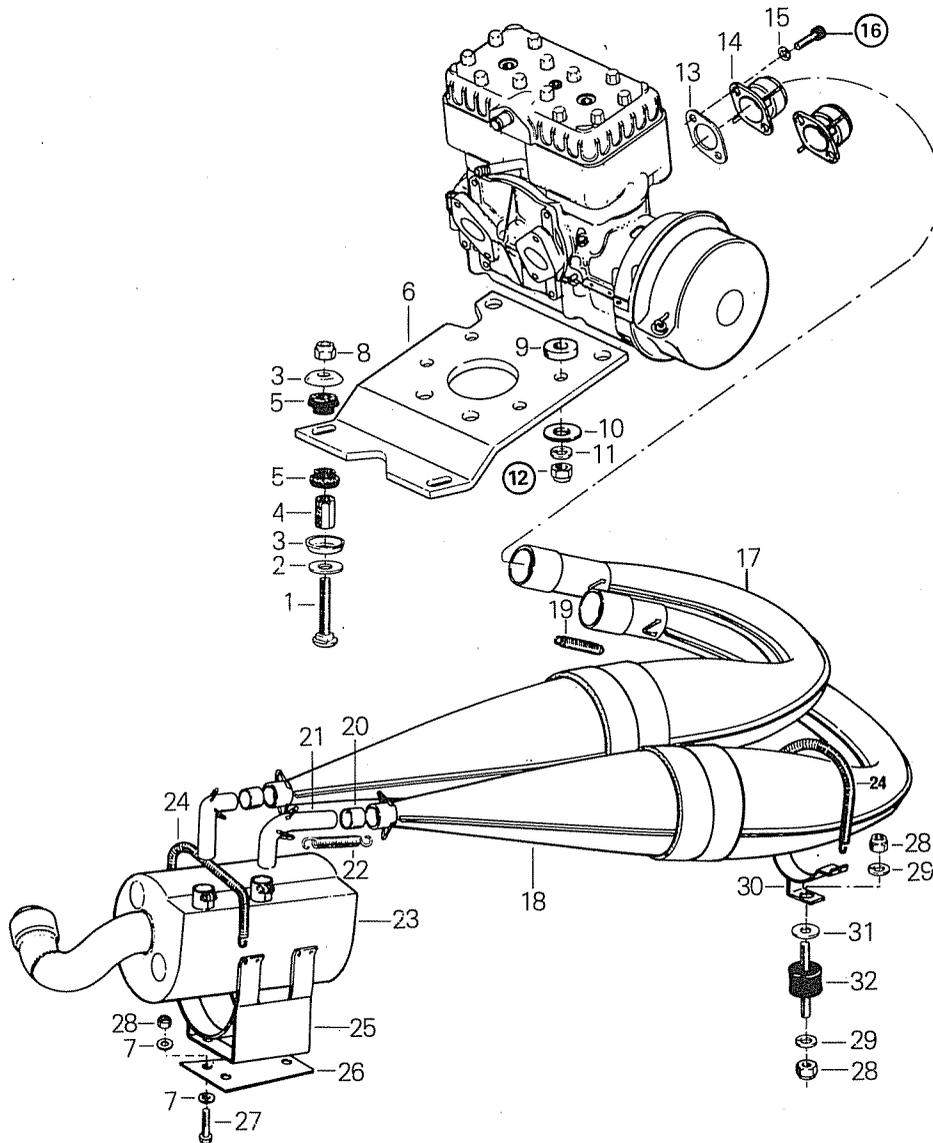
To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



㉒ When replacing breaker point set, apply a small amount of grease on lubricating wick.

## 354 ENGINE TYPE

### ENGINE SUPPORT & MUFFLER



1. Carriage bolt
2. Flat washer
3. Cup washer
4. Threaded spacer bushing
5. Vibration damper
6. Engine support
7. Flat washer
8. Nut
9. Distance sleeve
10. Flat washer
11. Lockwasher

12. Nut
13. Exhaust gasket
14. Exhaust socket
15. Lockwasher
16. Capscrew
17. Tuned pipe (P.T.O.)
18. Tuned pipe (MAG)
19. Spring
20. Coupler
21. Tail pipe
22. Spring

23. Swirl chamber
24. Spring
25. Swirl chamber support
26. Reinforcement plate
27. Bolt
28. Nut
29. Lockwasher
30. Tuned pipe support
31. Insulating washer
32. Rubber shear mount

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- Pulley guard and drive belt
- Air silencer and throttle cable
- Fuel lines, primer and impulse lines
- Muffler and rewind starter
- Electric wires
- Drain the cooling system and disconnect hoses at engine
- Rotary valve oil reservoir.

### DISASSEMBLY & ASSEMBLY

⑫ Torque to 35 N•m (26 ft-lbs).

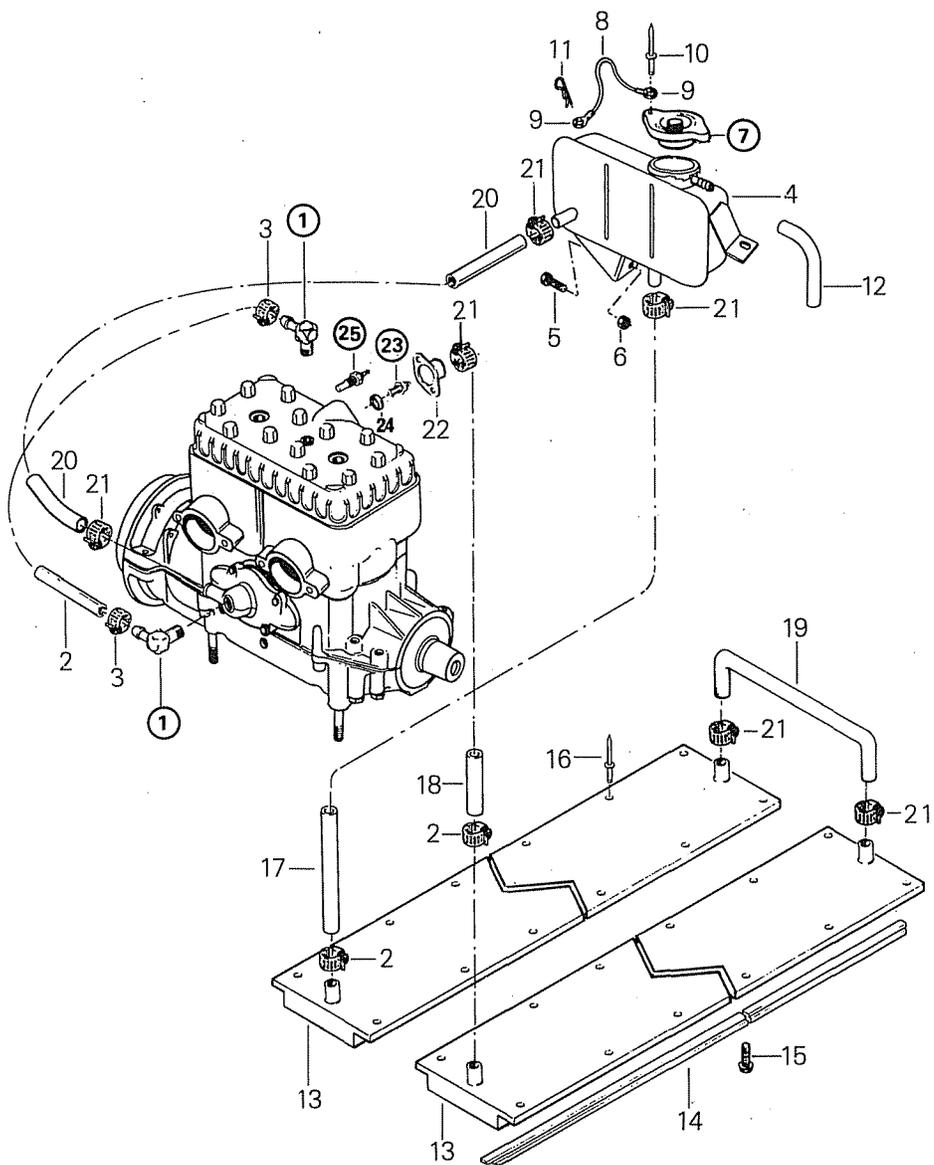
⑮ Torque to 22 N•m (16 ft-lbs).

### INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment.

**COOLING SYSTEM**



- 1. Fitting
- 2. By-pass hose (53.4 cm)
- 3. Hose clamp
- 4. Tank
- 5. Bolt
- 6. Nut
- 7. Plug
- 8. Wire
- 9. Terminal

- 10. Pop rivet
- 11. Hair pin
- 12. Overflow tube (38 cm)
- 13. Radiator
- 14. Radiator protector
- 15. Screw
- 16. Pop rivet
- 17. Hose 12.7 cm

- 18. Hose 66 cm
- 19. "U" hose
- 20. Hose 66 cm
- 21. Hose clamp
- 22. Coolant outlet collar
- 23. Thermostat
- 24. Sealing ring
- 25. Temperature gauge sender

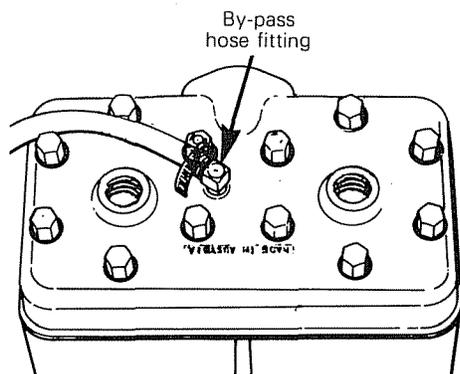
## COOLING SYSTEM

### INSPECTION

Check general condition of hose and clamp tightness.

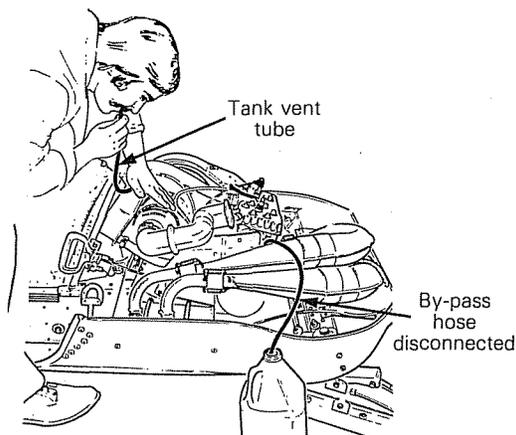
### DRAINING THE SYSTEM

To drain the cooling system, remove the coolant tank cap and disconnect the by-pass hose from fitting on cylinder head.



Block fitting and keep hose as low as possible to drain the system.

However, to completely drain the system, it is necessary to blow into the tank through the vent tube, while maintaining the hand over the filler neck to prevent air leakage.



### DISASSEMBLY & ASSEMBLY

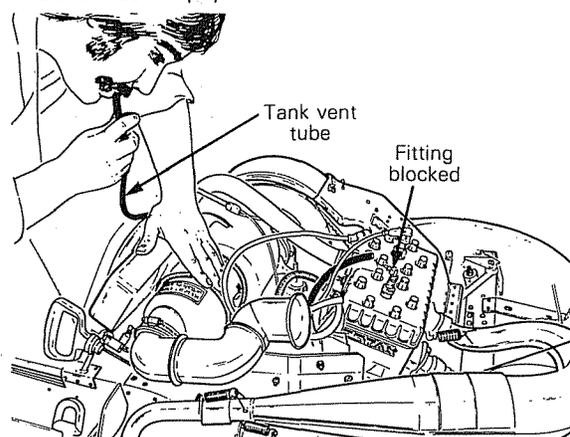
- ①<sup>25</sup> Apply pipe thread sealant to avoid leaks.
- ⑦ Pressure cap can be checked by depressing the red button (after engine has been run) to see that the cap pressurizes the system. If not, install a new 13 lbs cap, do not exceed 13 lbs of pressure.
- ②<sup>3</sup> To check thermostat, put it in water and heat water. Thermostat should open when water temperature reaches 43°C (110°F).

### REFILLING THE SYSTEM

Capacity: 2.5 liters approximately  
(0.5 Imp. gal.) (0.6 U.S. gal.)  
60% concentrated antifreeze + 40% water

To refill the cooling system, disconnect by-pass hose and keep it near fitting on cylinder head; refill tank and blow into it through the vent tube, while maintaining the hand over the filler neck until the liquid comes out at the by-pass hose and the fitting on cylinder head.

○ NOTE: It is necessary to refill tank as soon as it becomes empty.

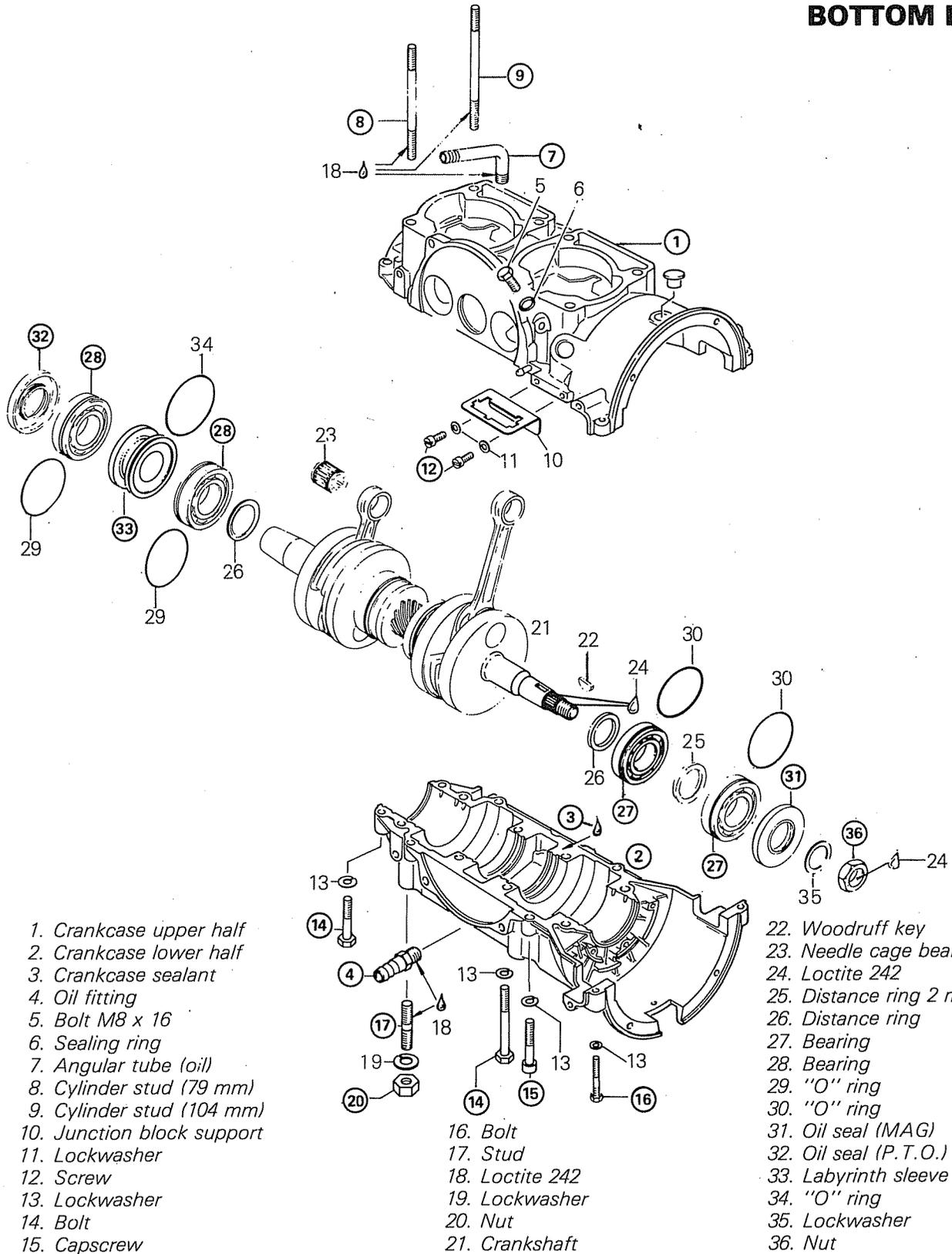


Reconnect by-pass hose and continue to pour the liquid in the coolant tank until the coolant level reaches 2.5 mm (1") below filler neck.

Reinstall tank cap and start engine; let engine run until it reaches its operating temperature and thermostat opens. Allow it to run a few minutes more. Stop engine and check coolant level; refill as necessary.

◆ **WARNING:** Always unscrew cap to the first step with a cloth to release pressure, before removing it.

**BOTTOM END**



- 1. Crankcase upper half
- 2. Crankcase lower half
- 3. Crankcase sealant
- 4. Oil fitting
- 5. Bolt M8 x 16
- 6. Sealing ring
- 7. Angular tube (oil)
- 8. Cylinder stud (79 mm)
- 9. Cylinder stud (104 mm)
- 10. Junction block support
- 11. Lockwasher
- 12. Screw
- 13. Lockwasher
- 14. Bolt
- 15. Capscrew

- 16. Bolt
- 17. Stud
- 18. Loctite 242
- 19. Lockwasher
- 20. Nut
- 21. Crankshaft

- 22. Woodruff key
- 23. Needle cage bearing
- 24. Loctite 242
- 25. Distance ring 2 mm
- 26. Distance ring
- 27. Bearing
- 28. Bearing
- 29. "O" ring
- 30. "O" ring
- 31. Oil seal (MAG)
- 32. Oil seal (P.T.O.)
- 33. Labyrinth sleeve
- 34. "O" ring
- 35. Lockwasher
- 36. Nut

SECTION 04  
SUB-SECTION 02, (ENGINES)

**BOTTOM END**

**CLEANING**

Discard all oil seals, gaskets, "O" rings and sealing rings. Clean all metal components in a non-ferrous metal cleaner. Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

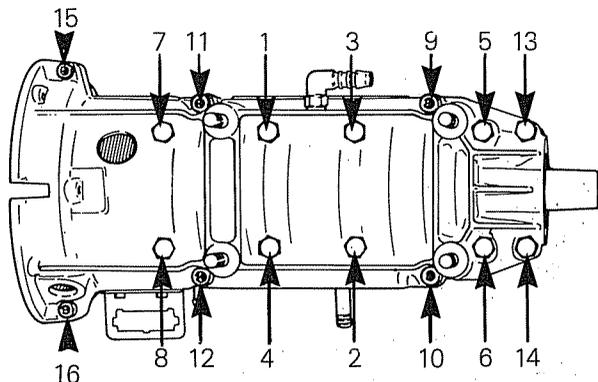
▼ **CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

**DISASSEMBLY & ASSEMBLY**

① ② ③ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (413 7027 00) on mating surfaces.

▼ **CAUTION:** Before joining of crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

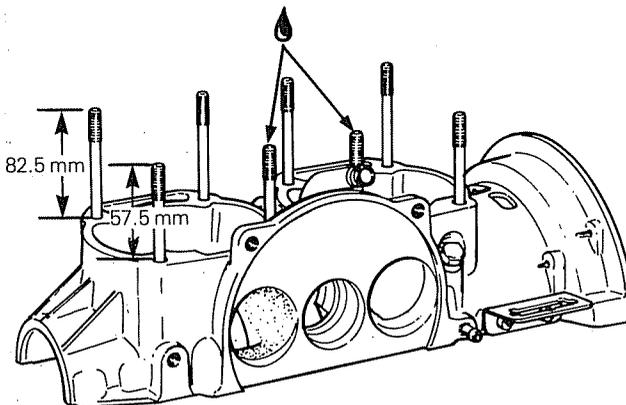
Position the crankcase halves together and torque bolts to 22 N•m (16 ft-lbs) following illustrated sequence.



○ **NOTE:** Torque the two smaller bolts (15 and 16) on magneto side to 13 N•m (10 ft-lbs).

④ ⑦ ⑫ Apply Loctite Lock'n Seal 242 on threads prior to assembly.

⑧ ⑨ Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 82.5 mm (3.250") on exhaust side and 57.5 mm (2.260") on intake side.



Apply Loctite Lock'n Seal 242 on the threads of the two studs screwed above the intake ports.

Longer threaded part of stud should be screwed into crankcase.

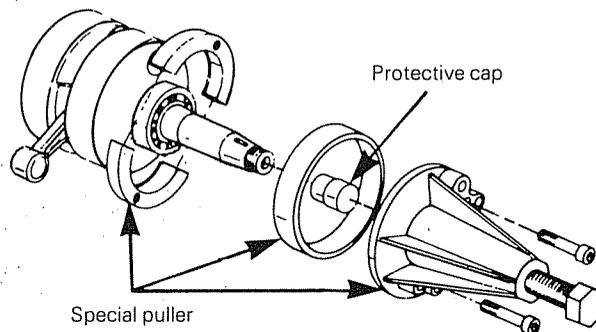
⑭ ⑮ Torque to 22 N•m (16 ft-lbs).

⑯ Torque to 14 N•m (10 ft-lbs).

⑰ At assembly on crankcase, apply Loctite Lock'n Seal 242 on threads.

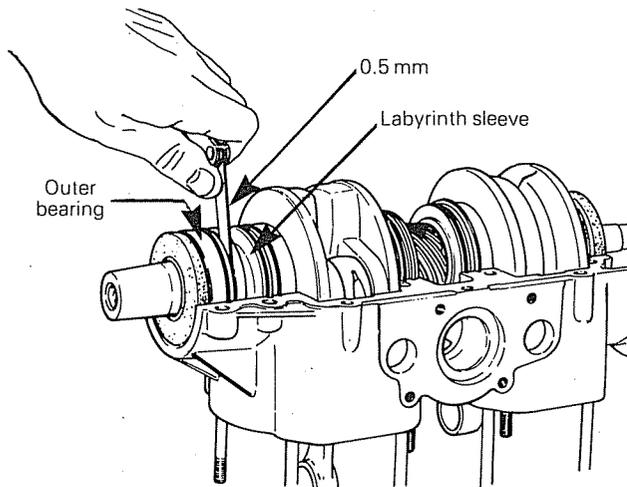
⑳ Torque to 35 N•m (26 ft-lbs).

㉗ ㉘ ㉛ To remove bearings from crankshaft, use a protective cap and special puller as illustrated.



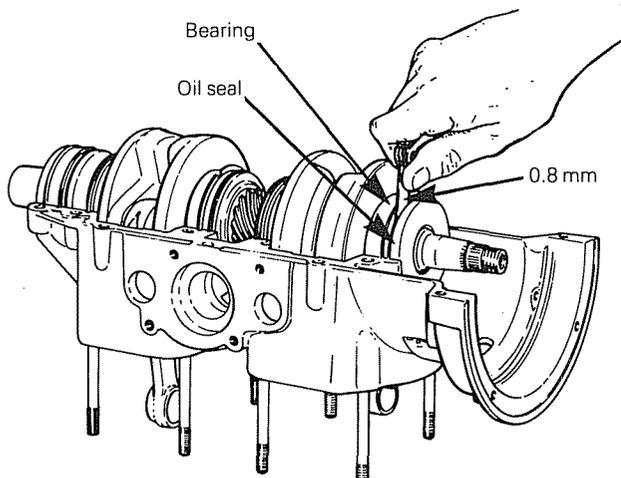
SECTION 04  
SUB-SECTION 02, (ENGINES)

Prior to installation, place bearings into an oil container and heat the oil to 100°C (212°F). This will expand bearings and ease installation. Install bearings with groove outward.



When positioning P.T.O. outer bearing on crankshaft, a gap of 0.5 mm (.020'') must be left between bearing and labyrinth sleeve to avoid axial forces to the bearing.

③① ③② At assembly, apply a light coat of lithium grease on seal lips.



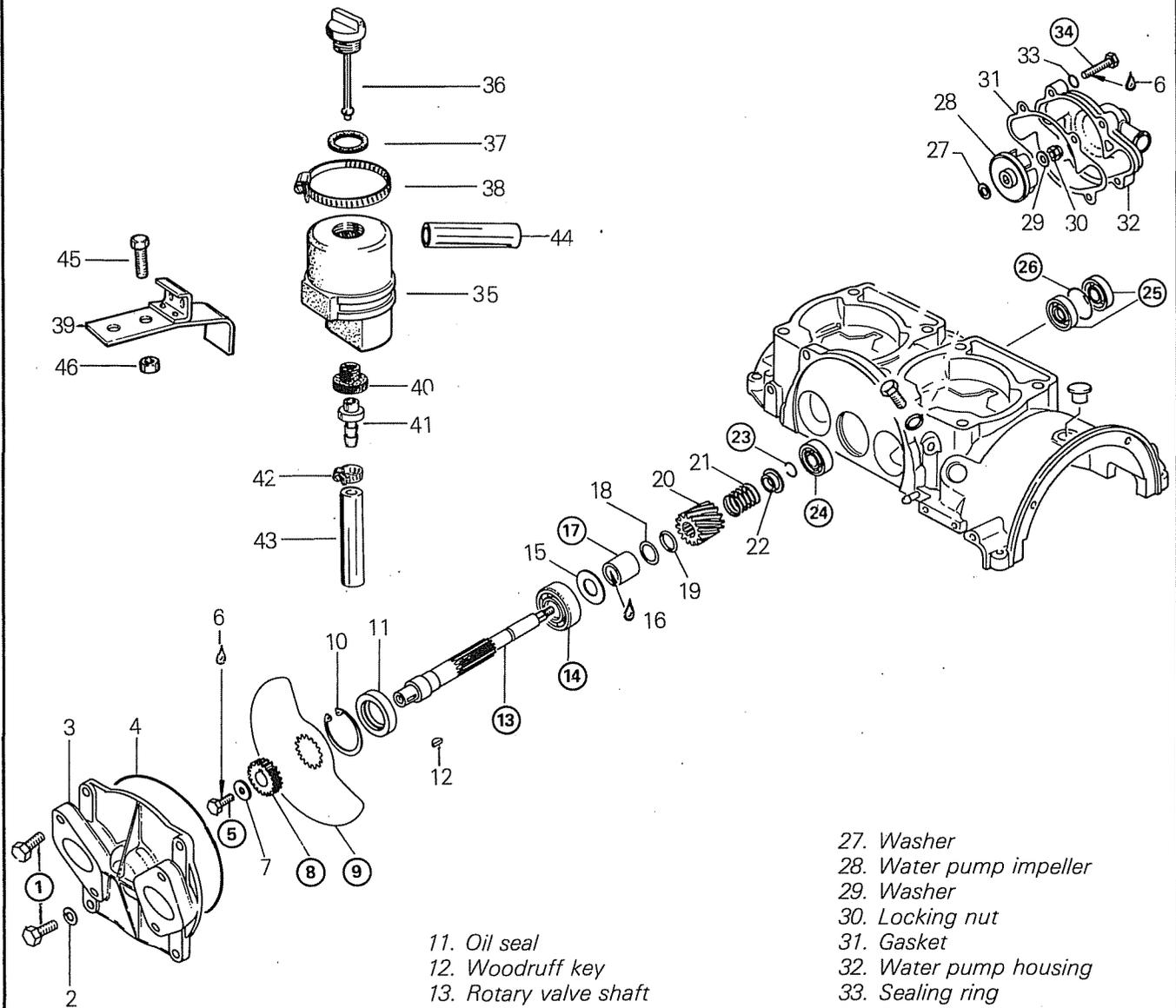
To insure adequate oil supply to the bearing on the magneto side, install oil seal with a gap of at least 0.8 mm (.030'') with bearing.

On P.T.O. side, install oil seal flush with crankcase.

③⑥ Torque to 98 N•m (72 ft-lbs).

SECTION 04  
SUB-SECTION 02, (ENGINES)

**ROTARY VALVE & WATER PUMP**



- 1. Bolt
- 2. Lockwasher
- 3. Rotary valve cover
- 4. Gasket ("O" ring)
- 5. Bolt
- 6. Loctite 242
- 7. Washer
- 8. Pinion
- 9. Rotary valve
- 10. Circlip

- 11. Oil seal
- 12. Woodruff key
- 13. Rotary valve shaft
- 14. Bearing
- 15. Shim 0.5 mm
- 16. Loctite 271
- 17. Distance sleeve 24.5 mm
- 18. Shim 0.5 mm
- 19. "O" ring
- 20. Gear
- 21. Spring
- 22. Spring retaining cup
- 23. Circlip
- 24. Bearing
- 25. Oil seal
- 26. Distance ring

- 27. Washer
- 28. Water pump impeller
- 29. Washer
- 30. Locking nut
- 31. Gasket
- 32. Water pump housing
- 33. Sealing ring
- 34. Bolt
- 35. Oil tank
- 36. Tank cap
- 37. Gasket
- 38. Hose clamp
- 39. Oil tank support
- 40. Grommet
- 41. Hose fitting
- 42. Hose clamp
- 43. Hose 24 cm
- 44. Hose 18 cm
- 45. Bolt
- 46. Nut

## ROTARY VALVE & WATER PUMP

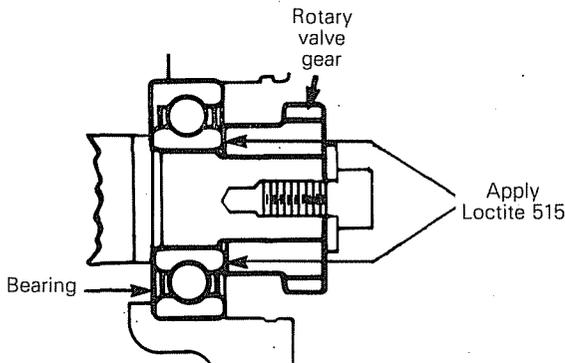
### CLEANING

Discard all oil seals and "O" rings.

Clean all metal components in a non-ferrous metal cleaner.

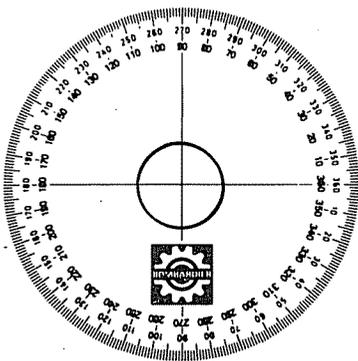
### DISASSEMBLY & ASSEMBLY

- ① Torque to 20 N•m (15 ft-lbs).
- ⑤ ③④ Apply Loctite Lock'n Seal 242 on threads.
- ⑧ ⑭ At assembly, apply crankcase sealant (Loctite 515) on bearing and rotary valve gear mating surfaces.

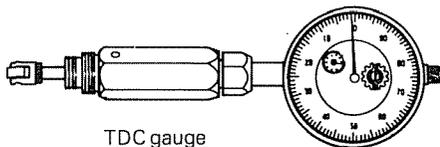


- ⑨ Rotary valve adjustment when replacing crankcase having no timing marks.

#### REQUIRED TOOLS



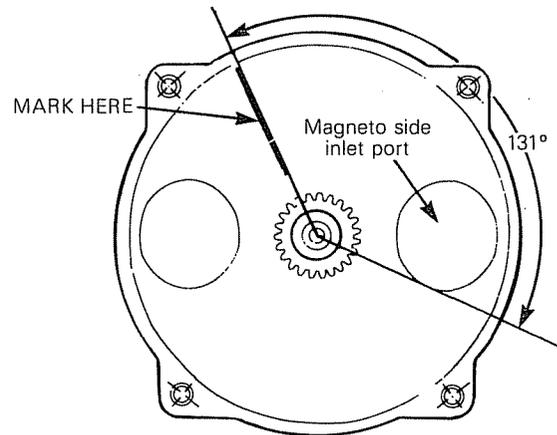
Angle finder  
(414 3529 00)



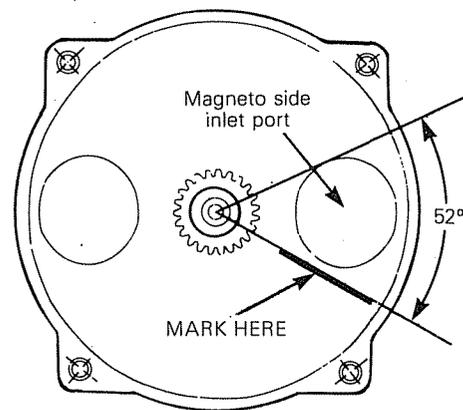
TDC gauge  
(414 1047 00)

1978 354 type: 131° BTDC opening  
52° ATDC closing

Using angle finder, mark crankcase at 131° from bottom edge of magneto side inlet port.



From top edge of magneto side inlet port, mark crankcase at 52°.

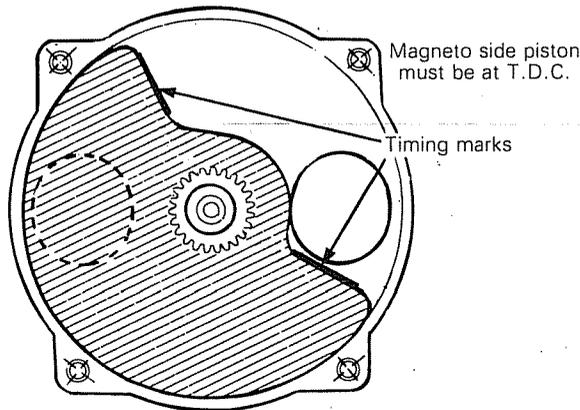


**SECTION 04**  
**SUB-SECTION 02, (ENGINES)**

To correctly install the rotary valve disc proceed as follows:

- Turning crankshaft counter-clockwise, (drive pulley side) bring magneto side piston to Top Dead Center using a T.D.C. gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

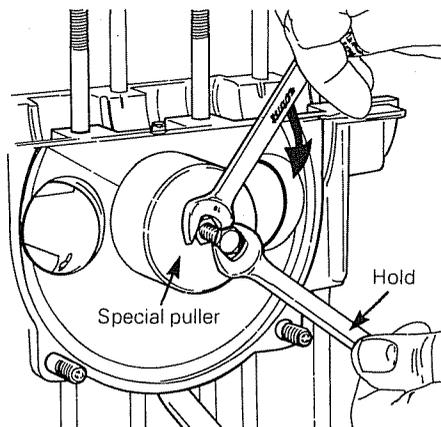
NOTE: The rotary valve disc is asymmetrical, therefore, at assembly try positioning each side of disc on gear to determine best installation position.



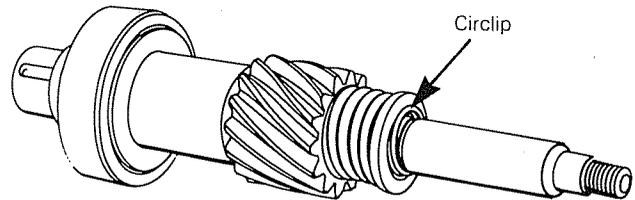
13 through 23 Rotary valve shaft assembly.

To remove rotary valve shaft assembly from crankcase, first remove water pump impeller 28 and circlip.

10 Position special puller over shaft bore and screw puller bolt into rotary valve shaft. While holding puller bolt, turn puller nut clockwise until shaft comes out.



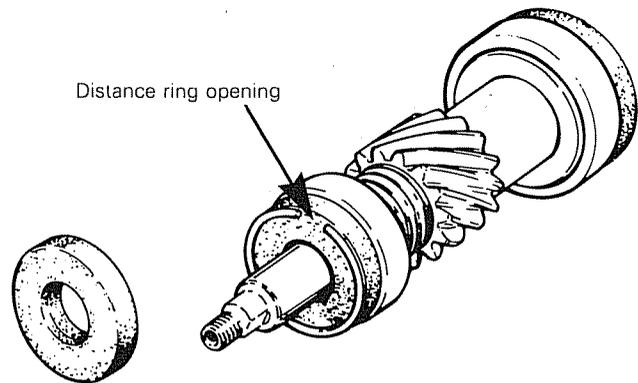
If it is necessary to disassemble components of rotary valve shaft assembly, install assembly carefully in a vise, compressing spring retaining cup 22 in order to remove circlip 23.



17 Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite Lock'n Seal 271 inside of distance sleeve.

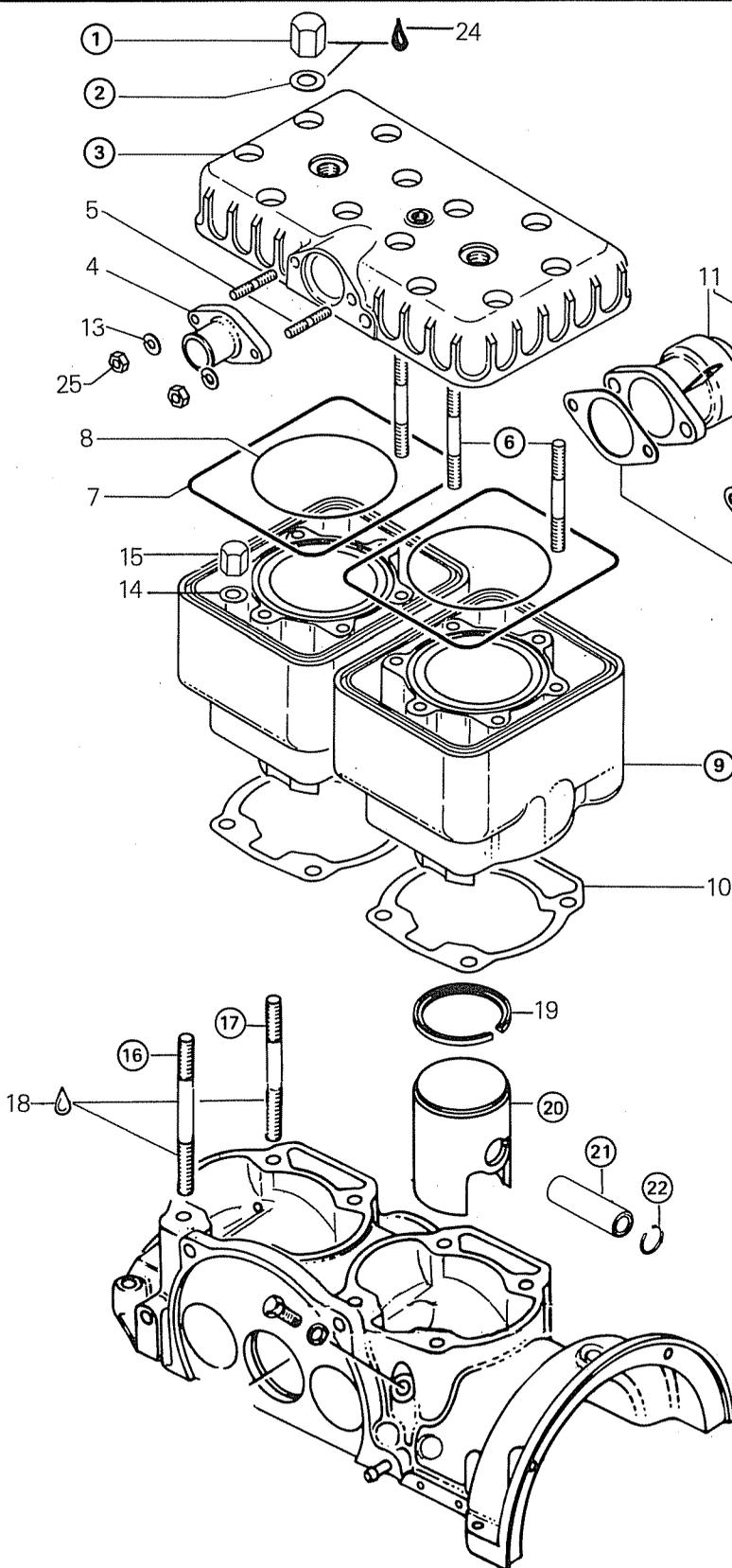
24 Using a suitable pusher, push water pump bearing with shield opposite to rotary valve disc.

25 26 Using a suitable pusher (see Tools section), install oil seals (with lithium grease on seal lips) as per illustration: distance ring opening must be in line with crankcase half draining hole.



SECTION 04  
SUB-SECTION 02, (ENGINES)

**TOP END**



1. Cap nut
2. Flat washer
3. Cylinder head
4. Coolant outlet collar
5. Stud
6. Stud (head)
7. Gasket
8. Gasket ("O" ring)
9. Cylinder
10. Cylinder/crankcase gasket
11. Exhaust socket
12. Cap screw
13. Lockwasher
14. Flat washer
15. Cap nut
16. Cylinder stud (79 mm)
17. Cylinder stud (104 mm)
18. Loctite 242
19. "L" ring
20. Piston
21. Gudgeon pin
22. Circlip
23. Exhaust gasket
24. Silicone sealant
25. Nut

SECTION 04  
SUB-SECTION 02, (ENGINES)

**TOP END**

**CLEANING**

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

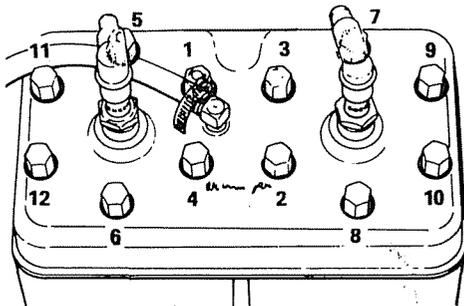
NOTE: The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

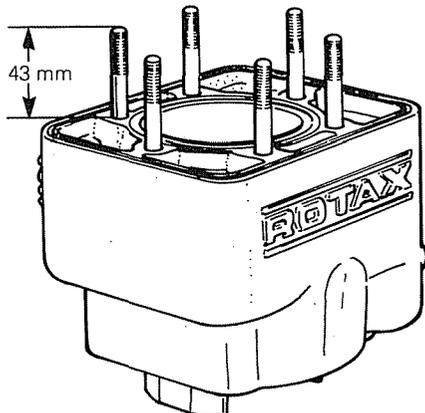
**DISASSEMBLY & ASSEMBLY**

Prior to washer installation, apply silicone sealant around studs.

① ② ③ Torque cylinder head nuts to 16 N•m (12 ft-lbs) following illustrated sequence.

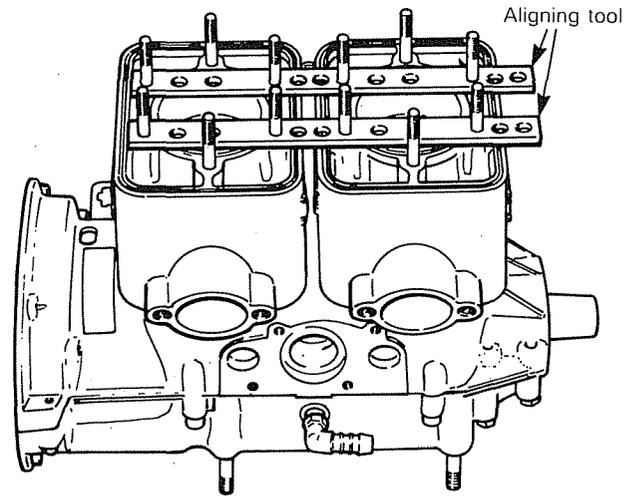


⑥ ⑨ Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not exceed further than 43 mm (1.700"). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Longer threaded part of stud should be screwed into crankcase.



Apply Loctite Lock'n Seal 242 on the threads of the two studs screwed above the intake ports.

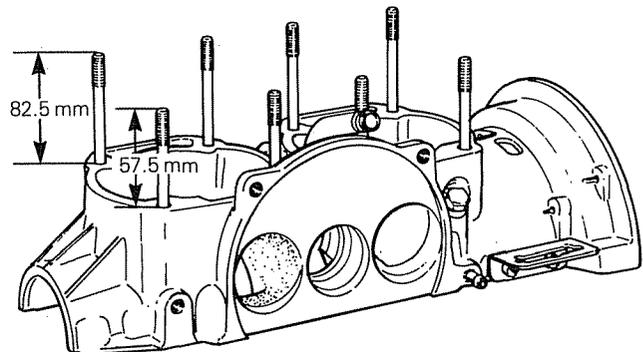
Longer threaded part of stud should be screwed into crankcase.



When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 16 N•m (12 ft-lbs).

⑫ Torque to 22 N•m (16 ft-lbs).

⑯ ⑰ Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 82.5 mm (3.250") on exhaust side and 57.5 mm (2.260") on intake side.

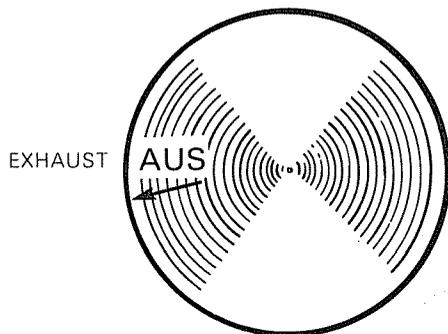


⑳㉑㉒ Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

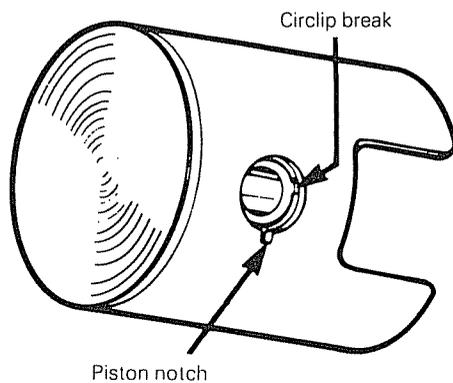
Drive the gudgeon pins in or out using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the pistons over the connecting rods with the letters AUS (over an arrow on the piston dome) facing direction of the exhaust port.

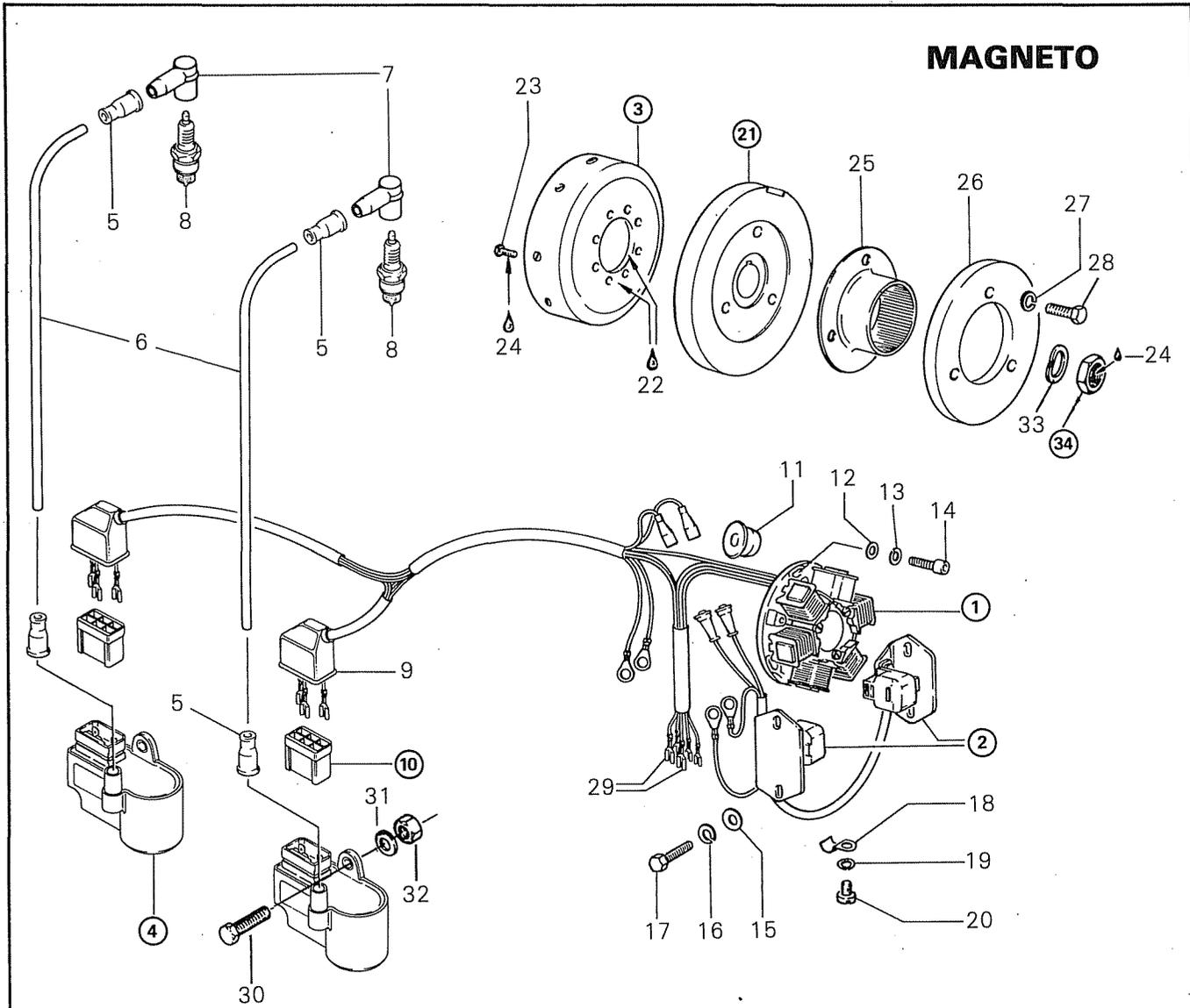


Once the circlips are installed, turn each circlip so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



SECTION 04  
SUB-SECTION 02, (ENGINES)

**MAGNETO**



- |                         |                     |                     |
|-------------------------|---------------------|---------------------|
| 1. Armature plate       | 13. Lockwasher      | 25. Starting pulley |
| 2. Trigger coil         | 14. Allen screw     | 26. Flywheel        |
| 3. Magneto ring         | 15. Washer          | 27. Lockwasher      |
| 4. Electronic box       | 16. Lockwasher      | 28. Bolt            |
| 5. Protection cap       | 17. Bolt            | 29. Terminal        |
| 6. Ignition cable       | 18. Clip            | 30. Bolt            |
| 7. Spark plug protector | 19. Lockwasher      | 31. Washer          |
| 8. Spark plug           | 20. Screw           | 32. Nut             |
| 9. Protection cap       | 21. Magneto housing | 33. Lockwasher      |
| 10. Junction block      | 22. Loctite 271     | 34. Nut             |
| 11. Plug                | 23. Bolt            |                     |
| 12. Washer              | 24. Loctite 242     |                     |

## MAGNETO

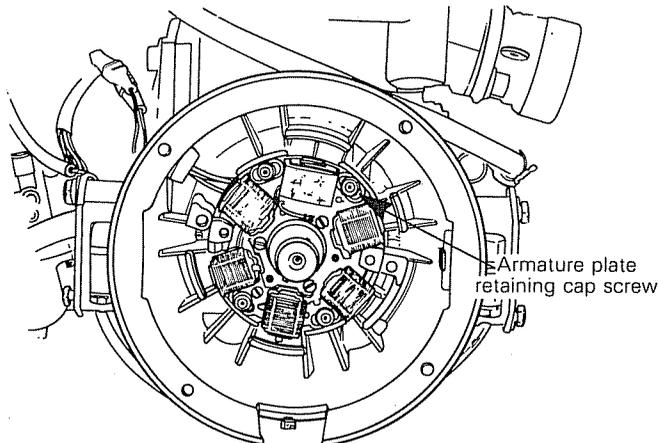
### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

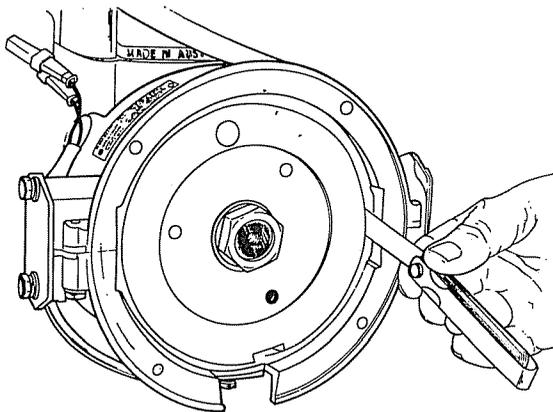
▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

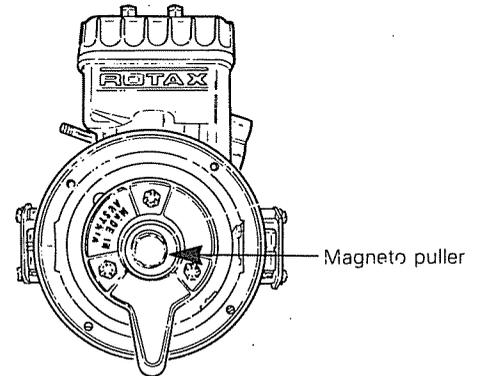
① To obtain best generator coil performance, position the armature plate on the crankcase with the retaining cap screws in the middle of the plate slots.



② Check air gap between magneto ring and trigger coil. The gap should be 1 to 1.6 mm (0.40-0.63").

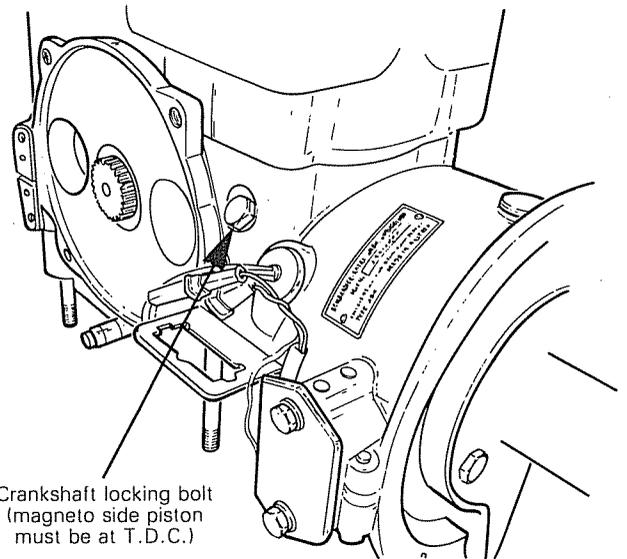


③ ②① To remove magneto, use special puller as illustrated. Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



Crankshaft can be blocked by means of special bolt when Mag. side piston is at Top Dead Center. (See Special tools).

▼ **CAUTION:** Do not overtighten the special bolt, the holding is done by the fit into a hole, not the pressure against the shaft.



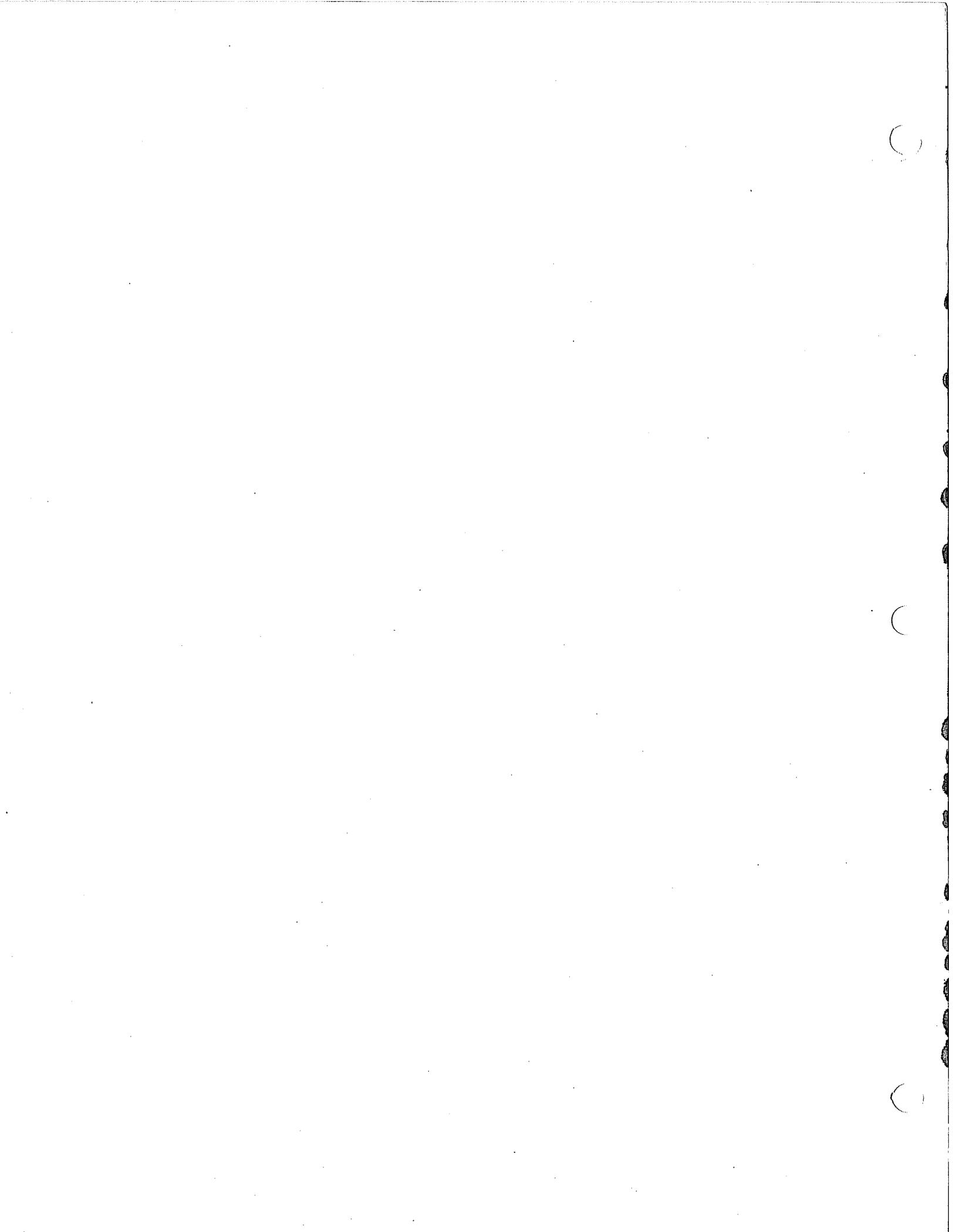
At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242.

④ ⑩ At the re-installation or verification of the ignition system electric connections, all the connections must be coated with lithium grease or dielectric grease to prevent corrosion.

▼ **CAUTION:** To prevent moisture, ensure no air is trapped within the connections. Do not use silicone sealant as contacts will corrode.

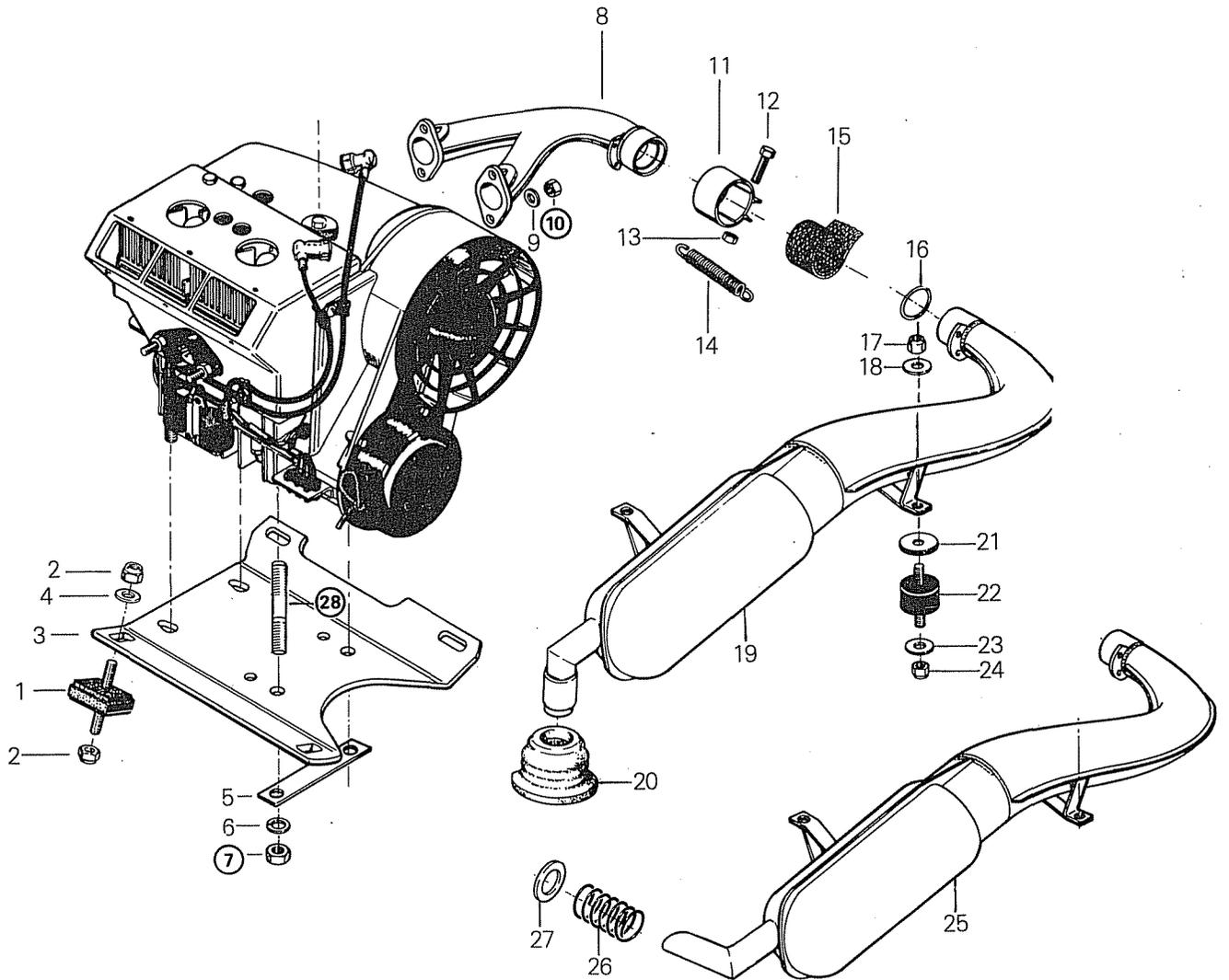
③④ Prior to assembly, clean threads then apply Loctite Lock'n Seal 242.

Torque to 98 N•m (72 ft-lbs).



# 440 ENGINE TYPE

## ENGINE SUPPORT & MUFFLER



- |                        |                                  |  |
|------------------------|----------------------------------|--|
| 1. Shear mount         | 11. Exhaust collar               | 20. Exhaust grommet (Everest and Futura) |
| 2. Nut                 | 12. Bolt                         | 21. Washer                               |
| 3. Engine bracket      | 13. Nut                          | 22. Rubber shear mount                   |
| 4. Washer              | 14. Spring                       | 23. Washer                               |
| 5. Reinforcement plate | 15. Asbestos tape                | 24. Nut                                  |
| 6. Lockwasher          | 16. Aluminum ring                | 25. Muffler (T'NT)                       |
| 7. Nut                 | 17. Nut                          | 26. Spring (T'NT)                        |
| 8. Exhaust manifold    | 18. Washer                       | 27. Washer (T'NT)                        |
| 9. Washer              | 19. Muffler (Everest and Futura) | 28. Stud                                 |
| 10. Bolt               |                                  |  |

SECTION 04  
SUB-SECTION 02 (ENGINES)

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle.

- Pulley guard & drive belt.
- Muffler & air duct.
- Cab retaining cable.
- Air intake silencer.
- Fuel lines at carburetor, impulse line.
- Throttle cable.
- Electrical junction block.

 **CAUTION:** On electric start model, disconnect negative cable (ground) from battery before disconnecting other wires.

- Rewind starter.
- Engine mount nuts.

### DISASSEMBLY & ASSEMBLY

⑦ Torque to 43 N•m (32 ft-lbs).

⑩ Torque to 20 N•m (15 ft-lbs).

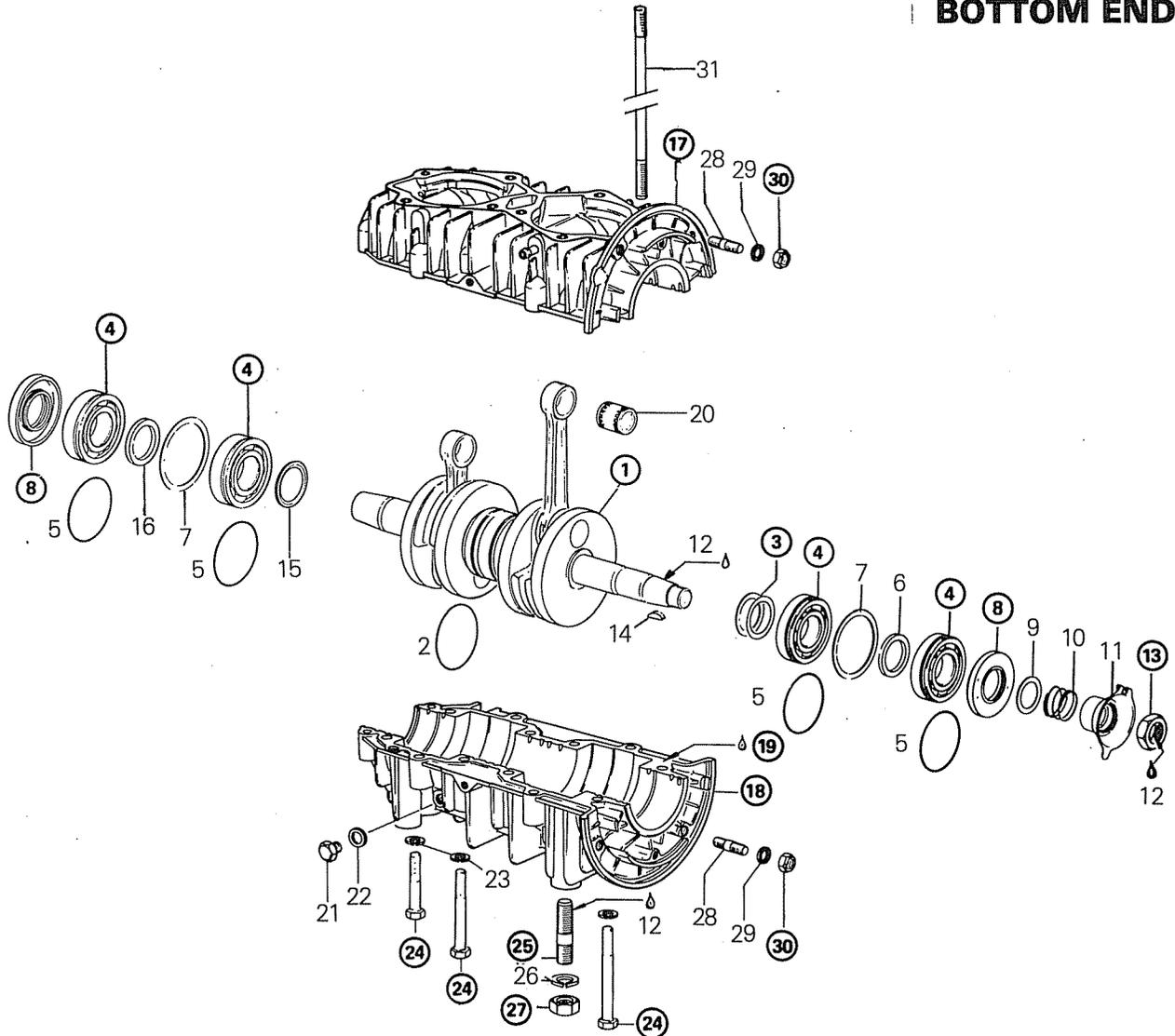
⑳ At assembly on crankcase, apply Loctite Lock'n Seal 242 or equivalent on threads.

### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment.

**BOTTOM END**



- |                          |                          |
|--------------------------|--------------------------|
| 1. Crankshaft            | 17. Upper crankcase half |
| 2. "O" ring              | 18. Lower crankcase half |
| 3. Shim(s)               | 19. Loctite 515          |
| 4. Bearing               | 20. Needle cage bearing  |
| 5. "O" ring              | 21. Drain plug           |
| 6. Distance ring (4 mm)  | 22. Sealing ring         |
| 7. Retaining washer      | 23. Lockwasher           |
| 8. Oil seal              | 24. Bolt                 |
| 9. Washer                | 25. Stud                 |
| 10. Cam spring           | 26. Lockwasher           |
| 11. Breaker point cam    | 27. Nut                  |
| 12. Loctite 242          | 28. Stud (fan housing)   |
| 13. Magneto ring nut     | 29. Washer (fan housing) |
| 14. Woodruff key         | 30. Nut (fan housing)    |
| 15. Distance ring 1 mm   | 31. Stud (cylinder)      |
| 16. Distance ring 6.5 mm |                          |

## SECTION 04 SUB-SECTION 02 (ENGINES)

### BOTTOM END

#### CLEANING

Discard all oil seals, gaskets, "O" rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

▼ **CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

#### DISASSEMBLY & ASSEMBLY

##### General

Refer to Technical Data Section for component fitted tolerance and wear limit.

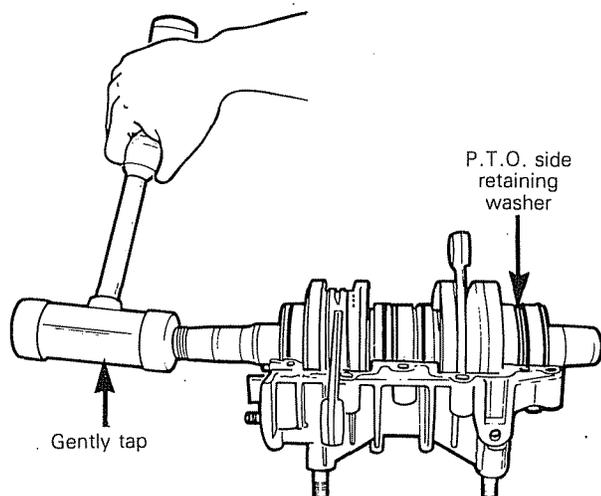
①③ Crankshaft end-play (maximum 0.1 mm (.004") is adjusted with shim(s) located between crankshaft and magneto side bearing. To determine correct amount of shim(s), proceed as follows.

○ **NOTE:** Crankshaft end-play requires adjustment only when crankshaft and/or crankcase is replaced.

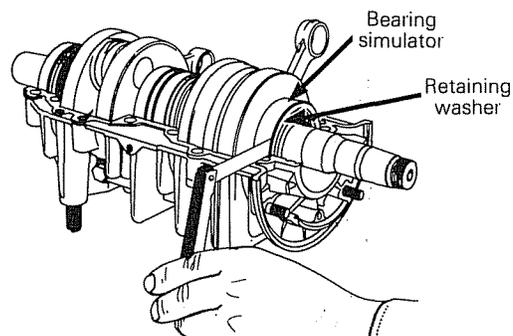
Remove magneto side bearings and existing shim(s). Slide the appropriate bearing simulator (no. 420 876 155) and the retaining washers on the crankshaft. (See Tools Section).

Position crankshaft assembly into crankcase lower half. Make sure that retaining washers are correctly seated in the grooves.

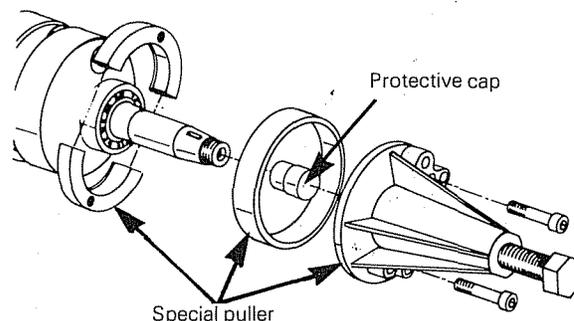
Gently tap crankshaft counterweight (mag. side) until P.T.O. side inner bearing bears against retaining washer.



Any free-play between the bearing simulator and magneto side retaining washer, minus maximum 0.1 mm (.004") end-play is the distance to be covered by shim(s). Shims are available in the thickness of 0.15 mm (.006"), 0.20 mm (.008") and 0.30 mm (.012").



④ To remove bearings from crankshaft use a protective cap and special puller, as illustrated. (See Tools Section).



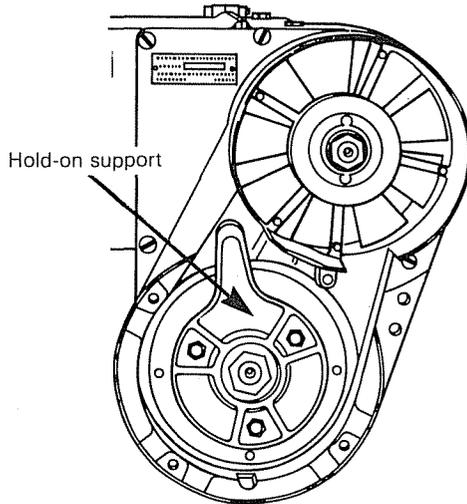
Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F) for 10 min. This will expand bearings and ease installation:

Install bearings with groove outward.

○ **NOTE:** Prior to magneto side bearing installation, determine crankshaft end-play and install required shim(s) on crankshaft extension.

⑧ At assembly apply a light coat of lithium grease on seal lip. Seal outer surface should be flush with crankcase.

⑬ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tools Section).



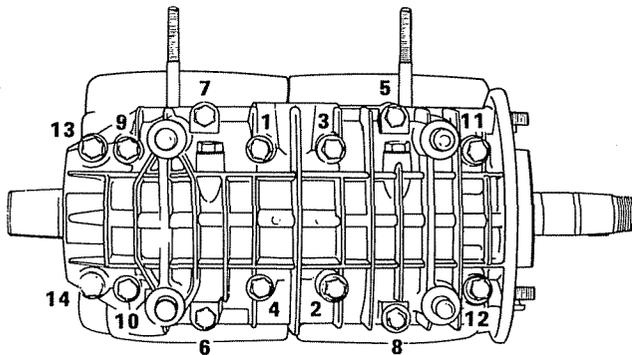
At assembly, apply Loctite Lock'n Seal 242 or equivalent on threads then torque to 85 N•m (63 ft-lbs).

⑰ ⑱ ⑲ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

Prior to joining of crankcase halves, apply Loctite 515 (no. 413 7027) on mating surfaces.

Position the crankcase halves together and tighten bolts by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque bolts or nuts to 22 N•m (16 ft-lbs) following illustrated sequence.



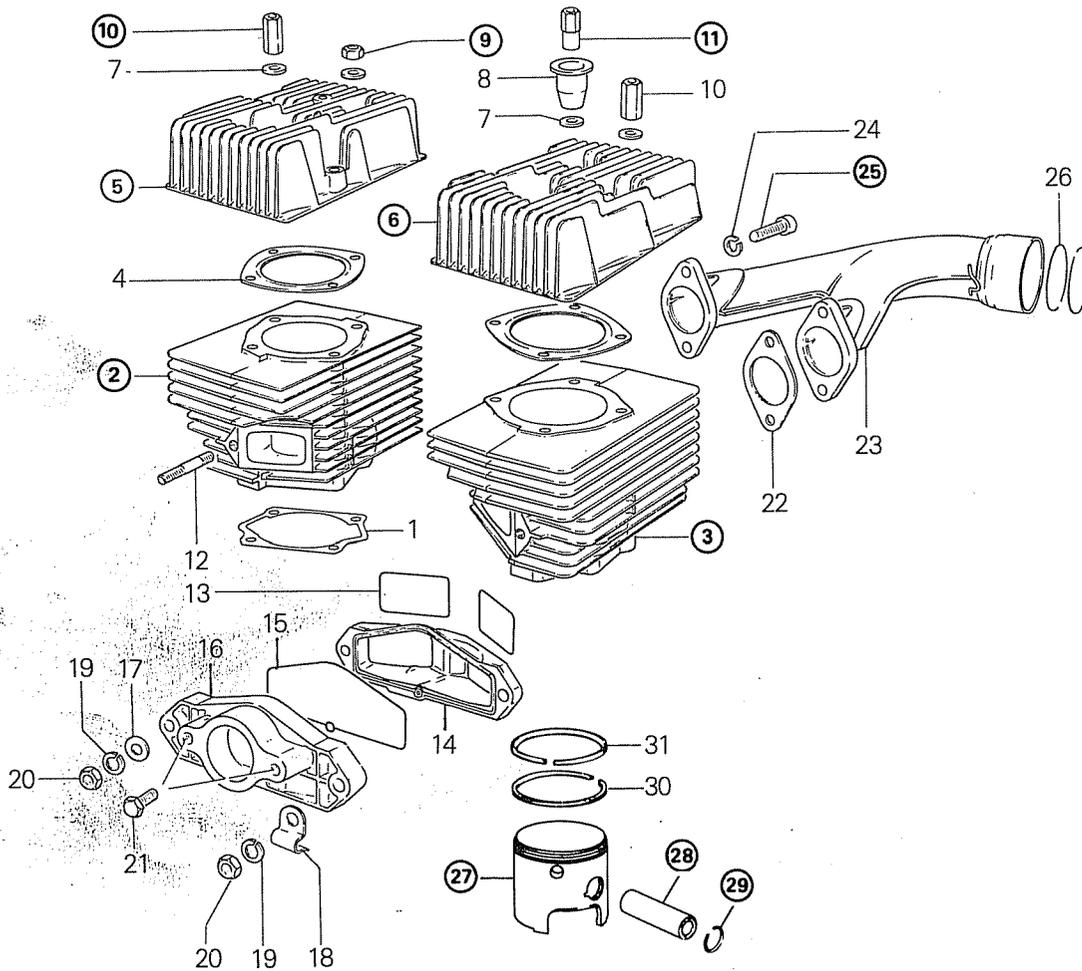
⑳ ㉓ Torque to 22 N•m (16 ft-lbs).

㉔ At assembly on crankcase apply Loctite Lock'n Seal 242 or equivalent on threads.

㉕ Torque to 43 N•m (32 ft-lbs).

SECTION 04  
SUB-SECTION 02 (ENGINES)

**TOP END**



- |                                |                        |
|--------------------------------|------------------------|
| 1. Gasket (cylinder/crankcase) | 17. Flat washer        |
| 2. Cylinder (P.T.O.)           | 18. H.T. cable bracket |
| 3. Cylinder (mag.)             | 19. Lockwasher         |
| 4. Cylinder head gasket        | 20. Nut                |
| 5. Cylinder head (P.T.O.)      | 21. Bolt               |
| 6. Cylinder head (Mag.)        | 22. Exhaust gasket     |
| 7. Flat washer                 | 23. Exhaust manifold   |
| 8. Support sleeve              | 24. Lockwasher         |
| 9. Nut                         | 25. Bolt               |
| 10. Distance nut               | 26. Sealing ring       |
| 11. Distance nut (short)       | 27. Piston             |
| 12. Stud                       | 28. Gudgeon pin        |
| 13. Gasket                     | 29. Circlip            |
| 14. Intake manifold            | 30. Rectangular ring   |
| 15. Gasket                     | 31. "L" trapez ring    |
| 16. Intake cover               |                        |

## TOP END

### CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

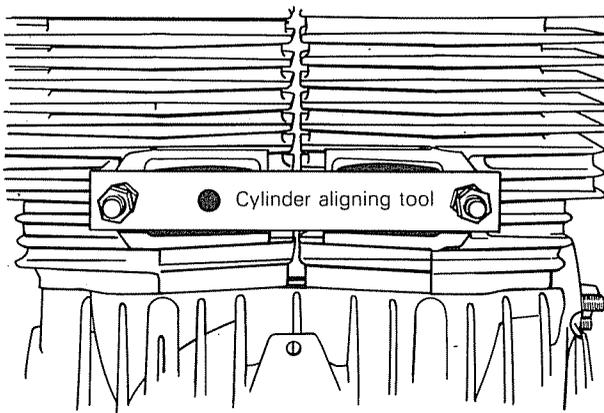
Clean the piston ring grooves with a groove cleaner tools, or with a piece of broken ring.

### DISASSEMBLY & ASSEMBLY

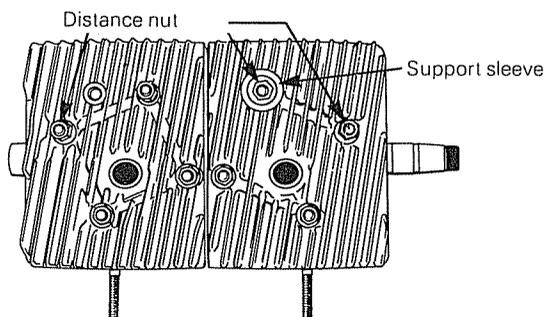
○ **NOTE:** Refer to Technical Data for component fitted tolerance and wear limit.

②③⑤⑥ When installing cylinder and/or cylinder head, the cylinder aligning tool must be used to ensure sealing of intake manifold and cylinders. (See Tools Section).

With exhaust manifold and aligning tool installed, you can then cross torque cylinder head nuts to 20 N•m (15 ft-lbs).



⑨⑩⑪ Position nuts and distance nuts as per illustration then cross torque to 20 N•m (15 ft-lbs).



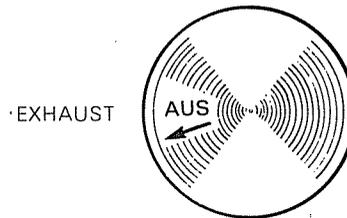
○ **NOTE:** Torque each cylinder head individually.

⑫ Torque to 20 N•m (15 ft-lbs).

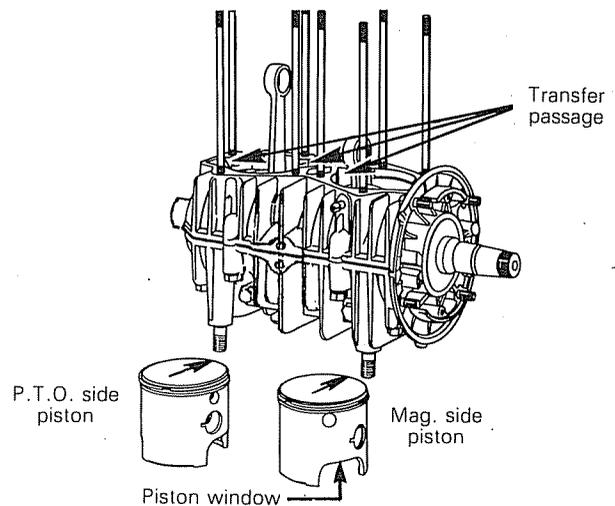
⑳㉑㉒ Place clean cloth over crankcase to prevent circlip from falling into crankcase. Use a pointed tool to remove circlips from piston.

▼ **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

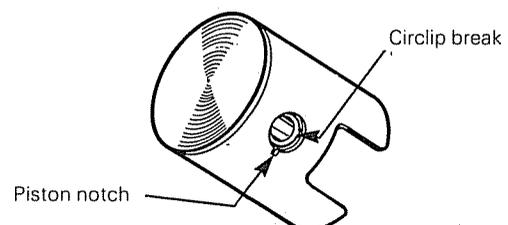
At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



Also make sure that the piston window is aligned with the crankcase transfer passage when the gudgeon pin orifice is in-line with the connecting rod bore.

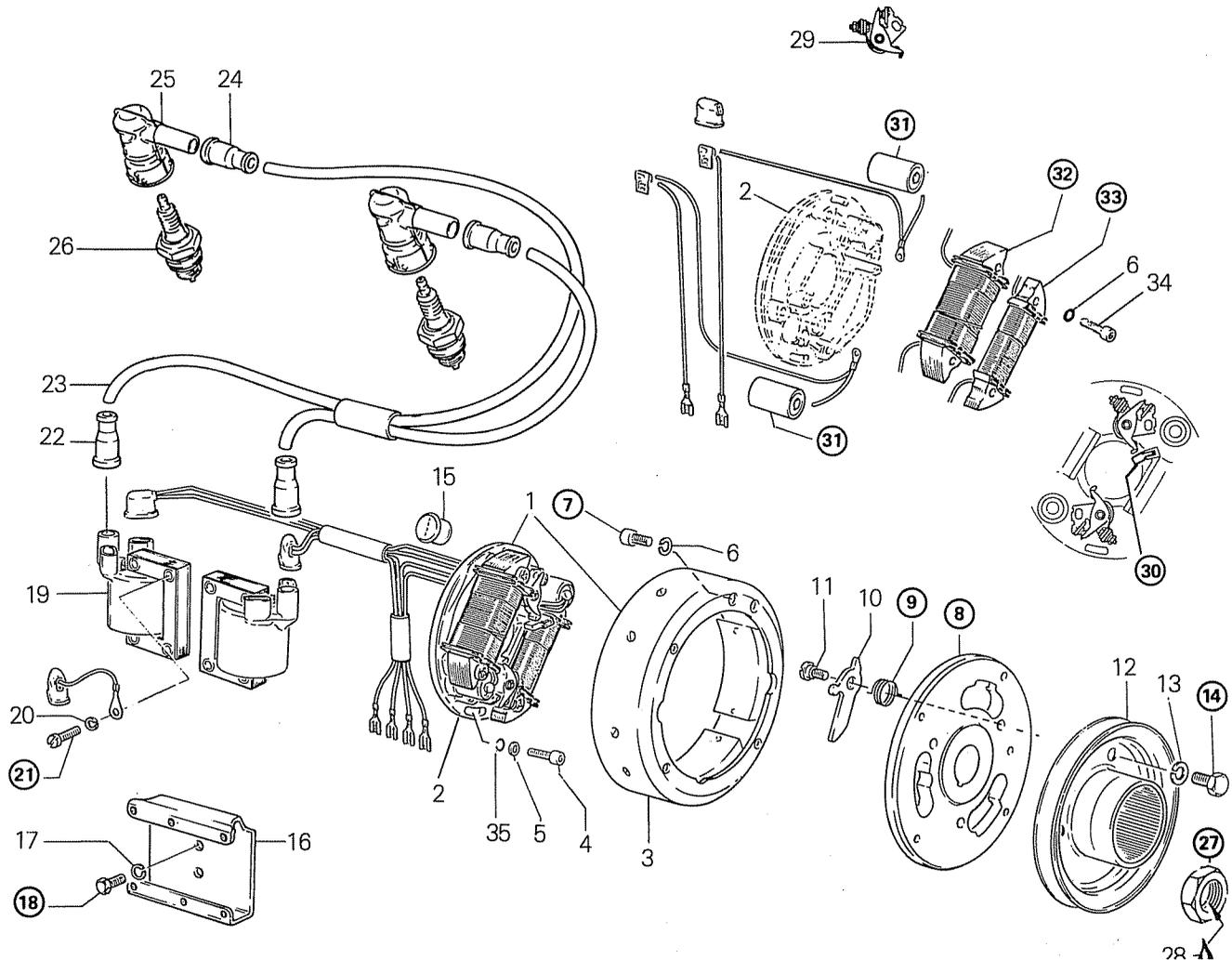


○ **NOTE:** Once the circlips are installed, turn each circlip so it is not directly on piston notch. Remove any burrs on piston caused through circlip installation using very fine emery cloth.



SECTION 04  
SUB-SECTION 02 (ENGINES)

**MAGNETO**



- |                       |                    |                          |
|-----------------------|--------------------|--------------------------|
| 1. Armature ass'y     | 13. Lockwasher     | 25. Spark plug protector |
| 2. Armature plate     | 14. Bolt           | 26. Spark plug           |
| 3. Magneto ring       | 15. Wire grommet   | 27. Magneto ring nut     |
| 4. Screw              | 16. Coil bracket   | 28. Loctite 242          |
| 5. Lockwasher         | 17. Lockwasher     | 29. Breaker point        |
| 6. Lockwasher         | 18. Screw          | 30. Lubricating wick     |
| 7. Screw              | 19. Ignition coil  | 31. Capacitor            |
| 8. Magneto housing    | 20. Lockwasher     | 32. Lighting coil        |
| 9. Spring             | 21. Screw          | 33. Generator coil       |
| 10. Centrifugal lever | 22. Protection cap | 34. Screw                |
| 11. Screw             | 23. H.T. cable     | 35. Flat washer          |
| 12. Starting pulley   | 24. Protection cap |                          |

## MAGNETO

### CLEANING

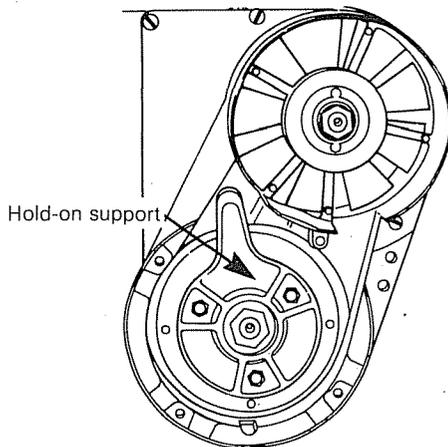
Clean all metal components in a non-ferrous metal cleaner.

**CAUTION:** Clean armature ass'y and magneto using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

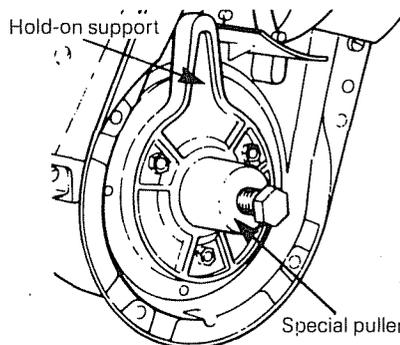
⑦ At assembly apply Loctite Lock'n Seal 242 on threads.

⑧ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tools Section).

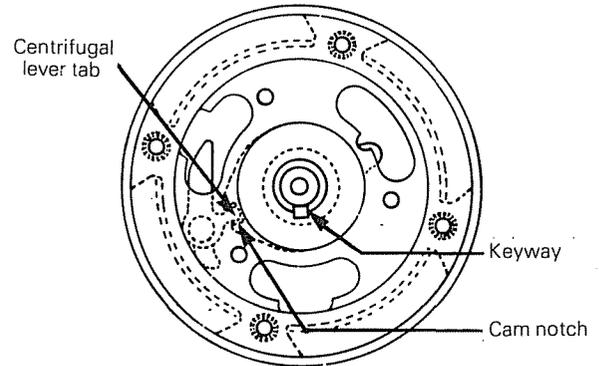


With magneto retaining nut removed and hold-on support in place, install special puller onto support.

Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 or equivalent, position magneto on crankshaft with the keyway and the cam notch positioned as illustrated.



Install magneto retaining nut (with Loctite Lock'n Seal 242 on threads) and torque to 85 N•m (63 ft-lbs).

⑨ At assembly apply a small amount of low temperature grease into spring seating.

⑭ Torque to 20 N•m (15 ft-lbs).

⑮ ⑰ Apply Loctite Lock'n Seal 242 or equivalent on threads.

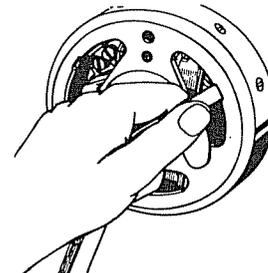
⑳ Apply Loctite Lock'n Seal 242 on threads then torque to 85 N•m (63 ft-lbs).

㉑ When replacing breaker point set, apply a light coat of grease on lubricating wick.

㉒ To replace a capacitor, it is first necessary to unsolder the two (2) black leads using a soldering iron. The capacitor can then be driven out of the armature plate using a suitable pusher. To reinstall, inverse procedure.

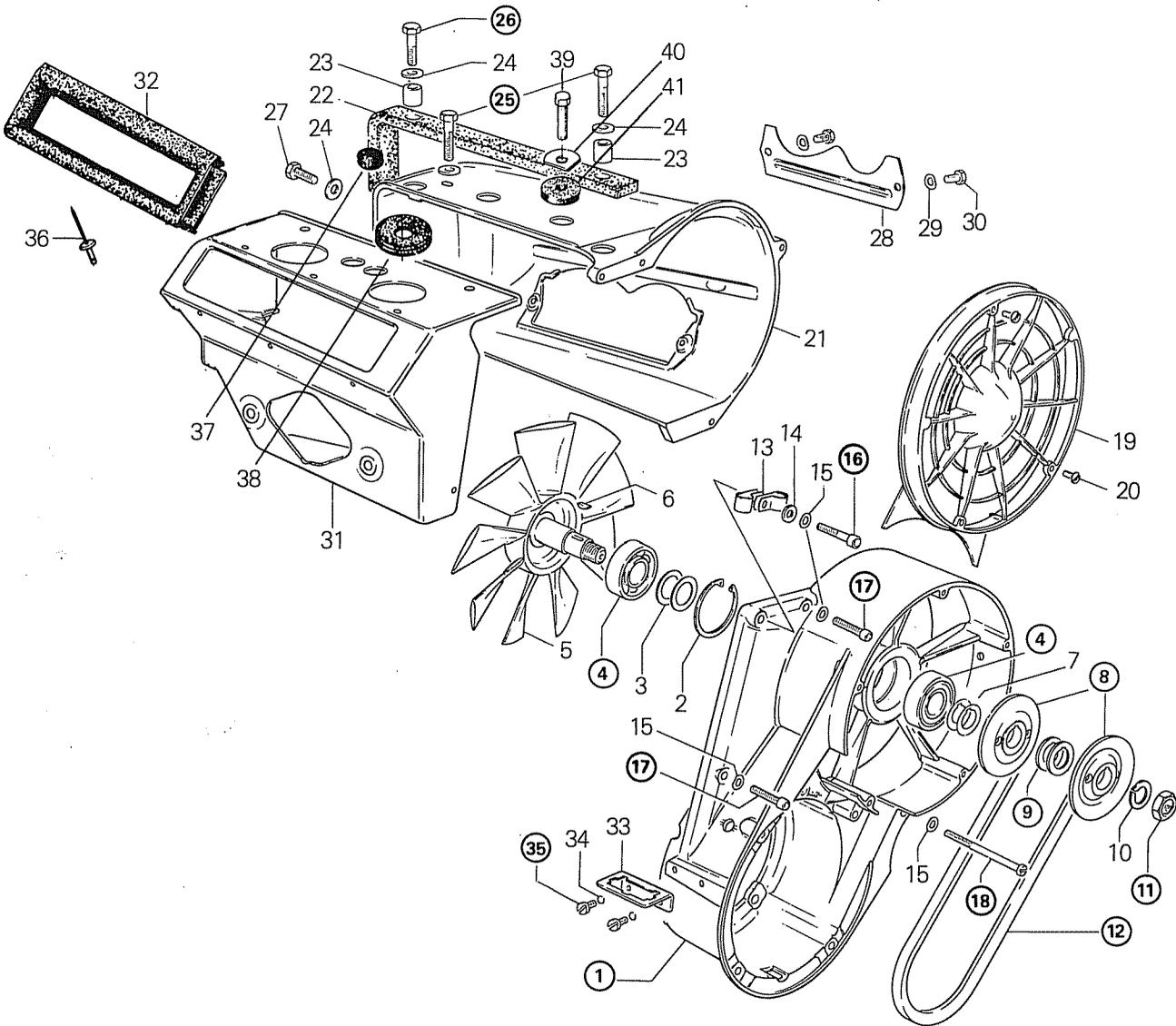
㉓ ㉔ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted.

To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



SECTION 04  
SUB-SECTION 02 (ENGINES)

**COOLING SYSTEM**



- 1. Fan housing
- 2. Circlip
- 3. Washer (2)
- 4. Bearing
- 5. Fan
- 6. Woodruff key
- 7. Shim (2)
- 8. Pulley half
- 9. Shim(s)
- 10. Lockwasher
- 11. Nut
- 12. Belt
- 13. Cable clamp
- 14. Washer

- 15. Spring washer
- 16. Screw M6 x 35
- 17. Screw M6 x 30
- 18. Screw M6 x 80
- 19. Fan cover
- 20. Screw
- 21. Fan cowl (exhaust)
- 22. Sealing strip
- 23. Distance sleeve
- 24. Washer
- 25. Screw M8 x 35
- 26. Screw M8 x 28
- 27. Screw M8 x 20
- 28. Fan cowl cover

- 29. Spring washer
- 30. Screw
- 31. Fan cowl (intake)
- 32. Cowl/cab gasket
- 33. Electrical junction block bracket
- 34. Lockwasher
- 35. Screw
- 36. Pop rivet
- 37. Plug
- 38. Spark plug sealing ring
- 39. Bolt
- 40. Washer
- 41. Rubber washer

## COOLING SYSTEM

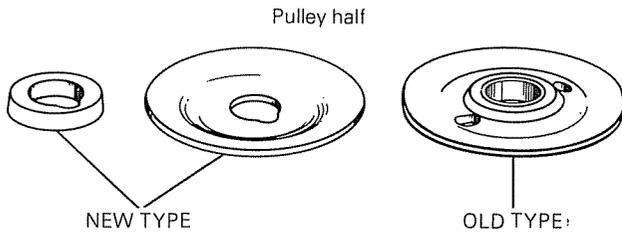
### CLEANING

Clean all components in a non-ferrous metal cleaner.

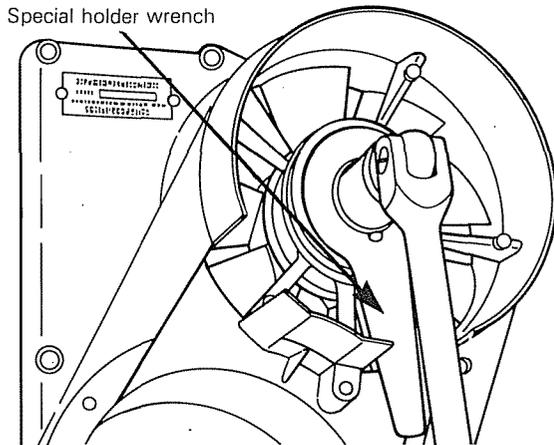
### DISASSEMBLY & ASSEMBLY

①④ Heat bearing housing to 70°C (160°F) prior to bearing removal or installation.

⑧ Newer inner pulley half does not have a shoulder on its inner face so it is installed with a 6 mm (.236") spacer.



⑩ To remove or install pulley retaining nut, lock fan pulley with special holder wrench (See Tools Section). At assembly torque nut to 62 N•m (46 ft-lbs).

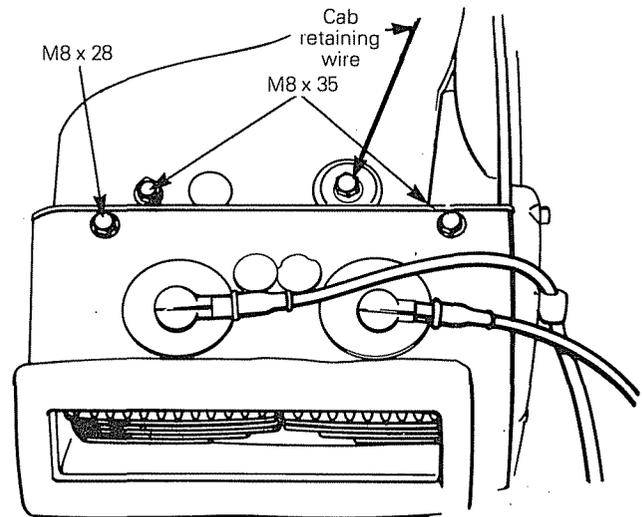


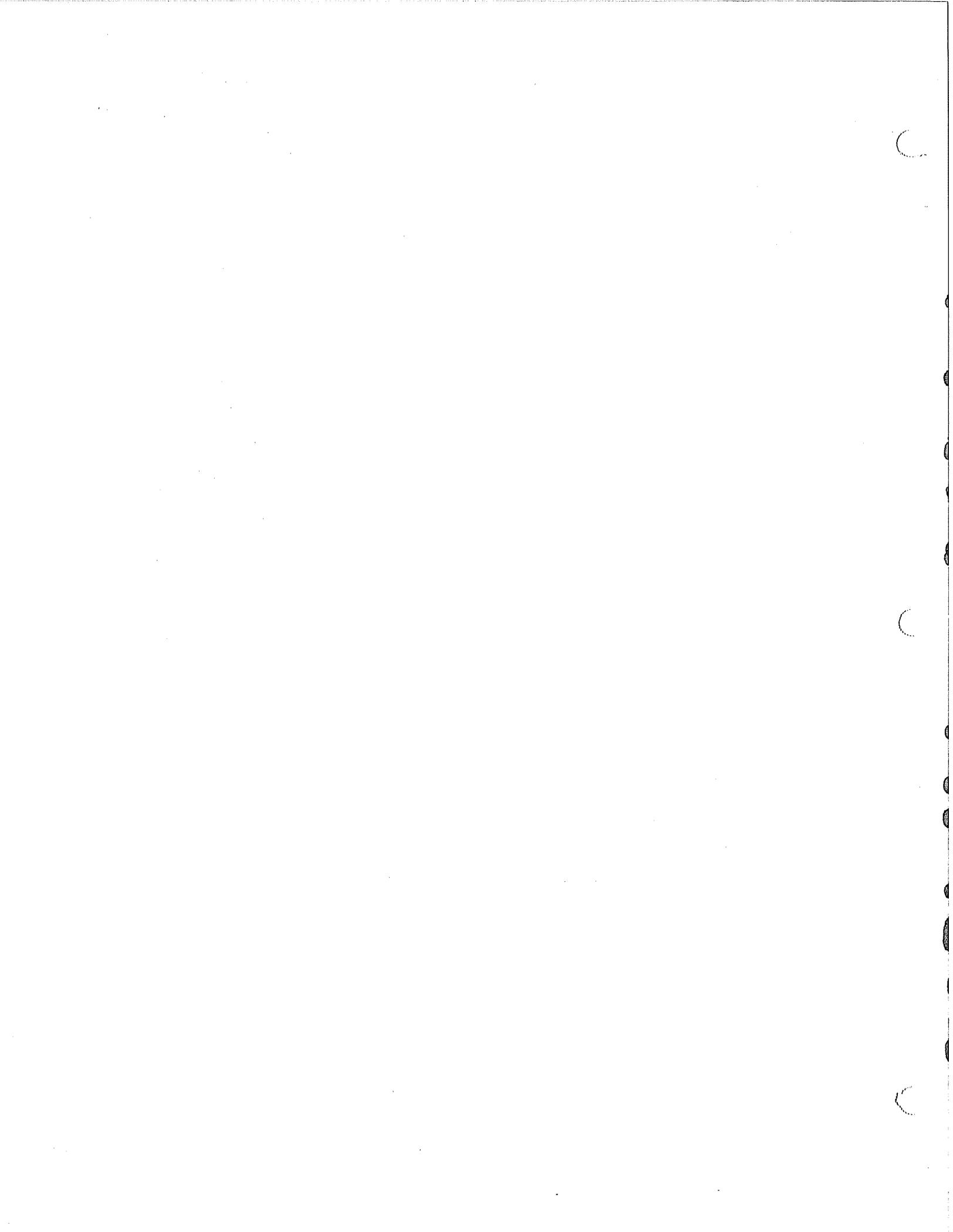
⑨⑫ Shim(s) located between pulley halves are used to adjust fan belt free-play. Correct free-play is 6 mm (1/4"). If necessary to adjust install or remove shim(s) between pulley half and washer.

⑮⑰⑱⑳ Apply Loctite Lock'n Seal 242 on threads.

○ NOTE: It should be noted that to correctly remove a Loctite locked screw, it is first necessary to tap on head of screw to break Loctite bond. This will eliminate the possibility of screw breakage.

㉕㉖ Position screw as per illustration.

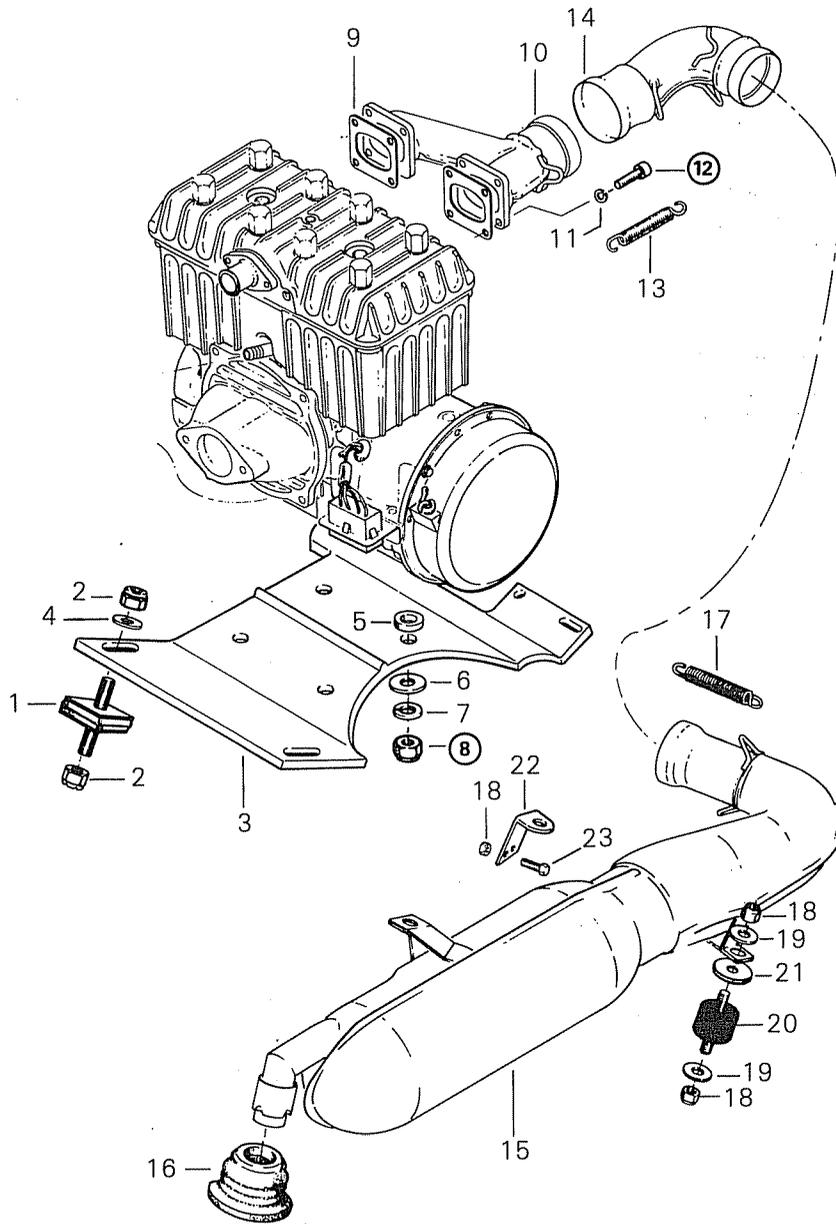




## 444 TYPE ENGINE

### ENGINE SUPPORT & MUFFLER

Everest and Futura



1. Engine shear mount
2. Nut
3. Engine support
4. Flat washer
5. Distance sleeve
6. Flat washer
7. Lockwasher
8. Nut
9. Exhaust gasket
10. Exhaust manifold
11. Lockwasher
12. Bolt
13. Spring
14. Exhaust elbow
15. Muffler
16. Exhaust grommet
17. Spring
18. Nut
19. Washer
20. Shear mount
21. Insulating washer
22. Bracket
23. Bolt

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Disconnect or remove the followings from vehicle:

- Pulley guard and drive belt.
- Air silencer, throttle cable.
- Fuel lines, primer and impulse lines.
- Muffler and rewind starter.
- Electrical wires (junction block, main ground wire, starter wires).

◆ **WARNING:** Before disconnecting any electrical wire in starter system always first disconnect the battery cable.

- Drain the cooling system and disconnect hoses at engine.

○ **NOTE:** It is not necessary to remove rotary valve oil hoses to remove engine from vehicle, it is easier to drain the system on the workshop bench.

- Remove engine mount nuts then lift engine from vehicle.

### DISASSEMBLY & ASSEMBLY

- ⑧ Torque to 35 N•m (26 ft-lbs).
- ⑫ Torque to 14 N•m (10 ft-lbs).

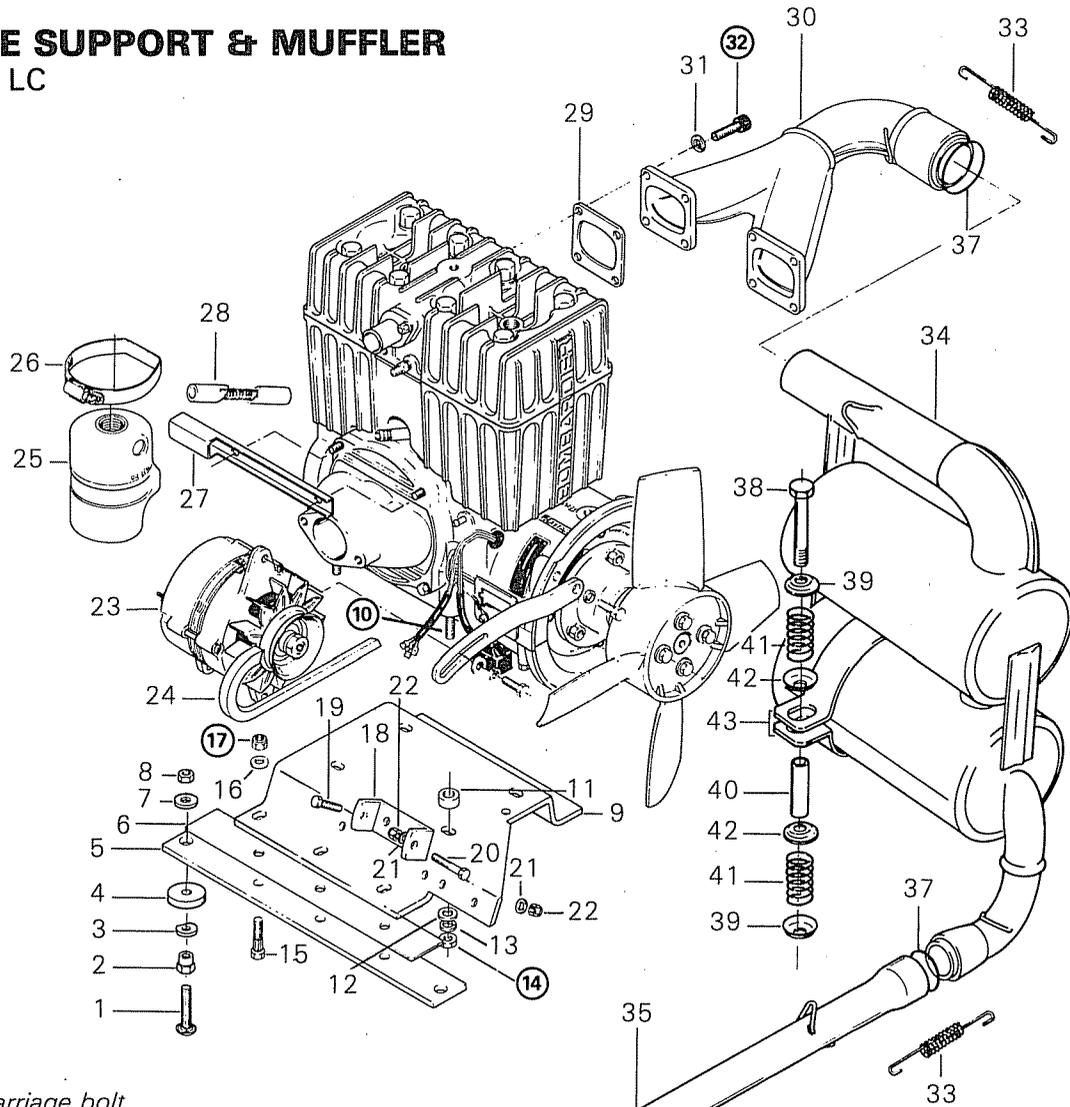
### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the followings:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment.

**ENGINE SUPPORT & MUFFLER**

Elite 450 LC



- 1. Carriage bolt
- 2. Threaded bushing
- 3. Spacer
- 4. Insulating rubber
- 5. Bracket
- 6. Spring leaf
- 7. Washer
- 8. Nut
- 9. Engine support
- 10. Stud
- 11. Distance sleeve
- 12. Washer
- 13. Lockwasher
- 14. Nut
- 15. Bolt
- 16. Washer
- 17. Nut
- 18. Support

- 19. Bolt
- 20. Bolt
- 21. Washer
- 22. Nut
- 23. Alternator
- 24. Belt
- 25. Oil tank
- 26. Hose clamp
- 27. Oil tank support

- 28. Hose 102 mm
- 29. Exhaust gasket
- 30. Exhaust manifold
- 31. Lockwasher
- 32. Allen screw
- 33. Spring
- 34. Muffler
- 35. Exhaust pipe
- 36. Exhaust grommet
- 37. Asbestos string
- 38. Bolt
- 39. Cup
- 40. Bushing
- 41. Spring
- 42. Cup
- 43. Muffler clamp

## ENGINE SUPPORT AND MUFFLER

### REMOVAL FROM VEHICLE

Disconnect or remove the followings from vehicle:

- Pulley guard and drive belt
- Intake silencer and throttle cable
- Fuel lines, primer and impulse lines, fuel tank.
- Electrical wires (at engine, alternator, starter).

 **WARNING:** Before disconnecting any electrical wire in starter system, always first disconnect the battery cable.

- Drain the cooling system and disconnect hoses at engine.
- Remove engine mount nuts then lift engine from vehicle.

### DISASSEMBLY AND ASSEMBLY

⑩ At assembly on crankcase, apply Loctite 242 on threads.

⑭ Torque to 36 N•m (26 ft-lbs).

⑰ Torque to 32 N•m (23 ft-lbs).

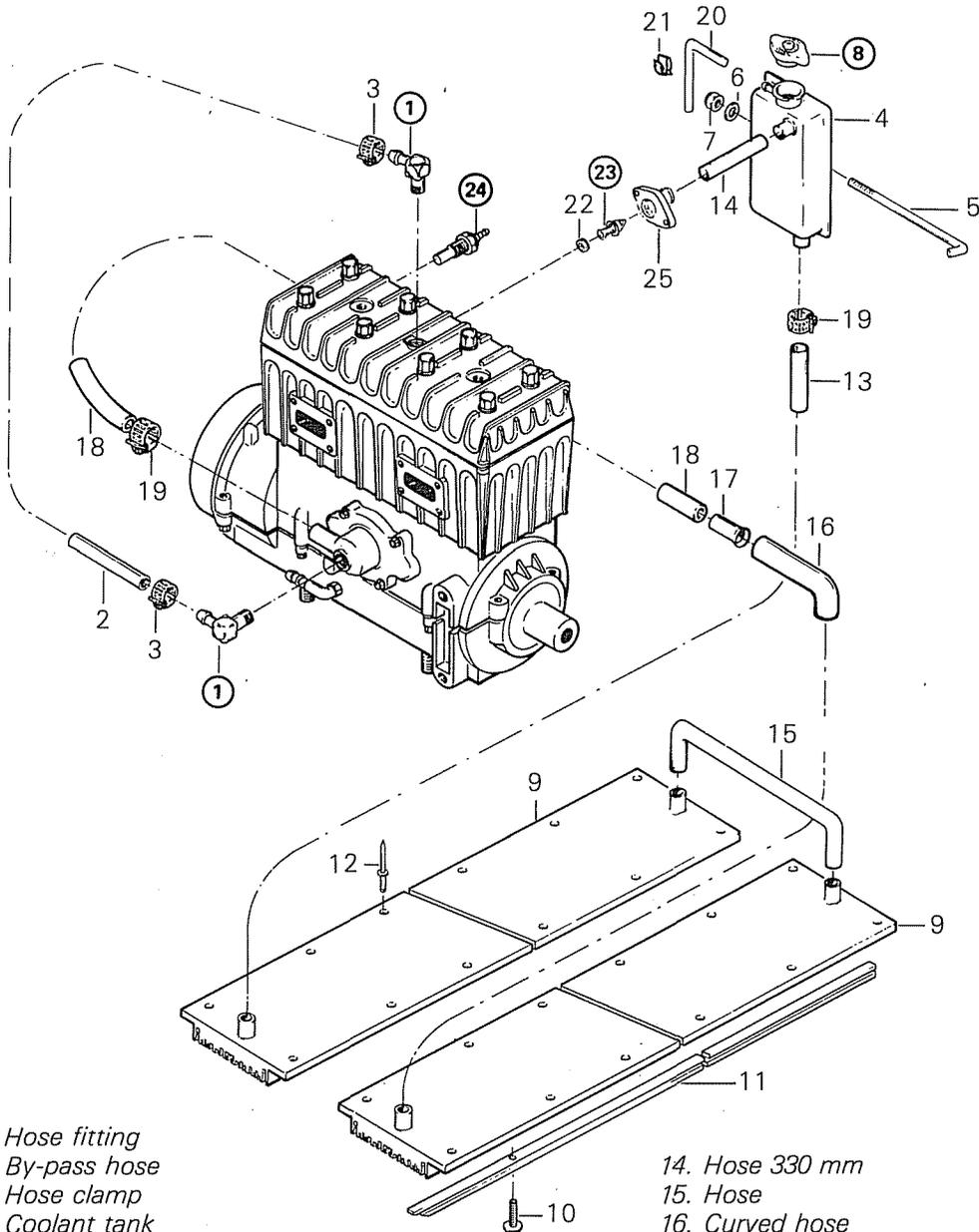
⑳ Torque to 14 N•m (10 ft-lbs).

### INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the followings:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment and alternator belt tension.

**COOLING SYSTEM**  
Everest and Futura



- 1. Hose fitting
- 2. By-pass hose
- 3. Hose clamp
- 4. Coolant tank
- 5. Retainer rod
- 6. Washer
- 7. Nut
- 8. Pressure cap
- 9. Radiator
- 10. Screw
- 11. Protector
- 12. Pop rivet
- 13. Hose 115 mm

- 14. Hose 330 mm
- 15. Hose
- 16. Curved hose
- 17. Coupling reducer
- 18. Hose 838 mm
- 19. Hose clamp
- 20. Overflow hose
- 21. Clip
- 22. Grommet
- 23. Thermostat
- 24. Temperature gauge sender
- 25. Water outlet connector (cylinder head)

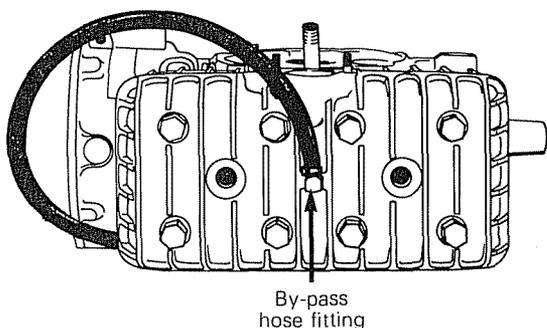
## COOLING SYSTEM

### INSPECTION

Check general condition of hoses and clamps tightness.

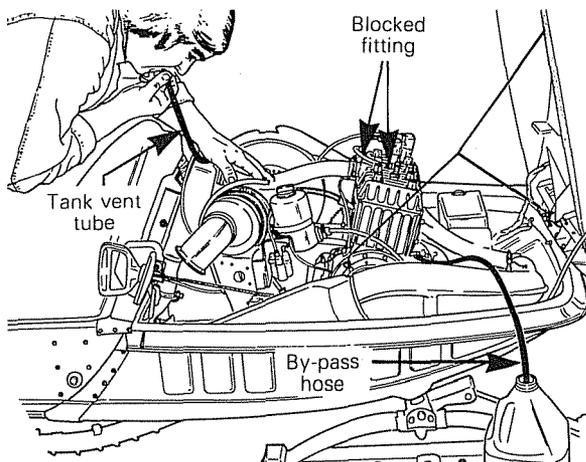
### DRAINING THE SYSTEM

To drain the cooling system, remove the coolant tank cap and disconnect the by-pass hose from fitting on cylinder head.



Block fitting and keep hose as low as possible to drain the system.

However, to completely drain the system, it is necessary to blow into the tank through the vent tube, while maintaining the hand over the filler neck to prevent air leak.



### DISASSEMBLY & ASSEMBLY

①②④ Apply pipe thread sealant to avoid leaks.

⑧ Pressure cap can be checked by depressing the red button (after engine has run) to see if the cap pressurizes the system. If not, install a new 13 lbs cap, (do not exceed 13 lbs of pressure).

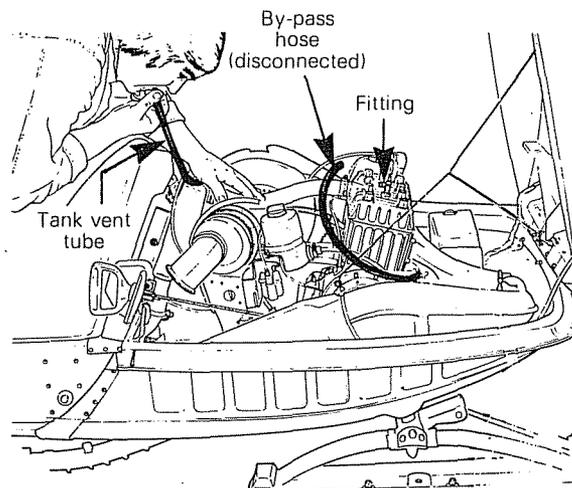
⑳ To check thermostat, put it in water and heat water. Thermostat should open when water temperature reaches 70°C (160°F).

### REFILLING THE SYSTEM

Capacity: 5 liters approximately  
(1 Imp. gal.) (1.2 U.S. gal.)  
60% concentrated antifreeze + 40% water

To refill the cooling system, disconnect by-pass hose and keep it near fitting on cylinder head; refill tank and blow into it through the vent tube, while maintaining the hand over the filler neck until the liquid comes out at the by-pass hose and the fitting on cylinder head.

○ NOTE: It is necessary to refill tank as soon as it becomes empty.

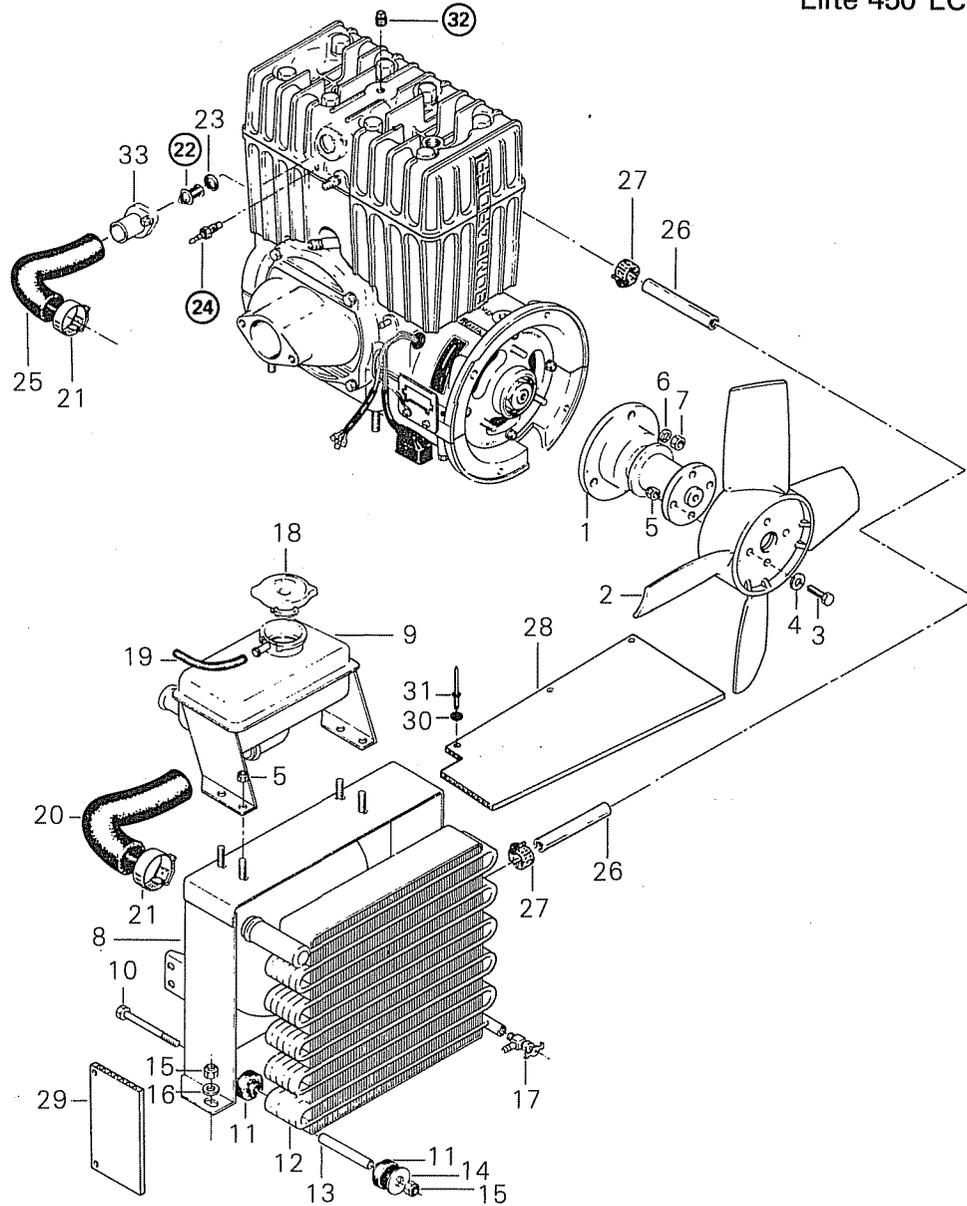


Reconnect by-pass hose and continue to pour the liquid in the coolant tank until the coolant level reaches 2.5 mm (1") below filler neck.

Reinstall tank cap and start engine; let engine run until it reaches its operating temperature and thermostat opens. Allow it to run a few minutes more. Stop engine and check coolant level; refill as necessary.

◆ **WARNING:** Always unscrew cap to the first step with a cloth to release pressure, before removing it.

**COOLING SYSTEM**  
Elite 450 LC



- |                      |                           |                                 |
|----------------------|---------------------------|---------------------------------|
| 1. Fan adaptor       | 12. Radiator              | 23. Sealing ring                |
| 2. Fan               | 13. Bushing               | 24. Sender                      |
| 3. Bolt              | 14. Washer                | 25. Outlet hose (engine)        |
| 4. Lockwasher        | 15. Nut                   | 26. Hose 38 cm                  |
| 5. Nut               | 16. Washer                | 27. Hose clamp                  |
| 6. Lockwasher        | 17. Drain valve           | 28. Upper deflector             |
| 7. Nut               | 18. Plug                  | 29. Side deflector              |
| 8. Grille (radiator) | 19. Overflow hose 64 cm   | 30. Washer                      |
| 9. Coolant tank      | 20. Inlet hose (radiator) | 31. Pop rivet                   |
| 10. Bolt             | 21. Hose clamp            | 32. Plug                        |
| 11. Rubber bumper    | 22. Thermostat            | 33. Cylinder head outlet collar |

## COOLING SYSTEM

### INSPECTION

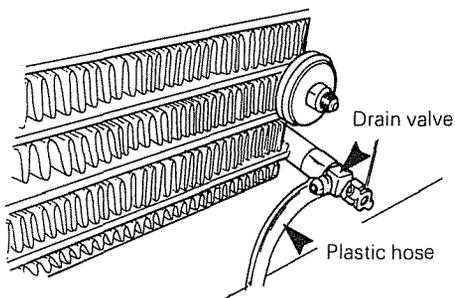
Check general condition of hoses and clamps tightness.

### DRAINING THE SYSTEM

To drain the cooling system, remove the coolant tank cap.

Remove the R.H. access grill, and connect a length of plastic hose to the radiator drain valve in order to drain the cooling system outside of the body.

Open the drain valve.



### DISASSEMBLY & ASSEMBLY

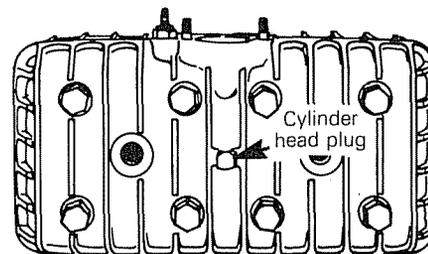
②② To check thermostat, put it in water and heat water. Thermostat should open when water temperature reaches 70°C (160°F).

②④ ③② Apply pipe thread sealant to avoid leaks.

### REFILLING THE SYSTEM

Capacity: 6.2 liters (220 Imp. ounces)  
(210 U.S. ounces)  
60% concentrated antifreeze + 40% water

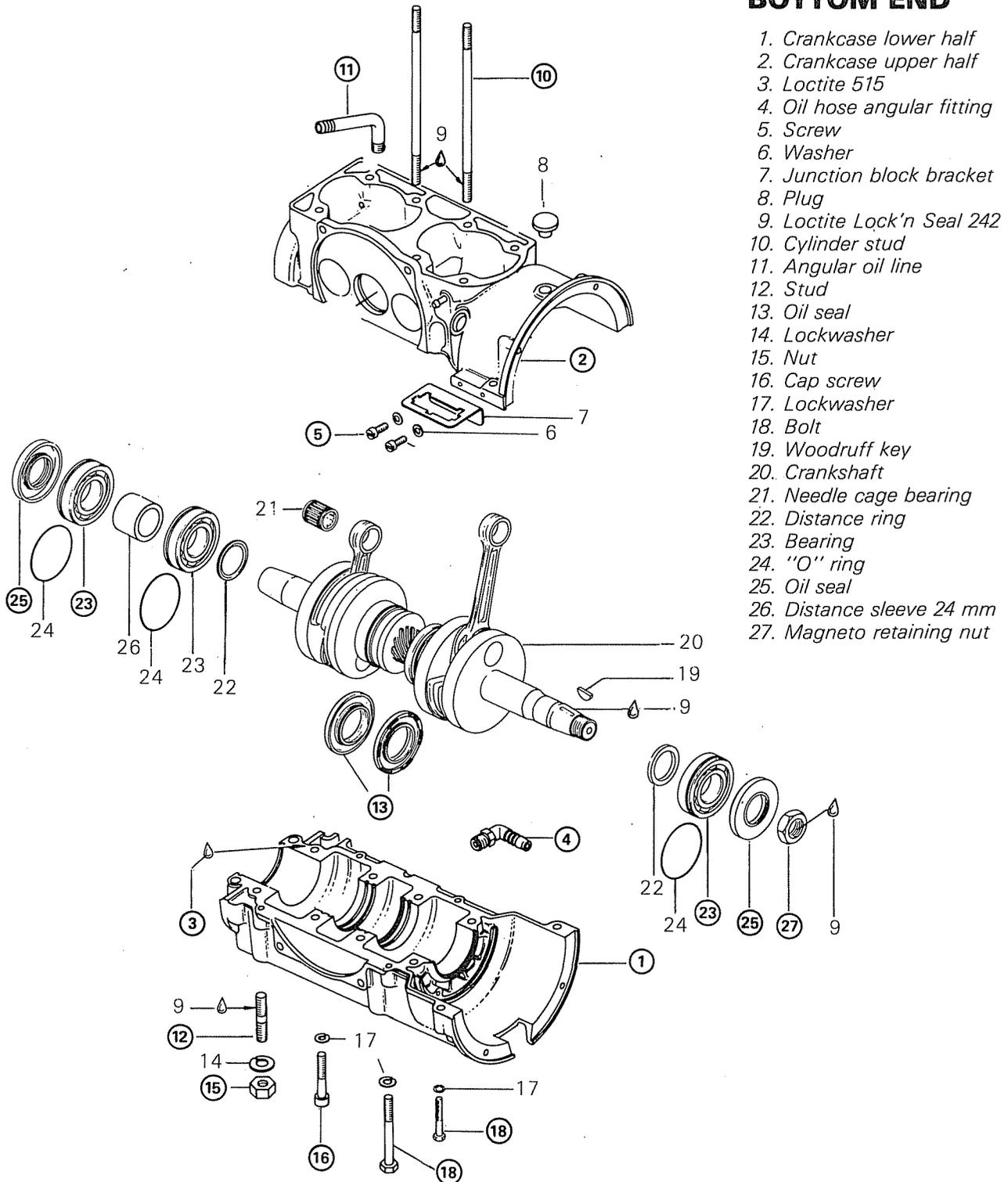
To refill the cooling system, unscrew the plug on top of the cylinder head, then slowly pour the liquid into the coolant tank until it reaches the plug hole in the cylinder head. Reinstall the plug. Continue to pour the liquid in the coolant tank until the coolant level reaches 25 mm (1") below filler neck of reservoir.



With the pressure cap removed, start engine to allow the coolant to circulate and let it run until normal temperature is reached. Stop engine.

Then recheck coolant level, ensuring that it is 25 mm (1") below filler neck of reservoir.

**BOTTOM END**



1. Crankcase lower half
2. Crankcase upper half
3. Loctite 515
4. Oil hose angular fitting
5. Screw
6. Washer
7. Junction block bracket
8. Plug
9. Loctite Lock'n Seal 242
10. Cylinder stud
11. Angular oil line
12. Stud
13. Oil seal
14. Lockwasher
15. Nut
16. Cap screw
17. Lockwasher
18. Bolt
19. Woodruff key
20. Crankshaft
21. Needle cage bearing
22. Distance ring
23. Bearing
24. "O" ring
25. Oil seal
26. Distance sleeve 24 mm
27. Magneto retaining nut

SECTION 04  
SUB-SECTION 02, (ENGINES)

## BOTTOM END

### CLEANING

Discard all oil seals, gaskets, "O" rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

▼ **CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

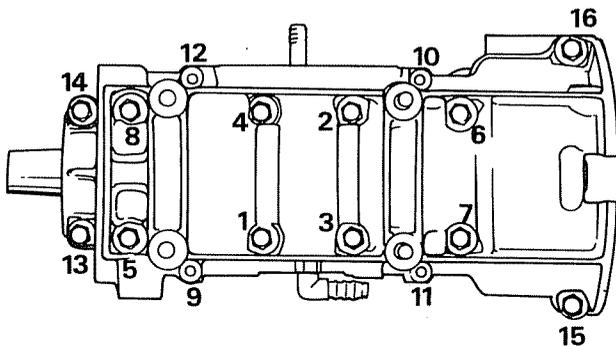
### DISASSEMBLY & ASSEMBLY

①②③ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply Loctite 515 (no. 413 7027 00) on mating surfaces.

▼ **CAUTION:** Before joining of crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

Position the crankcase halves together and tighten nut by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque bolts to 22 N•m (16 ft-lbs) following illustrated sequence.

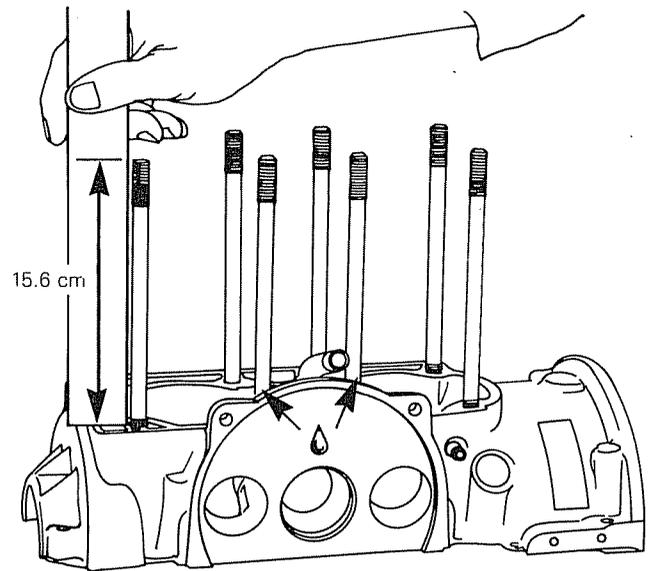


④ It is recommended to wrap Teflon pipe tape around threads.

⑤⑪ Apply Loctite Lock'n Seal 242 on threads prior to assembly.

⑩ Because of cap nuts, cylinder studs have to be screwed into crankcase so that they do not protrude further than 15.6 cm (6.140"). If it is not possible to obtain this length, a washer must be added between cylinder head and cap nut.

Apply Loctite Lock'n Seal 242 on the threads of the two studs screwed above the intake ports.



Longer threaded part of stud should be screwed into crankcase.

⑫ At assembly on crankcase, apply Loctite Lock'n Seal 242 on threads.

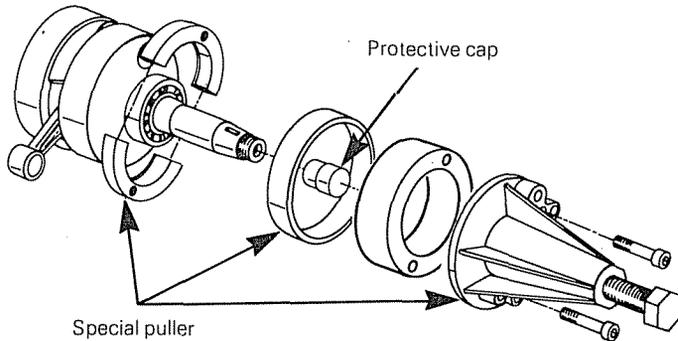
⑬ Crankshaft center oil seals may be replaced at a crankshaft rebuild shop.

⑮ Torque to 35 N•m (26 ft-lbs).

⑯⑰ Torque to 22 N•m (16 ft-lbs).

SECTION 04  
SUB-SECTION 02, (ENGINES)

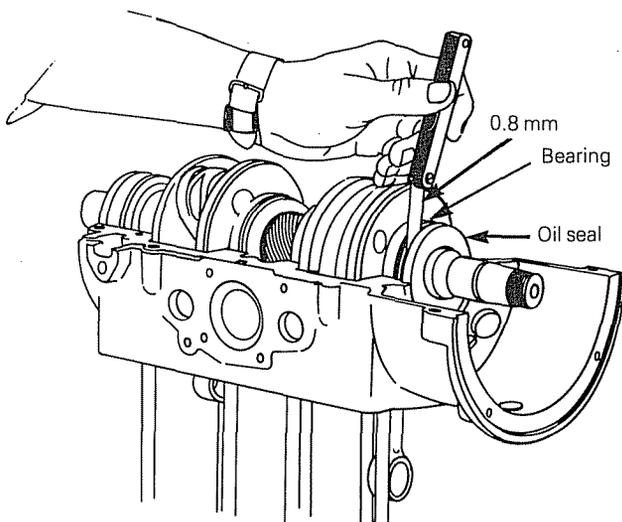
⑳ To remove bearings from crankshaft, use a protective cap and special puller as illustrated.



Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F). This will expand bearing and ease installation.

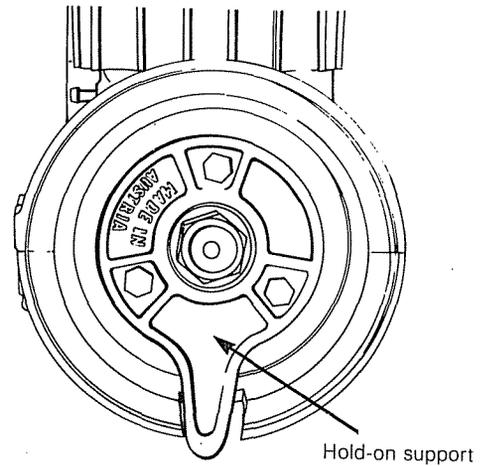
Install bearings with groove outward.

㉕ At assembly, apply a light coat of lithium grease on seals lips.



To insure adequate oil supply to the bearing on the magneto side, install oil seal with a gap of at least 0.8 mm (.030") with bearing. On P.T.O. side install oil seal flush with crankcase, no more in.

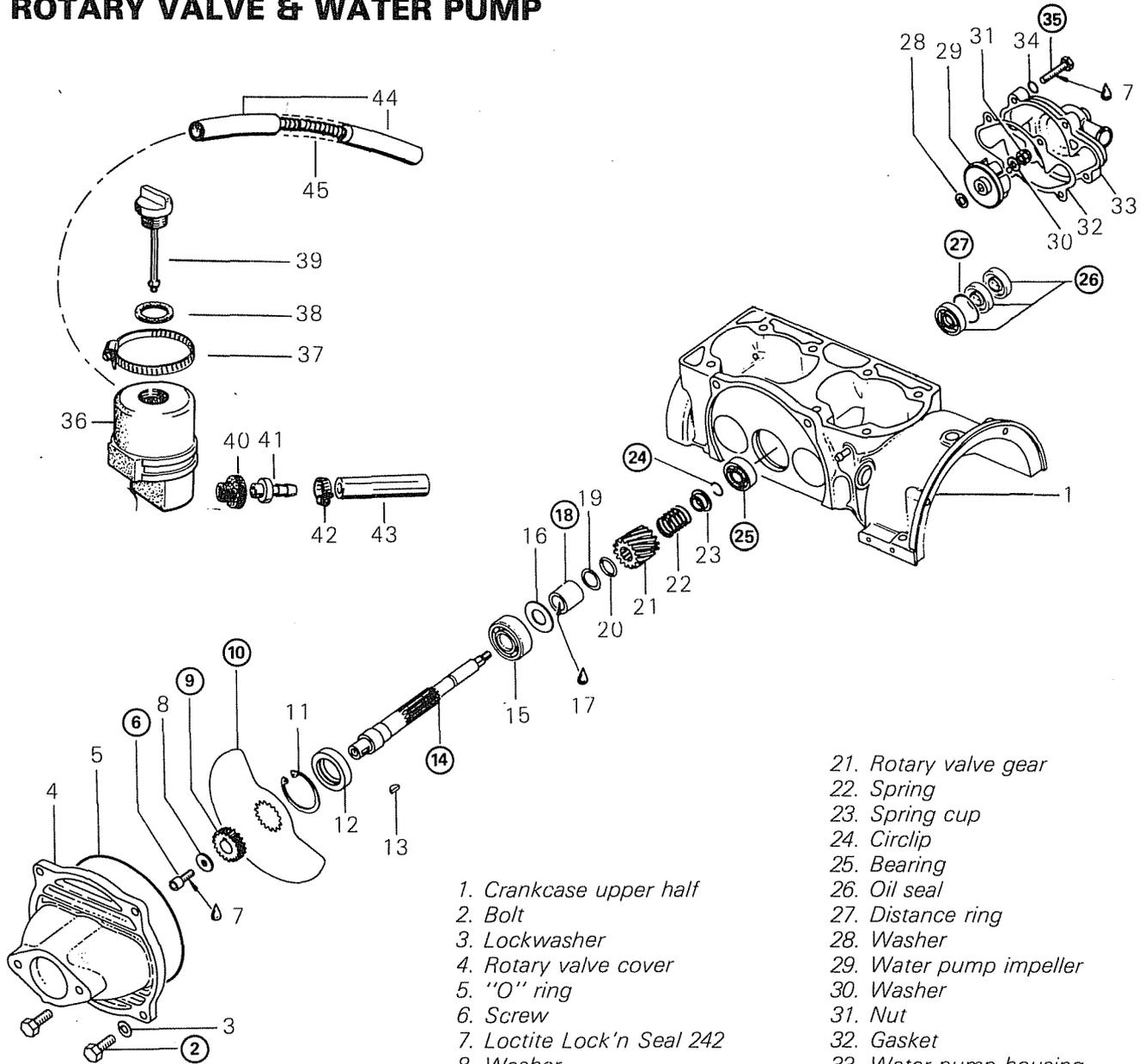
㉗



To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support, as illustrated.

SECTION 04  
SUB-SECTION 02, (ENGINES)

**ROTARY VALVE & WATER PUMP**



- |                             |                         |
|-----------------------------|-------------------------|
| 1. Crankcase upper half     | 21. Rotary valve gear   |
| 2. Bolt                     | 22. Spring              |
| 3. Lockwasher               | 23. Spring cup          |
| 4. Rotary valve cover       | 24. Circlip             |
| 5. "O" ring                 | 25. Bearing             |
| 6. Screw                    | 26. Oil seal            |
| 7. Loctite Lock'n Seal 242  | 27. Distance ring       |
| 8. Washer                   | 28. Washer              |
| 9. Rotary valve pinion      | 29. Water pump impeller |
| 10. Disc                    | 30. Washer              |
| 11. Circlip                 | 31. Nut                 |
| 12. Oil seal                | 32. Gasket              |
| 13. Woodruff key            | 33. Water pump housing  |
| 14. Rotary valve shaft      | 34. Sealing ring        |
| 15. Bearing                 | 35. Bolt                |
| 16. Shim 0.5 mm             | 36. Oil tank            |
| 17. Loctite Lock'n Seal 271 | 37. Hose clamp          |
| 18. Distance sleeve 24.5 mm | 38. Gasket              |
| 19. Shim 0.5 mm             | 39. Oil tank cap        |
| 20. "O" ring                | 40. Grommet             |
|                             | 41. Hose connector      |
|                             | 42. Hose clamp          |
|                             | 43. Hose 41 cm          |
|                             | 44. Hose 18 cm          |
|                             | 45. Spring              |

## ROTARY VALVE & WATER PUMP

### CLEANING

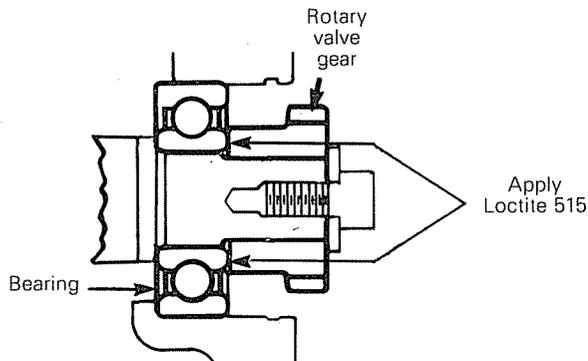
Discard all oil seals and "O" rings.

Remove old crankcase sealant from rotary valve gear, adjacent bearing and cap mating surface.

Clean all metal components in a non-ferrous metal cleaner.

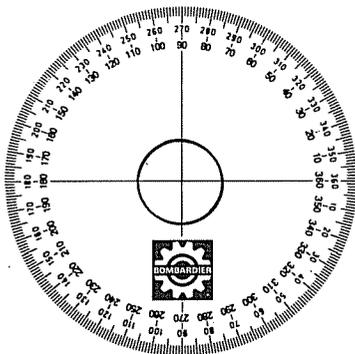
### DISASSEMBLY & ASSEMBLY

- ② Torque to 20 N•m (15 ft-lbs).
- ⑥ Apply Loctite Lock'n Seal 242 on threads.
- ⑦ At assembly, apply crankcase sealant (Loctite 515) on bearing and rotary valve gear mating surfaces.

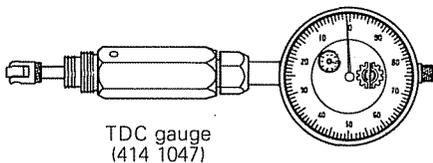


- ⑩ Rotary valve adjustment with replaced crankcase having no timing marks.

#### REQUIRED TOOLS



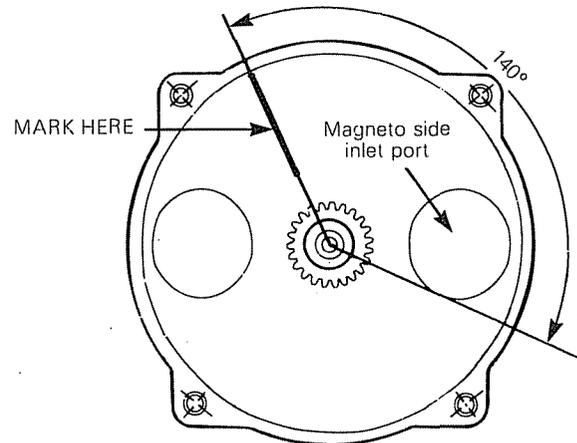
Angle finder  
(414 3529)



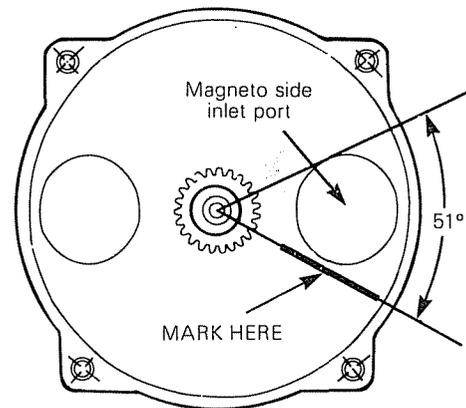
TDC gauge  
(414 1047)

1978 444 type: 140° BTDC opening  
51° ATDC closing

Using angle finder, mark crankcase at 140° from bottom edge of magneto side inlet port.



From top edge of magneto side inlet port, mark crankcase at 51°.

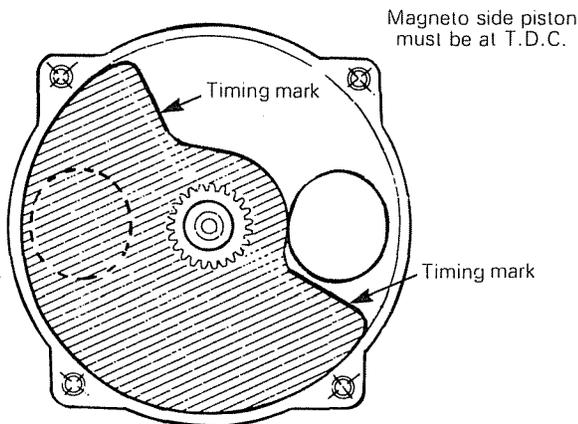


**SECTION 04**  
**SUB-SECTION 02, (ENGINES)**

To correctly install the rotary valve disc proceed as follows:

- Turning crankshaft counter-clockwise, (drive pulley side) bring magneto side piston to Top Dead Center using a T.D.C. gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

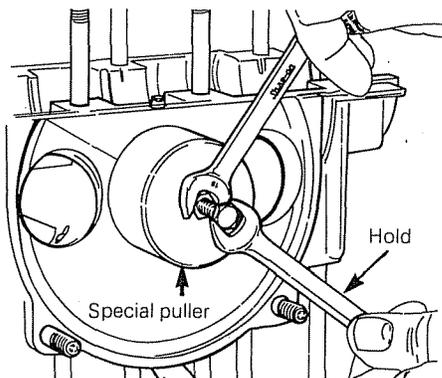
○ **NOTE:** The rotary valve disc is asymmetrical, therefore, at assembly try positioning each side of disc on gear to determine best installation position.



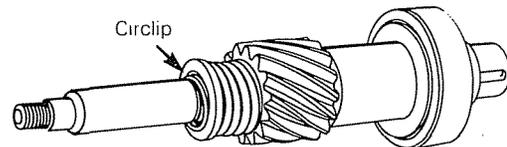
⑭ through ⑳ Rotary valve shaft assembly.

To remove rotary valve shaft assembly from crankcase, first remove water pump impeller ⑳ and circlip.

⑪ Position special puller over shaft bore and screw puller bolt into rotary valve shaft. While holding puller bolt, turn puller nut clockwise until shaft comes out.



If it is necessary to disassemble components of rotary valve shaft assembly, install assembly carefully in a vise compressing spring cup ㉓ in order to remove circlip ㉔.

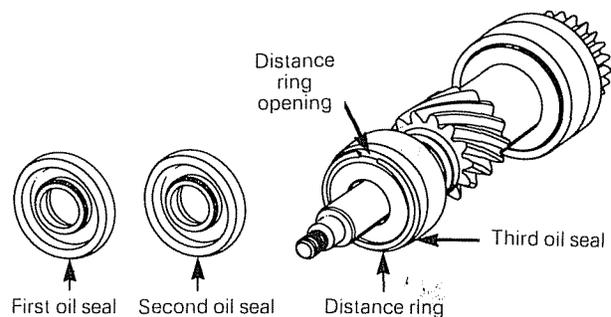


⑱ Clean rotary valve shaft and inside of distance sleeve. At assembly, apply Loctite Lock'n Seal 271 inside of distance sleeve.

㉕ Using a suitable pusher, push water pump bearing with shield facing rotary valve disc.

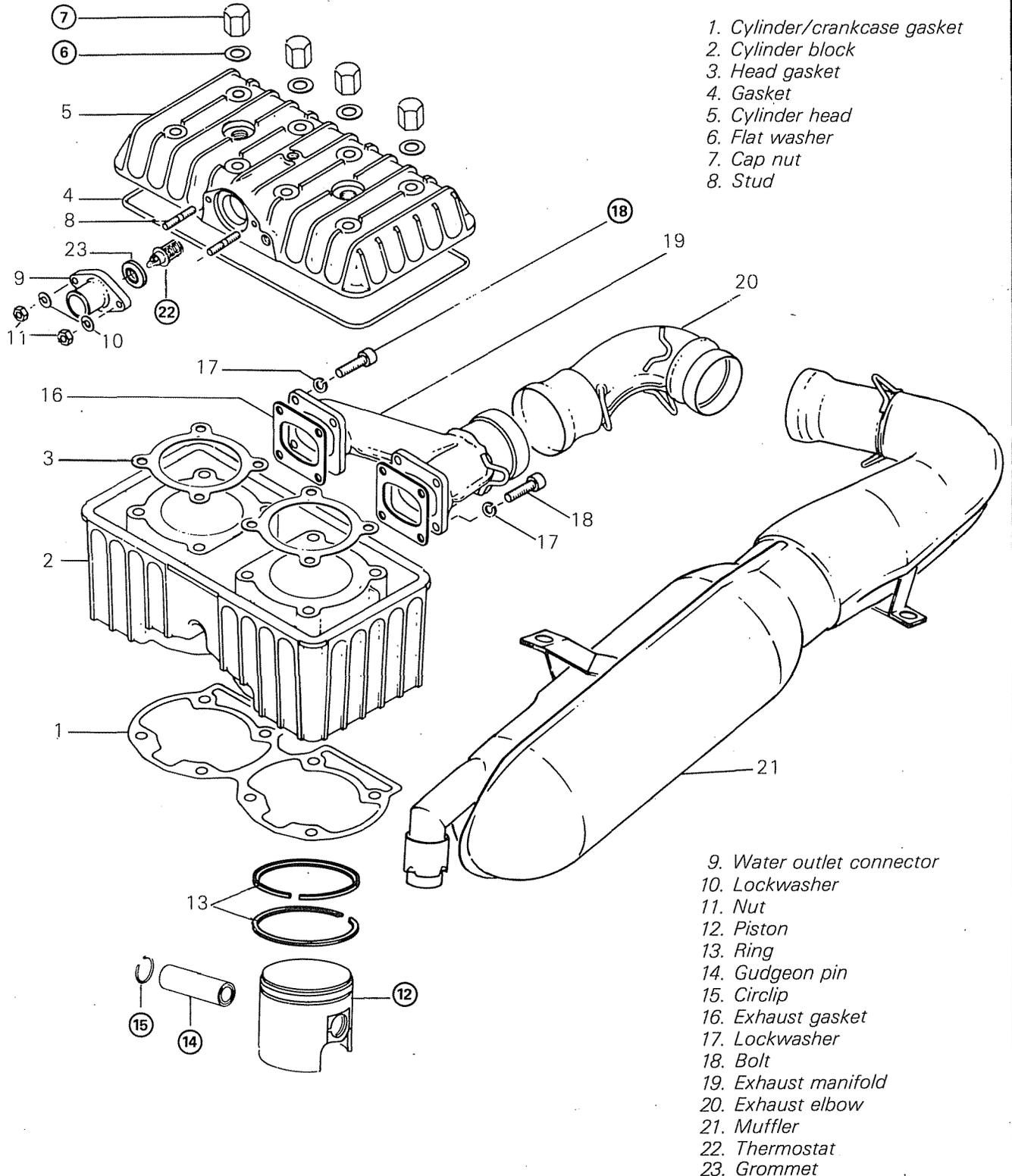
㉖ ㉗ From water pump side, using a suitable pusher, install oil seals (with lithium grease on lips) as per illustration, keeping in mind that:

- distance ring opening must be in line with crankcase draining hole.
- 35% of the area between first and second oil seal (first oil seal being flush with crankcase) must be filled with lithium grease or equivalent.



㉘ Apply Loctite Lock'n Seal 242 on threads.

**TOP END**



- 1. Cylinder/crankcase gasket
- 2. Cylinder block
- 3. Head gasket
- 4. Gasket
- 5. Cylinder head
- 6. Flat washer
- 7. Cap nut
- 8. Stud

- 9. Water outlet connector
- 10. Lockwasher
- 11. Nut
- 12. Piston
- 13. Ring
- 14. Gudgeon pin
- 15. Circlip
- 16. Exhaust gasket
- 17. Lockwasher
- 18. Bolt
- 19. Exhaust manifold
- 20. Exhaust elbow
- 21. Muffler
- 22. Thermostat
- 23. Grommet

SECTION 04  
SUB-SECTION 02, (ENGINES)

**TOP END**

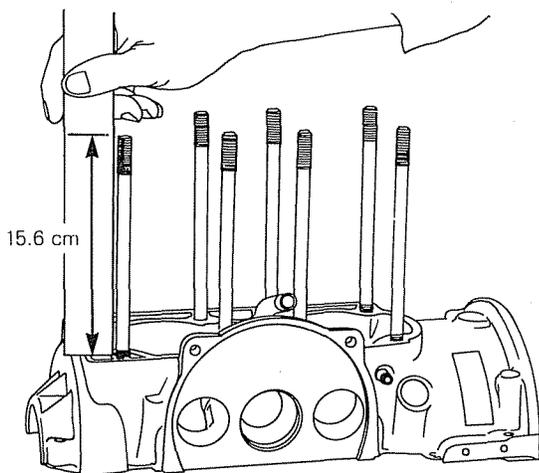
**CLEANING**

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

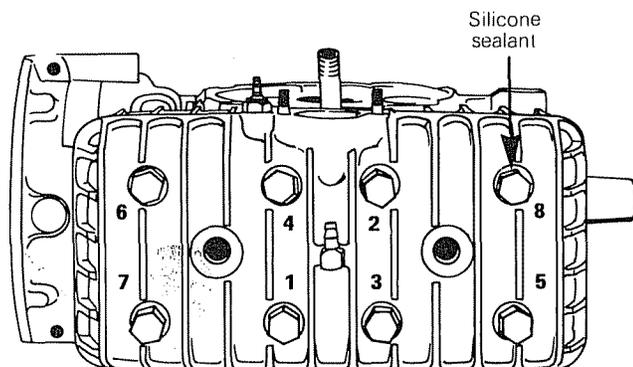
**DISASSEMBLY & ASSEMBLY**

⑥⑦ Because of cap nuts, cylinder studs have to be screwed into crankcase so they do not protrude further than 15.6 cm (6.140"). If it is not possible to obtain this length, a washer must be added between cylinder head and cap nut.



Prior to washers ⑥ installation, apply silicone sealant on washer seat of cylinder head, around stud.

Torque cylinder head nuts to 16 N•m (12 ft-lbs) following illustrated sequence.



⑫⑭⑮ Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

Drive the gudgeon pins in or out using a suitable drive punch and hammer.

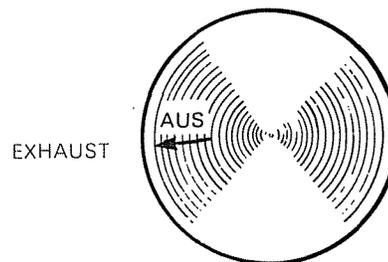
Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ NOTE: The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

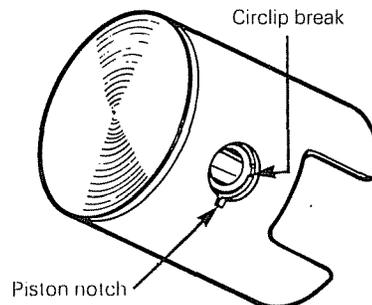
Clean the piston ring with a groove cleaner tool, or with a piece of broken ring.

▼ CAUTION: When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

At assembly, place the pistons over the connecting rods with the letters AUS (over an arrow on the piston dome) facing direction of the exhaust port.



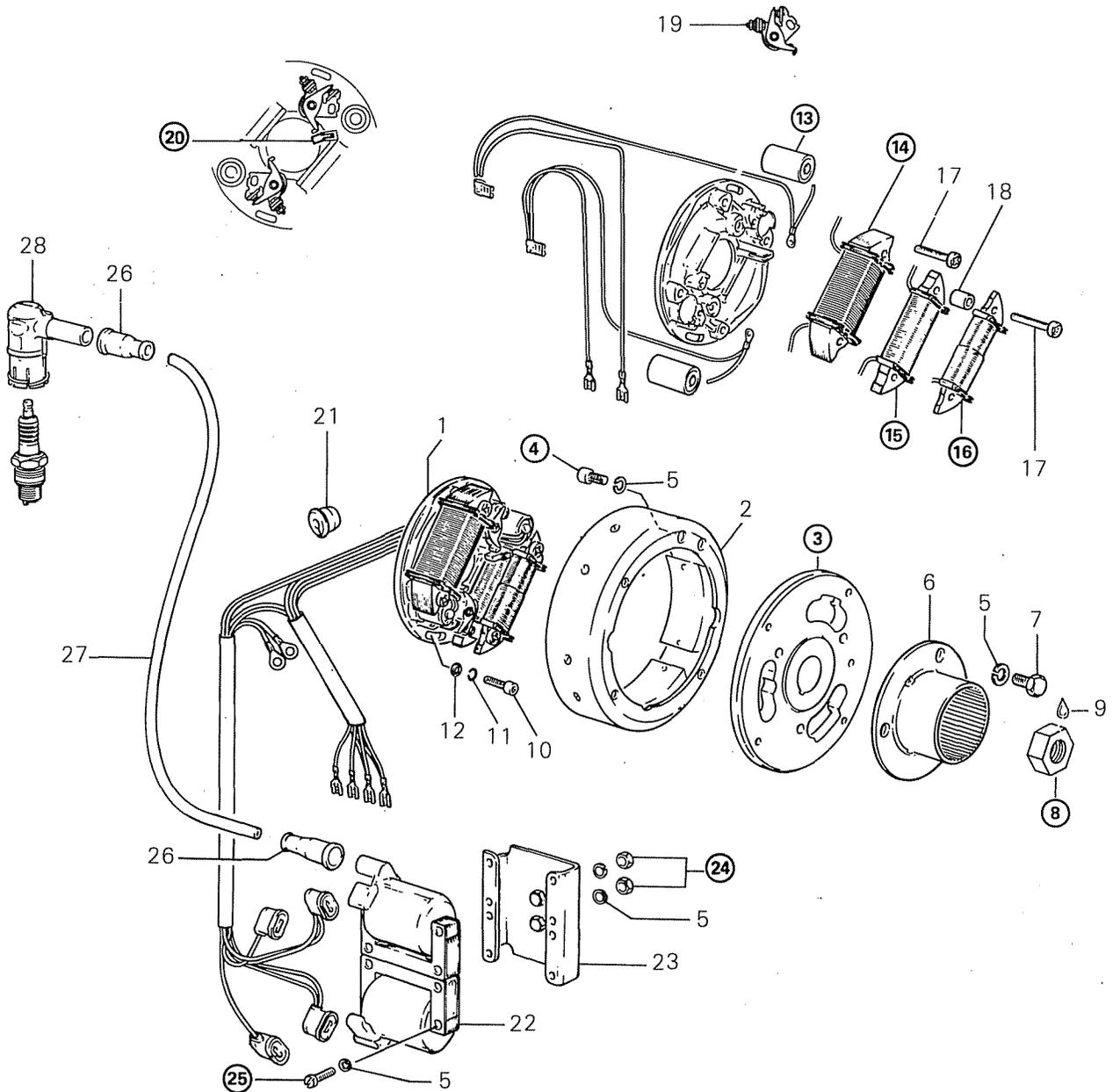
Once the circlips are installed, turn each circlip so that the circlip break is not directly in line with piston notch. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.



⑱ Torque to 14 N•m (10 ft-lbs).

⑳ To check thermostat put it in water and heat water, thermostat should open when water temperature reaches 70°C (160°F).

**MAGNETO**



- 1. Armature plate
- 2. Magneto ring
- 3. Magneto housing
- 4. Screw
- 5. Lockwasher
- 6. Starting pulley
- 7. Bolt
- 8. Magneto retaining nut
- 9. Loctite Lock'n Seal 242

- 10. Screw
- 11. Lockwasher
- 12. Flat washer
- 13. Capacitor
- 14. Lighting coil 110W
- 15. Generator coil
- 16. Lighting coil 30W
- 17. Screw
- 18. Distance sleeve 11 mm

- 19. Breaker point
- 20. Lubricating wick
- 21. Wire grommet
- 22. Ignition coil
- 23. Coil support
- 24. Nut
- 25. Screw
- 26. Protection cap
- 27. H.T. cable
- 28. Spark plug protector

SECTION 04  
SUB-SECTION 02, (ENGINES)

## MAGNETO

### CLEANING

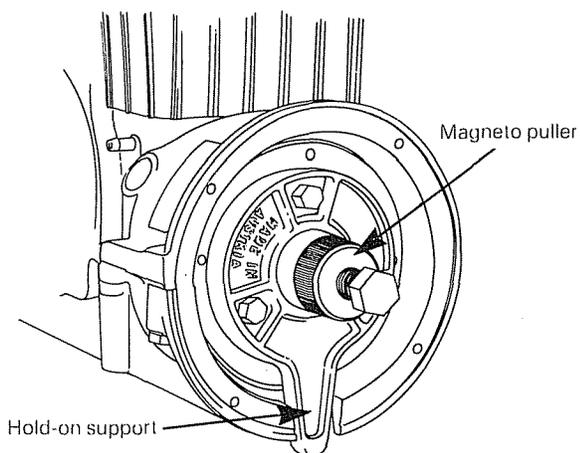
Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

### DISASSEMBLY & ASSEMBLY

③ ⑧ With magneto retaining nut removed and hold-on support in place, install special puller onto hub.

Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 or equivalent.

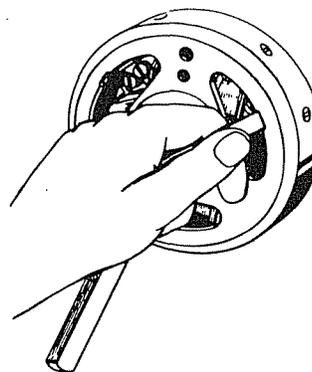
Install magneto retaining nut (with Loctite Lock'n Seal 242 on threads) and torque to 81 N•m (60 ft-lbs).

④ ②④ ②⑤ Apply Loctite Lock'n Seal 242 on threads.

⑬ To replace a capacitor, it is first necessary to unsolder the black lead. The capacitor can then be driven out of the armature plate using a suitable pusher and hammer. To reinstall, inverse procedure.

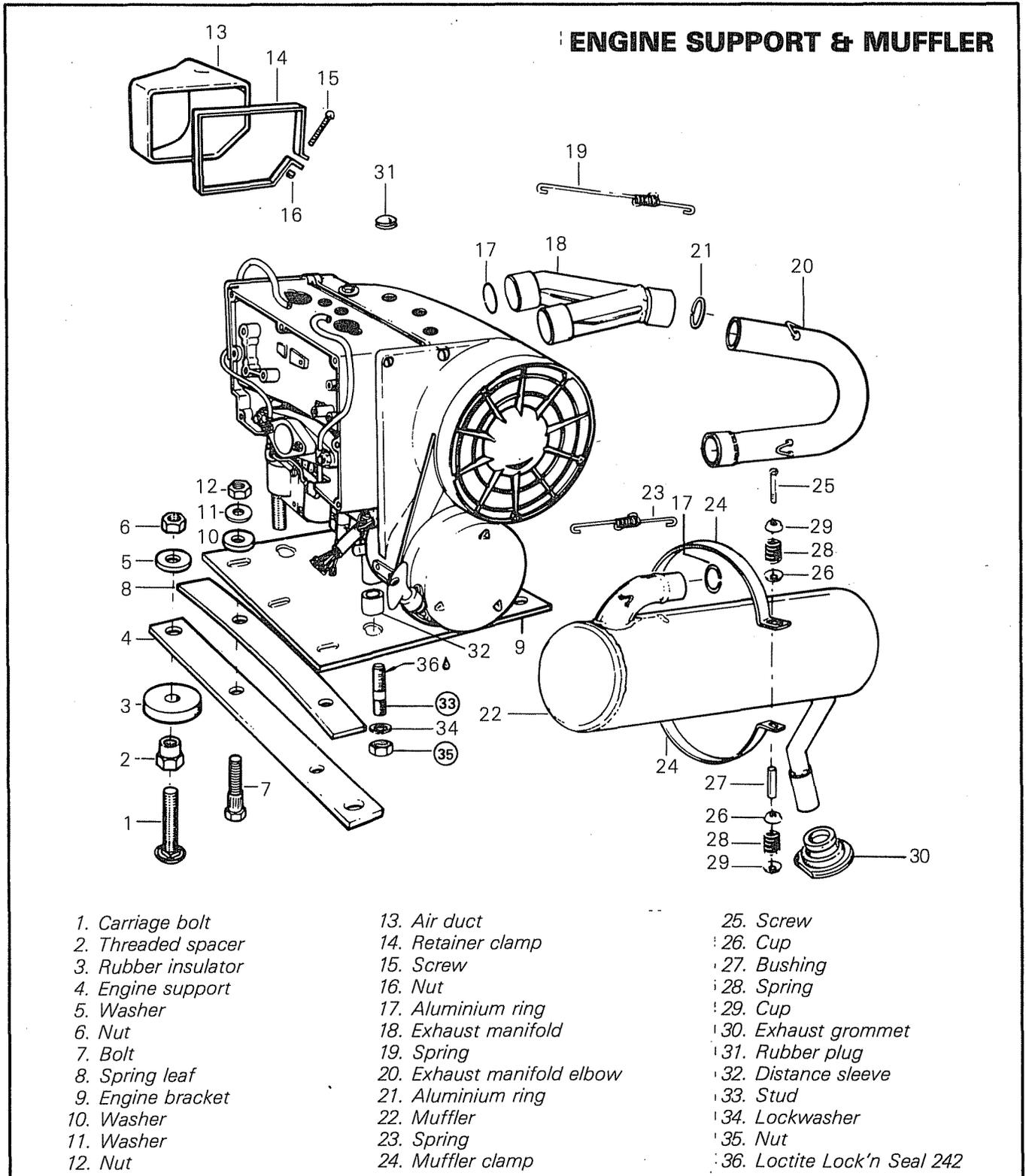
⑭ ⑮ ⑯ Whenever a coil is replace, the air gap (distance between coil end and magnet) must be adjusted.

To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



⑳ When replacing breaker point set, apply a light coat of grease on lubricating wick.

**| 640 ENGINE TYPE**



SECTION 04  
SUB-SECTION 02, (ENGINES)

## ENGINE SUPPORT & MUFFLER

### REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle.

- Drive belt.
- Muffler.
- Air intake silencer tube.
- Choke cable at carburetor.
- Throttle cable at carburetor.
- Fuel lines at carburetor.

○ **NOTE:** Secure fuel lines so that the opened ends are higher than the fuel level in the tank.

- Disconnect negative cable (ground) from battery, then disconnect electrical connections leading to engine.
- Console.
- Engine mount nuts.

### DISASSEMBLY & ASSEMBLY

③③ At assembly on crankcase, apply Loctite Lock'n Seal 242 or equivalent on threads.

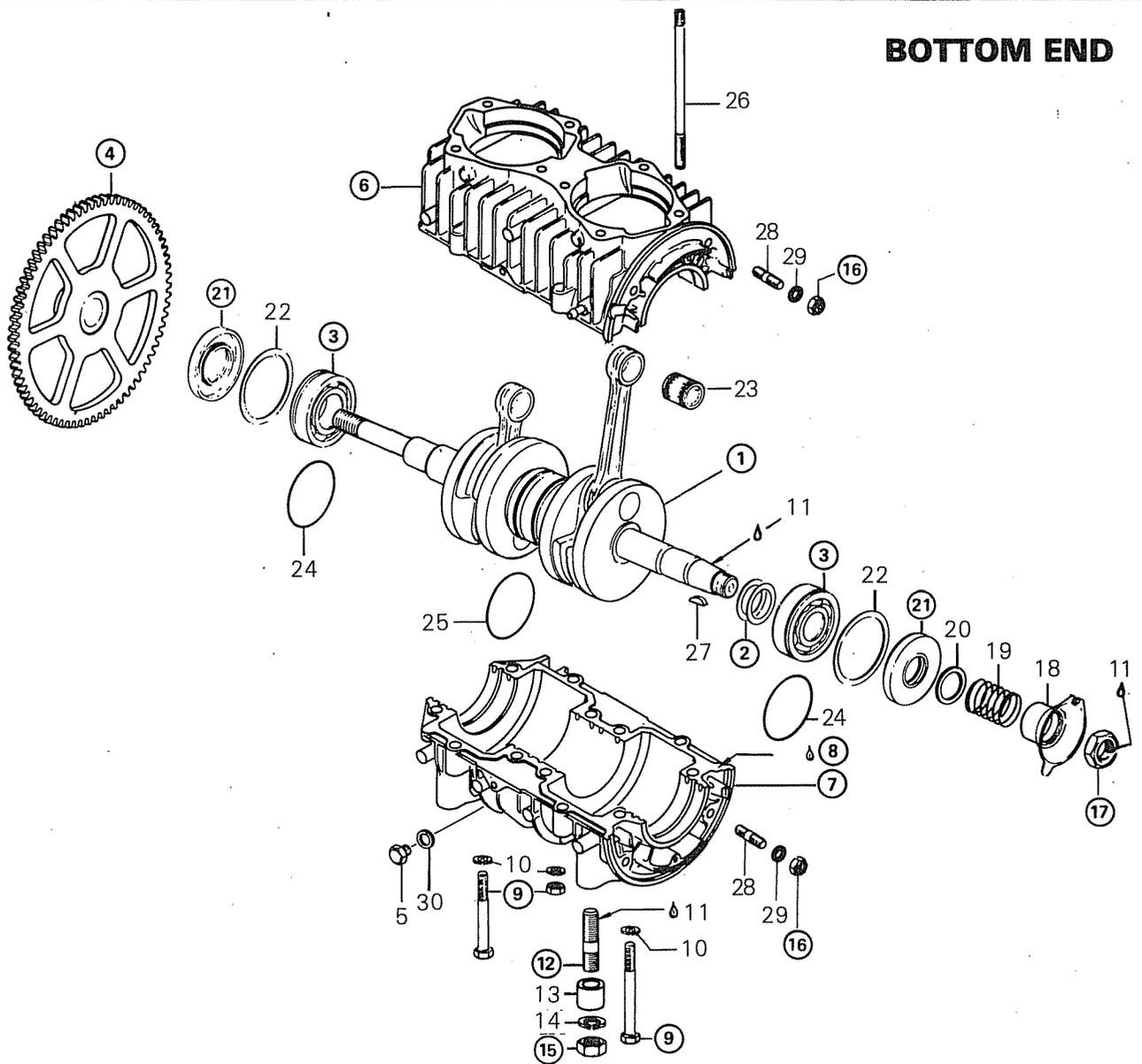
③⑤ Torque to 43 N•m (32 ft-lbs).

### INSTALLATION IN VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle opening.
- Check pulley alignment.

**BOTTOM END**



- 1. Crankshaft
- 2. Shim(s)
- 3. Bearing
- 4. Starter gear
- 5. Screw
- 6. Crankcase upper half
- 7. Crankcase lower half
- 8. Loctite 515
- 9. Bolt or stud with nut
- 10. Lockwasher

- 11. Loctite Lock'n Seal 242
- 12. Stud
- 13. Spacer bushing
- 14. Lockwasher
- 15. Nut
- 16. Nut
- 17. Nut (magneto)
- 18. Breaker point cam
- 19. Spring
- 20. Washer

- 21. Oil seal
- 22. Retaining washer
- 23. Needle cage bearing
- 24. "O" ring (bearing)
- 25. "O" ring
- 26. Stud
- 27. Woodruff key
- 28. Stud
- 29. Washer
- 30. Sealing ring

## BOTTOM END

### CLEANING

Discard all oil seals, gaskets, "O" rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper.

▼ **CAUTION:** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

### DISASSEMBLY & ASSEMBLY

#### General

Refer to Technical Data Section for component fitted tolerance and wear limit.

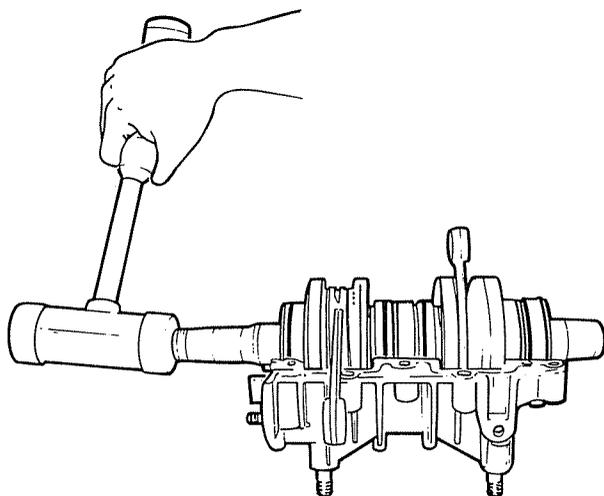
①② Crankshaft end-play (0.1 mm (.004") maximum) is adjusted with shim(s) located between crankshaft and magneto side bearing. To determine correct amount of shim(s), proceed as follows.

○ **NOTE:** Crankshaft end-play requires adjustment only when crankshaft and/or crankcase is replaced.

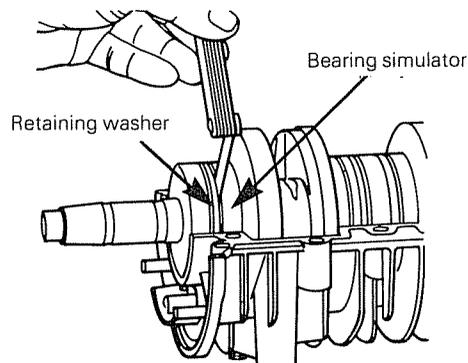
Remove magneto side bearing and existing shim(s). Slide the bearing simulator (no. 420 876 160) and the retaining washer on the crankshaft. (See Tools Section).

Position crankshaft assembly into crankcase lower half. Make sure that retaining washers are correctly seated in the grooves.

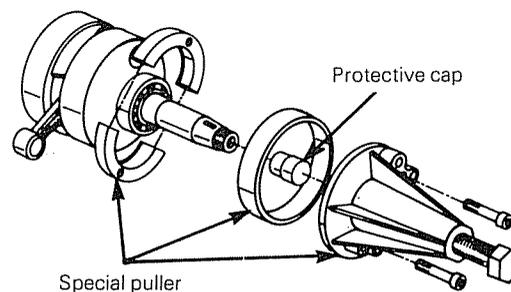
Gently tap crankshaft counterweight (mag. side) until P.T.O. side bearing bears against retaining washer.



Any free-play between the bearing simulator and magneto side retaining washer, minus 0.1 mm (.004") maximum end-play, is the distance to be covered by shim(s). Shims are available in the thickness of 0.15 mm (.006"), 0.2 mm (.008"), 0.3 mm (.012").



③ To remove bearing from crankshaft use a protective cap and special puller, as illustrated. (See Tools Section).

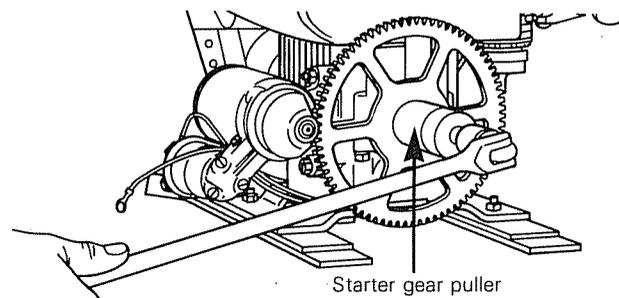


Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F) for 10 min. This will expand bearings and ease installation.

Install bearings with groove outward.

○ **NOTE:** Prior to magneto side bearing installation, determine crankshaft end-play and install required shim(s) on crankshaft extension.

④ To remove starter gear from crankshaft it may be necessary to use a special puller as illustrated. (See Tools Section).



SECTION 04  
SUB-SECTION 02, (ENGINES)

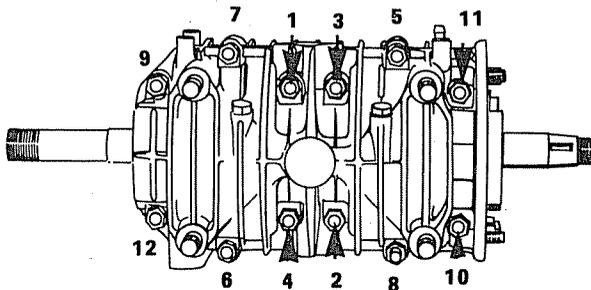
At assembly, apply a light coat of anti-seize compound on crankshaft extension nearest starter gear.

⑥⑦⑧Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

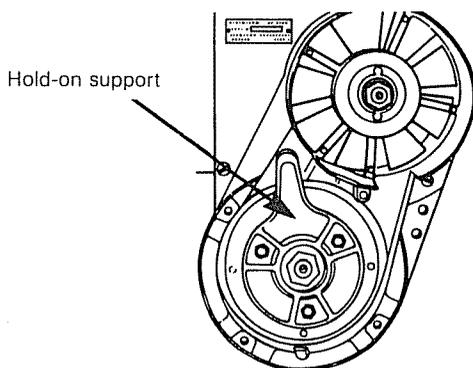
Prior to joining of crankcase halves, apply Loctite 515 (no. 413-7027) on mating surfaces.

Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque nuts (or bolts) to 22 N•m (16 ft-lbs) following illustrated sequence.



- ⑨ Torque to 22 N•m (16 ft-lbs).
- ⑫ At assembly on crankcase, apply Loctite Lock'n Seal 242 or equivalent on threads.
- ⑮ Torque to 44 N•m (32 ft-lbs).
- ⑯ Torque to 22 N•m (16 ft-lbs).
- ⑰ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tools Section).

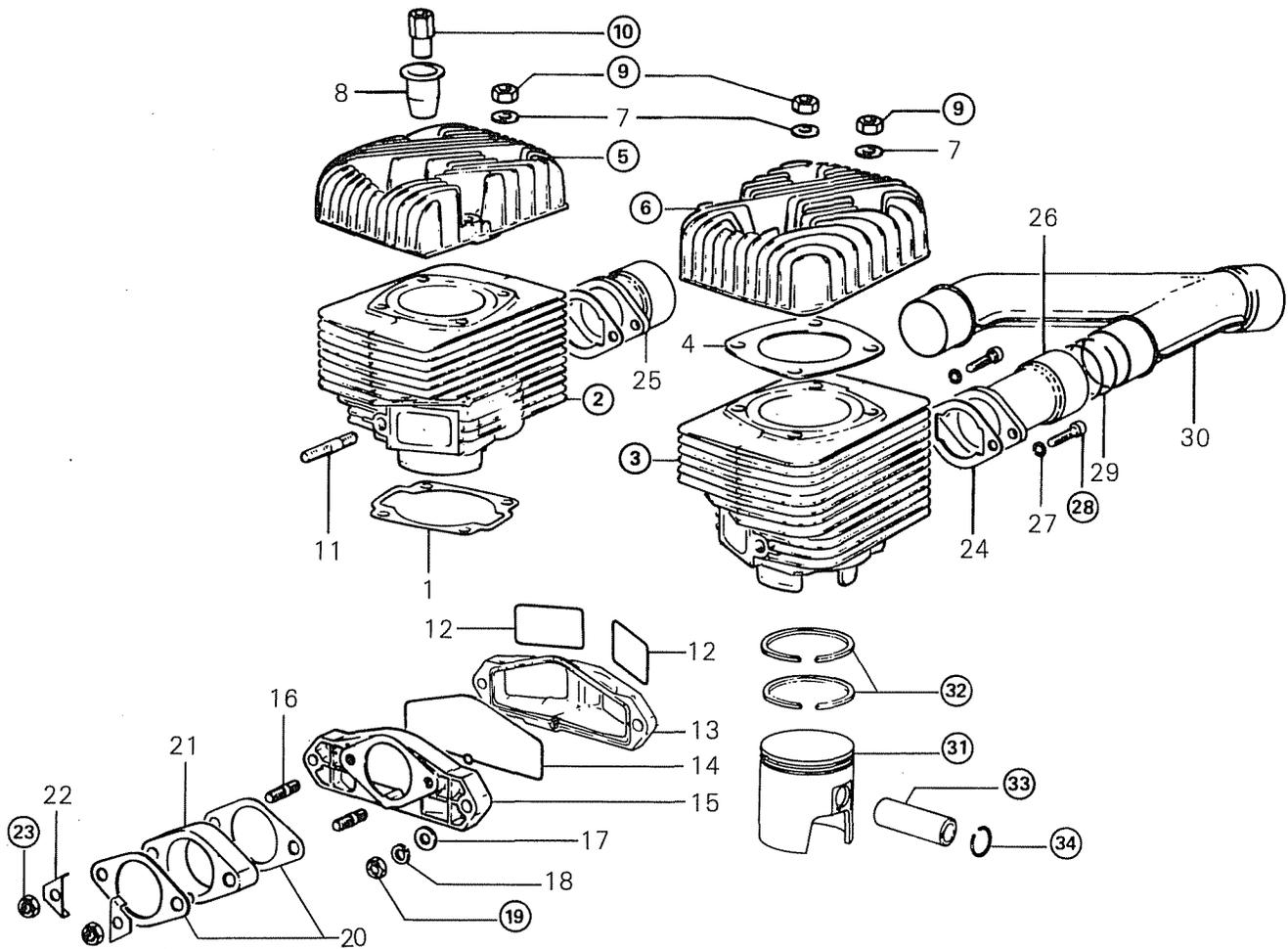


At assembly, apply Loctite Lock'n Seal 242 or equivalent on threads then torque to 118 N•m (87 ft-lbs).

⑳ At assembly, apply a light coat of lithium grease on seal lip. Seal outer surface should be flush with crankcase.

SECTION 04  
SUB-SECTION 02, (ENGINES)

**TOP END**



- |                                |                             |
|--------------------------------|-----------------------------|
| 1. Gasket (cylinder/crankcase) | 18. Lockwasher              |
| 2. Cylinder (P.T.O.)           | 19. Nut                     |
| 3. Cylinder (Mag)              | 20. Gasket                  |
| 4. Gasket (head, cylinder)     | 21. Insulating flange       |
| 5. Cylinder head (P.T.O.)      | 22. Locking tab             |
| 6. Cylinder head (Mag)         | 23. Nut                     |
| 7. Flat washer                 | 24. Exhaust gasket          |
| 8. Support sleeve              | 25. Exhaust socket (P.T.O.) |
| 9. Nut                         | 26. Exhaust socket (Mag)    |
| 10. Distance nut               | 27. Lockwasher              |
| 11. Stud                       | 28. Screw                   |
| 12. Gasket                     | 29. Sealing ring            |
| 13. Intake manifold            | 30. Exhaust manifold        |
| 14. Gasket                     | 31. Piston                  |
| 15. Intake cover               | 32. Ring                    |
| 16. Stud                       | 33. Gudgeon pin             |
| 17. Washer                     | 34. Circlip                 |

## TOP END

### CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

NOTE: The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

### DISASSEMBLY & ASSEMBLY

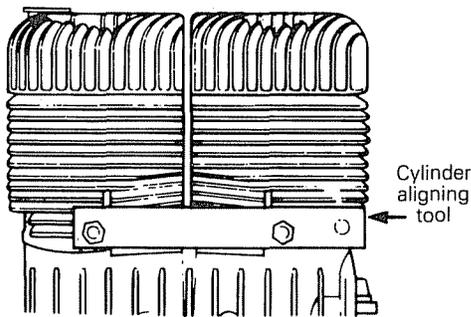
NOTE: Refer to Technical Data for component fitted tolerance and wear limit.

2 3 5 6 When installing cylinder and/or cylinder head, the cylinder aligning tool must be used to ensure sealing of intake manifold and exhaust. (See Tools Section).

Install muffler on exhaust socket then install aligning bar.

Cross torque cylinder head nuts to 20 N•m (15 ft-lbs).

NOTE: Torque each cylinder head individually.



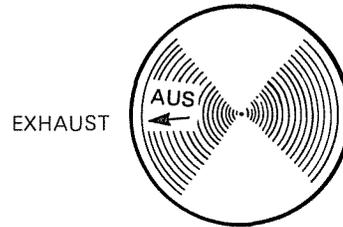
9 10 Torque cylinder head nuts to 20 N•m (15 ft-lbs).

19 23 28 Torque to 20 N•m (15 ft-lbs).

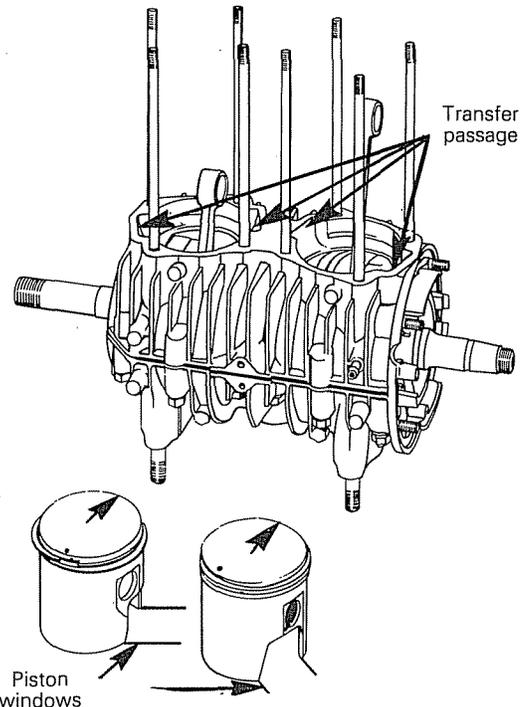
31 33 34 Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

**CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

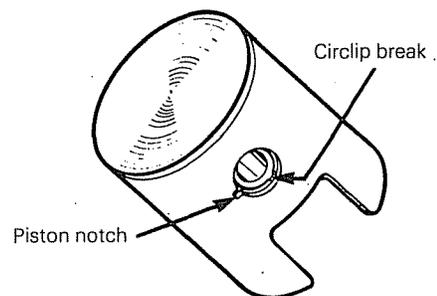
At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow to the piston dome) facing in direction of the exhaust port.



Also make sure that the piston windows are aligned with the crankcase transfer passages when the gudgeon pin orifice is in-line with the connecting rod bore.

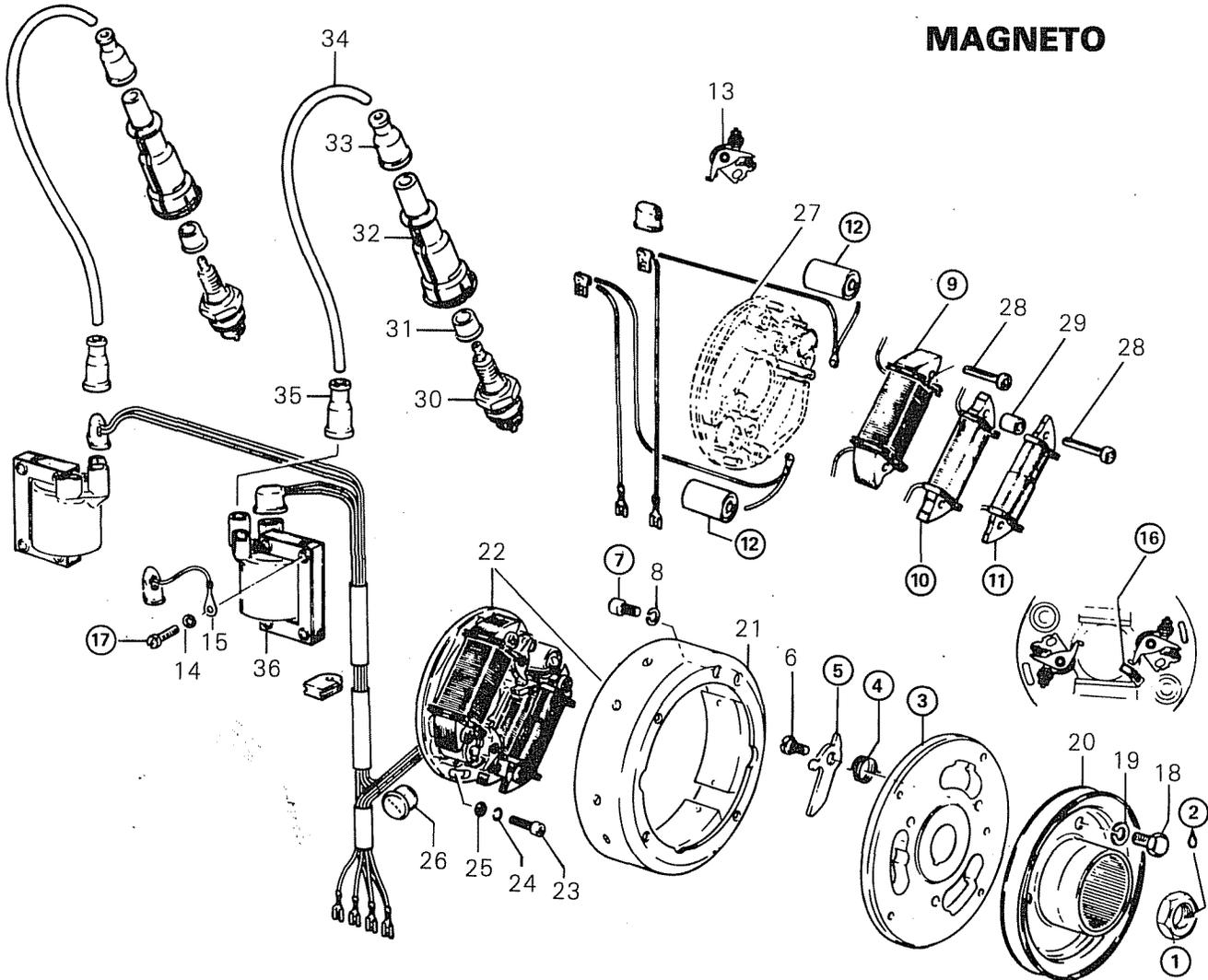


NOTE: Once circlips are installed turn each circlip so the circlip break is not directly on piston notch. Remove any burrs from piston caused through circlip installation using very fine emery cloth.



SECTION 04  
SUB-SECTION 02, (ENGINES)

**MAGNETO**



- |                            |                       |                           |
|----------------------------|-----------------------|---------------------------|
| 1. Nut                     | 13. Breaker point set | 25. Washer                |
| 2. Loctite Lock'n Seal 242 | 14. Lockwasher        | 26. Wire grommet          |
| 3. Magneto housing         | 15. Ground wire       | 27. Armature plate        |
| 4. Spring                  | 16. Lubricating wick  | 28. Screw                 |
| 5. Centrifugal weight      | 17. Screw             | 29. Distance sleeve 11 mm |
| 6. Screw                   | 18. Screw             | 30. Spark plug            |
| 7. Screw                   | 19. Lockwasher        | 31. Sealing sleeve        |
| 8. Lockwasher              | 20. Starting pulley   | 32. Spark plug protector  |
| 9. Lighting coil 110 W     | 21. Magneto ring      | 33. Protection cap        |
| 10. Generating coil        | 22. Armature          | 34. H.T. cable            |
| 11. Lighting coil 30 W     | 23. Screw             | 35. Protection cap        |
| 12. Capacitor              | 24. Lockwasher        | 36. Ignition coil         |

## MAGNETO

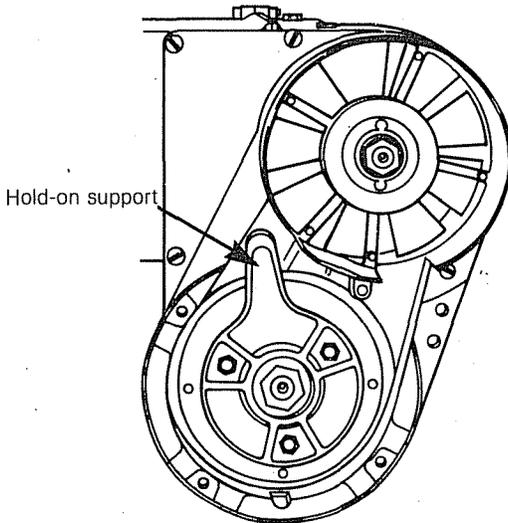
### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

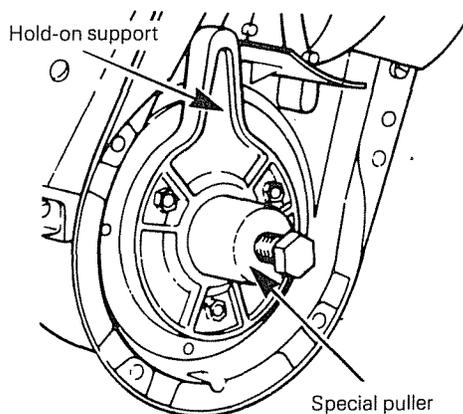
### DISASSEMBLY & ASSEMBLY

①②③ To remove or install magneto retaining nut, lock crankshaft in position with special hold-on support as illustrated. (See Tools Section).

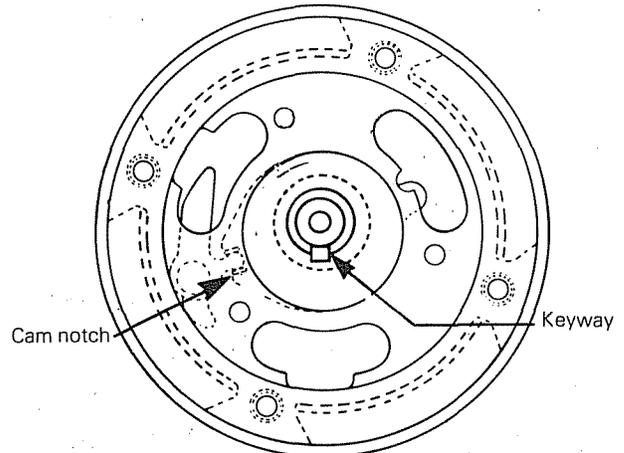


With magneto retaining nut remove and hold-on support in place, install special puller onto hub.

Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.



At assembly, clean crankshaft extension (taper) then apply Loctite Lock'n Seal 242 or equivalent.



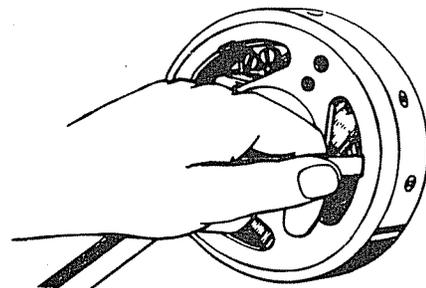
Install magneto retaining nut (with Loctite Lock'n Seal 242 on threads) and torque to 118 N•m (87 ft-lbs).

④⑤ At assembly, apply a small amount of low temperature grease into spring seat.

⑦ At assembly, apply Loctite Lock'n Seal 242 on retaining screw threads.

⑨⑩⑪ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted.

To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



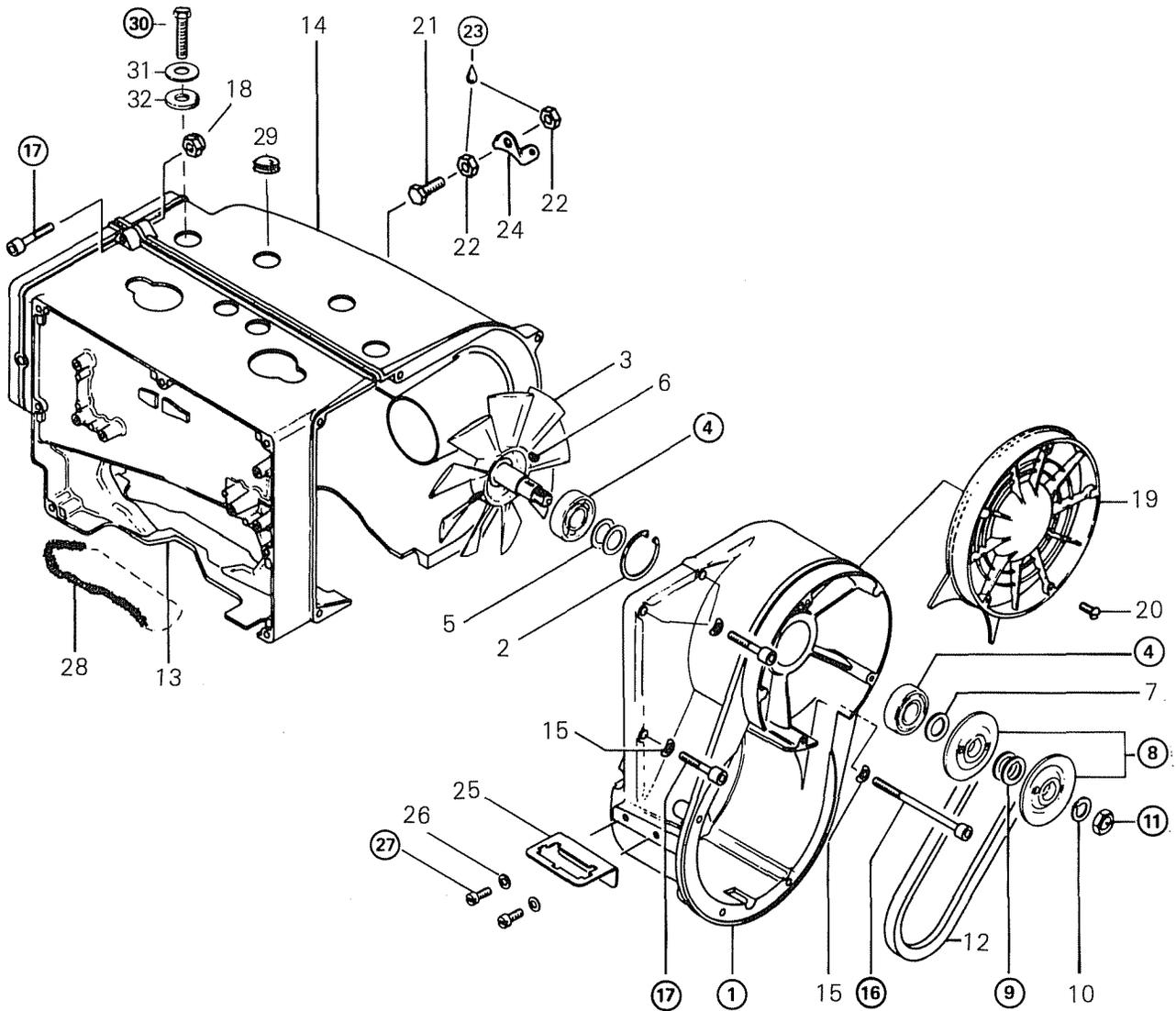
⑫ Pour remplacer un condensateur, dessouder d'abord les deux (2) fils noirs. To replace a capacitor, it is first necessary to unsolder the two (2) black leads. The capacitor can then be driven out of the armature plate using a suitable pusher and hammer. To reinstall, inverse procedure.

⑬ When replacing breaker point set, apply a light coat of grease on lubricating wick.

⑰ Apply Loctite Lock'n Seal 242 on threads.

SECTION 04  
SUB-SECTION 02, (ENGINES)

**COOLING SYSTEM**



- 1. Fan housing
- 2. Circlip
- 3. Fan
- 4. Bearing
- 5. Washer (2)
- 6. Woodruff key
- 7. Washer
- 8. Pulley half
- 9. Shim
- 10. Lockwasher
- 11. Nut

- 12. Belt
- 13. Air deflector (intake)
- 14. Air deflector (exhaust)
- 15. Spring washer
- 16. Screw
- 17. Screw
- 18. Nut
- 19. Fan cover
- 20. Screw
- 21. Bolt
- 22. Nut

- 23. Loctite Lock'n Seal 242
- 24. Spring bracket
- 25. Junction block bracket
- 26. Lockwasher
- 27. Screw
- 28. Sealer (intake/deflector)
- 29. Plug
- 30. Bolt
- 31. Washer
- 32. Washer

## COOLING SYSTEM

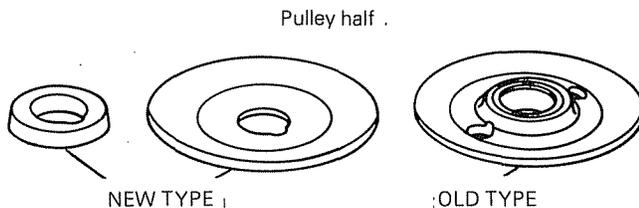
### CLEANING

Clean all metal components in a non-ferrous metal cleaner.

### DISASSEMBLY & ASSEMBLY

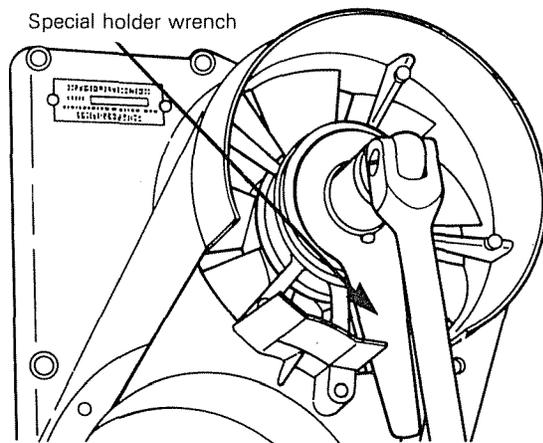
①④ It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

⑧ Newer pulley half does not have a shoulder on its inner face so it is installed with a 6 mm (0.236") spacer.



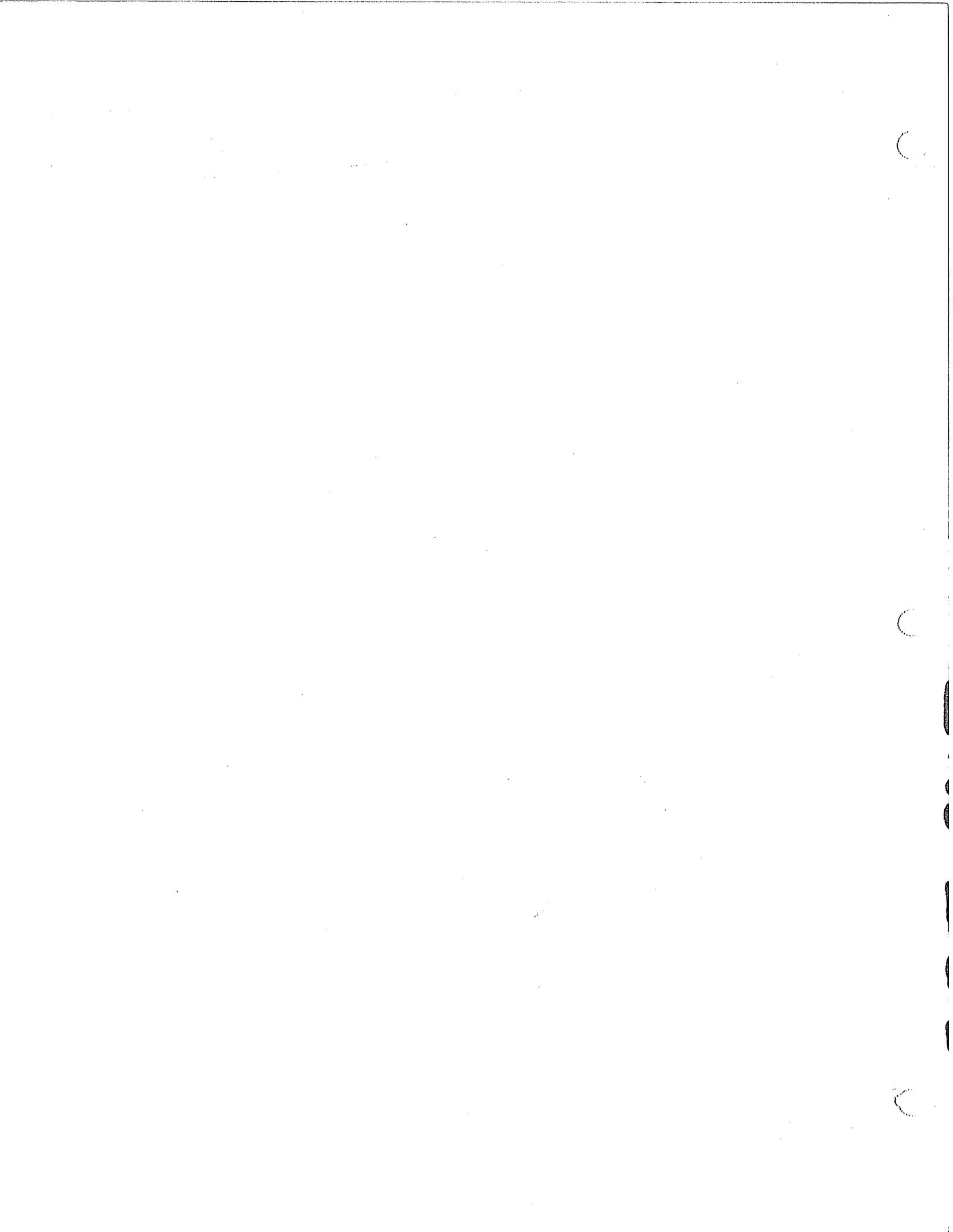
⑨ Shim(s) located between pulley halves are used to adjust fan belt free-play. Correct free-play is 6 mm (1/4"). If necessary to adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between outer pulley half and washer.

⑪ Lock fan pulley with special holder wrench to remove or install pulley retaining nut. (See Tools Section).

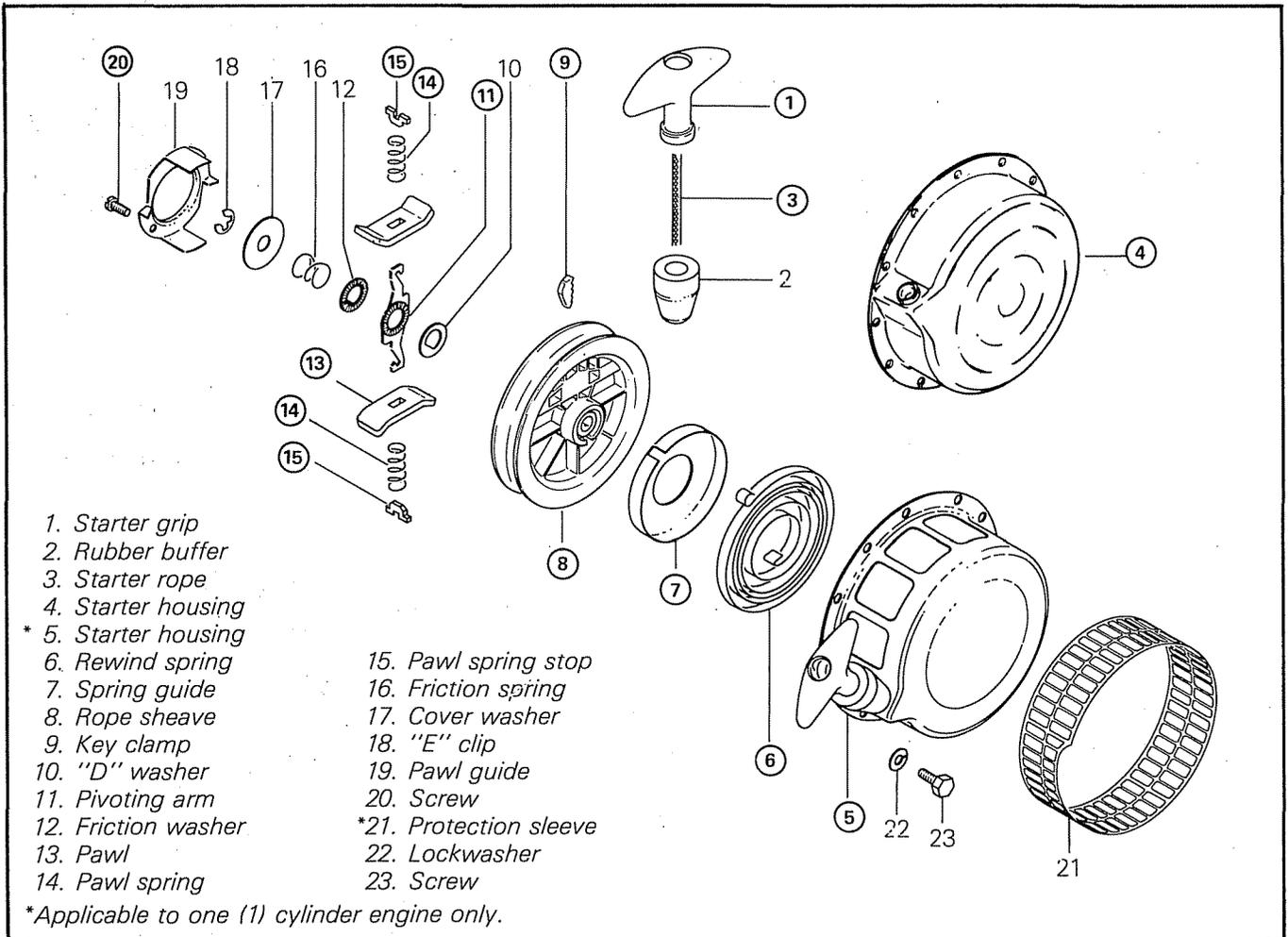


At assembly, torque to 62 N•m (46 ft-lbs).

⑩ ⑰ ⑲ ⑳ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ At assembly, apply a light coat of Loctite "Lock'n Seal 242" on threads. It should be noted that to correctly remove a Loctite locked screw, it is first necessary to slightly tap on head screw to break Loctite bond. The screw can then be removed. This will eliminate the possibility of screw breakage.



## REWIND STARTER



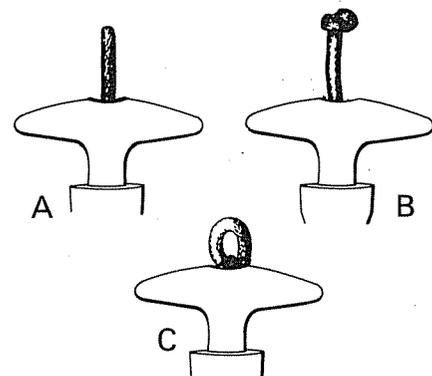
### REMOVAL

Remove bolts and washers securing rewind starter to engine, then remove rewind starter.

○ **NOTE:** On some models, the cab requires supporting before removing starter housing. The retaining cable is attached to one of the rewind starter attaching bolts.

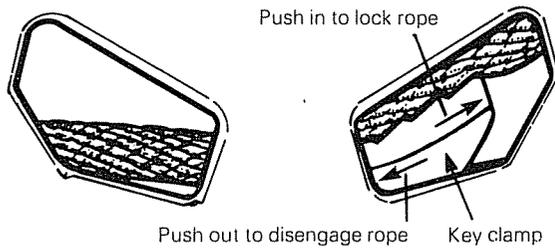
### DISASSEMBLY & ASSEMBLY

①③ Prior to installing starter grip on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter grip, and tie a knot in the rope end. Fuse the knot with a lit match then turn the knot down and pull the starter grip over the knot.



**SECTION 04**  
**SUB-SECTION 03, (REWIND STARTER)**

③ ⑧ ⑨ To remove rope from rewind starter mechanism, fully extend rope and hold rope sheave in position. Then using a pointed tool, disengage key clamp and pull rope free.

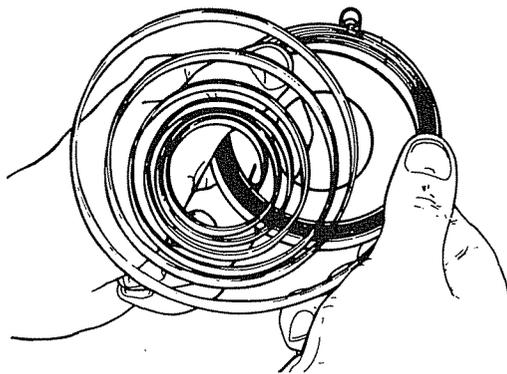


To install rope, proceed as follow:

- Rotate sheave counter-clockwise six (6) turns to achieve correct recoil tension. Hold in position.
- While holding sheave under tension, rotate sheave until the starter housing orifice and sheave orifice align.
- Insert rope through both orifices until rope is visible in the key clamp housing.
- Position the key clamp in its housing then push in to lock the rope.

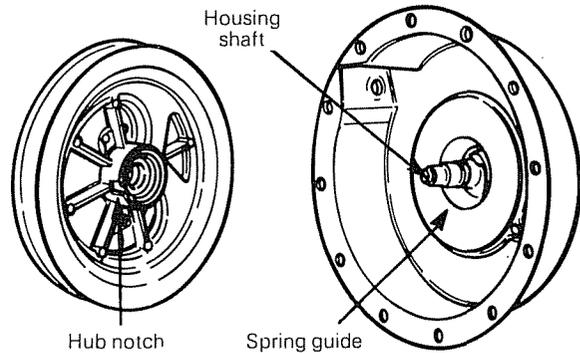
④ ⑤ ⑥ ⑦ At assembly, position spring outer end into spring guide notch then wind the spring clockwise into guide.

**WARNING:** Since the spring is tightly wound inside the guide it may fly out when the guide is manipulated. Always handle with care.



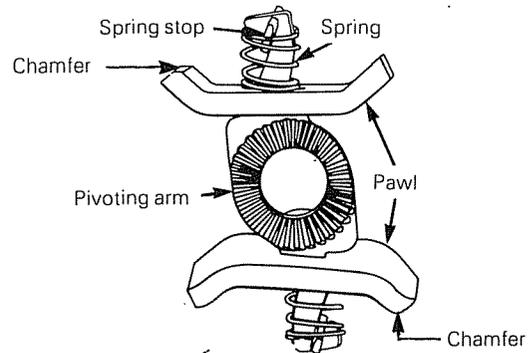
Before installing spring ass'y into starter housing, lubricate spring with light machine oil. Also apply low temperature grease on housing shaft base.

Position spring assembly into starter housing as illustrated, then place rope sheave into starter housing making sure that the sheave hub notch engages in the spring hook.

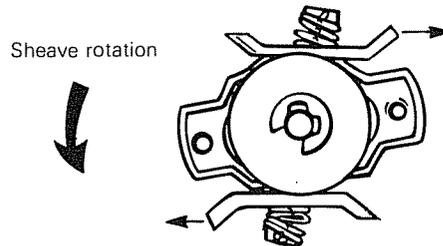


⑧ ⑩ Plastic rope sheaves and metal rope sheaves are interchangeable. However it is recommended to use the appropriate screws with plastic rope sheaves.

⑪ ⑬ ⑭ ⑮ Position pawls, springs and spring stops on pivoting arm as illustrated.



Install and secure pivoting arm assembly within rope sheave hub, making sure that the assembly moves clockwise when the rope sheave is turned counter-clockwise.



Reinstall pawl guide onto sheave (it may be necessary to pull on starter rope to ease guide installation).

**INSTALLATION**

Reinstall rewind starter on engine and secure with previously removed bolts and washers.

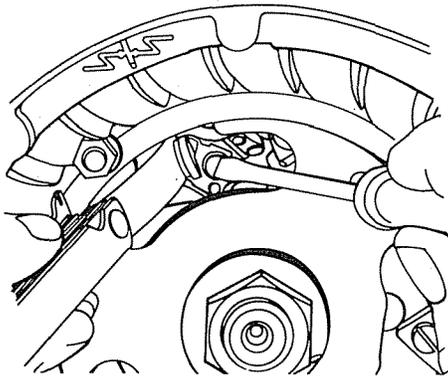
○ NOTE: If applicable, connect cab retaining cable to one (1) of the starter housing bolts.

## IGNITION TIMING — ONE CYLINDER (247 TYPE)

Two methods are detailed in this section; the first using the timing marks stamped on the engine, the second using a Top Dead Center gauge.

### TIMING MARK PROCEDURE

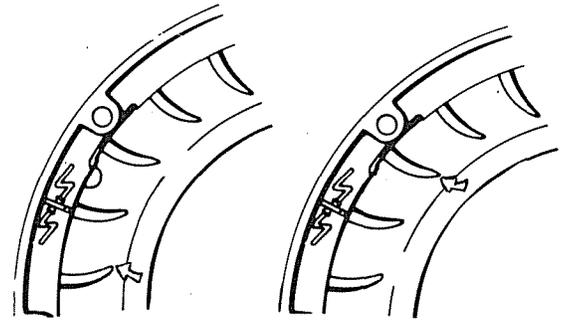
1. Disconnect spark plug wire and remove spark plug.
2. Remove rewind starter assembly from engine then remove the starting pulley from magneto ring.
3. Rotate crankshaft until breaker points, visible through magneto ring opening, are fully opened. Adjust points gap to  $0.40 \text{ mm} \pm 0.05 \text{ mm}$  (.016"  $\pm$  .002") using a feeler gauge and screwdriver as illustrated.



○ NOTE: Breaker points gap can change upon tightening. Always recheck after tightening.

4. Disconnect junction block at engine then connect one lead of a timing light (flashlight type), or a tone timer to the blue wire leading from engine. Connect other to fan cowl (ground).
5. Turn timing instrument ON and rotate crankshaft until timing marks align. Slacken the three (3) armature plate retaining screws then rotate armature plate until timing light fluctuates or tone signal sound level varies.

Retighten retaining screws at this position.



Too early:  
Turn armature  
plate clockwise

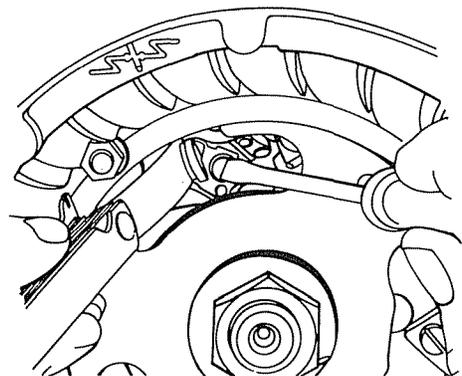
Too late:  
Turn armature  
plate counter-clockwise

○ NOTE: Ignition timing can change upon tightening. Always recheck after tightening.

### TDC GAUGE PROCEDURE

1. Disconnect spark plug wire and remove spark plug.
2. Remove rewind starter assembly from engine then remove the starting pulley from magneto ring.
3. Rotate crankshaft until breaker points, visible through magneto ring opening, are fully open. Adjust points gap to  $0.40 \text{ mm} \pm 0.05 \text{ mm}$  (.016"  $\pm$  .002") using a feeler gauge and screwdriver as illustrated.

○ NOTE: Breaker points gap can change upon tightening. Always recheck after tightening.



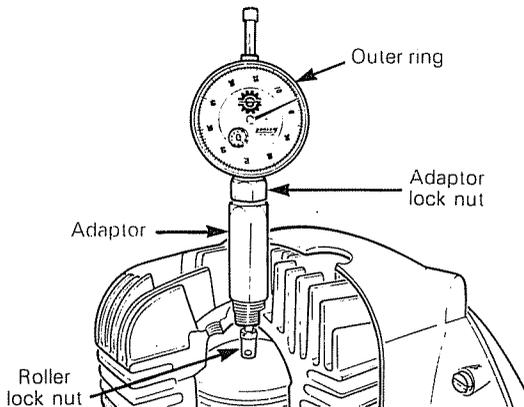
4. Disconnect junction block at engine then connect one lead of a timing instrument (flashlight type) or tone timer, to the blue wire coming from engine. Connect other wire to fan cowl (ground).
5. Install and adjust T.D.C. gauge on engine as follows:

## SECTION 04

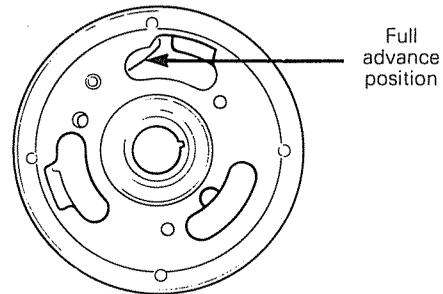
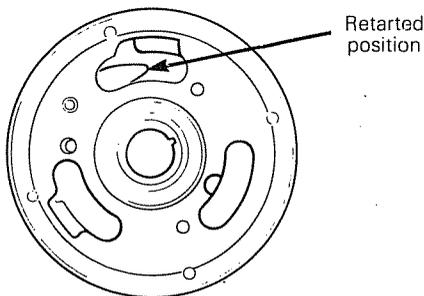
### SUB-SECTION 04, (IGNITION TIMING)

AGE)

- Rotate magneto clockwise until piston is just before top dead center.
- With gauge in adaptor, adjust roller so that it is parallel with dial face. Tighten roller lock nut.



- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.
  - Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
  - Rotate magneto until piston is at Top Dead Center.
  - Unlock outer ring of dial and turn it until "0" on dial aligns with pointer.
  - Lock outer ring in position.
6. Slacken the three (3) armature plate retaining screws and turn timing instrument ON.
  7. Rotate magneto counter-clockwise until piston is at  $3.98 \text{ mm} \pm 0.25$  (.157"  $\pm$  .010) B.T.D.C. (before top dead center). Hold advance mechanism centrifugal lever in full advance position (toward magneto ring) then slowly rotate armature plate until timing light fluctuates or until tone signal sound level varies. Retighten retaining screws.



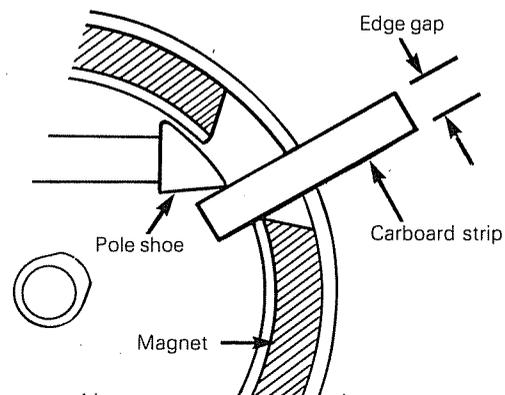
NOTE: Ignition timing can change upon tightening. Always recheck after tightening.

### EDGE GAP VERIFICATION

By following either of the two procedures herein mentioned the edge gap will automatically be adjusted. However, if the edge gap is to be verified, proceed as follows:

From timing marks, rotate magneto clockwise 1/4 of a turn. Hold advance mechanism centrifugal weight in the open position (toward magneto rim) then slowly turn magneto back counter-clockwise until timing light fluctuates or until tone signal sound level increases.

At this point check the distance between pole shoe trailing edge and magnet (edge gap), with a 5 to 8 mm (.200 to .315") wide cardboard strip.



If edge gap is more or less than specified the problem lies within engine internal components (crankshaft out of alignment, broken Woodruff key, loose breaker cam, etc.), corrective measures should be applied.

## IGNITION TIMING – TWO CYLINDER ENGINES (248, 294, 305, 343, 346, 402, 440, 444, 640 TYPES)

### FOREWORD

For timing purposes, it is necessary to separate the twin cylinder engines into two groups.

#### GROUP 1: 248, 294 engine types

These engines do not incorporate an automatic advance mechanism. The ignition timing marks on the magneto ring are stamped at the full advance position.

#### GROUP 2: 305, 343, 346, 402, 440, 444, 640 engine types

These engines incorporate an automatic advance mechanism. The ignition timing marks on the magneto ring are stamped at the full advance position. Therefore, when setting the ignition timing always hold the centrifugal lever at the full advance position.

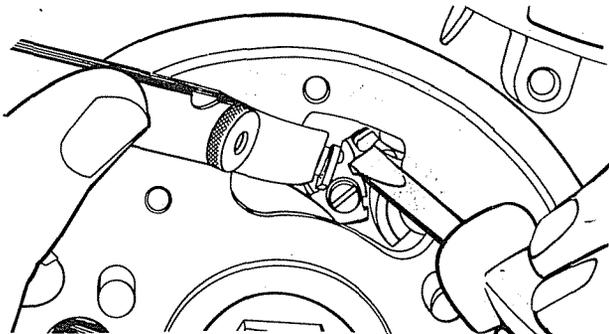
Two methods are detailed in this section; the first using the timing marks stamped on the engine, the second using a Top Dead Center gauge.

### TIMING MARKS PROCEDURE

1. Disconnect spark plug wires and remove spark plugs.
2. Remove rewind starter assembly from engine then remove the fan protector, starting pulley and "V" belt.

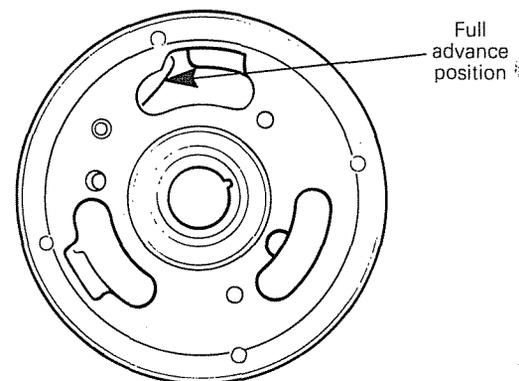
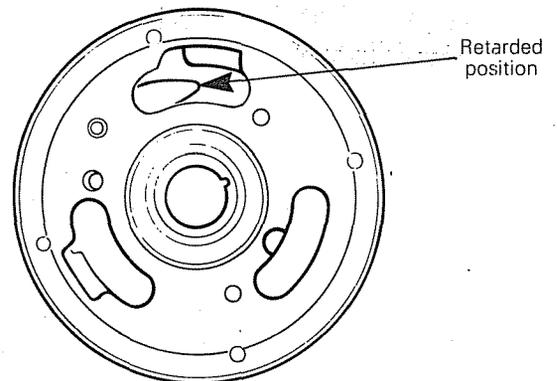
NOTE: The upper breaker points set controls the timing of the magneto side piston and the lower breaker points set controls the P.T.O. side piston.

3. Rotate crankshaft until breaker points, visible through magneto ring opening, are fully opened. Adjust points setting to  $0.40 \text{ mm} \pm 0.05$  ( $.016'' \pm .002$ ) using a feeler gauge and screwdriver, as illustrated. Repeat procedure for other set of points. Adjust both sides equally.



NOTE: Breaker points gap can change upon tightening. Always recheck after tightening.

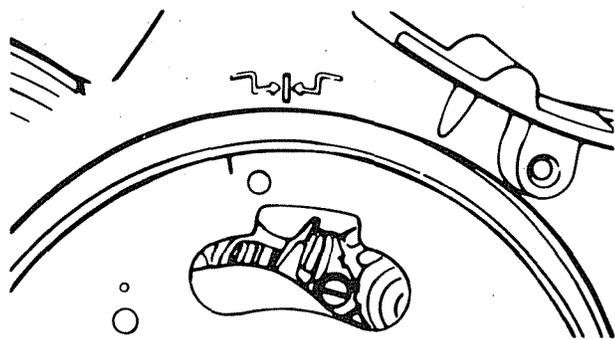
4. Disconnect junction block at engine then connect one lead of a timing light (flashlight type) or of a tone timer, to the blue wire (mag. side) leading from engine. Connect other wire to fan cowl (ground).
5. Slacken the two (2) armature plate retaining screws and turn timing instrument ON. Rotate crankshaft until mag. side piston approaches top dead center and timing marks align (while holding centrifugal lever in the open position, toward magneto rim).



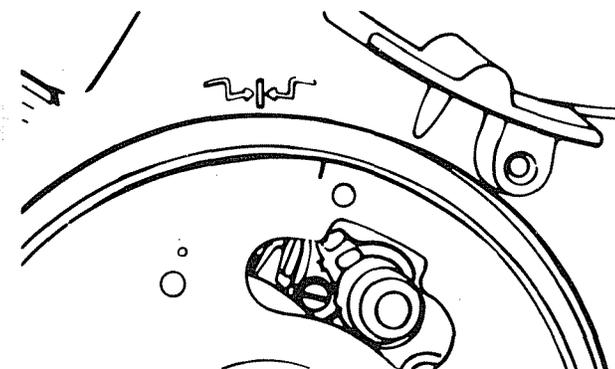
Rotate armature plate until timing light fluctuates or tone signal level varies. Retighten retaining screws.

SECTION 04  
SUB-SECTION 04, (IGNITION TIMING)

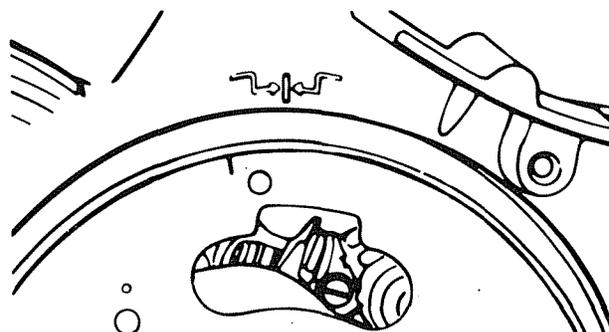
6. Ignition timing can change upon tightening therefore, rotate the magneto counter-clockwise 1/4 of a turn and slowly turn the magneto back in a clockwise direction. As soon as the timing marks align the timing light should fluctuate, or the tone signal level should vary. Readjust if necessary.



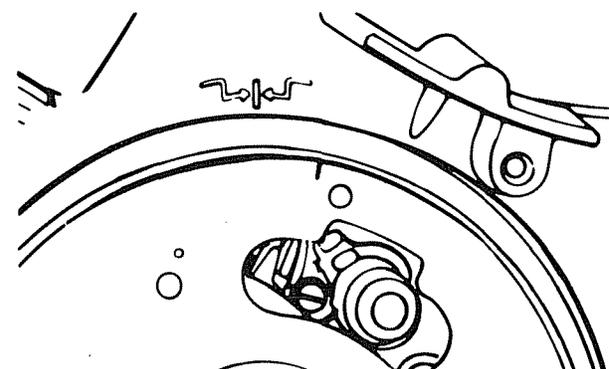
Too early: Turn armature plate clockwise



Too late: Turn armature plate counter-clockwise



Too early: Decrease points gap



Too late: Increase points gap

7. Disconnect timing instrument wire from blue wire then reconnect it to the blue/red wire (P.T.O. side) leading from engine. Rotate crankshaft until P.T.O. side piston approaches top dead center. As soon as timing marks align, timing light should fluctuate, or tone signal sound level should vary. If necessary to adjust, proceed as follows:

- If timing is too early decrease breaker points gap toward lower limit, i.e. 0.35 mm (.014"), then re-check timing.
- If timing is too late increase breaker points gap toward upper limit, i.e. 0.45 mm (.018"), then re-check timing.

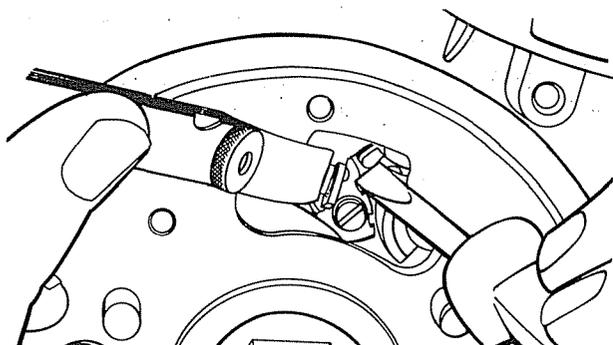
## TDC GAUGE PROCEDURE

1. Disconnect spark plug wires and remove spark plugs.
2. Remove rewind starter assembly from engine then remove the fan protector, starting pulley and "V" belt.

○ NOTE: The upper breaker points set controls the timing of the magneto side piston and the lower breaker points set control the P.T.O. side piston.

3. Rotate crankshaft until breaker points, visible through magneto ring opening are fully open. Adjust points setting to  $0.40 \text{ mm} \pm 0.05$  ( $.016'' \pm .002$ ) using a feeler gauge and screwdriver, as illustrated.

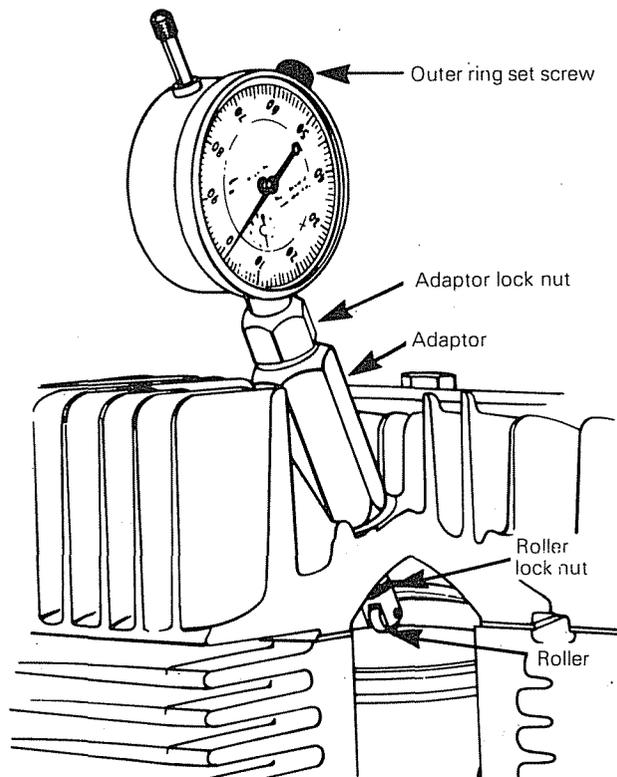
Repeat procedure for other set of points. Adjust both side equally.



○ NOTE: Breaker points gap can change upon tightening. Always recheck after tightening.

4. Disconnect junction block at engine then connect one lead of a timing light (flashlight type) or a tone timer, to the blue wire (mag. side) leading from engine. Connect other wire to fan cowl (ground).
5. Install and adjust T.D.C. gauge on engine as follows.
  - Rotate magneto until mag. side piston is just before top dead center.

- With gauge in adaptor, adjust roller so that it is parallel with dial face. Tighten roller lock nut.

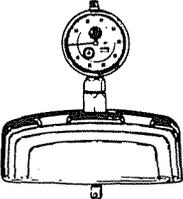
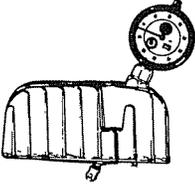


- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in mag. side spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
- Rotate magneto until mag. side piston is at top dead center.
- Unlock outer ring of dial and turn it until "0" on dial aligns with pointer.
- Lock outer ring in position.

**SECTION 04**  
**SUB-SECTION 04, (IGNITION TIMING)**

6. Slacken the two (2) armature plate retaining screws and turn timing instrument ON.

Rotate magneto counter-clockwise until specified piston position before top dead center is reached.

Engine type	Direct measurement B.T.D.C.	Indirect measurement B.T.D.C.
		
248	2.22 mm ± 0.25 (.087" ± .010)	2.29 mm ± 0.25 (.090" ± .010)
294	2.39 mm ± 0.25 (.094" ± .010)	2.49 mm ± 0.25 (.098" ± .010)
305, 343, 402	2.11 mm ± 0.25 (.083" ± .010)	2.46 mm ± 0.25 (.097" ± .010)
346	2.52 mm ± 0.25 (.100" ± .010)	---
440	3.07 mm ± 0.25 (.121" ± .010)	3.30 mm ± 0.25 (.130" ± .010)
444	2.35 mm ± 0.25 (.092" ± .010)	---
640	3.95 mm ± 0.25 (.156" ± .010)	4.11 mm ± 0.25 (.162" ± .010)

Hold advance mechanism centrifugal lever in full advance position (toward magneto ring) then slowly rotate armature plate until timing light fluctuates or until tone signal sound level varies. Retighten retaining screws.

**NOTE:** Ignition timing can change upon tightening. Always recheck after tightening.

7. Disconnect timing instrument wire from blue wire then reconnect it to the blue/red wire leading from engine. Remove T.D.C. gauge from mag. side and reinstall it on P.T.O. side, as previously detailed.

8. Hold centrifugal lever in full advance position (toward magneto rim) and rotate crankshaft until P.T.O. piston approaches T.D.C. As soon as same specified piston position before top dead center as on mag. side is reached the timing light should fluctuate or tone signal level vary. If necessary to adjust proceed as follows:

With centrifugal lever in full advance position and piston at specified position, slacken lower breaker points set retaining screw then readjust breaker points gap until fluctuates or tone signal level varies.

- If timing is too early decrease breaker points gap toward lower limit, i.e. 0.35 mm (.014"), then recheck timing.
- If timing is too late increase breaker points gap toward upper limit, i.e. 0.45 mm (.018"), then recheck timing.

**NOTE:** Breaker points gap can change upon tightening. Always recheck after tightening.

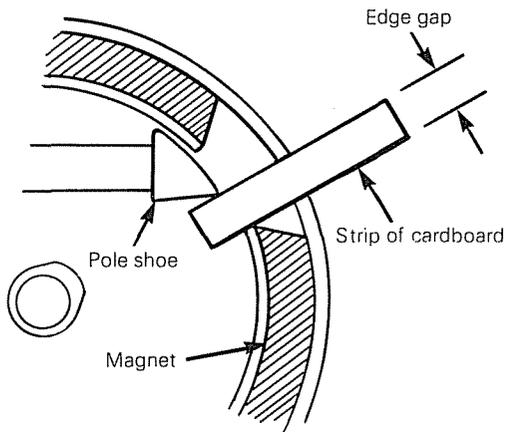
## EDGE GAP VERIFICATION

By following either of the procedures mentioned herein the edge gap will automatically be adjusted. However, if the edge gap is to be verified, proceed as follows:

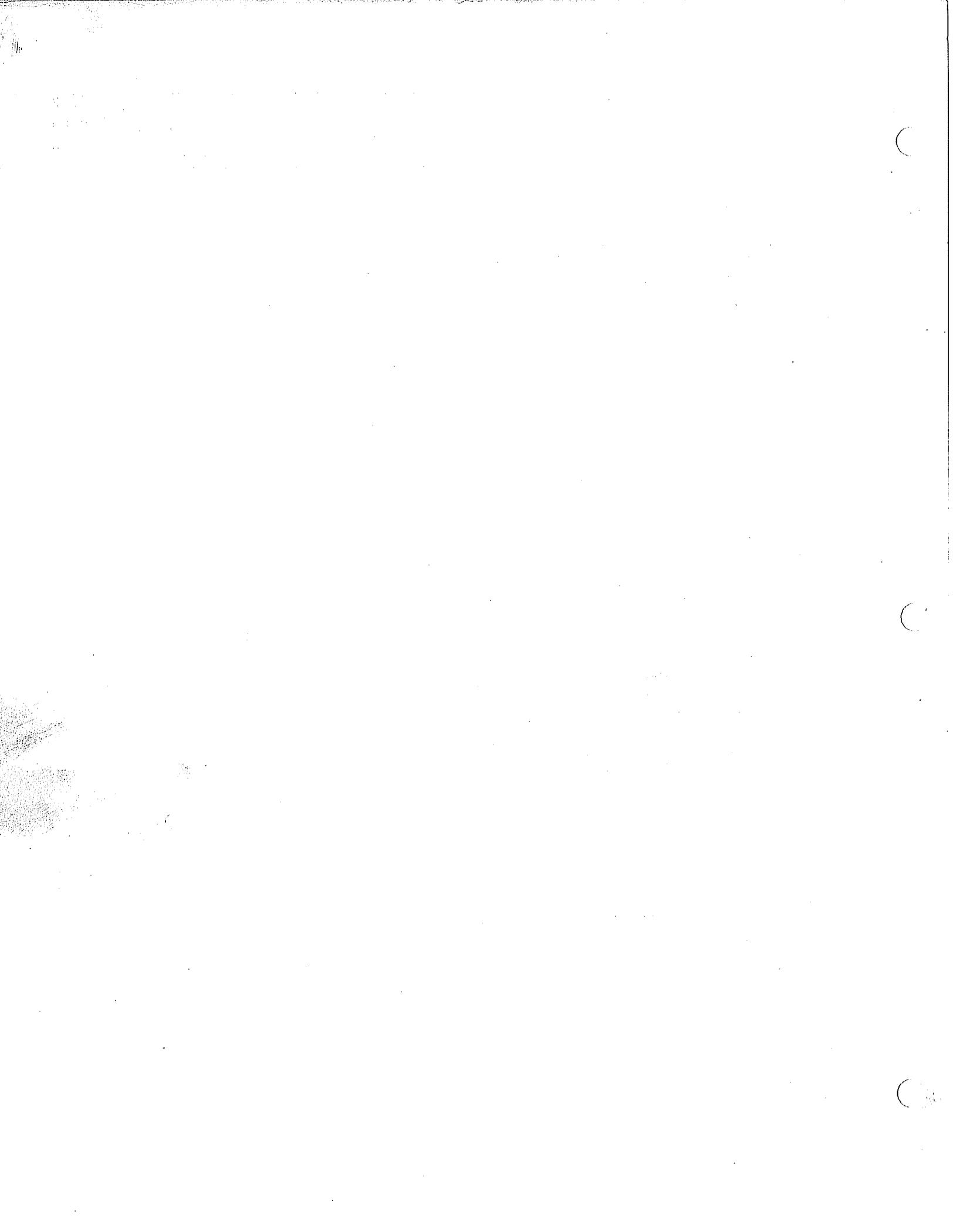
- From timing marks, rotate magneto clockwise 1/4 of a turn. Hold advance mechanism centrifugal weight in the open position (toward magneto rim) then slowly turn magneto back counter-clockwise until timing light fluctuates or until tone signal sound level varies.

At this point check the distance between pole shoe trailing edge and magnet (edge gap), with a strip of cardboard of appropriate width. (Refer to the following table.)

Engine type	Edge gap
248, 294	7-11 mm (.275 - .430")
305, 343, 346, 402, 440, 640	5-8 mm (.200 - .315")
444	6-10 mm (.235 - .400")



If edge gap is more or less than specified the problem lies within engine internal components (crankshaft out of alignment, broken Woodruff key, loose breaker cam, etc.). Corrective measures should be applied.



## C.D. IGNITION — 345 - 354 ENGINE TYPES

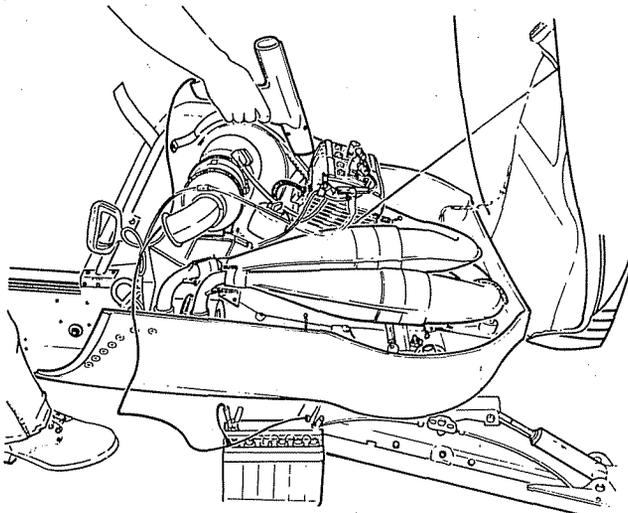
### FOREWORD

On models equipped with a C.D. ignition system, plug firing is initiated by an electrical pulse. This pulse is released when a metal projection on the flywheel hub rotates near the pick-up coil. Therefore, timing must be performed while the engine is running.

A stroboscopic timing light such as Sun PTL 45, Snap-On MT215B, Bosch EFAW 169A, or a suitable equivalent, plus a 12 volt battery are needed.

### 345 ENGINE TYPE

Place ski tips against a wall. Use a support incorporating protective guard to block vehicle off the ground. (Approx. 15 cm (6") between track and floor). Remove rubber plug from upper crankcase half. Connect an operating timing light to magneto side spark plug wire.

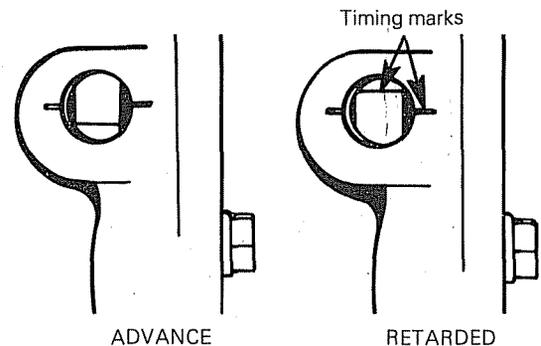


◆ **WARNING:** Ensure that no one will pass behind the vehicle, even momentarily, while timing engine. Also, make sure that pulley guard is in position and that track is clear of tools, clothes, etc.

Start engine. The magneto ring/crankcase timing marks should coincide when full advance is obtained. Full advance is at 5,000 RPM.

▼ **CAUTION:** Running the engine unnecessarily will cause premature slider shoe wear.

If the timing marks do not coincide, remove rewind starter and starting pulley. Slacken off the two (2) Allen capscrews securing the armature plate. Rotate plate clockwise if timing is advanced, counter-clockwise if timing is retarded.



Once timing is correct on mag. side, release throttle, apply the brake and turn off the ignition. Connect timing light to P.T.O. side spark plug wire. Start engine and check if P.T.O. timing coincides with mag side timing.

If timing does not coincide, install a T.D.C. gauge into P.T.O. spark plug hole. Scribe true marks on magneto ring at lower and upper timing limits B.T.D.C.: 0.87-1.37 mm (.0034-.054"). Repeat for other cylinder.

Position armature plate so that both cylinders fire within specified tolerance.

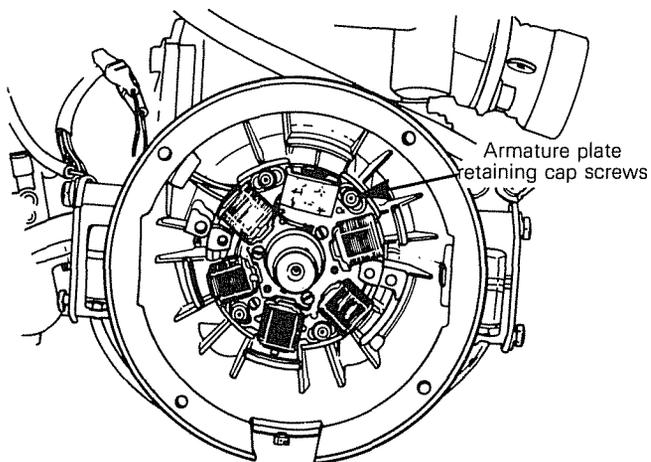
## SECTION 04

### SUB-SECTION 04, (IGNITION TIMING)

#### 354 ENGINE TYPE

Timing procedure for this engine type is composed of four main phases, all being equally important:

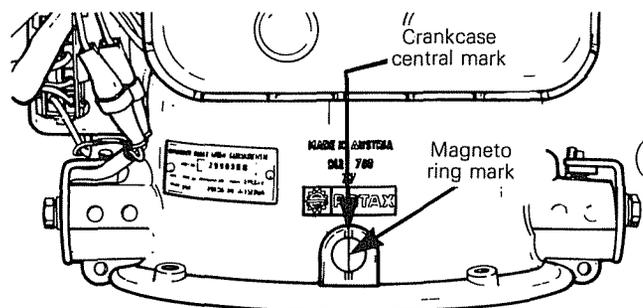
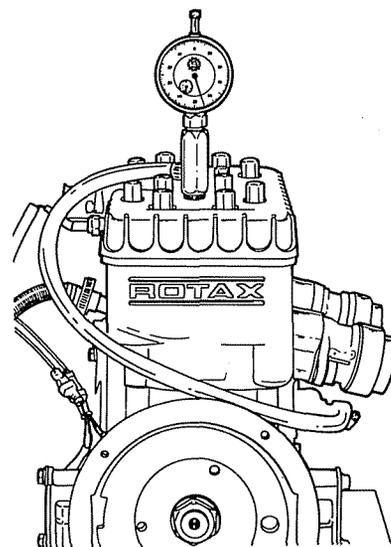
1. Position of the armature plate
  2. Position of the timing marks on magneto ring
  3. Air gap between trigger coil and magneto ring
  4. Timing verification using a stroboscopic timing.
1. To obtain best generator coil performance, position the armature plate on the crankcase with the retaining cap screw in the middle of the plate slots.



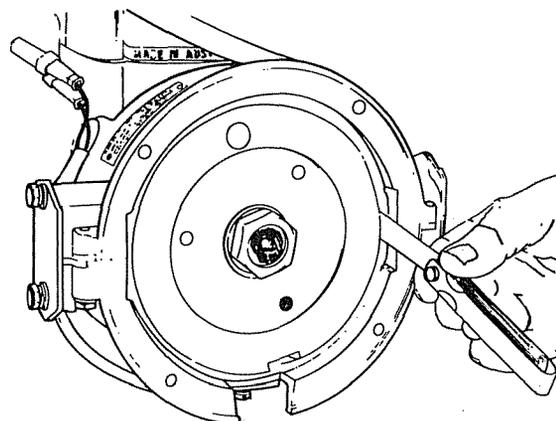
▼ **CAUTION:** When assembling magneto ring on crankshaft, clean crankshaft extension (cone) and thread. Apply Loctite 242 (no. 413 7025) on cone and threads. Torque bolt to 98 N•m (72 ft-lbs).

2. Check the position of the timing marks (for each cylinder) on magneto ring: repunch if necessary.

With the piston positioned at 1.40 mm (.055") B.T.D.C., magneto ring mark should align with central mark on crankcase (around timing hole).



3. Check air gap between magneto ring and trigger coil. The gap should be 1 to 1.6 mm (.040 to .063").

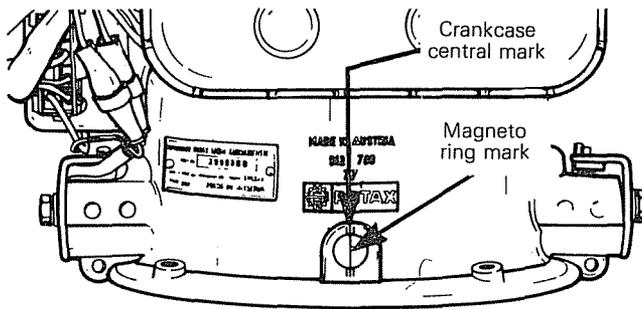


SECTION 04  
SUB-SECTION 04, (IGNITION TIMING)

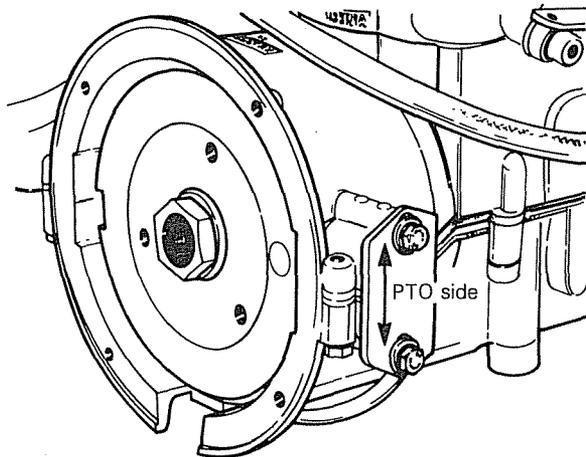
4. Check timing using a stroboscopic timing light (on each cylinder).

◆ **WARNING:** Place ski tips against the wall, raise rear of vehicle so the track is not in contact with the ground and place it on a stand equipped with a protector. Make sure nobody passes behind the vehicle during timing procedure.

Magneto ring mark and crankcase central mark should align at 6000 RPM.

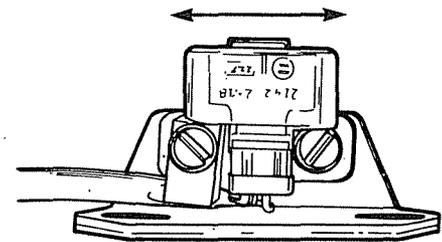


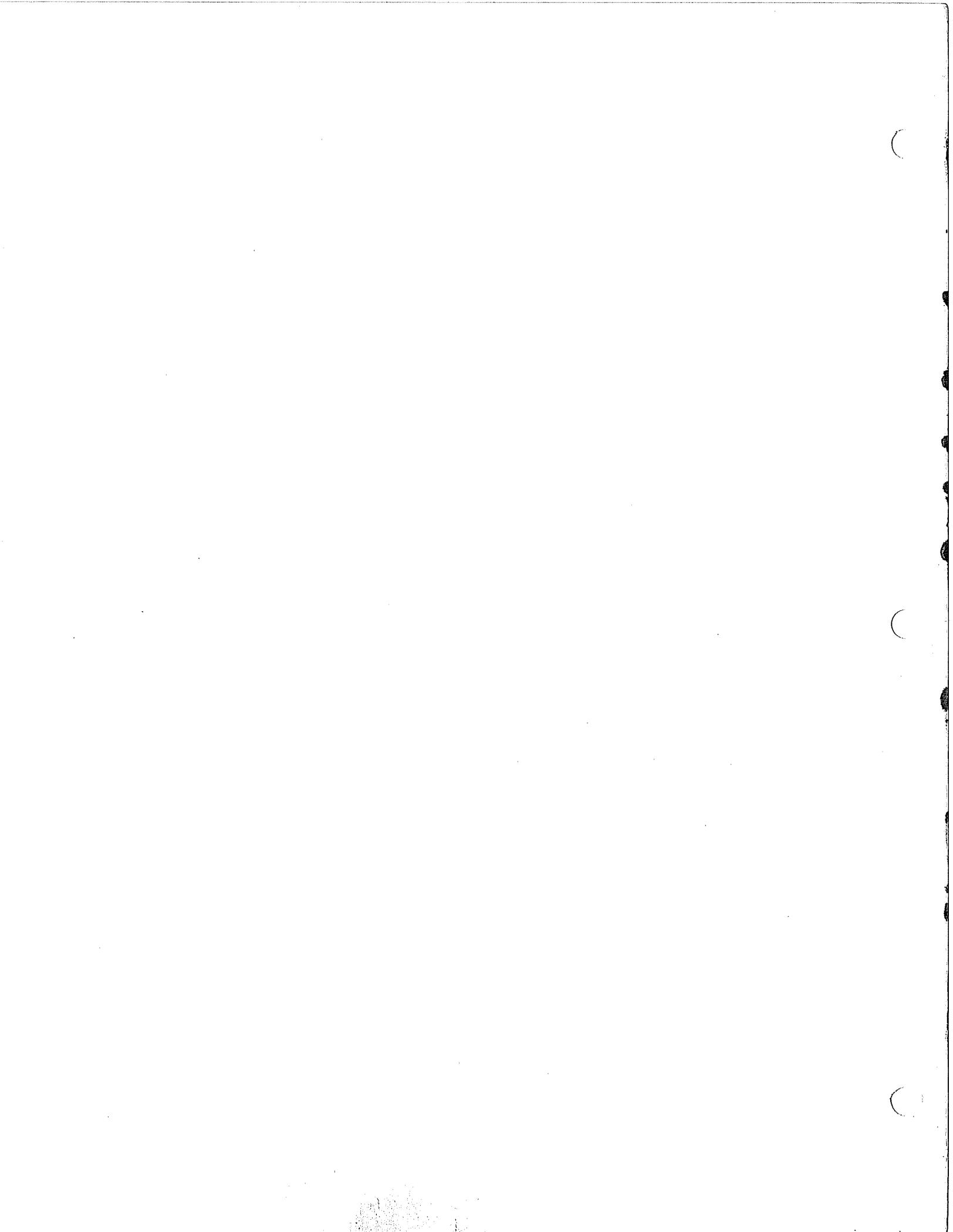
If necessary to adjust: unscrew slightly the two (2) screws holding trigger coil bracket, then move bracket up or down.



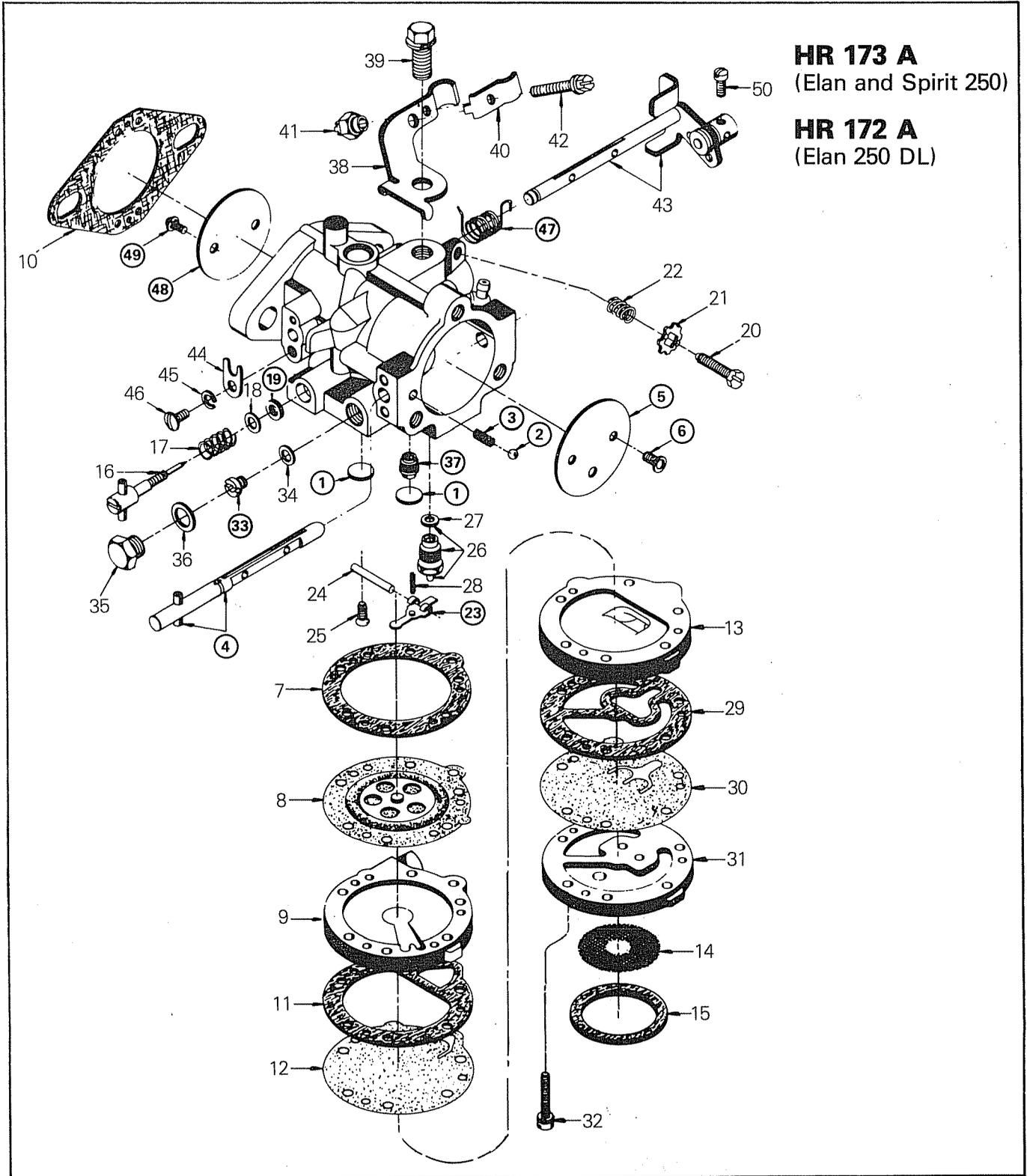
○ **NOTE:** Carburetor side trigger coil controls magneto side ignition and exhaust side trigger coil controls P.T.O. side ignition.

If correct timing is impossible with trigger coil bracket travel, stop engine, remove bracket from crankcase and relocate the trigger coil on its bracket.





# TILLOTSON — HR TYPE



## SECTION 04 SUB-SECTION 05, (CARBURETOR)

1. Welch plug
2. Choke friction ball
3. Spring
4. Choke shaft
5. Choke shutter
6. Screw and lockwasher
7. Metering diaphragm gasket
8. Metering diaphragm
9. Metering diaphragm cover
10. Gasket
11. Fuel pump gasket
12. Fuel pump diaphragm
13. Fuel pump body
14. Fuel strainer screen
15. Gasket
16. Idle mixture adjusting screw
17. Spring
18. Washer
19. "O" ring
20. Idle speed adjusting screw
21. Washer
22. Spring
23. Fulcrum lever
24. Fulcrum pin
25. Fulcrum pin retaining screw
26. Inlet needle
27. Gasket
28. Fulcrum lever spring
29. Gasket
30. Inlet valve diaphragm
31. Inlet valve body
32. Screw
33. Main jet
34. Gasket
35. Bolt
36. Gasket
37. Main nozzle check valve
38. Throttle cable bracket
39. Bolt
40. Throttle cable clamp
41. Nut
42. Screw
43. Throttle shaft
44. Throttle shaft clip
45. Lockwasher
46. Screw
47. Spring
48. Throttle shutter
49. Screw and lockwasher
50. Throttle cable retaining screw

## REMOVAL

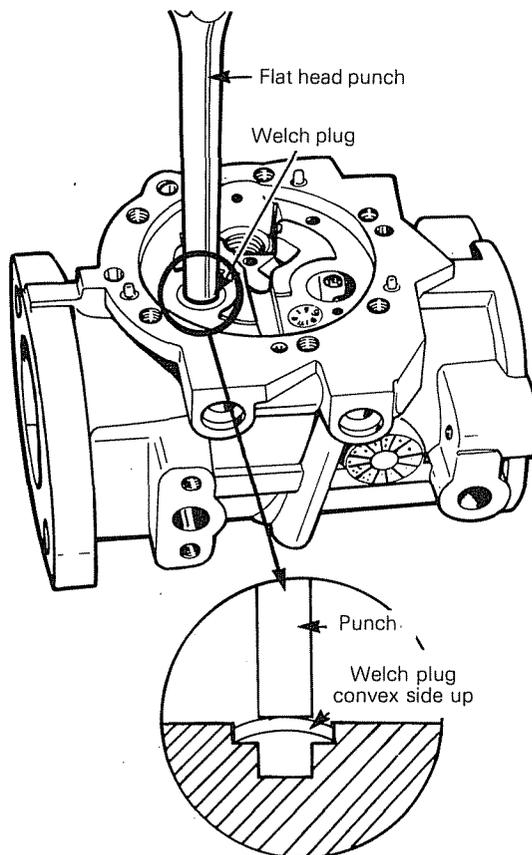
Detach or remove the following - if applicable - from carburetor:

- air silencer
- choke cable
- primer line
- throttle cable and housing
- fuel lines
- pulsation line

Open lock tabs, then remove nuts securing carburetor.

## DISASSEMBLY & ASSEMBLY

① To remove welch plug, break through the plug using a 3 mm (1/8") drill. Avoid plug center. Drill should penetrate the plug only, not the chamber. Pry from seating using a pointed tool. To install, position a new welch plug (convex side up) then using a 8 mm (5/16") flat end punch and hammer, gently tap the plug until flat.



**SECTION 04**  
**SUB-SECTION 05, (CARBURETOR)**

Leak test welch plugs by allowing compressed air - max. 345 kPa (50 P.S.I.) - into the high speed and low speed screw orifices (or plug orifices). The carburetor must be inverted, welch plugs up, and a drop or two of oil laying over each plug. Small air bubbles indicate leak. Reseal with a punch and hammer then leak test once again.

②③④ Exercise care when pulling choke shaft from carburetor. The friction ball and spring can fly out from the casting.

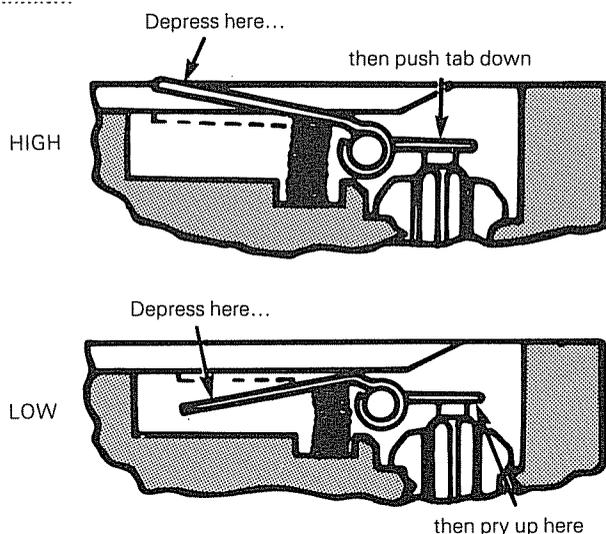
At assembly, position spring and friction ball into casting. Using a suitable tool, depress friction ball. At same time, push choke shaft into carburetor body.

⑤ The choke shutter must be installed with shutter hole facing down.

⑥④⑨ Apply a light coat of "Loctite Lock'n Seal 242" on threads.

⑱ Prior to assembly, lubricate "O" ring with petroleum jelly.

⑲ Adjust the inlet control lever until the center of the lever contacting the metering diaphragm is flush with the metering chamber wall. To adjust, bend lever as illustrated.



⑳ Test main nozzle check valve operation by alternately applying pressure and vacuum with the mouth on the section located on carburetor venturi side. The check valve must hold pressure and release under vacuum.

㉑ Spring must be wound 1 1/4 turns to achieve correct throttle return tension.

㉒ The throttle shutter sides are slightly angled to match the carburetor bore when closed. At assembly, make sure shutter is correctly positioned and location mark is facing outward.

## CLEANING & INSPECTION

The entire carburetor should be cleaned with a general purpose solvent and dried with compressed air before disassembly.

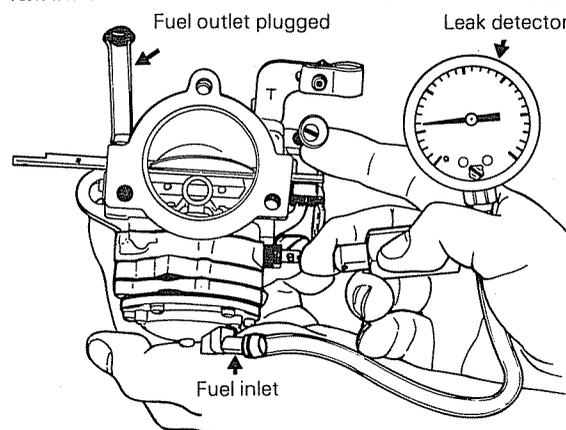
◆ **WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.**

Carburetor body and metal parts should be cleaned in a carburetor cleaner solution following manufacturer's instructions.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

Inspect all diaphragms. They should be free of holes or imperfections. Replace as needed.

After assembly, leak test carburetor as follows: with both idle speed and high speed adjustment screws opened and fuel return outlet plugged, connect a leak detector to the fuel inlet. (See Tools Section).



Pump detector until inlet needle release pressure is reached (sudden pressure drop), then observe gauge reading; the system must stay pressurized. If pressure drops completely the cause should be investigated.

Immerse carburetor in clean gas then pressurize it to a pressure lower than the inlet needle release pressure.

Air bubbles escaping from inside the carburetor bore indicates a leaking inlet needle. Bubbles escaping from a leaking gasket or diaphragm indicates tightening or replacement.

**SECTION 04**  
**SUB-SECTION 05, (CARBURETOR)**

**INSTALLATION & ADJUSTMENT**

To install carburetor on engine, inverse removal procedure.

Make sure the fuel return line is correctly identified and connected to the fuel tank.

 **NOTE:** The fuel return line inlet on the tank connector is identified with the letters "IN".

 **CAUTION:** Lock tabs should be replaced if bent more than three (3) times. If in doubt, replace.

**Maximum Throttle Opening Adjustment**

With engine off and air silencer removed, depress throttle lever at handlebar and hold. Throttle butterfly should be horizontal when the lever gently touches the handlebar grip. To adjust for maximum opening, loosen screw at point where cable joins carburetor lever. Clamp throttle lever to handlebar. With finger, hold carburetor throttle lever in fully open position (UP), pull cable until taut and retighten screw. Unclamp throttle lever from handlebar and install air silencer.

 **WARNING:** Before starting engine, carburetor throttle lever must return to idle position (throttle shutter closed). Do not start engine unless this is verified.

**Low Speed Mixture Adjustment**

With engine off, gently turn idle mixture screw fully clockwise until closed, then back off one (1) turn + 1/4 -0 counter-clockwise.

**Idle Speed Adjustment**

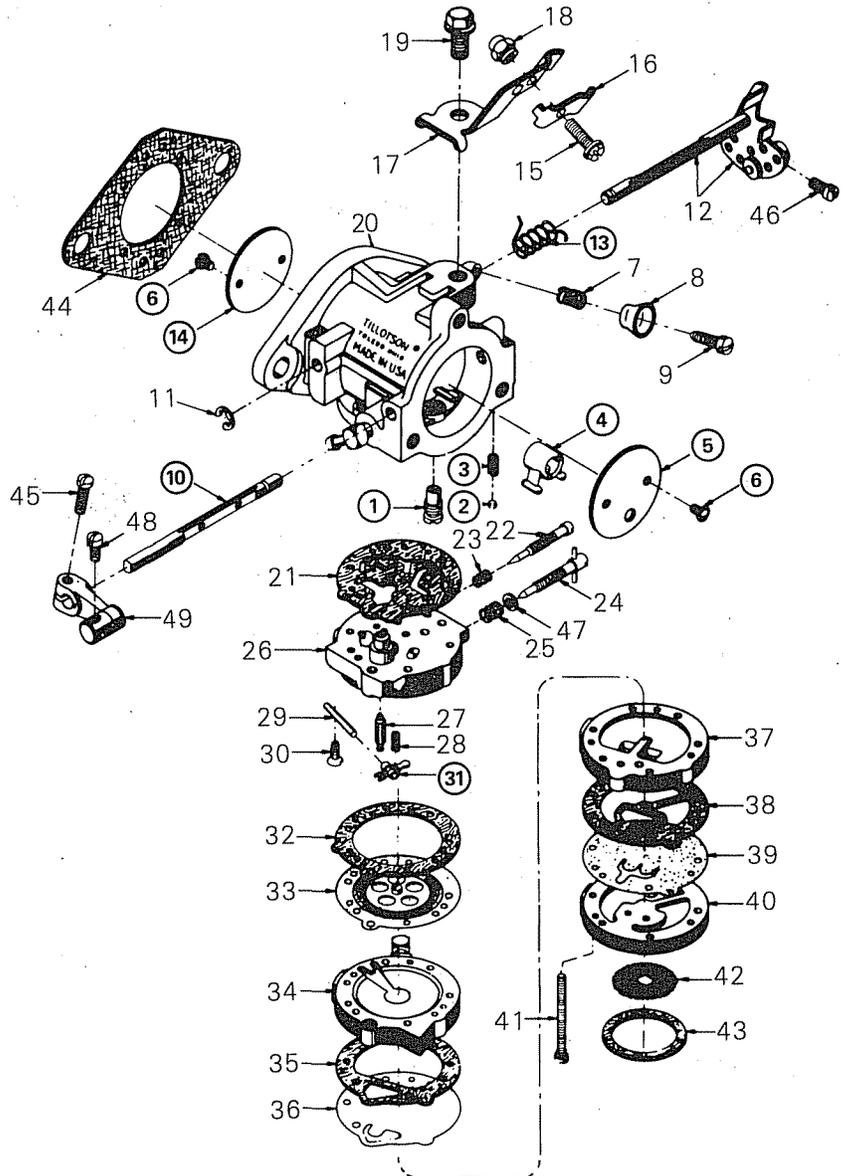
Allow engine to warm then using a screwdriver, turn the idle speed adjusting screw clockwise to increase idling speed, counter-clockwise to decrease. Adjust to following specifications:

	RPM
Elan and Spirit 250	1500-1800
Elan 250 DL	1800-2200

# TILLOTSON — HRM TYPE

## HRM 7 A (Alpine)

1. Nozzle check valve
2. Friction ball
3. Spring
4. Primary venturi
5. Choke shutter
6. Screw
7. Spring
8. Cup
9. Idle speed screw
10. Choke shaft
11. Circlip
12. Throttle shaft
13. Spring
14. Throttle shutter
15. Screw
16. Throttle cable clamp
17. Throttle cable bracket
18. Nut
19. Bolt
20. Carburetor body
21. Adjustment module gasket
22. Idle mixture screw
23. Spring
24. High speed mixture screw
25. Spring
26. Adjustment module
27. Inlet needle
28. Inlet tension spring
29. Fulcrum pin
30. Retaining screw
31. Fulcrum lever
32. Diaphragm gasket
33. Metering diaphragm
34. Diaphragm cover
35. Fuel pump cover
36. Fuel pump diaphragm
37. Fuel pump body
38. Fuel pump diaphragm gasket
39. Inlet valve diaphragm
40. Inlet valve body
41. Screw and lockwasher
42. Fuel strainer screen
43. Cover gasket
44. Gasket
45. Retaining screw
46. Cable retaining screw
47. Washer
48. Cable retaining screw
49. Choke lever



**SECTION 04**  
**SUB-SECTION 05, (CARBURETOR)**

**REMOVAL**

Remove or disconnect the following from carburetor:

- air silencer
- choke cable
- throttle cable
- fuel lines and pulsation line

Open lock tabs then remove nuts securing carburetor.

**DISASSEMBLY & ASSEMBLY**

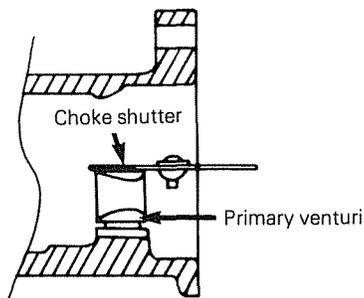
① Test main nozzle check valve operation by alternately applying pressure and vacuum with the mouth on the section located on carburetor venturi side.

The check valve must hold under pressure and release under a vacuum.

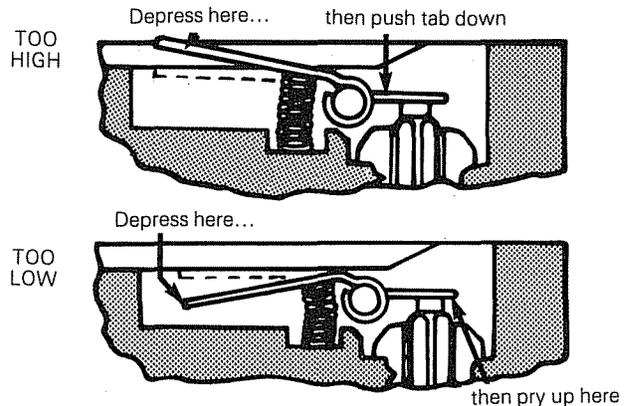
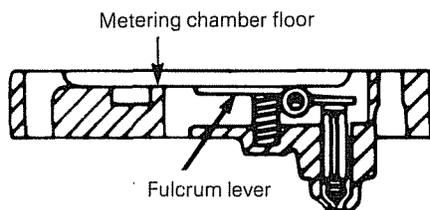
②③⑩ Exercise care when pulling choke shaft from carburetor. Friction ball and spring can "fly out" of the casting.

At assembly, position spring friction ball into casting. Using a suitable tool, depress friction ball, at same time, push choke shaft into carburetor body.

④ Primary venturi must be installed with largest opening toward front of carburetor.



- ⑤ At assembly, ensure the shutter hole faces down.
- ⑥ Apply a coat of "Loctite 242" on threads.
- ⑬ Spring should be wound close to 1/2 a turn.
- ⑭ The throttle shutter sides are slightly angled to match the carburetor bore when closed. At assembly, make sure shutter is correctly positioned.
- ⑳ Adjust fulcrum lever so that the center of lever contacting the metering diaphragm is flush with the metering chamber floor.



**CLEANING & INSPECTION**

The entire carburetor should be cleaned with a general purpose solvent and dried with compressed air before disassembly.

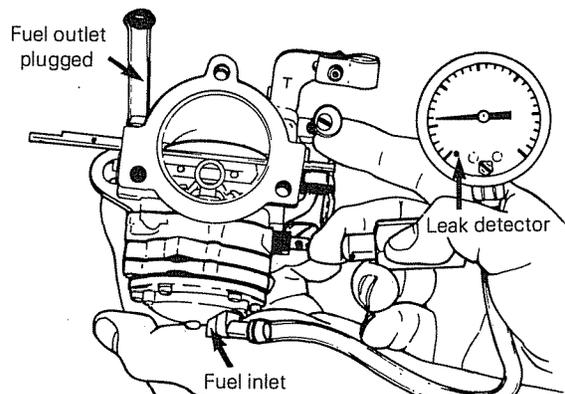
◆ **WARNING: Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.**

Carburetor body and metal parts should be cleaned in a carburetor cleaner solution following manufacturer's instructions.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

Inspect all diaphragms. They should be free of holes or imperfections. Replace as needed.

After assembly, leak test carburetor as follows: with both idle speed and high speed adjustment screws opened and fuel return outlet plugged, connect a leak detector to the fuel inlet. (See Tools Section).



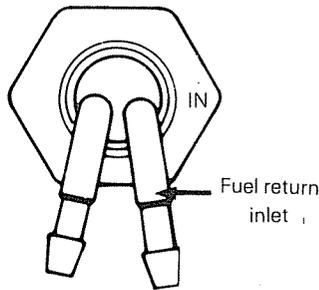
Pump detector until inlet needle release pressure is reached (sudden pressure drop), then observe gauge reading; the system must stay pressurized. If pressure drops completely the cause should be investigated.

Immerse carburetor in clean gas then pressurize it to a pressure lower than the inlet needle release pressure.

Air bubbles escaping from inside the carburetor bore indicates a leaking inlet needle. Bubbles escaping from a leaking gasket or diaphragm indicates tightening or replacement.

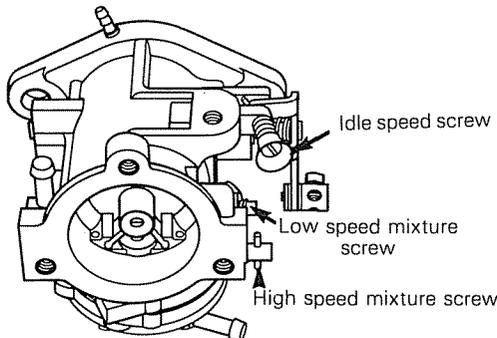
## INSTALLATION

To install carburetor on engine, inverse removal procedure. For identification purposes, the fuel return line inlet on the tank male connector is stamped with the letters "IN".



▼ CAUTION: Lock tabs should be replaced if bent more than three (3) times. If in doubt, replace.

## ADJUSTMENT



### Maximum throttle opening

With engine off and air silencer removed, hold throttle lever at handlebar. Throttle butterfly should be horizontal when the lever gently touches the handlebar grip.

To adjust for maximum opening, loosen screw at point cable joints throttle shaft lever. Clamp throttle lever to handlebar. With finger, hold carburetor throttle lever in fully open position (UP), pull cable until taut and retighten screw.

◆ WARNING: Before starting engine, carburetor throttle lever must return to idle position (throttle shutter closed). Do not start engine unless this is verified.

### Low speed mixture

With engine off, gently turn idle mixture screw fully clockwise until closed, then back off 1 1/8 turns + 1/4 - 0 counter-clockwise.

▼ CAUTION: When pulling heavy loads such as trail groomer, it is strongly recommended to enrich the Low Speed Mixture by turning the screw 1/4 of a turn counter-clockwise.

### Idle speed

Allow engine to warm then using a screwdriver, turn the idle speed adjusting screw clockwise to increase idling speed, counter-clockwise to decrease. Adjust to 1500-1800 RPM.

### High speed mixture

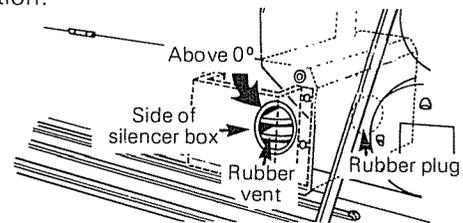
A primary adjustment, with engine off, should be made by first turning high speed mixture screw fully clockwise until closed, then back off 1 1/4 turns + 1/4 - 0 counter-clockwise.

For final adjustment, start engine and allow it to warm. Drive the vehicle for approximately 1.6 km (1 mile) at 6,000 RPM. (The high speed jet will be operational at this RPM range). Stop the engine immediately. Remove spark plug and inspect plug face.

The plug face will indicate whether the mixture is rich, normal or lean. A brownish tip reflects ideal carburetor adjustment. A black insulator tip indicates a rich mixture. Light grey insulator tip indicates a lean mixture. If the mixture is incorrect, readjust 1/8 of a turn and recheck color of spark plug face.

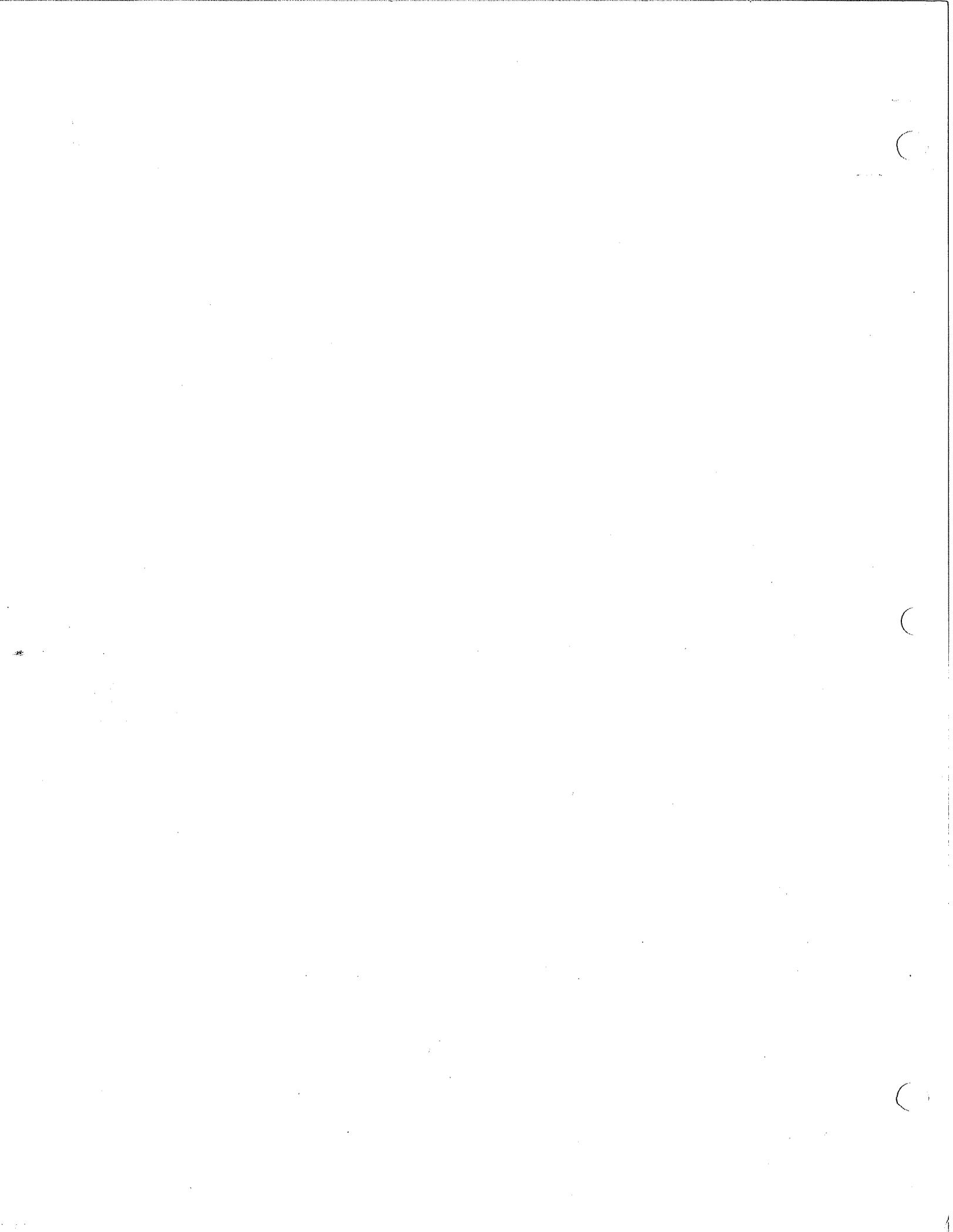
○ NOTE: This method applied to an engine in good working condition. If after adjustment it is found there is considerable deviation from nominal setting, the carburetor and/or the engine is malfunctioning and needs repair.

IMPORTANT: When operating the vehicle in temperature exceeding 0°C (32°F), the rubber plug must block the engine side orifice and the rubber vent must be positioned on the side of the silencer box to allow cold air circulation.



In temperatures below 0°C (32°F) and/or powder snow, the rubber plug must block the entry of fresh air on the side of the silencer box and the rubber vent must allow the warm air being emitted from the engine to be directed over the carburetor.

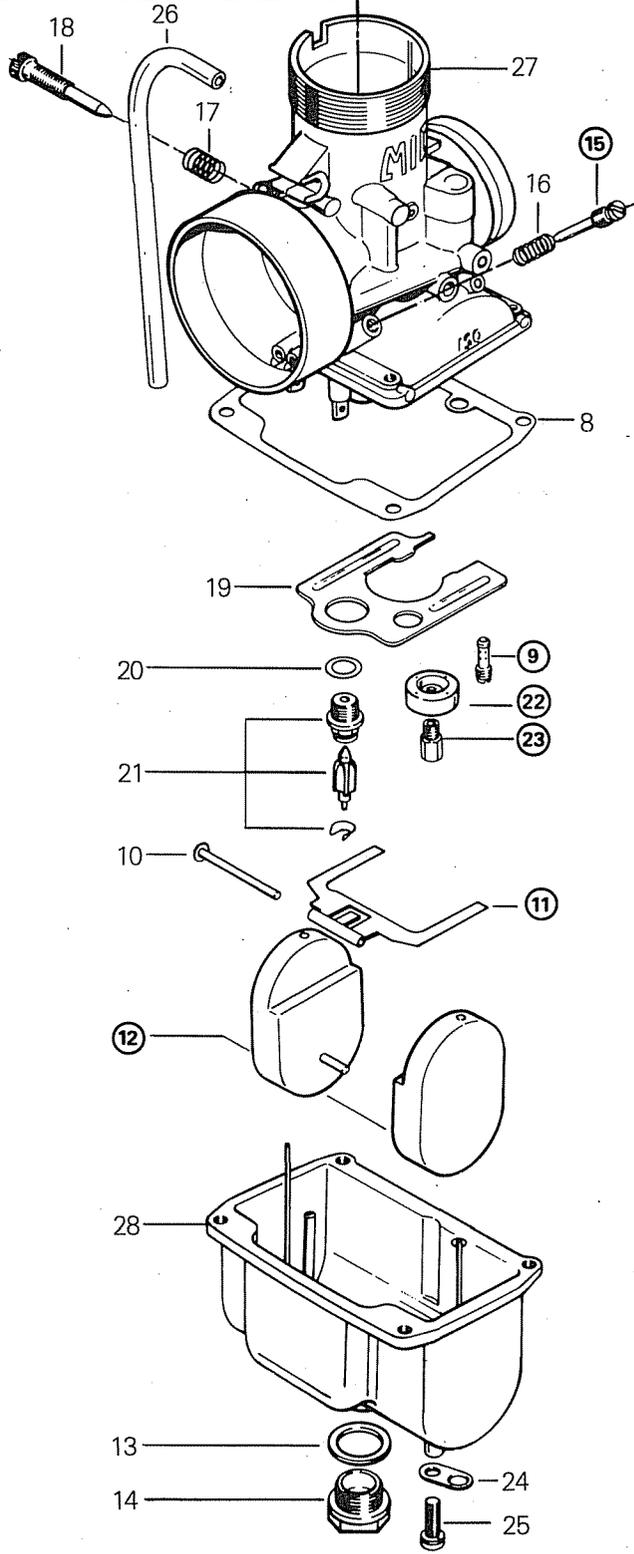
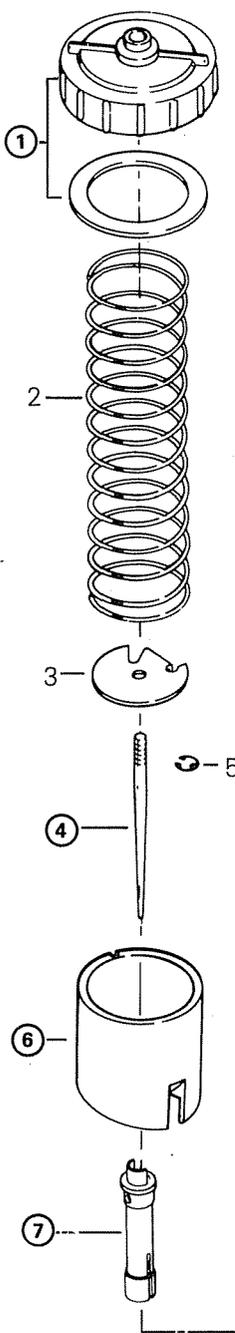
▼ CAUTION: Observe temperature changes and locate plugs accordingly. Incorrect location of plugs may cause carburetor ice-up or engine overheating.



# MIKUNI CARBURETOR

**APPLICABLE TO:** VM 30-90  
VM 30-91  
VM 30-92  
VM 30-94  
VM 30-98  
VM 34-118  
VM 34-135  
VM 34-150  
VM 34-165  
VM 34-177  
VM 34-184

1. Cover
2. Throttle slide spring
3. Needle retainer plate
4. Jet needle
5. "E" clip
6. Throttle slide
7. Needle jet
8. Float chamber gasket
9. Pilot jet
10. Float arm pin
11. Float arm
12. Float
13. Sealing ring
14. Access plug
15. Air screw
16. Air screw spring
17. Idle speed screw spring
18. Idle speed screw
19. Baffle (plate)
20. Sealing ring
21. Inlet valve ass'y
22. Baffle (ring)
23. Main jet
24. Vent tube guide
25. Screw
26. Vent tube
27. Carburetor body
28. Float chamber



**SECTION 04  
SUB-SECTION 05, (CARBURETOR)**

**REMOVAL**

Remove air silencer box, fuel inlet line and primer line. Unscrew carburetor cover then pull out throttle slide ass'y from carburetor.

**ATTENTION:** Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

Untighten rubber flange clamp then remove carburetor from engine.

**CLEANING & INSPECTION**

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

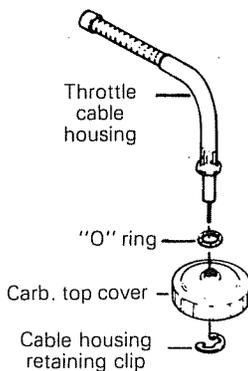
**WARNING:** Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

Check throttle slide for wear. Replace as necessary.

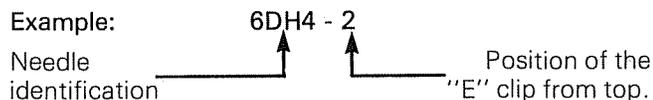
**DISASSEMBLY & ASSEMBLY**

① Carburetor cover and throttle cable used in 1978 are of the following type:

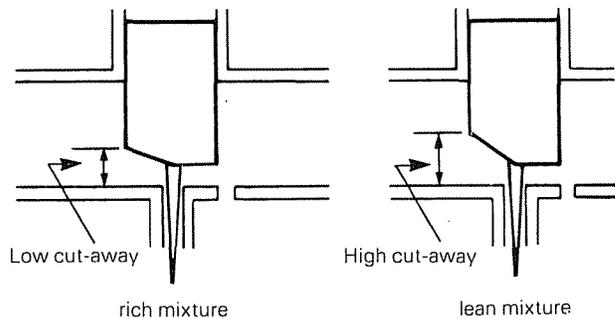


④ ⑥ ⑦ ⑨ ⑮ ⑳ Refer to Technical Data (08, 04-05) for exact calibration of carburetor.

④ The position of the needle in the throttle slide is adjustable by means of an "E" clip inserted into one of 5 grooves located on the upper part of the needle. Position 1 is the leanest, 5 the richest.



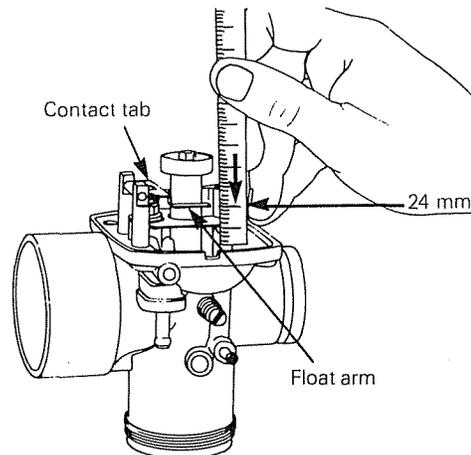
⑥ The size of the throttle slide cut-away affects the fuel mixture between 0 to 3/4 throttle opening. A certain amount of richness is needed for that particular range because this is where the transition from the low speed to the high speed circuit takes place.



⑳ The main jet installed in the carburetor is suitable for a wide range of temperature (-30° to 5°C/-20° to 40°F) at sea level. However, different jetting is available. Always check spark plug tip color to find out correct jetting.

⑪ ⑫ Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct level, proceed as follows:

- Remove float chamber and gasket from carburetor.
- With carburetor chamber upside-down, measure height between float chamber flange rib and top edge of float arm.
- To adjust bend contact tab of float arm until a height of 24 mm (.945") is reached.

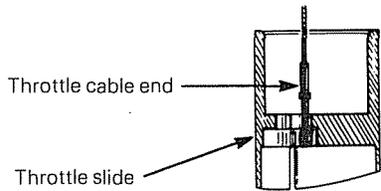


## INSTALLATION

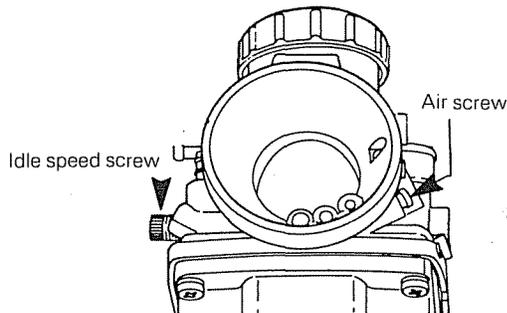
To install carburetor(s) on engine, inverse removal procedure.

However, pay attention to the following:

- Apply a thin layer of silicone sealant between carburetor rubber flange and intake cover on engine.
- Apply Loctite Lock'n Seal 242 on bolts retaining rubber flange to intake cover.
- When installing throttle cable end in throttle slide, hook up cable by using the stopper at the extremity of the cable.

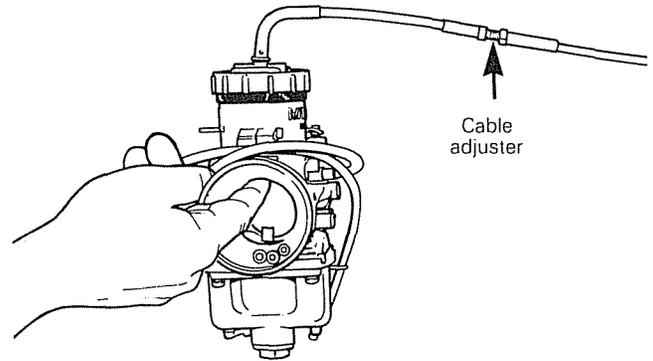


## CARBURETOR ADJUSTMENTS



### Throttle slide adjustment

With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handle grip. Unscrew the cable adjuster by hand to obtain maximum carburetor slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



### Air screw adjustment

Completely close the air screw until a slight seating resistance is felt then back off to specifications in Technical data.

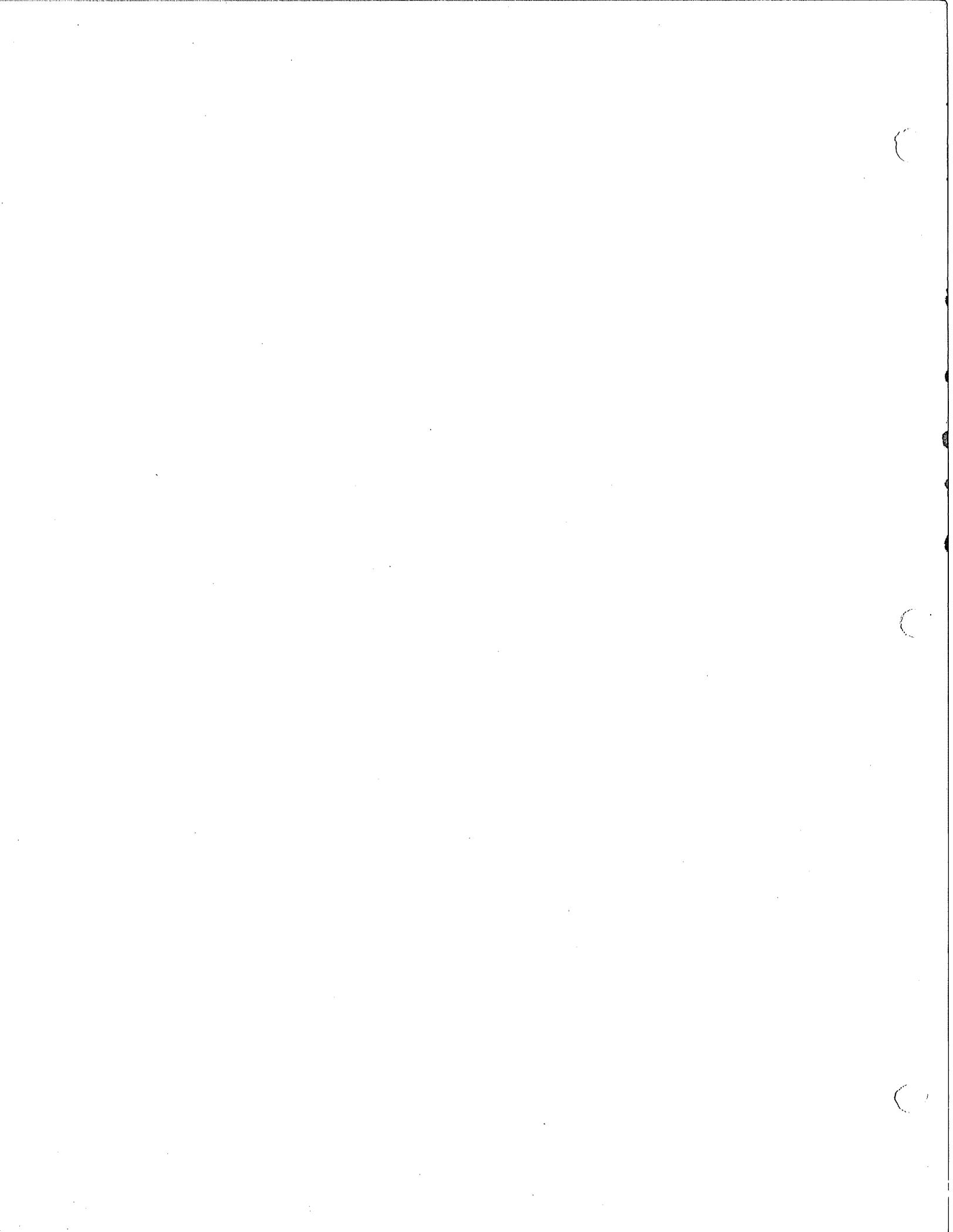
### Idle speed adjustment

Turn idle speed screw clockwise until it contacts the throttle slide then continue turning two (2) additional turns. This will provide a preliminary idle speed setting. Start engine and allow it to warm then adjust idle speed to specifications in Technical data by turning idle speed screw clockwise or counter-clockwise.

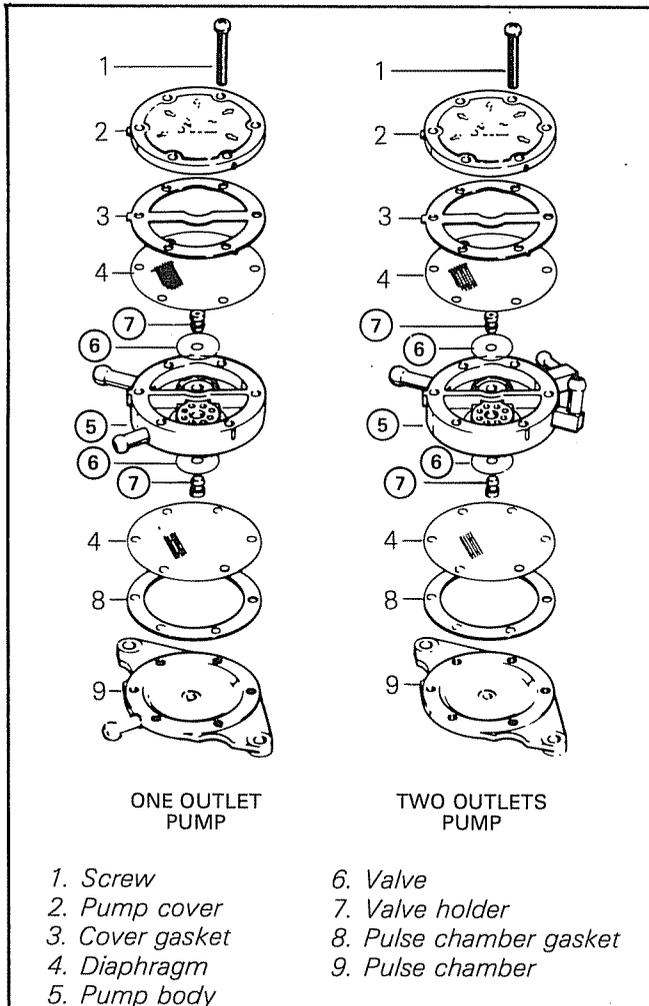
▼ **CAUTION:** Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

### High speed mixture adjustment

The high speed jet installed in the carburetor is suitable for a wide range of temperatures (-30° to 5°C/-20° to 40°F) at sea level. However, different jetting is available. Always check spark plug tip color to find out correct jetting.



## FUEL PUMP – MIKUNI TYPE



### REMOVAL

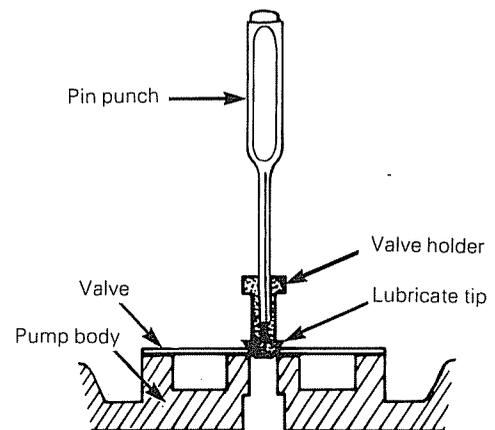
- Disconnect fuel inlet line at fuel pump then secure fuel line to steering support so that the open end is located higher than the fuel tank.
- Disconnect fuel outlet line(s).
- Disconnect pulsation line.
- Remove nuts and bolts securing fuel pump.

### DISASSEMBLY & ASSEMBLY

- ⑤ ⑥ ⑦ Do not disassemble valve unless replacement is indicated.

To install a new valve, proceed as follows:

- Place new valve flat on its seat.
- Insert a 3/32" pin punch inside valve holder and lubricate tip of holder with a drop of oil
- Push holder into carburetor body as illustrated.



### CLEANING & INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

◆ **WARNING:** Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes or imperfections. Replace as needed.

Check fuel pump valves operation as follows:

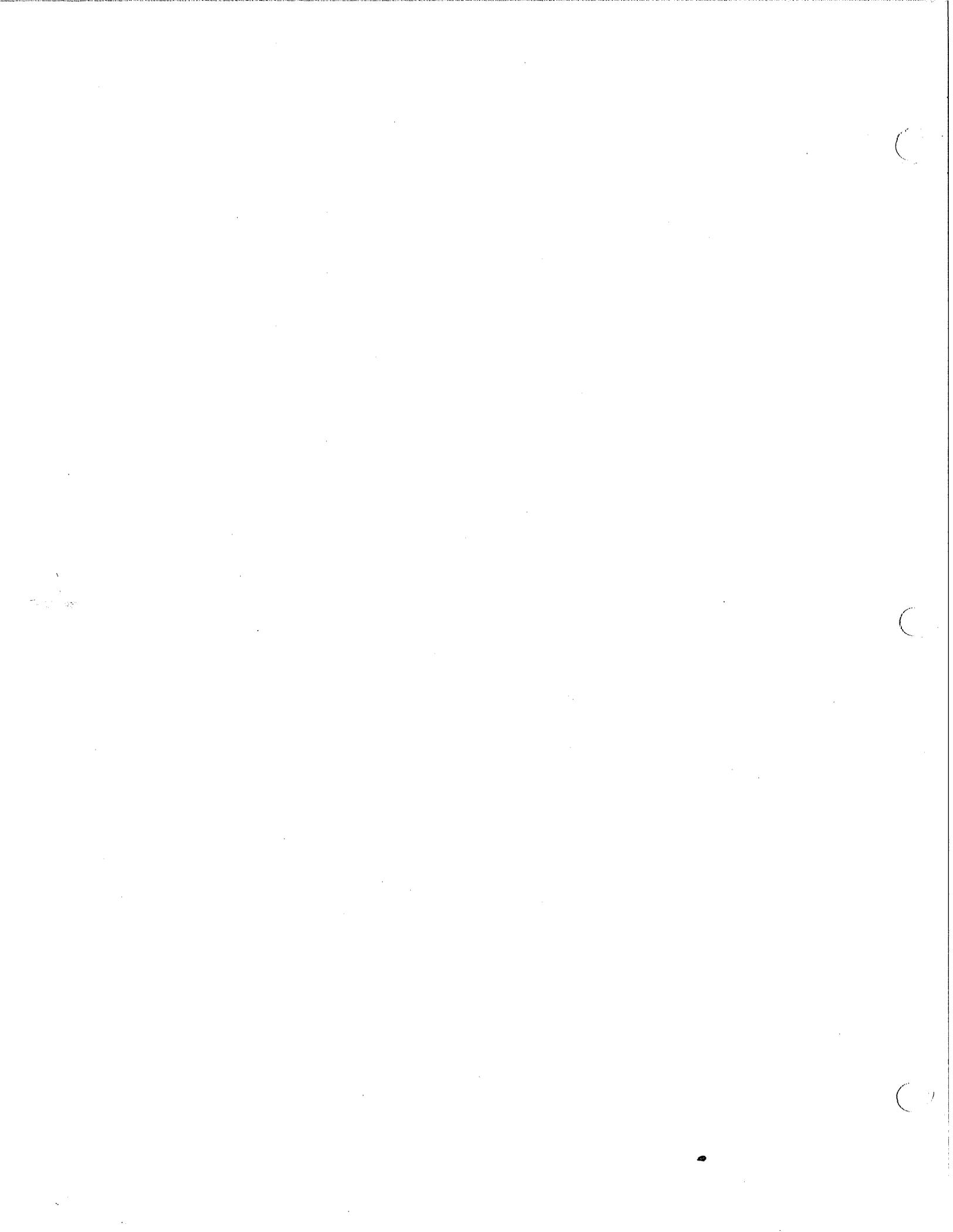
Connect a length of clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with the mouth. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

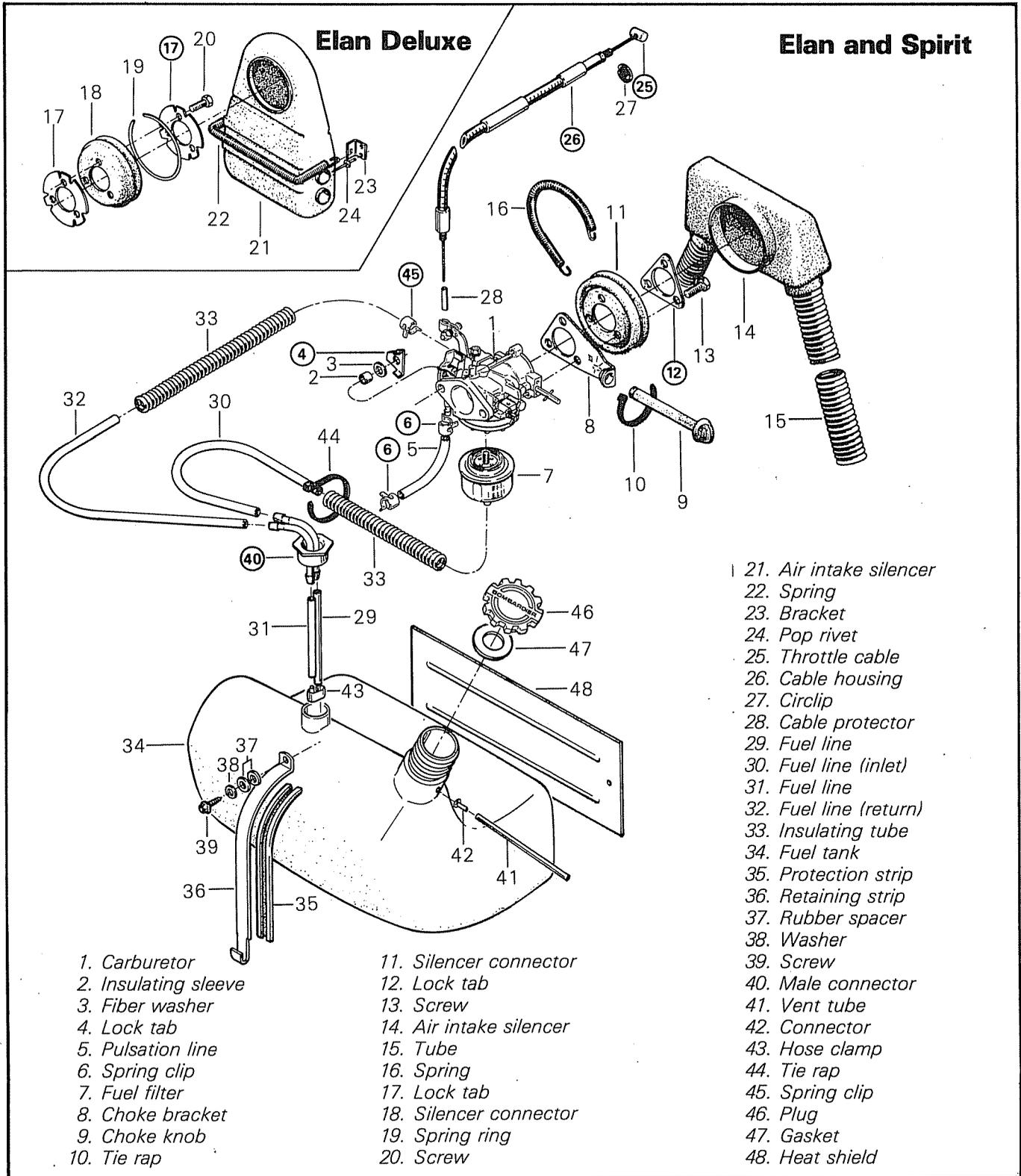
○ **NOTE:** On model fitted with two outlets, plug one outlet with finger while checking outlet valve.

### INSTALLATION

To install, inverse removal procedure.



# AIR INTAKE SILENCER AND FUEL TANK



**SECTION 04**  
**SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)**

**ELAN AND SPIRIT**

④⑫⑰ Always bend lock tabs over screws and replace if they seem worn.

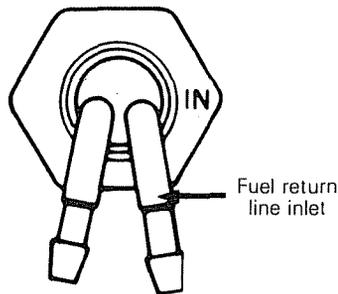
⑥④⑤ Always reposition spring clips after any repair to prevent possible leaks.

**②⑤②⑥ Maximum throttle opening adjustment**

With engine off and air silencer removed, depress throttle lever at handlebar and hold. Throttle butterfly should be horizontal when the lever gently touches the handlebar grip. To adjust for maximum opening, loosen screw at point where cable joins carburetor lever. Clamp throttle lever to handlebar. With finger, hold carburetor throttle lever in fully open position (UP), pull cable until taut and retighten screw (with the lever depressed, there must be no excessive tension on the cable). Unclamp throttle lever from handlebar and install air silencer.

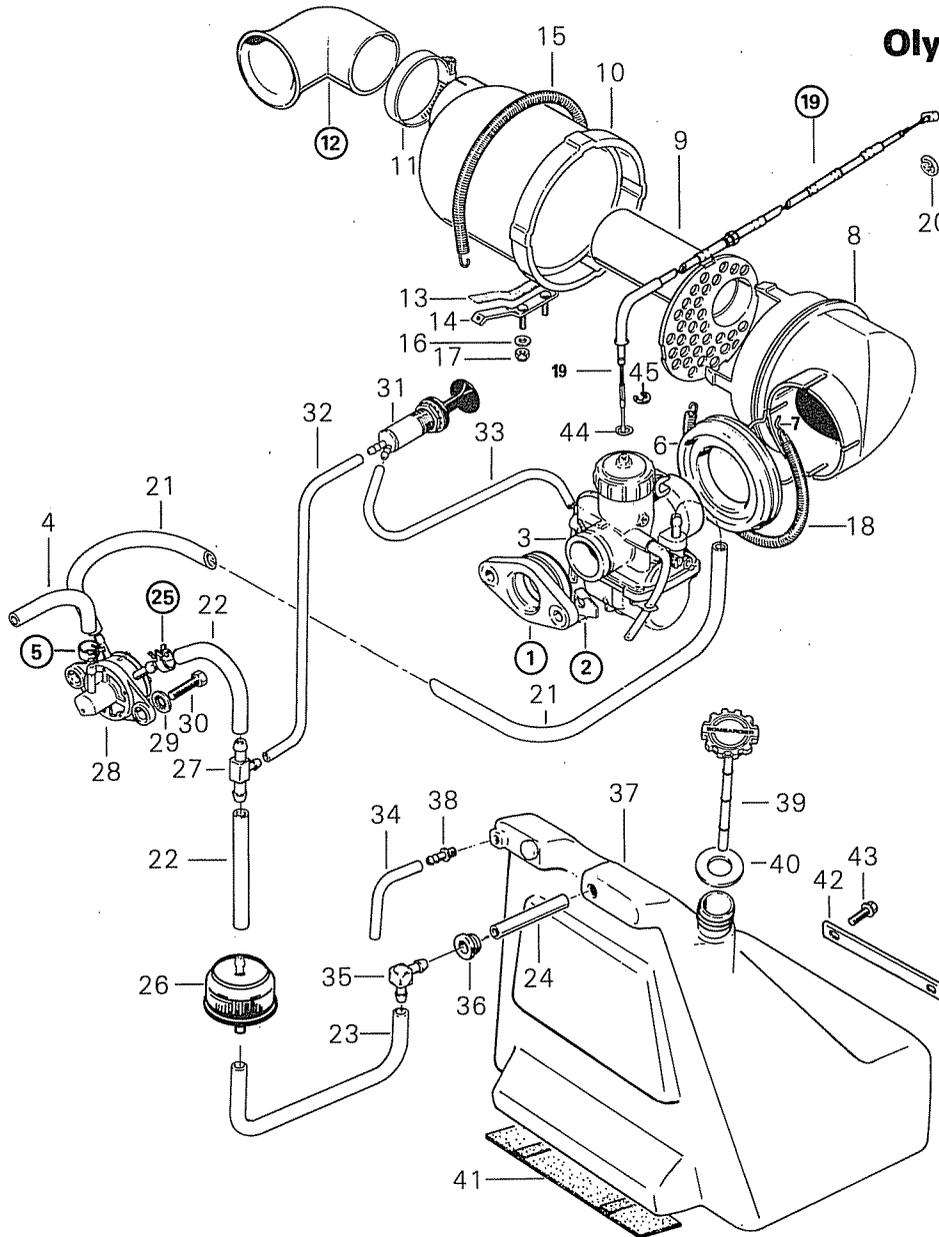
◆ **WARNING:** Before starting engine, carburetor throttle lever must return to idle position (throttle shutter closed). Do not start engine unless this is verified.

④⑩ The fuel return line inlet on the tank connector is identified with the letters "IN".



SECTION 04  
 SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

**Olympique and Nuvik**



- 1. Rubber flange
- 2. Lock tab
- 3. Carburetor
- 4. Pulsation line
- 5. Spring clip
- 6. Silencer connector
- 7. Spring clamp
- 8. Silencer housing
- 9. Baffle
- 10. Resonator
- 11. Hose clamp
- 12. Elbow
- 13. Felt strip
- 14. Bracket
- 15. Spring
- 16. Washer

- 17. Nut
- 18. Spring
- 19. Throttle cable
- 20. Circlip
- 21. Inlet line
- 22. Fuel line
- 23. Fuel line
- 24. Fuel line
- 25. Spring clip
- 26. Fuel filter

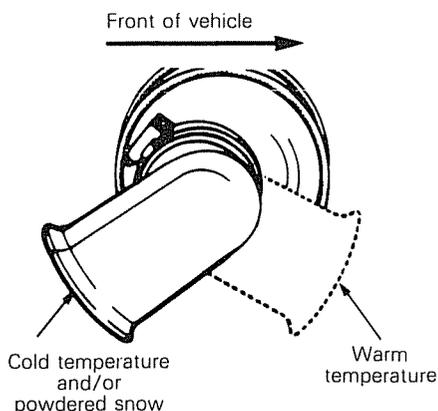
- 27. "T" connector
- 28. Fuel pump
- 29. Lockwasher
- 30. Screw
- 31. Primer
- 32. Primer line (inlet)
- 33. Primer line
- 34. Air duct
- 35. Male connector
- 36. Rubber insulating ring

- 37. Fuel tank
- 38. Air duct connector
- 39. Plug
- 40. Gasket
- 41. Cushion
- 42. Retaining bar
- 43. Screw
- 44. "O" ring
- 45. Circlip

SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

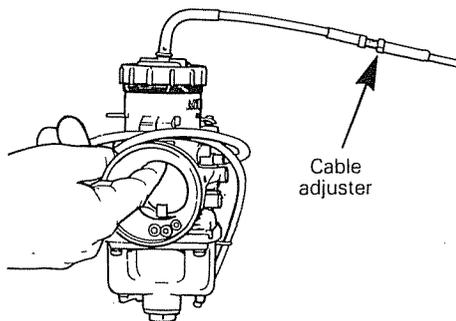
### OLYMPIQUE AND NUVIK

- ① At assembly on intake manifold, apply a light coat of silicone sealant on rubber flange mating surface.
- ② Always bend lock tabs over screws and replace if they seem worn.
- ⑤ ②⑤ Always reposition spring clips after any repair to prevent possible leaks.



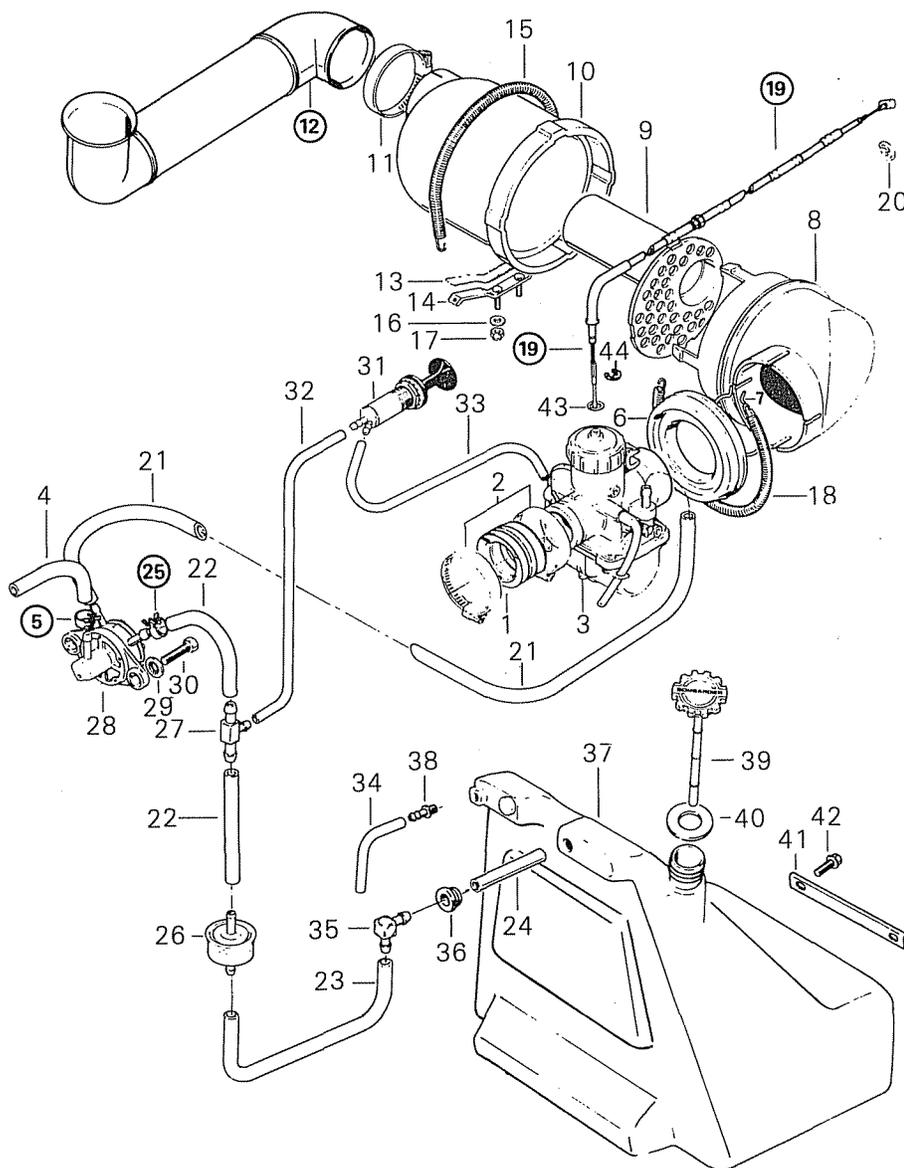
### ⑱ Carburetor throttle slide adjustment

With the throttle cable adjuster jam nut unlocked, press the cable adjuster by hand to obtain maximum carburetor or slide opening. (With the air silencer removed, check for slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

**Citation**



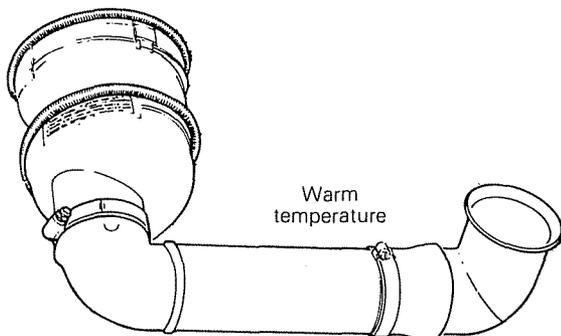
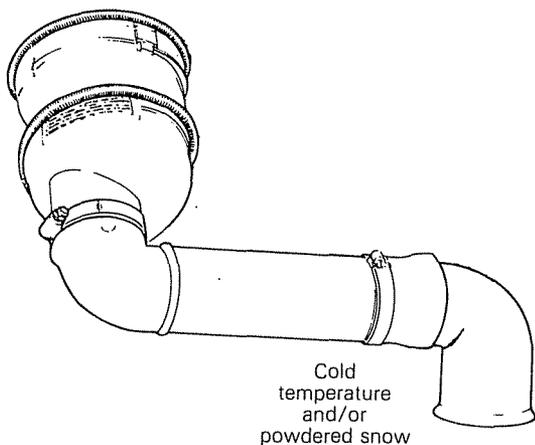
- |                       |                   |                            |
|-----------------------|-------------------|----------------------------|
| 1. Rubber flange      | 23. Fuel line     | 34. Air duct               |
| 2. Hose clamp         | 24. Fuel line     | 35. Male connector         |
| 3. Carburetor         | 25. Spring clip   | 36. Rubber insulating ring |
| 4. Pulsation line     | 26. Fuel filter   | 37. Fuel tank              |
| 5. Spring clip        | 27. "T" connector | 38. Air duct connector     |
| 6. Silencer connector | 28. Fuel pump     | 39. Plug                   |
| 7. Spring clamp       | 29. Washer        | 40. Gasket                 |
| 8. Silencer housing   | 30. Screw         | 41. Retaining bar          |
| 9. Baffle             | 31. Primer        | 42. Screw                  |
| 10. Resonator         | 32. Primer line   | 43. "O" ring               |
| 11. Hose clamp        | 33. Fuel line     | 44. Circlip                |
| 12. Elbow             |                   |                            |
| 13. Felt strip        |                   |                            |
| 14. Bracket           |                   |                            |
| 15. Spring            |                   |                            |
| 16. Washer            |                   |                            |
| 17. Nut               |                   |                            |
| 18. Spring            |                   |                            |
| 19. Throttle cable    |                   |                            |
| 20. Circlip           |                   |                            |
| 21. Fuel inlet line   |                   |                            |
| 22. Fuel line         |                   |                            |

SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

CITATION

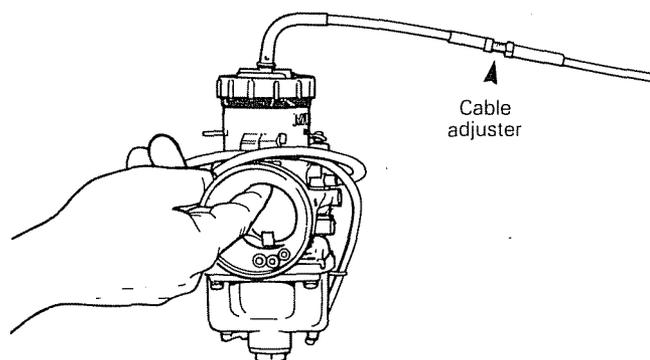
⑤ ②⑤ Always reposition spring clips after any repair to prevent possible leaks.

⑫



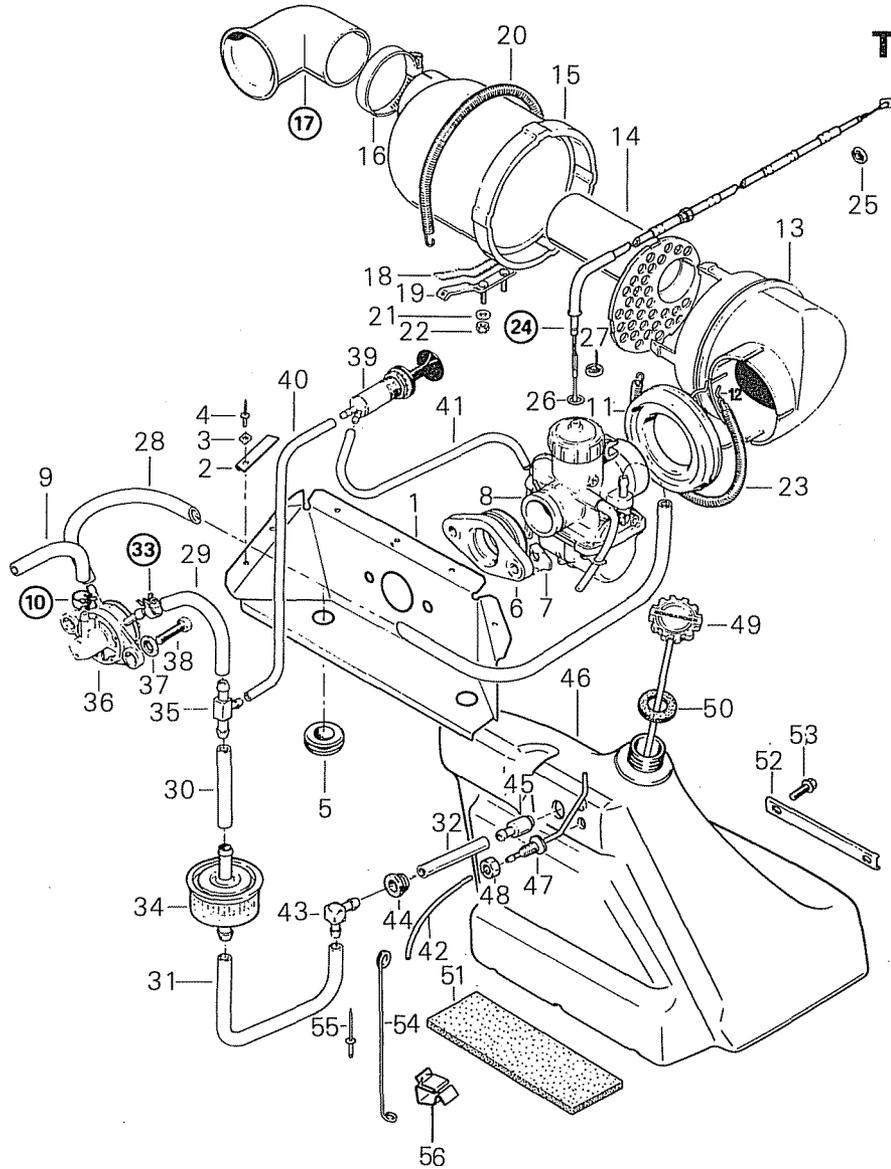
⑲ Carburetor throttle slide adjustment

With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handlebar grip. Unscrew the cable adjuster by hand to obtain maximum carburetor slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

**T'NT, Everest and Futura**



- 1. Deflector (T'NT F/A)
- 2. Rubber gasket (T'NT F/A)
- 3. Washer (T'NT F/A)
- 4. Pop rivet (T'NT F/A)
- 5. Insulating ring (T'NT F/A)
- 6. Rubber flange
- 7. Lock tab
- 8. Carburetor
- 9. Pulsation line
- 10. Spring clip
- 11. Silencer connector
- 12. Spring clamp
- 13. Silencer housing
- 14. Baffle
- 15. Resonator
- 16. Hose clamp
- 17. Elbow
- 18. Felt strip
- 19. Bracket
- 20. Spring
- 21. Washer
- 22. Nut
- 23. Spring
- 24. Throttle cable
- 25. Circlip
- 26. "O" ring
- 27. Circlip
- 28. Fuel inlet line
- 29. Fuel line
- 30. Fuel line
- 31. Fuel line
- 32. Fuel line

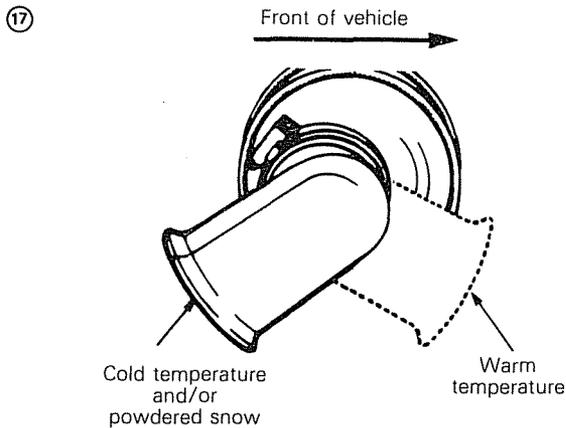
- 33. Spring clip
- 34. Fuel filter
- 35. "T" connector
- 36. Fuel pump
- 37. Lockwasher
- 38. Screw
- 39. Primer
- 40. Primer line (inlet)
- 41. Fuel line
- 42. Air duct
- 43. Male connector
- 44. Rubber insulating ring

- 45. Tube
- 46. Fuel tank
- 47. Air duct connector
- 48. Nut
- 49. Plug
- 50. Gasket
- 51. Cushion (except 444 LC)
- 52. Retaining bar
- 53. Screw
- 54. Air duct support (except 444 LC)
- 55. Pop rivet
- 56. Clip (air duct) (444 LC)

SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

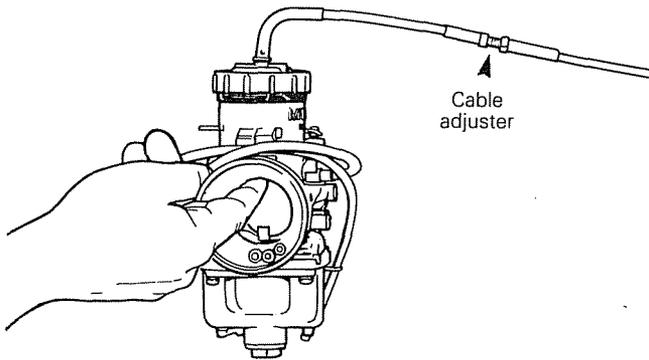
**T'NT, EVEREST AND FUTURA**

- ⑥ At assembly on intake manifold, apply a light coat of silicone sealant on rubber flange mating surface.
- ⑦ Always bend lock tabs over screws and replace if they seem worn.
- ⑩⑬ Always reposition spring clips after any repair to prevent possible leaks.



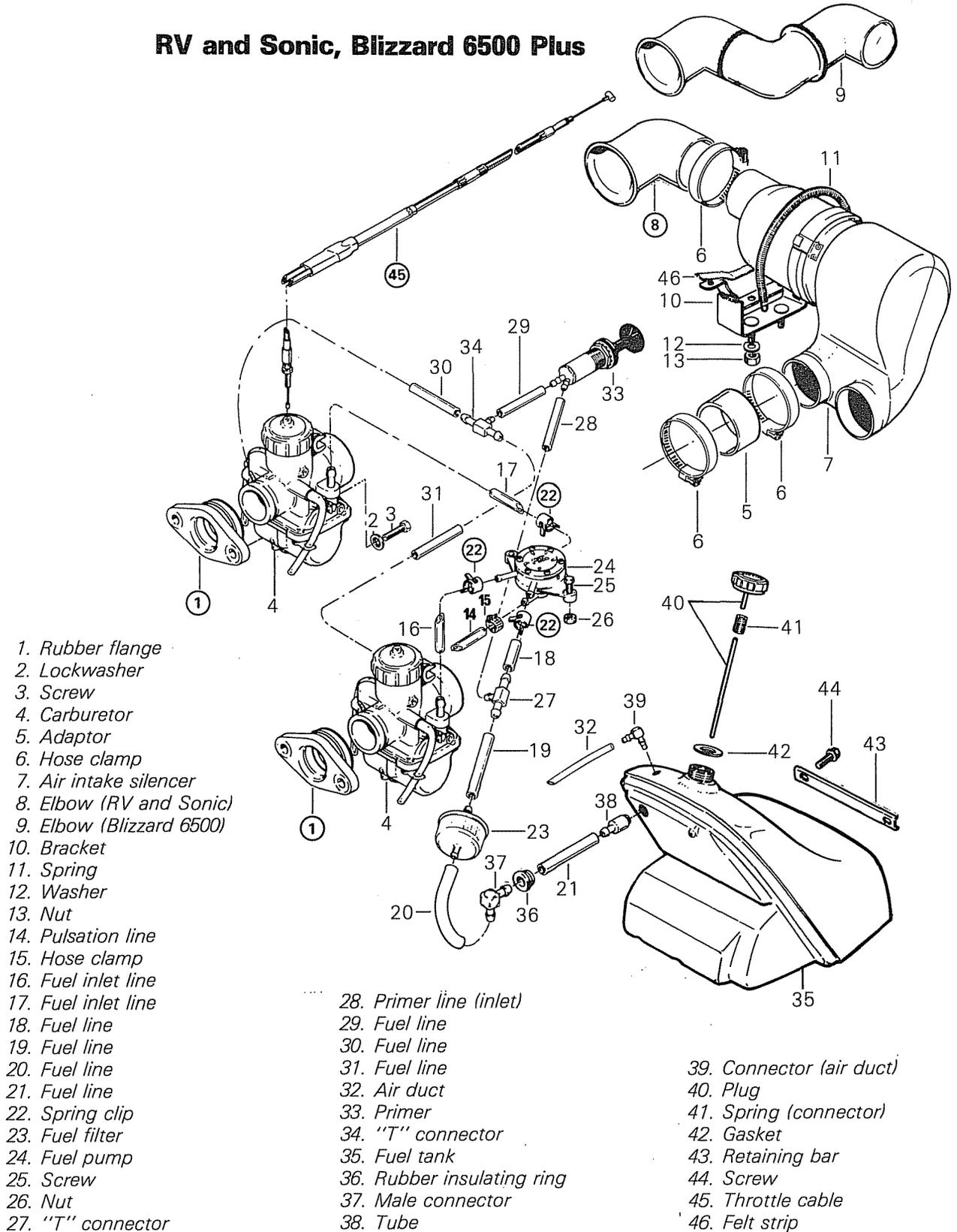
**⑳ Carburetor throttle slide adjustment**

With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handlebar grip. Unscrew the cable adjuster by hand to obtain maximum carburetor slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

**RV and Sonic, Blizzard 6500 Plus**



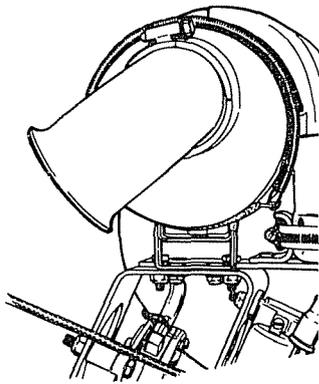
SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

**RV AND SONIC,  
BLIZZARD 6500 PLUS**

① At assembly on intake manifold, apply a light coat of silicone sealant on rubber flange mating surface.

**⑧ RV and Sonic**

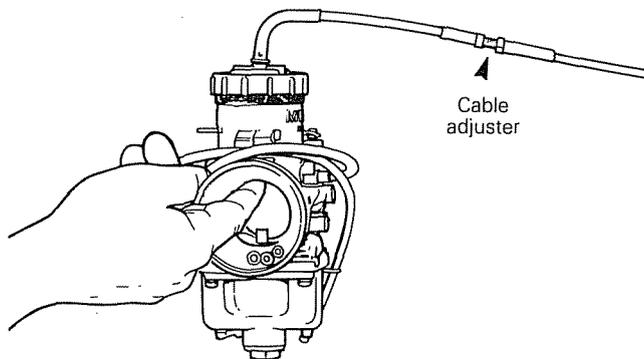
The neck of the air intake silencer must always be turned down and facing the rear (see illustration) otherwise the pressure created by the vehicle speed will lean the mixture and cause engine damage.



②② Always reposition spring clips after any repair to prevent possible leaks.

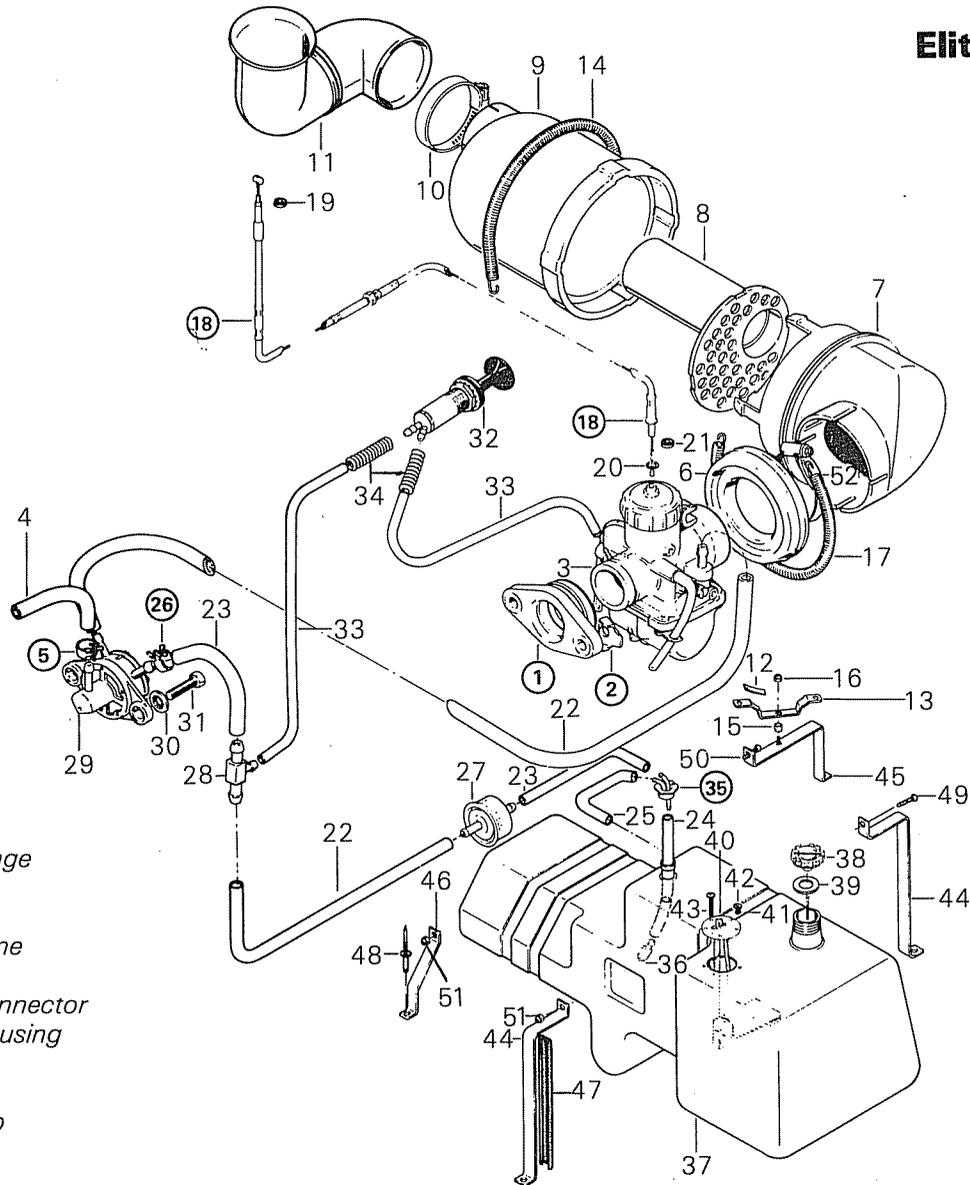
**④⑤ Carburetor throttle slide adjustment**

With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handlebar grip. Unscrew the cable adjuster by hand to obtain maximum carburetor slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

Elite



- |                       |                     |                      |
|-----------------------|---------------------|----------------------|
| 1. Rubber flange      | 27. Fuel filter     | 40. Sender           |
| 2. Lock tab           | 28. "T" connector   | 41. Cushion          |
| 3. Carburetor         | 29. Fuel pump       | 42. Washer           |
| 4. Pulsation line     | 30. Lockwasher      | 43. Screw            |
| 5. Spring clip        | 31. Screw           | 44. Retaining strip  |
| 6. Silencer connector | 32. Primer          | 45. Retaining strip  |
| 7. Silencer housing   | 33. Fuel line       | 46. Retaining strip  |
| 8. Baffle             | 34. Insulating tube | 47. Protection strip |
| 9. Resonator          | 35. Male connector  | 48. Pop rivet        |
| 10. Hose clamp        | 36. Tube            | 49. Bolt             |
| 11. Elbow             | 37. Fuel tank       | 50. Bolt             |
| 12. Felt strip        | 38. Plug            | 51. Nut              |
| 13. Bracket           | 39. Gasket          | 52. Hose clamp       |
| 14. Spring            |                     |                      |
| 15. Distance sleeve   |                     |                      |
| 16. Nut               |                     |                      |
| 17. Spring            |                     |                      |
| 18. Throttle cable    |                     |                      |
| 19. Circlip           |                     |                      |
| 20. "O" ring          |                     |                      |
| 21. Circlip           |                     |                      |
| 22. Fuel line         |                     |                      |
| 23. Fuel line         |                     |                      |
| 24. Fuel line         |                     |                      |
| 25. Vent hose         |                     |                      |
| 26. Spring clip       |                     |                      |

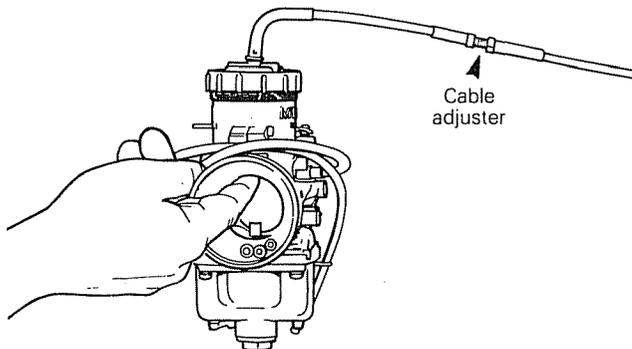
**SECTION 04**  
**SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)**

**ELITE**

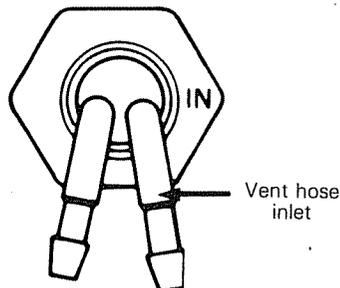
- ① At assembly on intake manifold, apply a light coat of silicone sealant on rubber flange mating surface.
- ② Always bend lock tabs over screws and replace if they seem worn.
- ⑤ ②⑥ Always reposition spring clips after any repair to prevent possible leaks.

**⑱ Carburetor throttle slide adjustment**

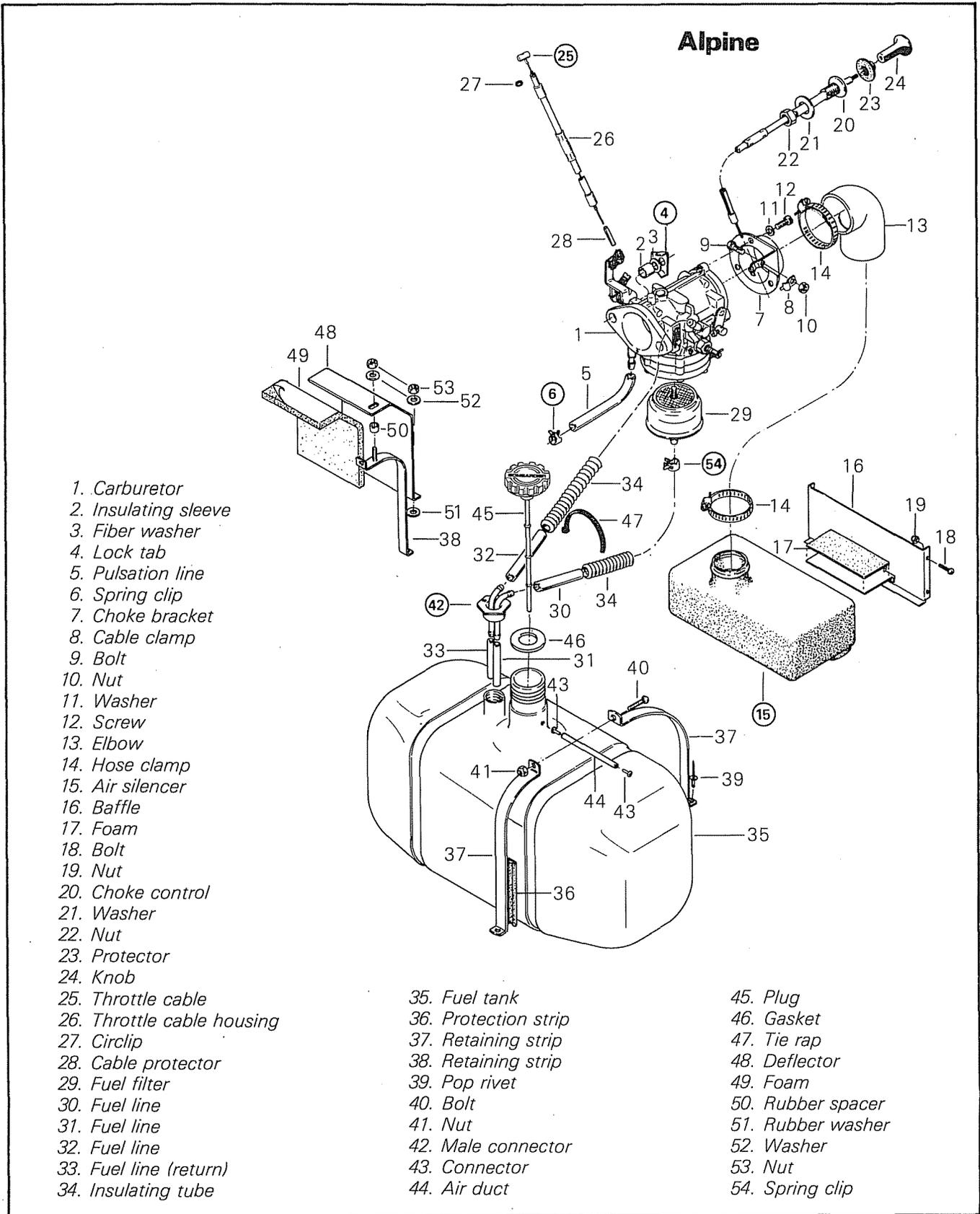
With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handlebar grip. Unscrew the cable adjuster by hand to obtain maximum carburetor slide opening. (With the air silencer removed, check with your finger if the carburetor slide is well seated against the carburetor top portion). Then, screw the cable adjuster in two turns in order to nullify any possible tension on the throttle cable and tighten the cable adjuster jam nut.



- ⑳ Connect vent hose as shown on illustration.



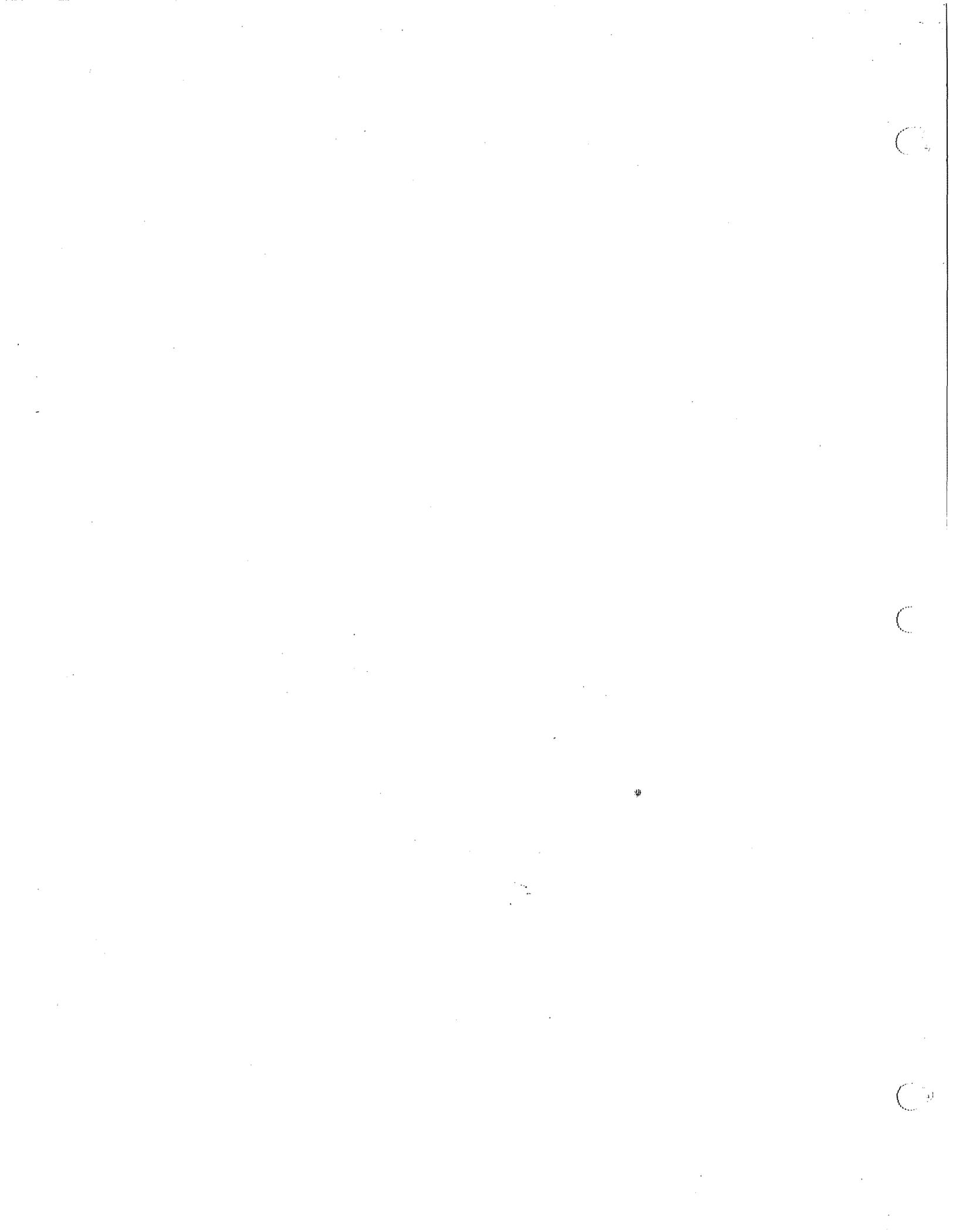
SECTION 04  
SUB-SECTION 06, (AIR INTAKE SILENCER, FUEL TANK)

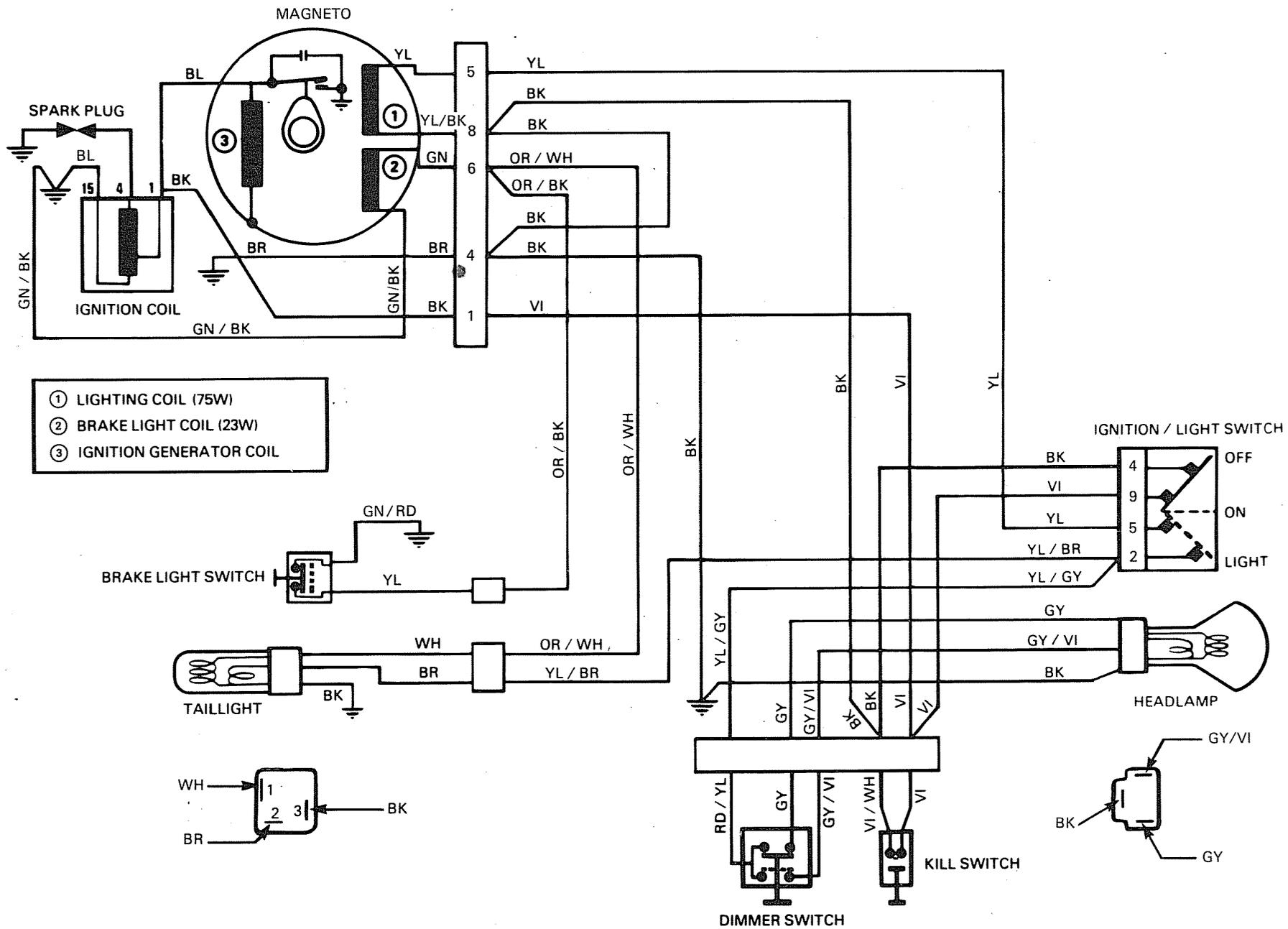


SECTION 05  
SUB-SECTION 01 (ELECTRICAL CHARTS)

MODEL	CHART NO	HEADLAMP WATT	TAIL LIGHT WATT
Elan 250	1	60/60	5/21
Spirit	1	60/60	5/21
Elan 250 Deluxe	2	45/45	5/21
Citation	3	45/45	5/21
Olympique 300 - 340	4	60/60	5/21
Olympique 340E	5	60/60	5/21
Nuvik 340	4	60/60	5/21
Nuvik 340E	5	60/60	5/21
TNT F/A 340	6	60/60	5/21
TNT F/C 440	6	60/60	5/21
Everest 340 - 440	6	60/60	5/21
Everest 440E	7	60/60	5/21
Everest 444 LC	8	60/60	5/21
Futura 400 - 440	6	60/60	5/21
Futura 440E	7	60/60	5/21
Futura 444 LC	8	60/60	5/21
RV 340	9	60/60	5/21
Sonic 340	9	60/60	5/21
Blizzard 6500 Plus	10	60/60	5/21
Élite 450 LC	11	60/60	5/21
Alpine 640 ER	12	60/60	5/21

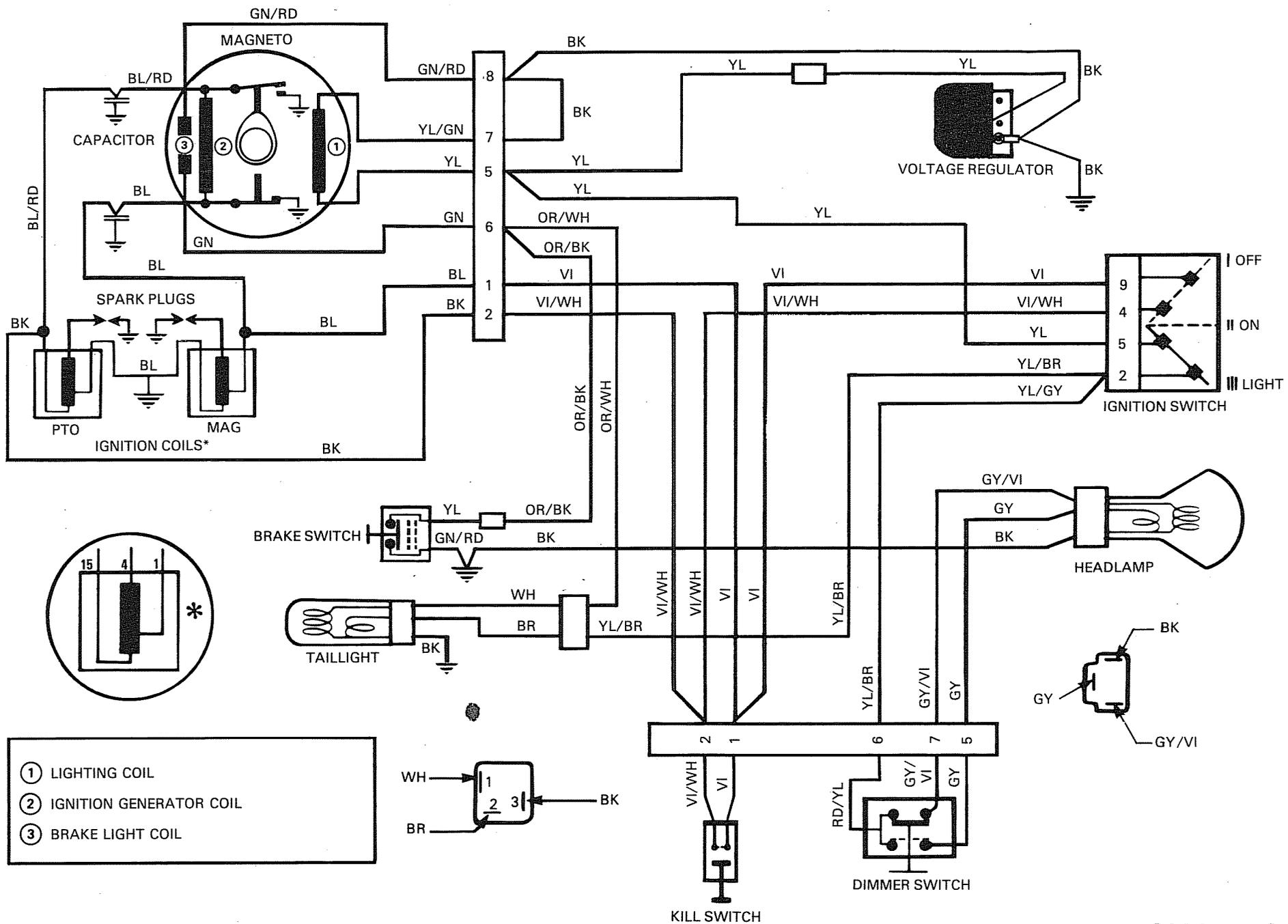
COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN



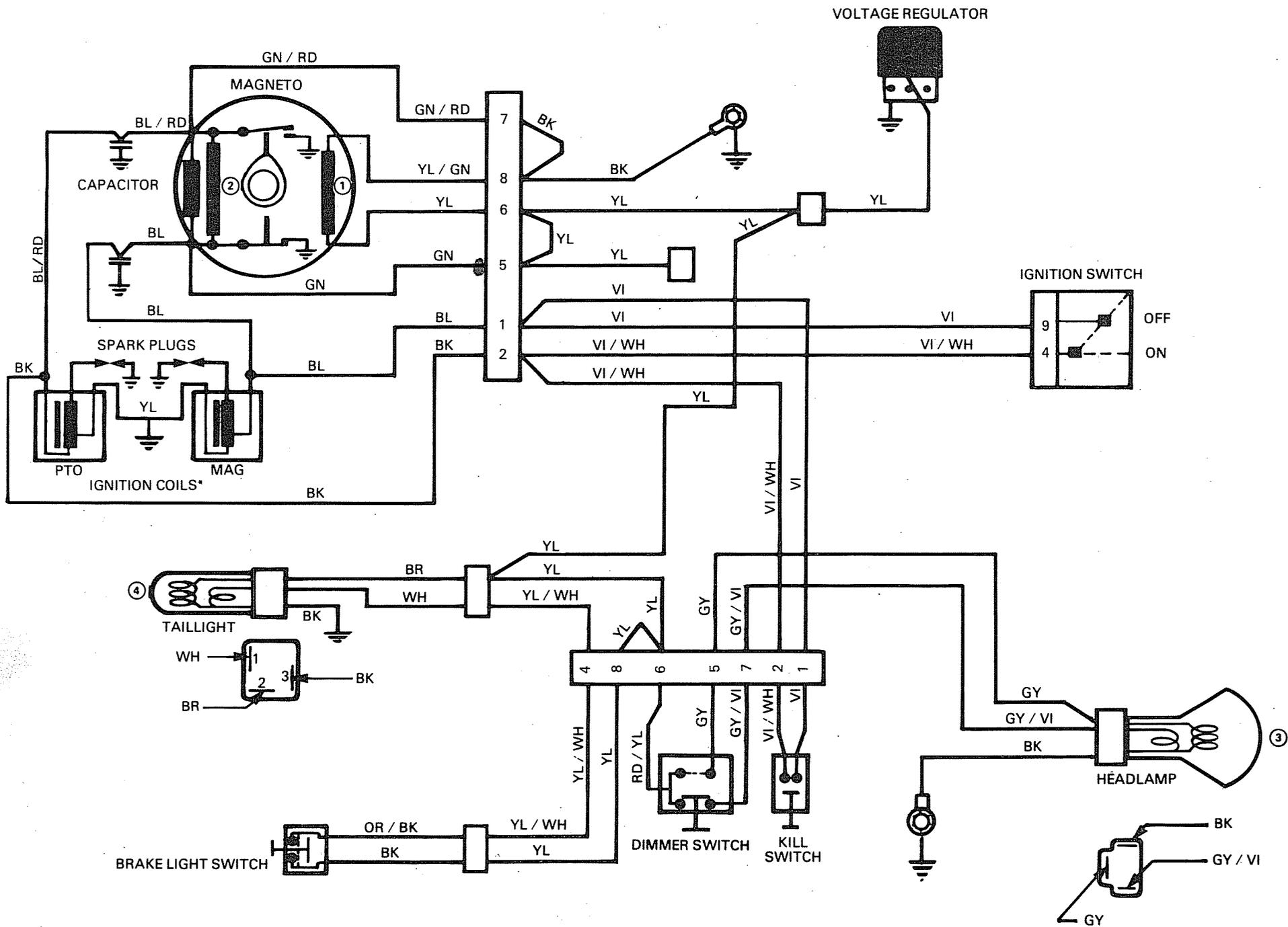


# CHART 1

ELAN 1978  
SPIRIT 1978

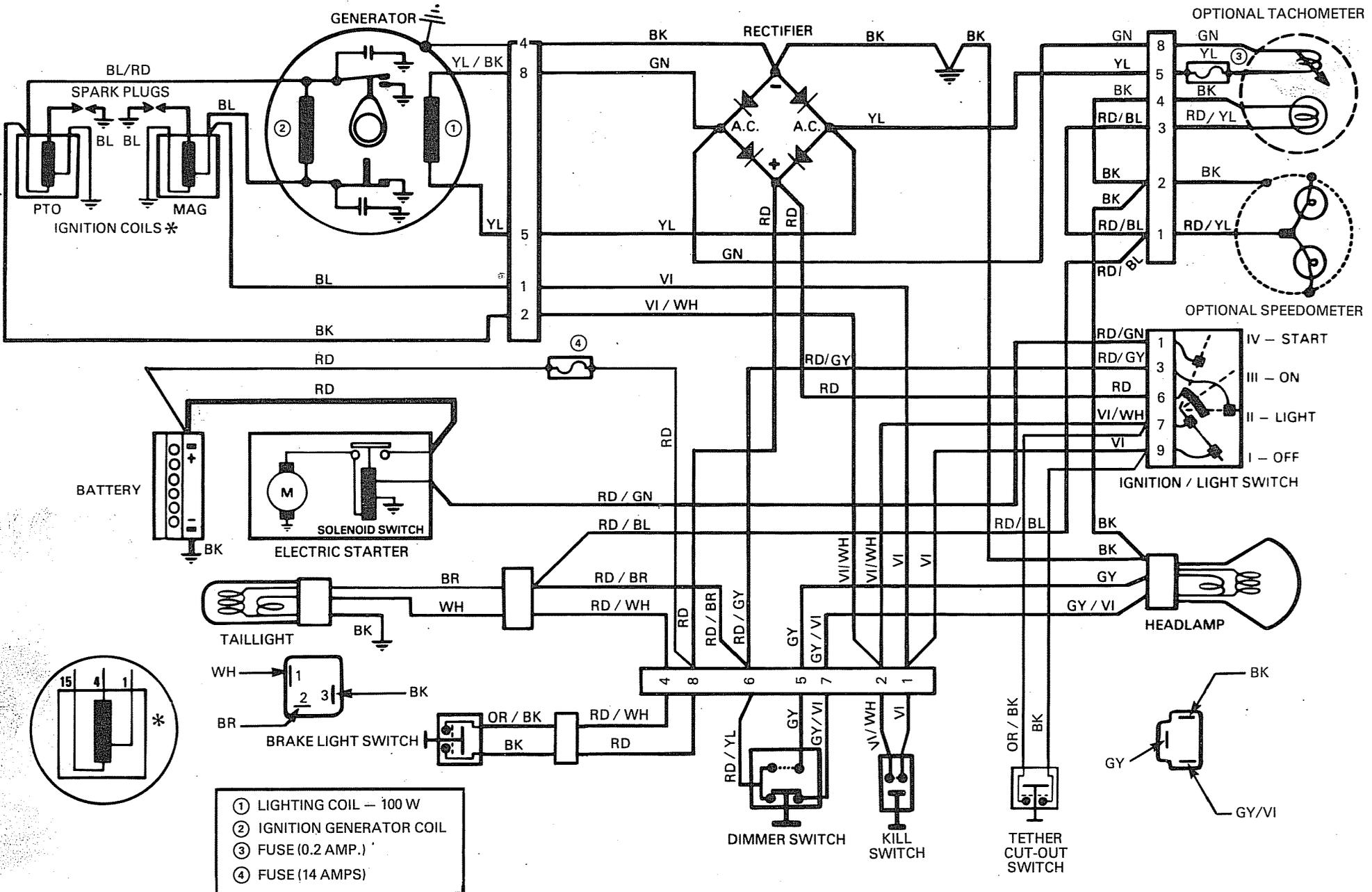


**CHART 2**  
ELAN 250 DELUXE 1978



**CHART 3**  
CITATION 1978



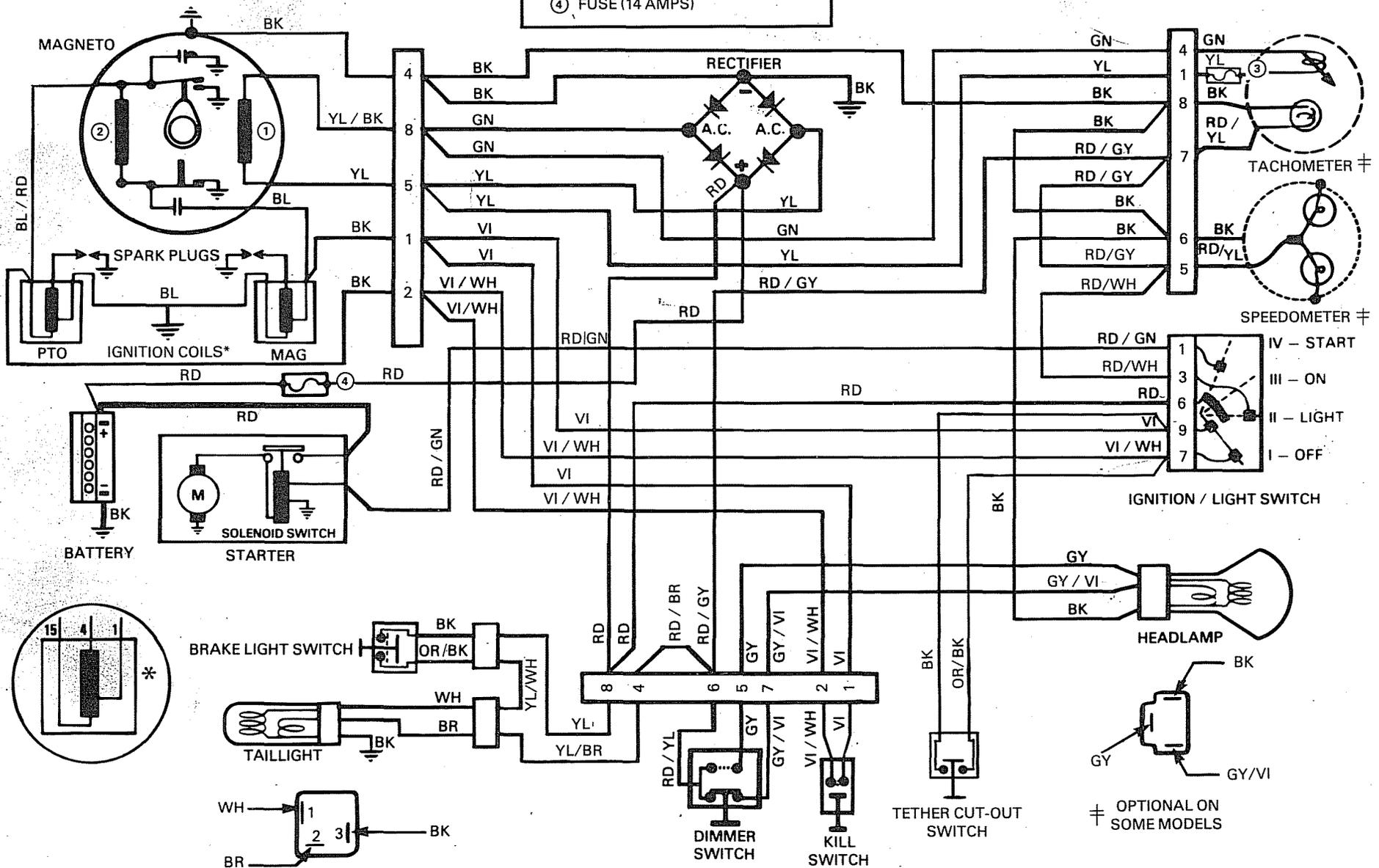


# CHART 5

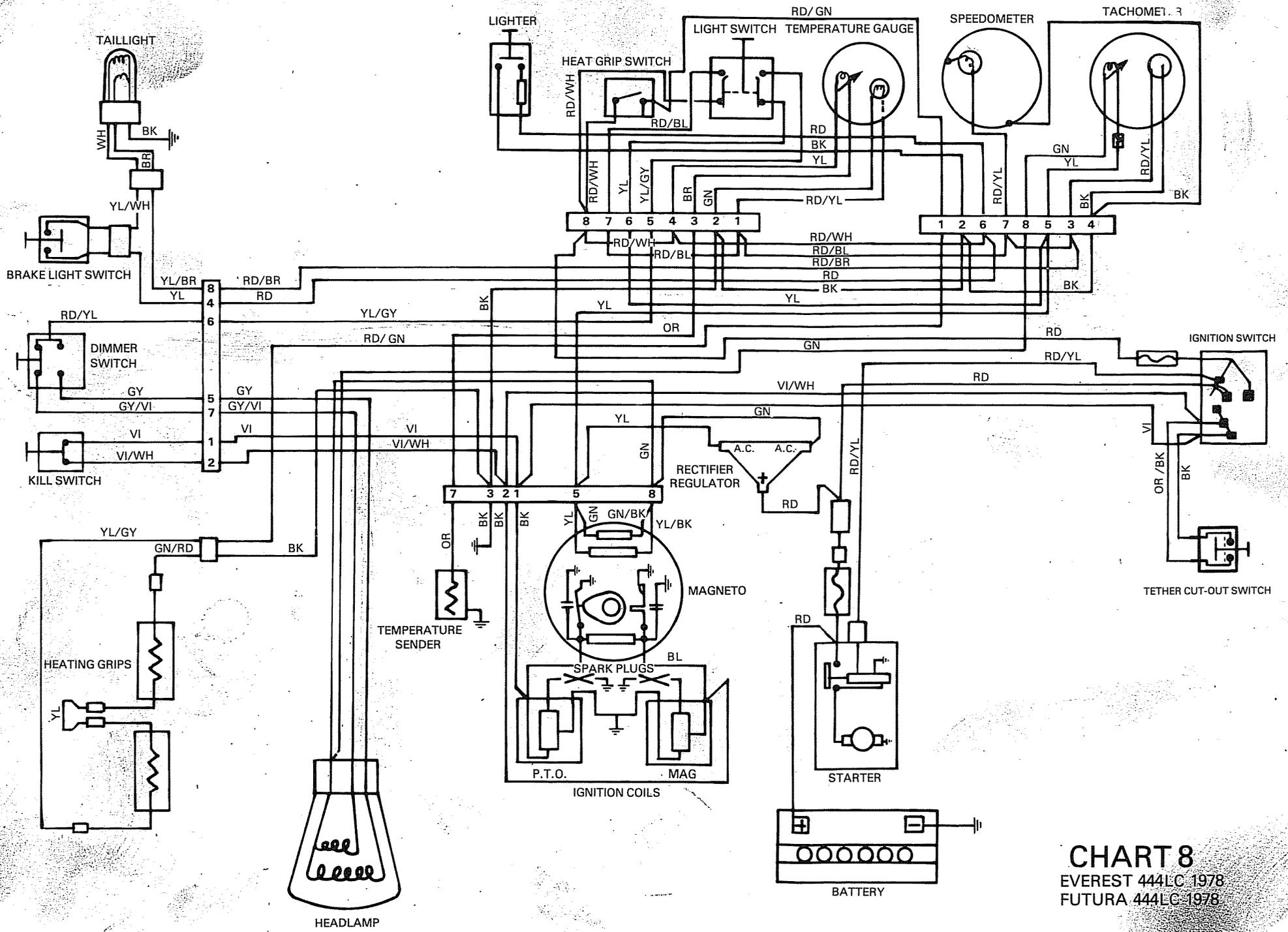
OLYMPIQUE 340E 1978  
 NUVIK 340E 1978



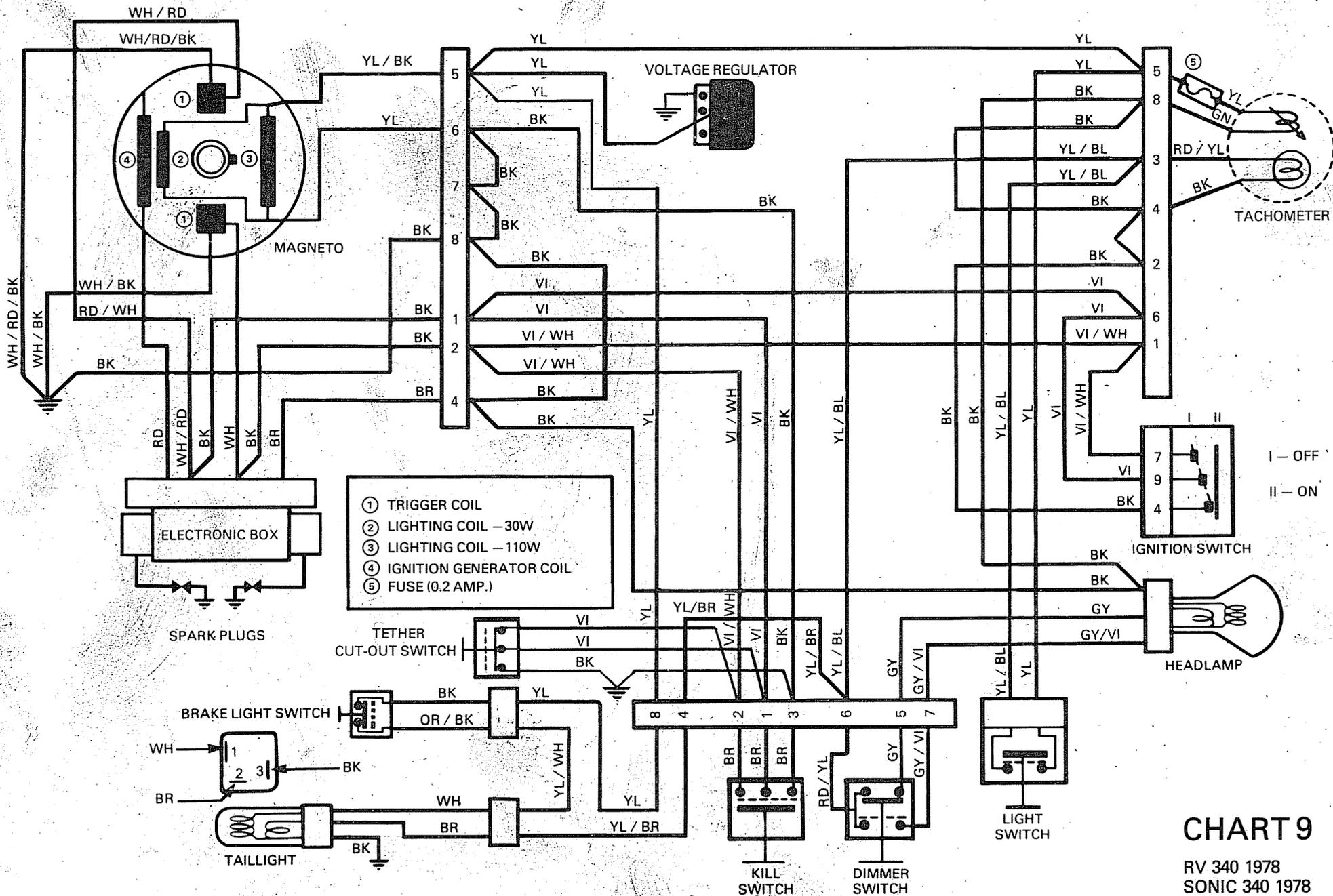
- ① LIGHTING COIL
- ② IGNITION GENERATOR COIL
- ③ FUSE (0.2 AMP)
- ④ FUSE (14 AMPS)



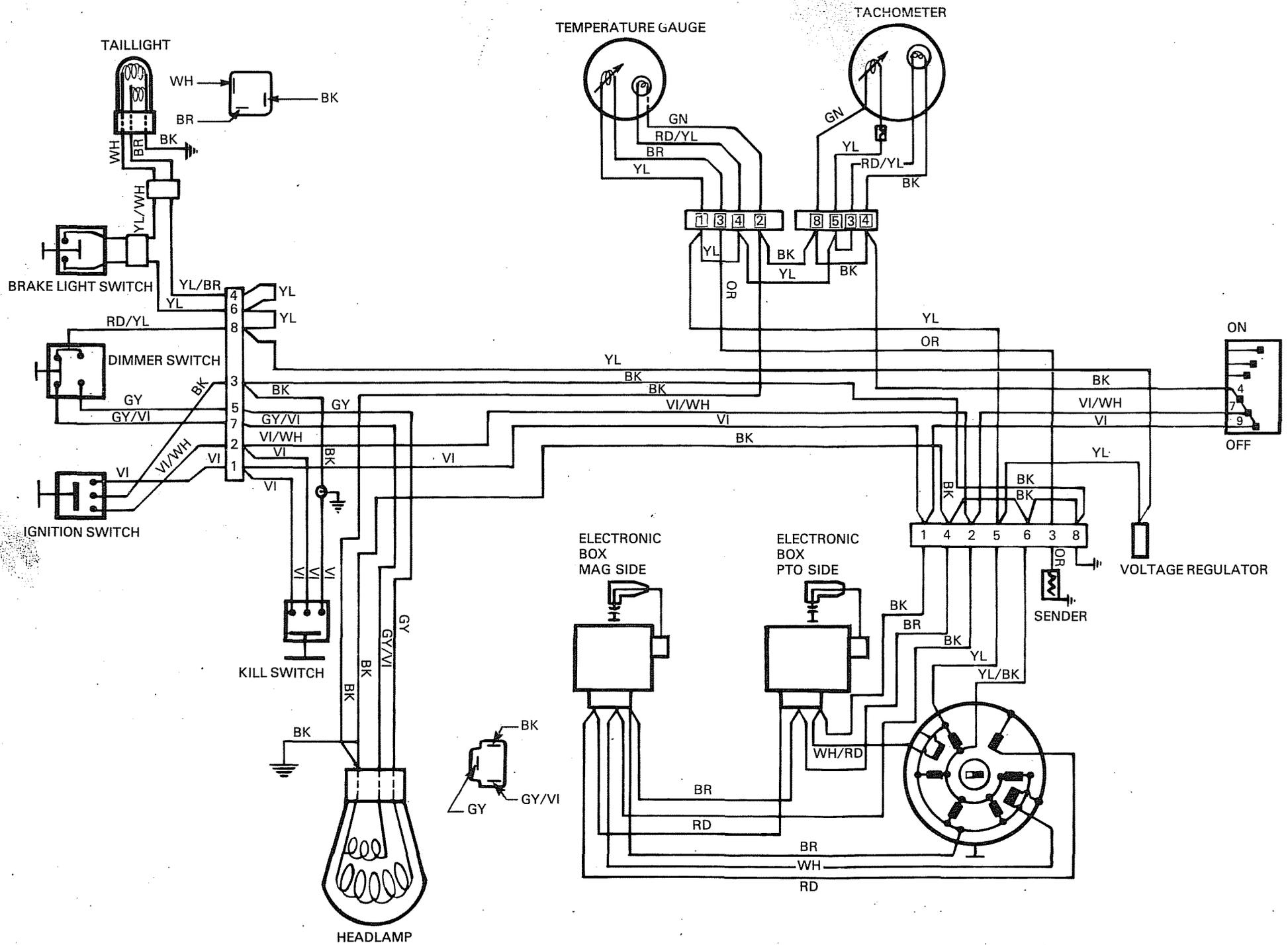
**CHART 7**  
 FUTURA 440E 1978  
 EVEREST 440E 1978



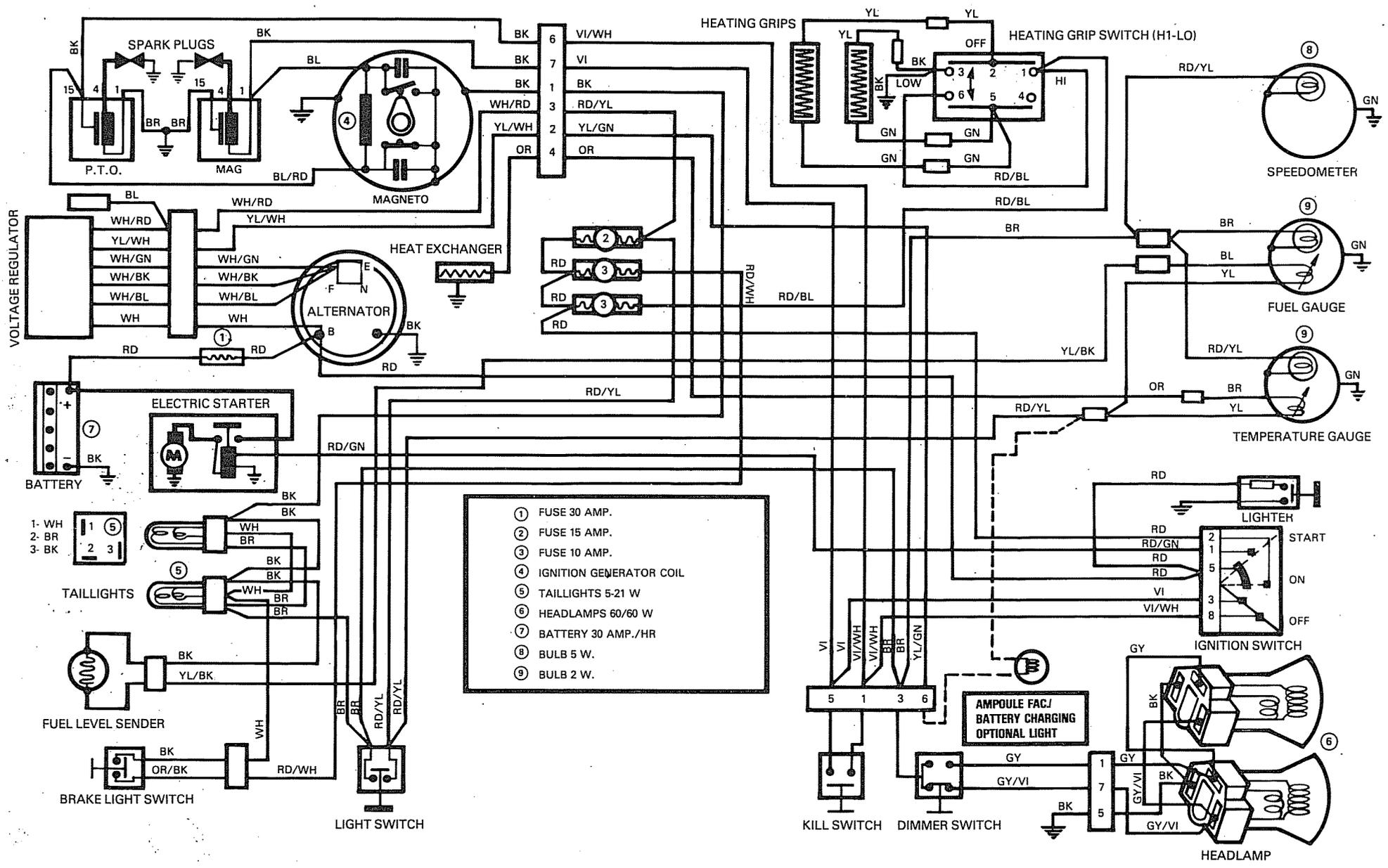
**CHART 8**  
 EVEREST 444LC 1978  
 FUTURA 444LC 1978



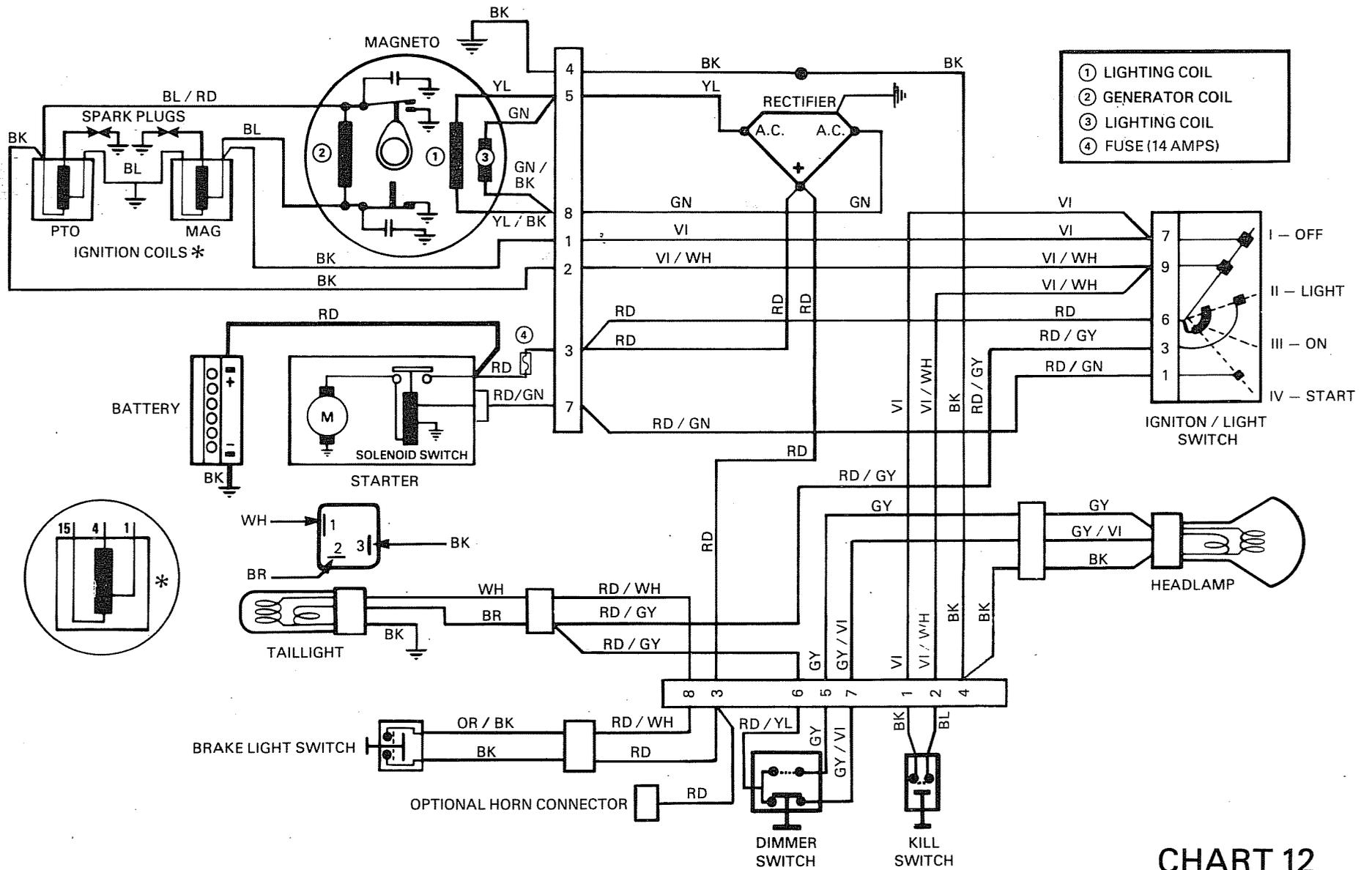
**CHART 9**  
 RV 340 1978  
 SONIC 340 1978



**CHART 10**  
 BLIZZARD 6500 PLUS 1978



**CHART 11**  
 ELITE 450LC 1978



**CHART 12**  
ALPINE 640ER 1978

## BOSCH SPARK PLUG

### BOSCH SPARK PLUG NUMBERING SYSTEM

#### Old system:

W 280 MZ 2 — Indicates particular design detail such as reach (3/4").

- T: Standard type
- M: Two cycle engine
- Z: Semi covered front electrode

Heat range: If we consider a 280 rating as normal, a plug with a 260 rating is "hotter" and a 340 rating is "colder".

W: indicates 14 mm thread  
M: indicates 18 mm thread

#### New system:

W 3 C 0 — electrode configuration

- reach (3/4")
- heat range: if we consider a 3 rating as normal, a plug with a 2 rating is "colder" and a 4 rating is "hotter".

W: indicates 14 mm thread  
M: indicates 18 mm thread

NOTE: It must be noted that in the new system the higher the rating the hotter the plug; and the lower the rating the colder the plug.

During the period of transition from one system to the other, the spark plugs will be identified both ways.

W 3 C 0 (H) W 280 MZ 2

### HEAT RANGE

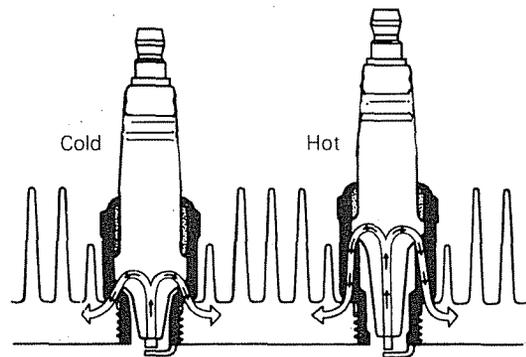
The proper operating temperature or heat range of the spark plug is determined by the spark plug's ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



CAUTION: Severe engine damage can occur if a wrong heat range plug is used:

A too "hot" plug will result in overheating and preignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

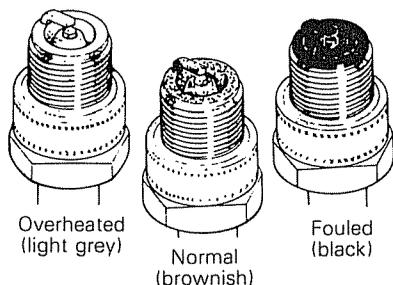
## SECTION 05

### SUB-SECTION 02, (SPARK PLUG)

## FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreasing engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, running the engine with the choke on, or running on a too rich a mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

## SPARK PLUG ANALYSIS



The plug face (and piston dome) reveals the condition of the engine, operating condition, method of driving, and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber) and the piston dome.

## SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap to 0,5 mm (.020").
2. Apply a light coat of graphite grease over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench:  
M (18 mm) 40 N•m (30 ft-lbs)  
W (14 mm) 27 N•m (20 ft-lbs)

## 1978 SPARK PLUG CHART

Bombardier Limited prescribes two spark plug types for specific uses on many of its snowmobile models.

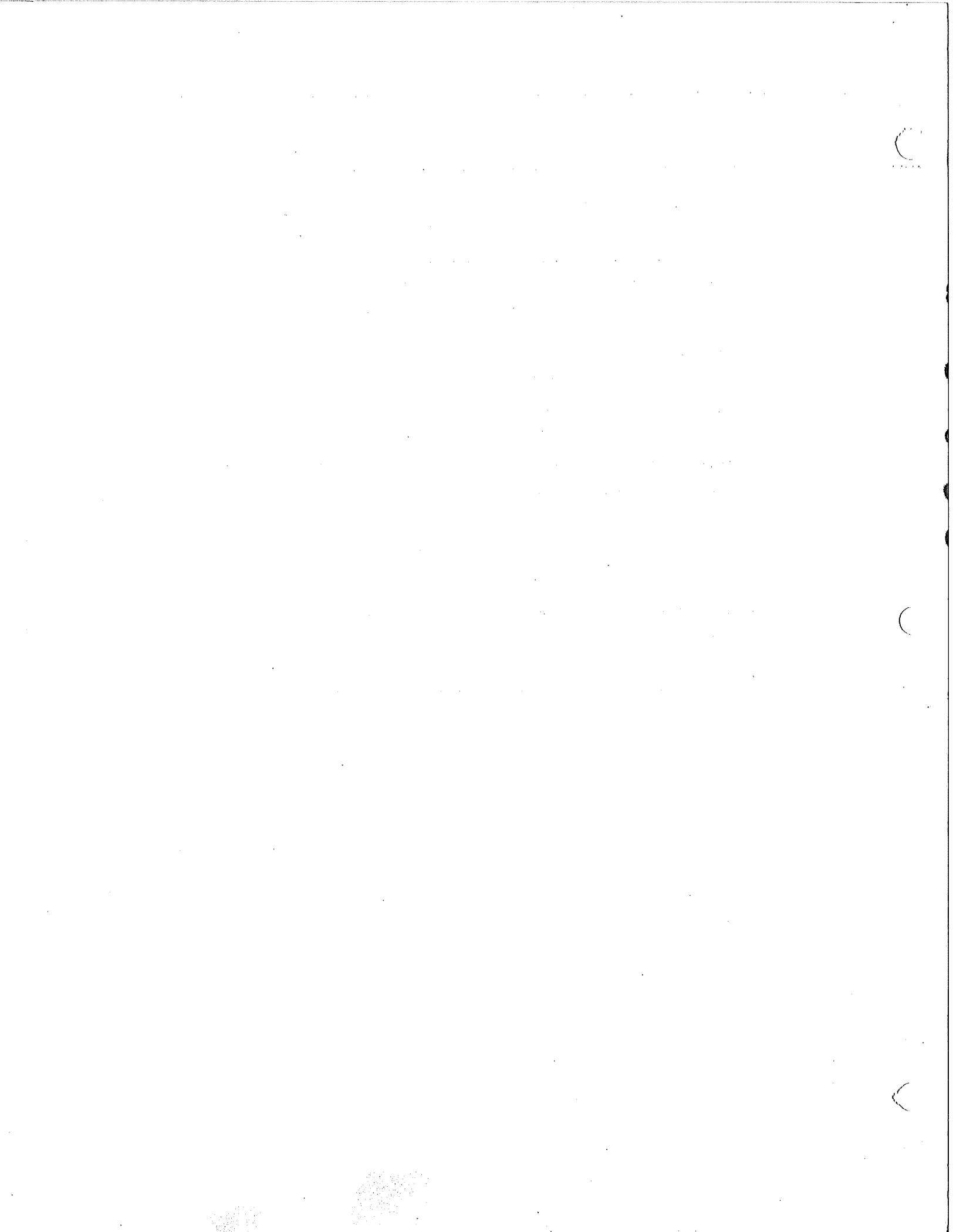
**Full load:** frequent use of maximum engine RPM.

**Partial load:** use of medium engine RPM.

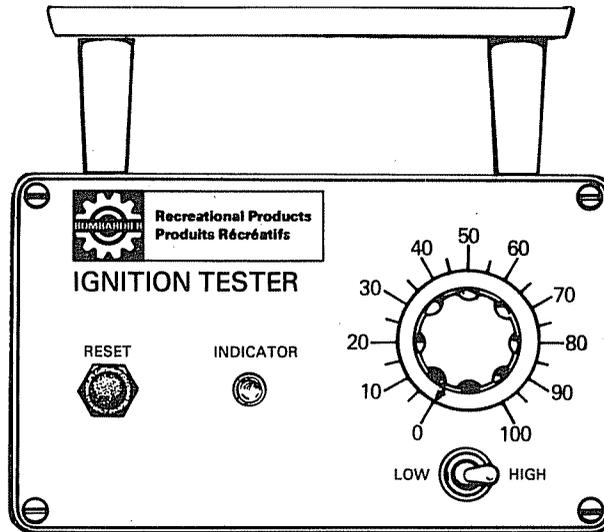
SECTION 05  
SUB-SECTION 02, (SPARK PLUG)

		ENGINE TYPE	FULL LOAD	PART LOAD
ELAN & SPIRIT	250	247	M7A – M175T1	same
ELAN	250 Deluxe	248	W4A2 – W240T1	same
OLYMPIQUE	300T	305	W3A0 – W280MZ1	W4A0 – W260MZ1
OLYMPIQUE & NUVIK	340	343	W3A0 – W280MZ1	W4A0 – W260MZ1
CITATION	300	294	W3A0 – W280MZ1	W4A0 – W260MZ1
EVEREST	340	343	W3A0 – W280MZ1	W4A0 – W260MZ1
FUTURA	400	402	W3A0 – W280MZ1	W4A0 – W260MZ1
EVEREST & FUTURA	440	440	M4A1 – M260T1	same
EVEREST & FUTURA	444 LC	444	W3C0 – W280MZ2*	same
T'NT	340 F/A	346	W4C3 – W260MZ2	same
T'NT	440 F/C	440	M4A1 – M260T1	same
RV & SONIC	340	345	W3C0 – W280MZ2	same
BLIZZARD	6500 Plus	354	W08CS – W340S2S	same
ALPINE	640	640	M4A2 – M240T1	same
ELITE	450 LC	444	W4C3 – W260MZ2	same

\*With 2 gaskets



## BOMBARDIER IGNITION TESTER



### GENERAL

The Bombardier ignition tester is an electrical energy measuring device capable of measuring the peak energy output of a coil.

The tester is of solid state construction and performs as a comparator. The correct value of energy output is indicated in each test and is then compared with the value taken from the engine being tested.

The energy output is verified by means of a 0-100 scale on the tester. The greater the energy output, the greater value indication on the scale. The indication is in the form of an incandescent lamp that lights when the scale knob is set at the position corresponding to the energy output.

The tester has two input ranges selected by a toggle switch. The **LOW** range is sensitive to AC or DC voltages from 0.5 to 27 volts. The **HIGH** range is sensitive to AC or DC voltages of from approximately 75 to 500 volts.

### TEST CONDITION

All tests are performed on the vehicle at cranking speed. Vigorous cranking against compression causes the flywheel to snap over, raising the output higher than by cranking without compression, therefore, do not remove spark plugs.

**Test values listed are taken against compression.**

Always crank vigorously as in actual starting.

Read all instructions thoroughly and as you become familiar with this test instrument it will be possible to test a complete ignition system in a matter of minutes. Always proceed in the following order:

1. Connect tester P and N clip leads as illustrated.
2. Follow test procedure sequence.
3. After every test that lights the indicator lamp, reset the indicator circuit by depressing the reset button.

## SECTION 05 SUB-SECTION 03, (ELECTRICAL TESTS)

### ANALYSIS OF TEST RESULTS

#### Indicator lamp lights at specific setting

Output is as specified. Test results should repeat three times. If readings do not repeat, output is erratic and cause should be investigated (loose connections or components, etc.).

#### Indicator lamp lights at lower setting

This indicates that the output is less than that designed to operate in a satisfactory manner. However, before coming to the conclusion of a faulty condition be certain that correct engine cranking conditions were met before condemning the ignition.

#### Indicator lamp does not light.

One component is defective. Proceed as instructed to find defective component.

#### Intermittent ignition problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

In most cases of temperature and/or vibration failure, only parts replacement can solve the problem as most of these failures return to normal when engine is not running.

#### Double trouble

There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

### ANALYSER TEST AND MAINTENANCE

A test simulator is provided with each tester as a means to test the lamp, detector circuit, and batteries.

#### High scale test

- Place switch in **HIGH** position. Plug the simulator into an electric outlet (117 VAC) for then seconds.

▼ **CAUTION:** After charging, do not touch plug terminals while pressing test button. A mild shock will result.

- Remove the simulator from the outlet, and connect the "P" and "N" leads from the tester to the simulator as indicated on the button of the simulator.
- Set the tester dial to 50, or below. Depress the button of the simulator. The indicator lamp on the tester should light.

○ **NOTE:** For each test performed by the simulator, it must be recharged.

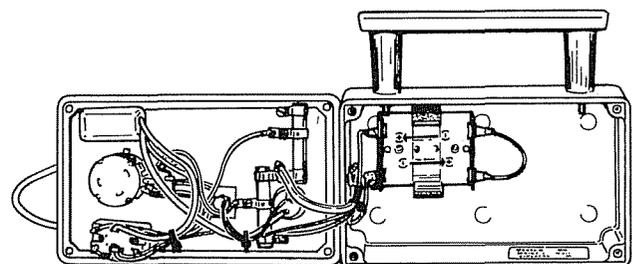
#### Low scale test

- Place switch in **LOW** position.
- Set tester dial to 50, or below.
- Connect **N** lead to negative terminal of 12 volt battery. Connect **P** lead to positive terminal of 12 volt battery: indicator lamp should light.

If lamp does not light, check tester batteries. If they are installed correctly and are good, check the clip leads for faulty connections. If no fault can be found, refer to the warranty statement for instructions for sending the tester back to Electro-Specialties, Inc.

#### Battery replacement

- Remove the four (4) screws securing cover to case.
- Carefully lift cover.
- Replace batteries with size "C" Alkaline batteries. Be sure to observe polarity markings on battery holder or lamp will not light.



4. Carefully install cover on case being certain that no wires are pinched between cover and case. Secure cover.

NOTE: Weak batteries will not impair tester operation or calibration. The light will glow dim.

The ignition tester may give false readings if the rivets on the back cover come in contact with metal.

#### Indicator knob alignment

Check indicator knob alignment by turning knob fully clockwise. The white mark on the knob must align with no. 100 on the scale. If the mark does not line up with the no. 100, loosen the knob set screw, line the mark on the knob with no. 100, and tighten the set screw. Re-check alignment.

NOTE: If after adjustment, the knob is turned fully counter-clockwise and it does not exactly align with the 0, it is of no consequence.

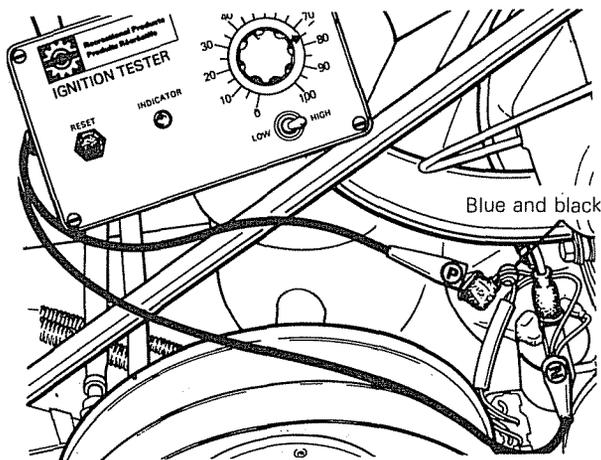
## TESTS INDEX

<b>ROTAX ONE CYLINDER BREAKER POINTS ENGINE</b>	<ol style="list-style-type: none"><li>1. Generator coil output.</li><li>2. Lighting coil output.</li><li>3. Brake light coil output.</li></ol>
<b>ROTAX TWO CYLINDER BREAKER POINTS ENGINE</b>	<ol style="list-style-type: none"><li>4. Generator coil output.</li><li>5. Lighting coil output.</li><li>6. Brake light coil output.</li></ol>
<b>ROTAX TWO CYLINDER ELECTRONIC IGNITION ENGINE</b>	<ol style="list-style-type: none"><li>7. Generator coil output.</li><li>8. Trigger coil output.</li><li>9. Lighting coil output.</li></ol>

**ONE CYLINDER ENGINE**

**1. GENERATOR COIL OUTPUT**

1. Disconnect blue and black wires from terminal (15) of ignition coil.
2. Attach tester P lead to blue and black wires previously disconnected. Connect tester N lead to a good engine ground.



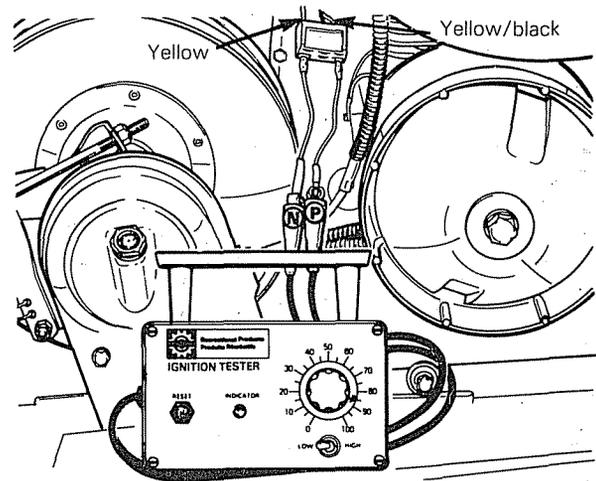
3. Set tester dial and switch as follows:

Engine type	Switch position	Dial
247	HIGH	75

4. Turn ignition key to ON position, disable emergency cut-out button circuit then crank engine.
  - A. **Indicator lamp lights:** Coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
  - B. **Indicator lamp does not light:** Coil output is below specifications. This could be caused by a faulty coil or breaker points. Check breaker points condition and adjustment, and correct as necessary. Repeat test. If lamp still does not light the coil is defective and should be replace.

**2. LIGHTING COIL OUTPUT**

1. Disconnect wiring harness junction block at engine .
2. Connect tester leads as illustrated using two (2) harness adaptors.



3. Set tester dial and switch as follows:

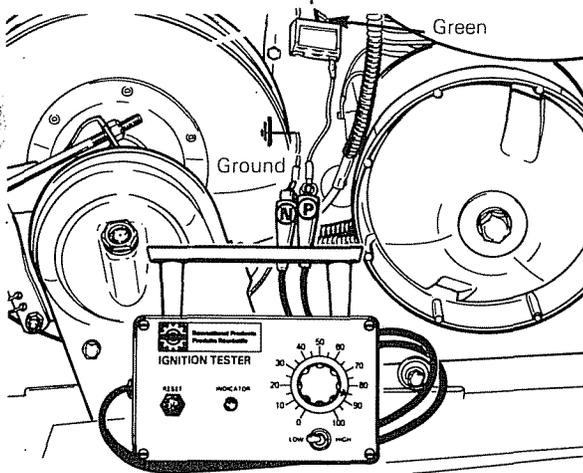
Engine type	Switch position	Dial
247	LOW	85

4. Crank engine.
  - A. **Indicator lamp lights:** Lighting coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
  - B. **Indicator lamp does not light:** Lighting coil is faulty.

SECTION 05  
SUB-SECTION 03, (ELECTRICAL TESTS)

### 3. BRAKE LIGHT COIL OUTPUT

1. Disconnect wiring harness junction block at engine .
2. Connect tester leads as illustrated using two (2) harness adaptors.



3. Set tester dial and switch as follows:

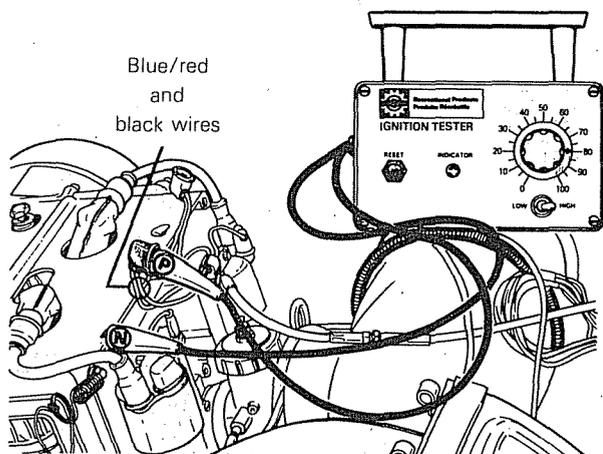
Engine type	Switch position	Dial
247	LOW	85

4. With ignition key to OFF position, crank engine.
  - A. **Indicator lamp lights:** Brake light coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
  - B. **Indicator lamp does not light:** Brake light coil is faulty.

## TWO CYLINDER BREAKER POINTS ENGINE

### 4. GENERATOR COIL OUTPUT

1. Disconnect blue/red and black wires from terminal (15) of P.T.O. side ignition coil. Disconnect the two (2) blue wires from terminal (1) of magneto side ignition coil. Make sure that neither connector touches the engine (ground).
2. Connect tester P lead to blue/red and black wires previously disconnected. Connect N lead to a good engine ground.



3. Set tester switch and dial as follows:

Engine type	Switch position	Dial
248, 294	HIGH	75
305, 343, 346, 402, 440, 444, 640	HIGH	80

4. Turn ignition key to ON position, disable cut-out button circuit then crank engine.

A. **Indicator lamp lights:** Generator coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.

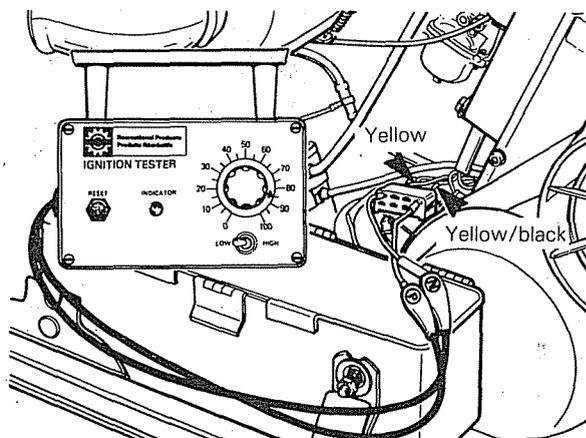
B. **Indicator lamp does not light:** Generator coil output is below specifications. This could be caused either by a faulty coil or breaker points.

5. Repeat test with other side (blue wires). If test indicates good on magneto side wire, but not on the other, suspect faulty breaker points. If test indicates no output on either side, suspect either faulty generator coil or breaker points.

### 5. LIGHTING COIL OUTPUT

NOTE: In some engine types covered by this test an additional lighting coil is connected in parallel with the main lighting coil, in this case, the test will determine if the whole assembly is working right or not. If test appears to be negative, each component must be checked separately.

1. Disconnect wiring harness junction block at engine.
2. Connect tester leads as illustrated using two (2) harness adaptors.



3. Set tester dial and switch as follows:

Engine type	Switch position	Dial
248, 294	LOW	80
305, 343, 346, 402, 440, 444, 640	LOW	85

4. With ignition key to OFF position, crank engine.

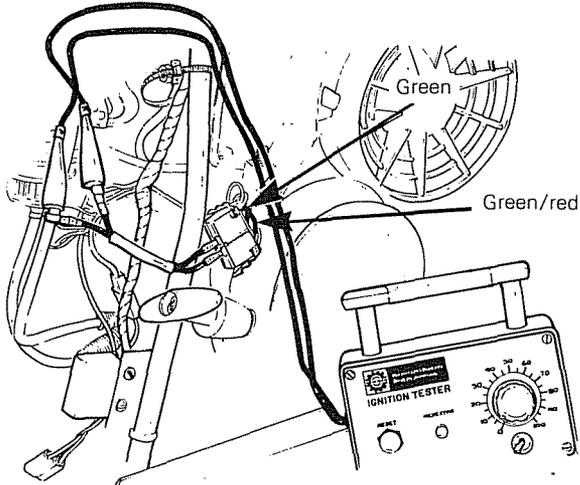
A. **Indicator lamp lights:** Lighting coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.

B. **Indicator lamp does not light:** Timing coil is faulty.

SECTION 05  
SUB-SECTION 03, (ELECTRICAL TESTS)

## 6. BRAKE LIGHT COIL OUTPUT

1. Disconnect wiring harness junction block at engine .
2. Connect tester leads as illustrated using two (2) harness adaptors.



3. Set tester dial and switch as follows:

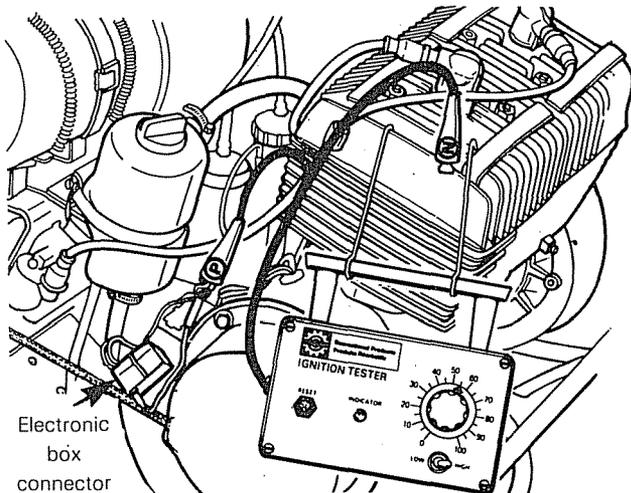
Engine type	Switch position	Dial
248, 294	LOW	80

4. With ignition on OFF position, crank engine.
  - A. Indicator lamp lights: Brake light coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
  - B. Indicator lamp does not light: Brake light coil output is defective.

## TWO CYLINDER ELECTRONIC IGNITION ENGINE

### 7. GENERATOR COIL OUTPUT

1. Disconnect wire connector from C.D.I. electronic box.
2. Using one (1) harness adaptor, connect tester P test lead to red wire of connector removed from C.D.I. electronic box. Connect N test lead to ground (engine); do not use brown wire as ground.



3. Set tester switch and dial as follows:

Engine type	Switch position	Dial
345, 354	HIGH	55

4. Turn ignition key to ON position, disable cut-out button circuit then crank engine.

◆ **WARNING:** To prevent powerful electric shocks with engine running, do not touch any component related to electronic ignition system (ignition coil, high tension wire, wire harness, etc...)

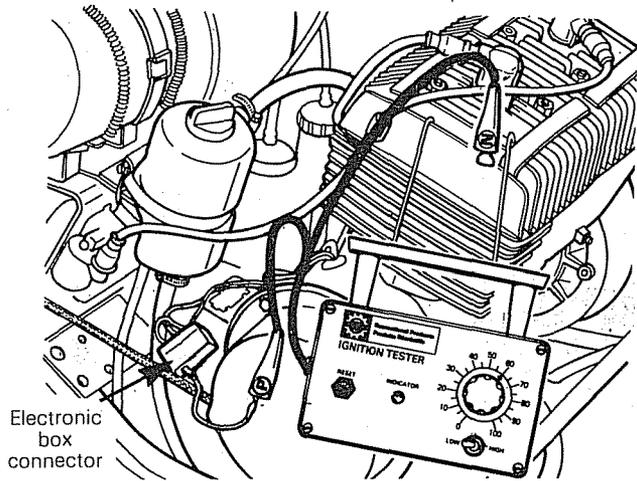
A. **Indicator lamp lights:** Generator coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.

B. **Indicator lamp does not light:** If trigger coil (no. 8) is positive, the problem is a faulty generator coil.

◆ **WARNING:** Do not touch tester P lead clip while cranking the engine. Also make sure that tester P lead clip does not contact any metallic object.

### 8. TRIGGER COIL OUTPUT

1. Disconnect electronic box connector.  
**Magneto side:** Connect tester P lead to white wire.  
**P.T.O. side:** Connect tester P lead to white/red wire.  
 Connect tester N lead to a good engine ground.
2. Set tester switch and dial as follows:



Engine type	Switch position	Dial
345	LOW	65
354	LOW	45

3. Turn ignition key to ON position, disable cut-out button circuit then crank engine.

◆ **WARNING:** To prevent powerful electric shocks with engine running, do not touch any component related to electronic ignition system (ignition coil, high tension wire, wire harness, etc...)

A. **Indicator lamp lights:** Trigger coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.

B. **Indicator lamp does not light:** The problem is a faulty trigger coil.

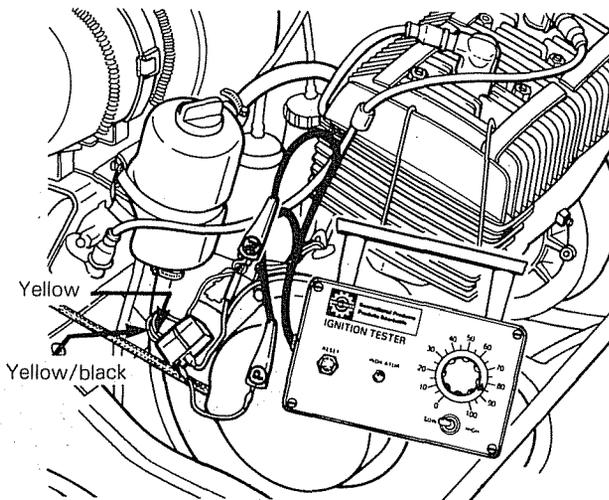
○ **NOTE:** (345 type) if no output is indicated on trigger coil, carefully inspect the trigger ground connection wire connected to C.D.I. electronic box retaining screw. Clean and tighten connection then repeat test.

SECTION 05  
SUB-SECTION 03, (ELECTRICAL TESTS)

## 9. LIGHTING COIL OUTPUT

○ NOTE: In some engine types covered by this test an additional lighting coil is connected in parallel with the main lighting coil, in this case, the test will determine if the whole assembly is working right or not. If test appears to be negative, each component must be checked separately.

1. Disconnect wiring harness junction block at engine .
2. Connect tester leads as illustrated using two (2) harness adaptors.



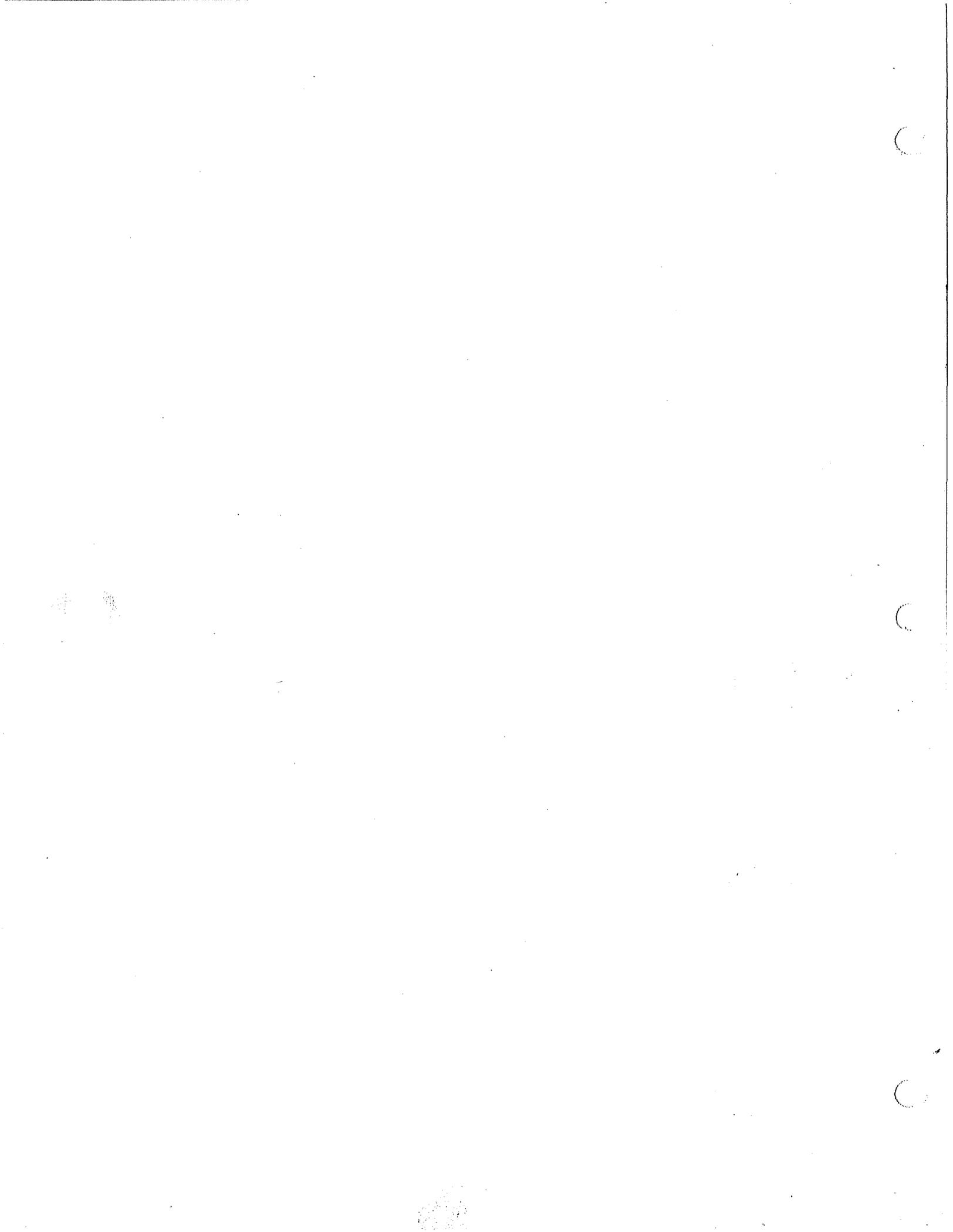
3. Set tester dial and switch as follows:

Engine type	Switch position	Dial
345	LOW	85
354	LOW	70

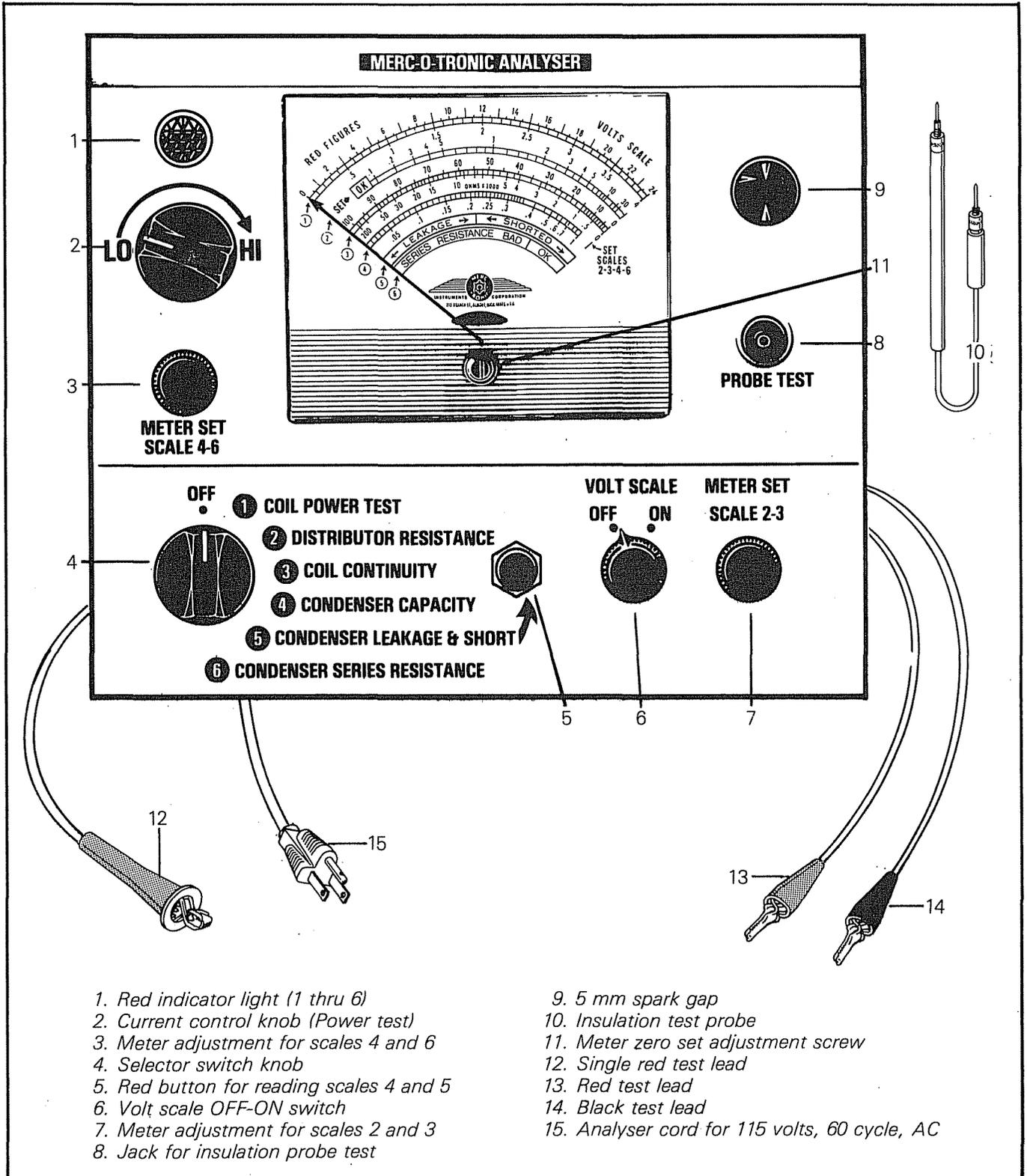
4. With ignition key to OFF position, crank engine.
  - A. Indicator lamp lights: Lighting coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
  - B. Indicator lamp does not light: Lighting coil is faulty.

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## MERC-O-TRONIC ANALYSER IDENTIFICATION



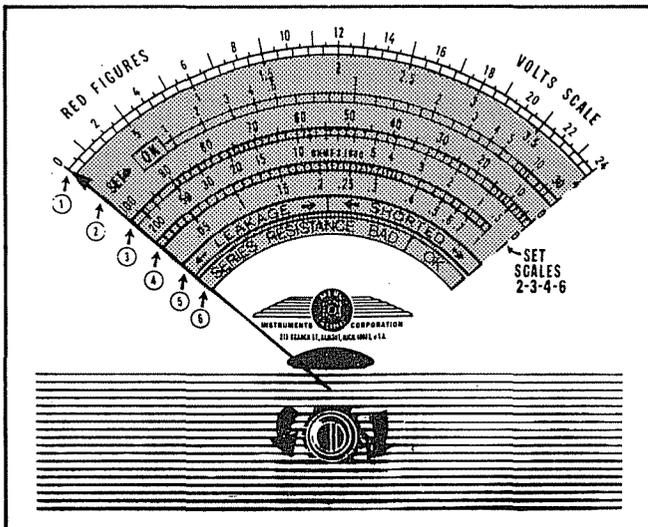
## SECTION 05 SUB-SECTION 03, (MERC-O-TRONIC TEST)

- **NOTE:** To test the armature plate components, remove armature plate and ignition coil(s) from engine.
- ▼ **CAUTION:** Do not connect test leads together when selector switch is turned to position no. 1 as this will result in a direct battery short.
- ◆ **WARNING:** When testing any components, place your Merc-O-Tronic analyser as well as the components on an insulated or wooden table top. This will prevent any leakage or shock hazards.

### ANALYSER TEST

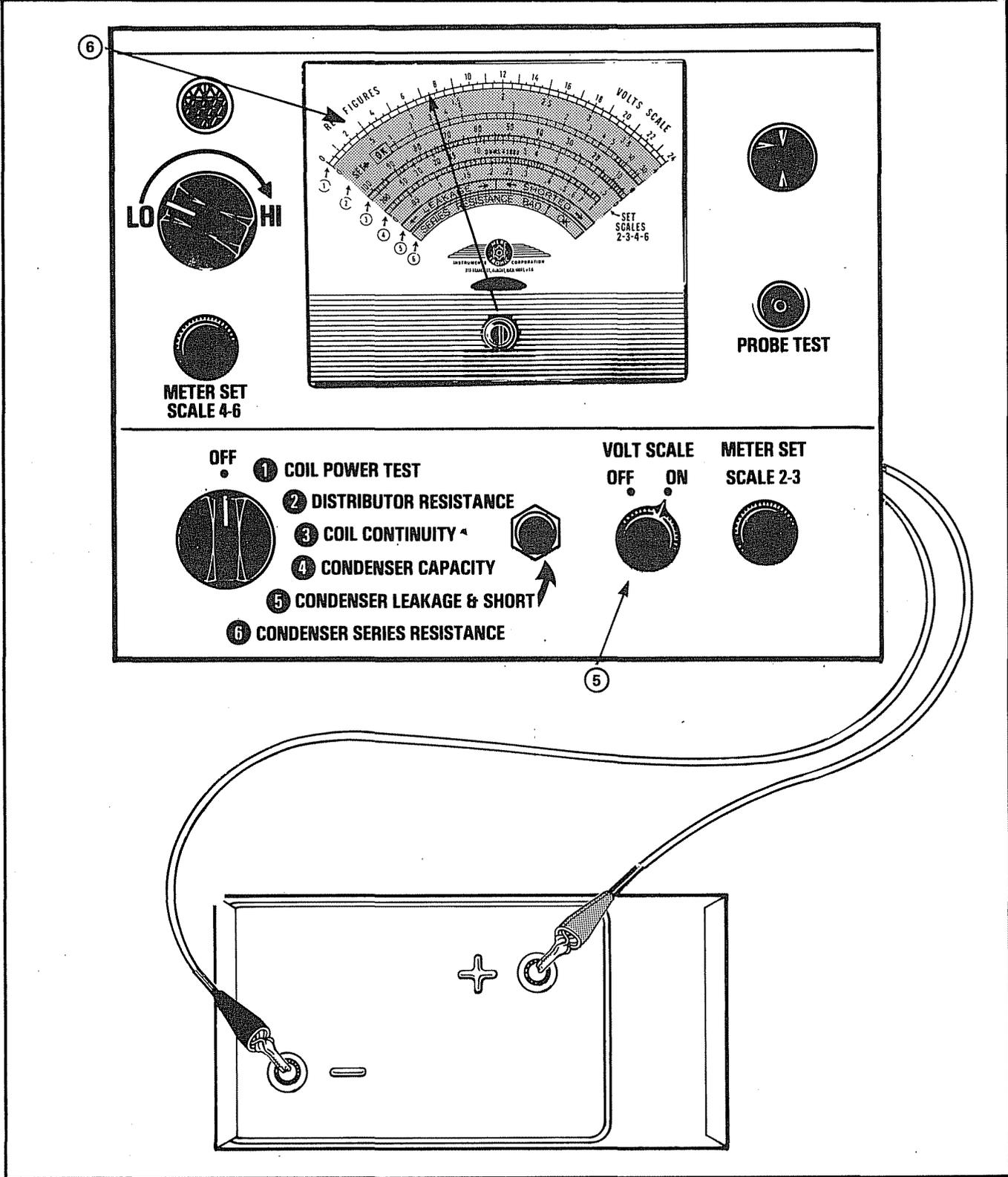
Prior to testing the circuitry or any electrical component, it is first necessary to test the operation and battery power of the analyser. To do this, proceed as follows:

1. Turn the small adjustment screw ⑪ so that the needle pointer aligns with the "0" reading on scale no. 1 of meter.



2. Remove the two (2) screws affixing analyser cover and expose the analyser battery.
3. Attach the black test lead ⑭ of analyser to negative post of analyser battery.
4. Attach the red test lead ⑮ of the analyser to positive post of analyser battery.
5. Turn the volt scale no. 1 switch ⑥ to the ON position.
6. Read RED figures on top of scale no. 1. Reading must not be less than 6.0 volts, if less, replace battery.

**ANALYSER TEST**



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SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

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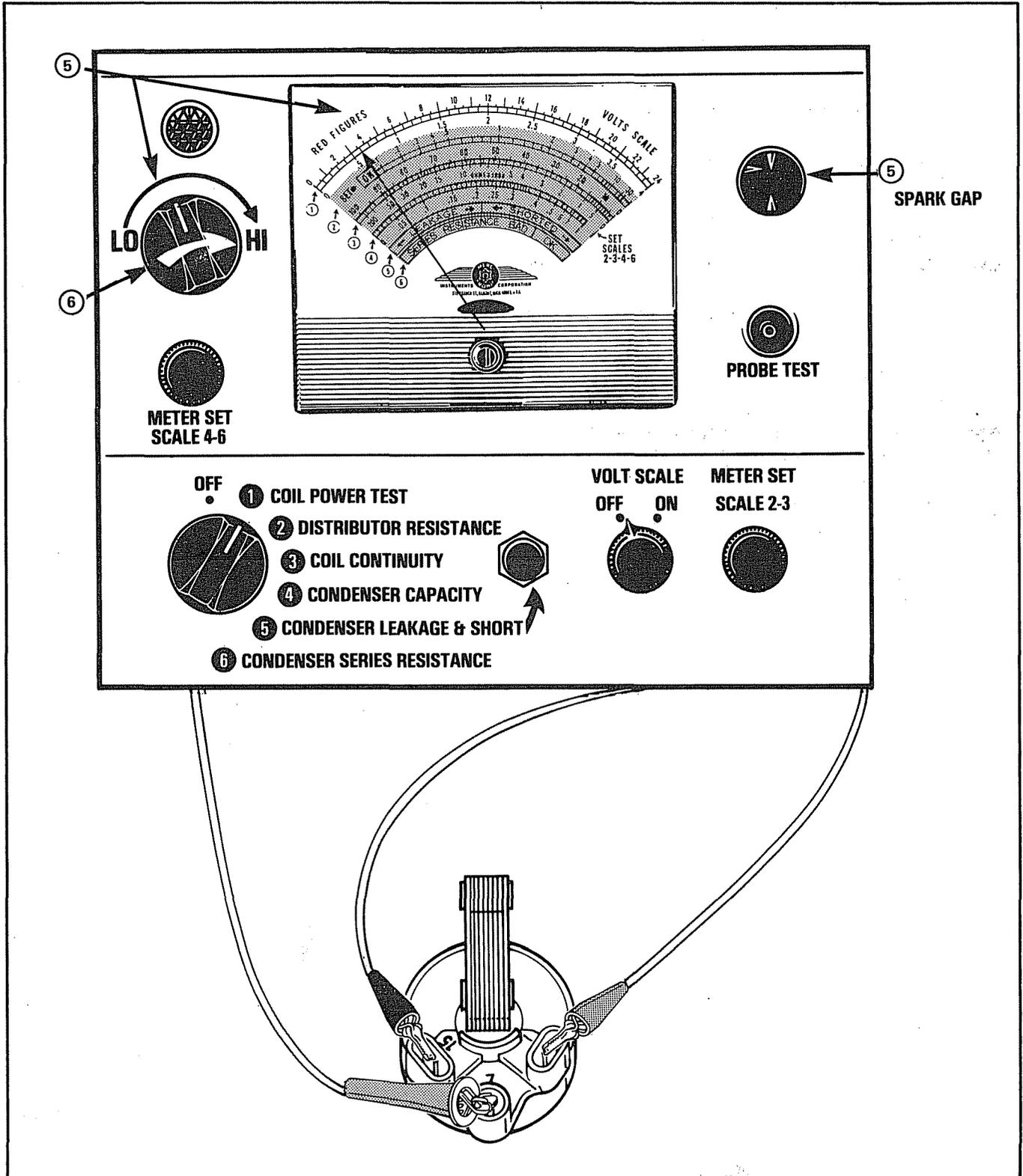
## TEST NO. 1 IGNITION COIL POWER TEST

For test no. 1 and 2, the battery normally installed in the analyser has insufficient voltage to produce exact readings required. Therefore, disconnect the analyser battery cables at the battery posts and connect each cable to appropriate post of 12 volt battery. Test condition of the connected 12 volt battery as detailed in analyser test.

1. Connect the black test lead (14) to terminal no. 15 of the ignition coil.
2. Connect the red test lead (13) to terminal no. 1 of ignition coil.
3. Connect the single red test lead (12) to spark plug terminal.
4. With the current control knob (2) at LO position, turn the selector switch (4) to position no. 1 — **COIL POWER TEST**.
5. Slowly turn the current control knob clockwise and note the current value on scale no. 1. When it reaches the operating amperage (.6 amp) for that particular winding, stop and note the spark gap indicator (9) located on right hand side of analyser. It should fire steadily. If the spark is faint, the coil is defective and should be replaced. If the coil is good, perform the high speed test as follows:
6. Continue turning the current control knob clockwise to obtain maximum meter reading. The spark gap should fire steadily. If the spark is faint, the coil is defective and should be replaced.

 **CAUTION:** Complete the test as quickly as possible and immediately upon completion of test, turn selector switch to **OFF** position and current control knob to **LO** position.

**TEST NO. 1 IGNITION COIL POWER TEST**



SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 2 IGNITION COIL  
INSULATION**

1. Connect the black test lead to terminal no. 15 of the ignition coil.
2. Connect the red test lead to terminal no. 1 of ignition coil.
3. Plug the Insulation Test Probe into "jack" located at the front of analyser.
4. Turn selector switch to position no. 1 **COIL POWER TEST.**
5. Turn current control knob to obtain maximum current reading.

 **CAUTION: Do not exceed maximum meter reading.**

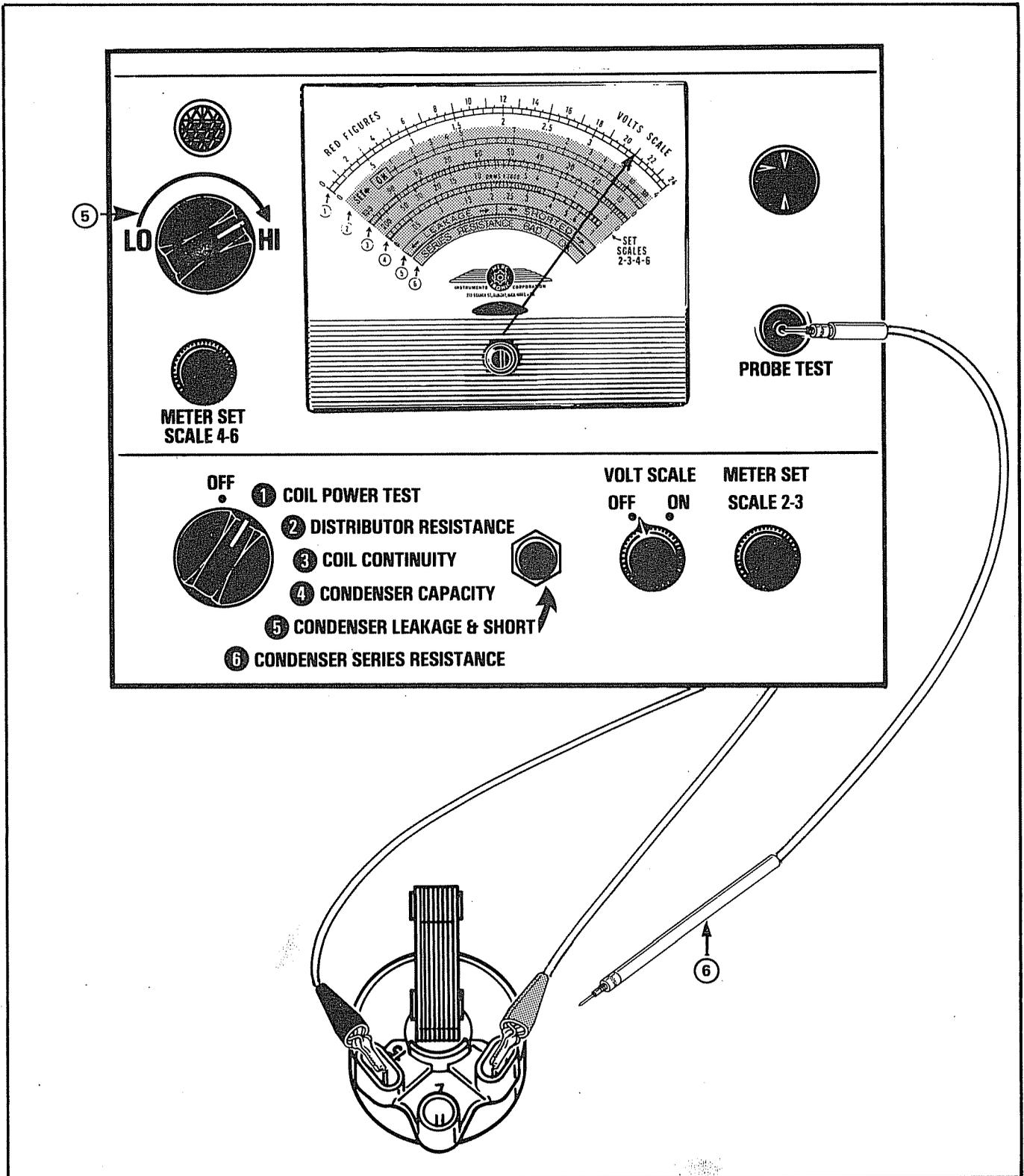
6. Pass the Insulation Test Probe tip over the insulating surface of the coil and spark plug wire. If coil insulation is cracked, leaking or damaged, or spark discharge will be noted at the cracked or leaking surface.

 **CAUTION: Do not allow test probe to linger at any one point during test operation. Complete test as fast as possible as this is a severe test for a coil.**

 **NOTE: A faint spark, occurring around coil insulation is a "corona spark" and does not mean a defective coil.**

7. Disconnect 12 volt battery and reinstall the analyser battery (6 volts).

**TEST NO. 2 IGNITION COIL INSULATION**



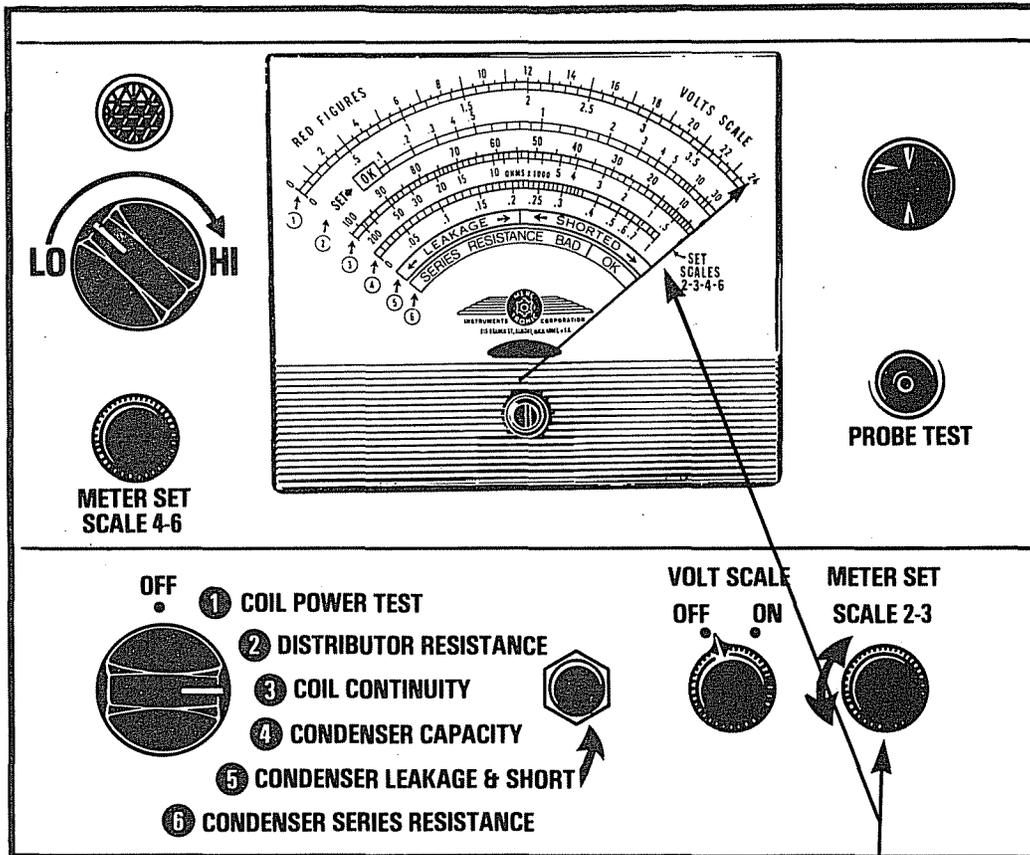
SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**ADJUSTMENT OF SCALE NO. 3  
FOR TEST NO. 3-11**

1. Turn selector switch to position no. 3 — COIL CONTINUITY.
2. Temporarily attach the red and black test leads together.
3. Turn meter adjustment knob for scale no. 3 until pointer aligns with set position "0" on right side of scale. Disconnect leads.
4. Proceed with test no. 3 or no. 11.

○ NOTE: Always readjust scale no. 3 before starting these tests (3 & 11).

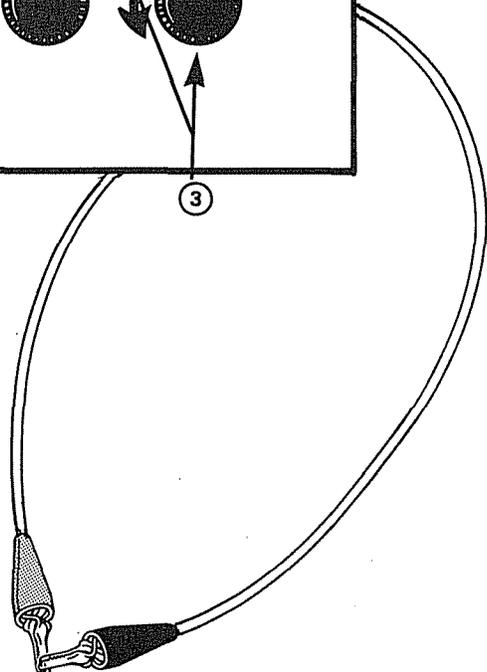
**ADJUSTMENT OF SCALE NO. 3 FOR TEST NO. 3 AND 11**



- OFF ● ① COIL POWER TEST
- ② DISTRIBUTOR RESISTANCE
- ③ COIL CONTINUITY
- ④ CONDENSER CAPACITY
- ⑤ CONDENSER LEAKAGE & SHORT
- ⑥ CONDENSER SERIES RESISTANCE

VOLT SCALE  
 OFF ON

③



SECTION 05

SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 3 IGNITION COIL  
RESISTANCE (SECONDARY)**

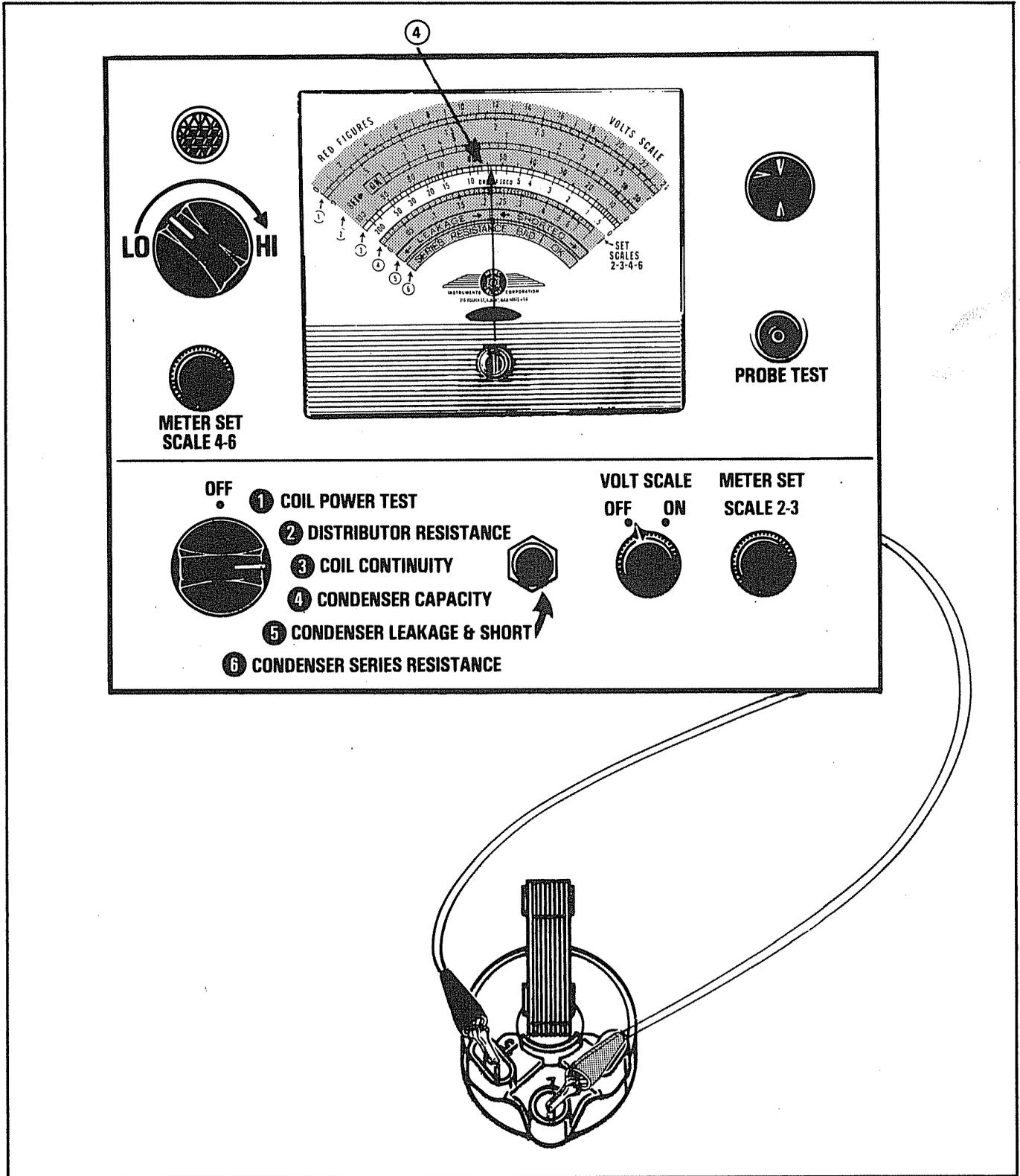
1. Turn selector switch to position no. 3 — COIL CONTINUITY.
2. Connect the black test lead to terminal no. 15 of the external coil.
3. Connect the red test lead to the spark plug terminal of the coil.
4. Read the RED figures of Scale no. 3. Meter reading must be between specification limits. The values on red scale no. 3 are in OHM and must be multiplied by 1,000. If coil is not within specifications, replace the defective coil.

**SECONDARY RESISTANCE**

MIN  
6300 ohms

MAX.  
8500 ohms

**TEST NO. 3 IGNITION COIL RESISTANCE (SECONDARY)**



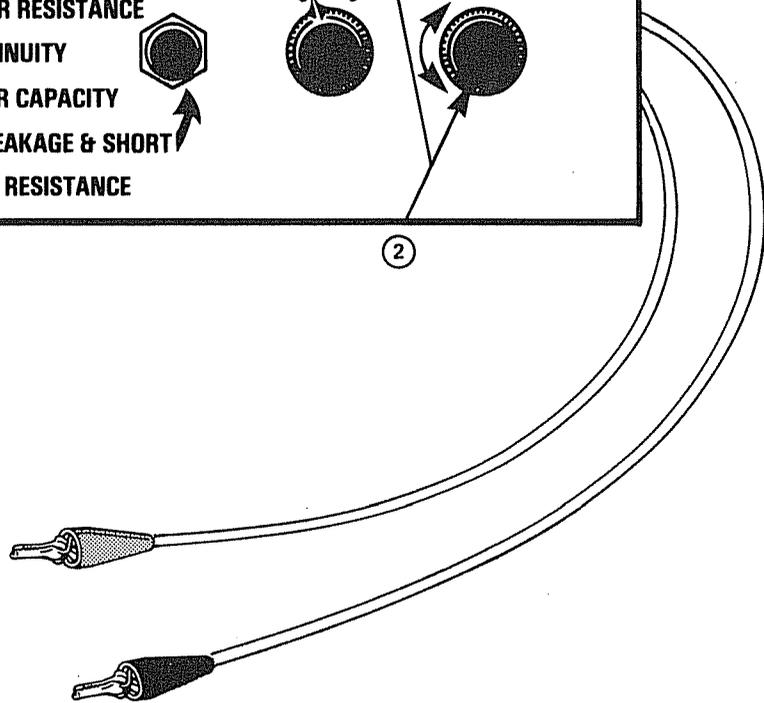
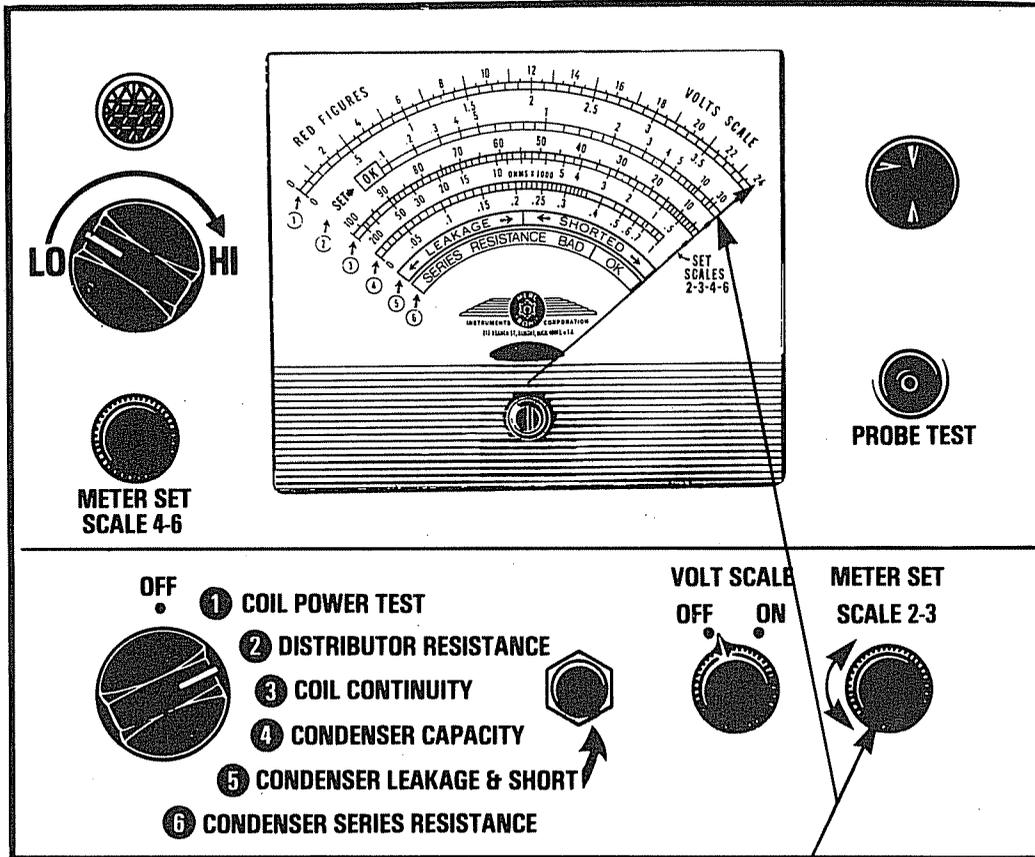
**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

**ADJUSTMENT OF SCALE NO. 2**  
**FOR TESTS NO. 4-5-9-10**

1. Turn selector switch to position no. 2 — (DISTRIBUTOR RESISTANCE — for checking low ohm values.)
2. Do not clip test leads together. Turn meter adjustment knob for scale no. 2 until pointer aligns with set position "0" on right side of scale.

**NOTE:** Always readjust scale no. 2 before starting these tests (4, 5, 9, 10).

**ADJUSTMENT OF SCALE NO. 2 FOR TESTS NO. 4, 5, 9, 10**



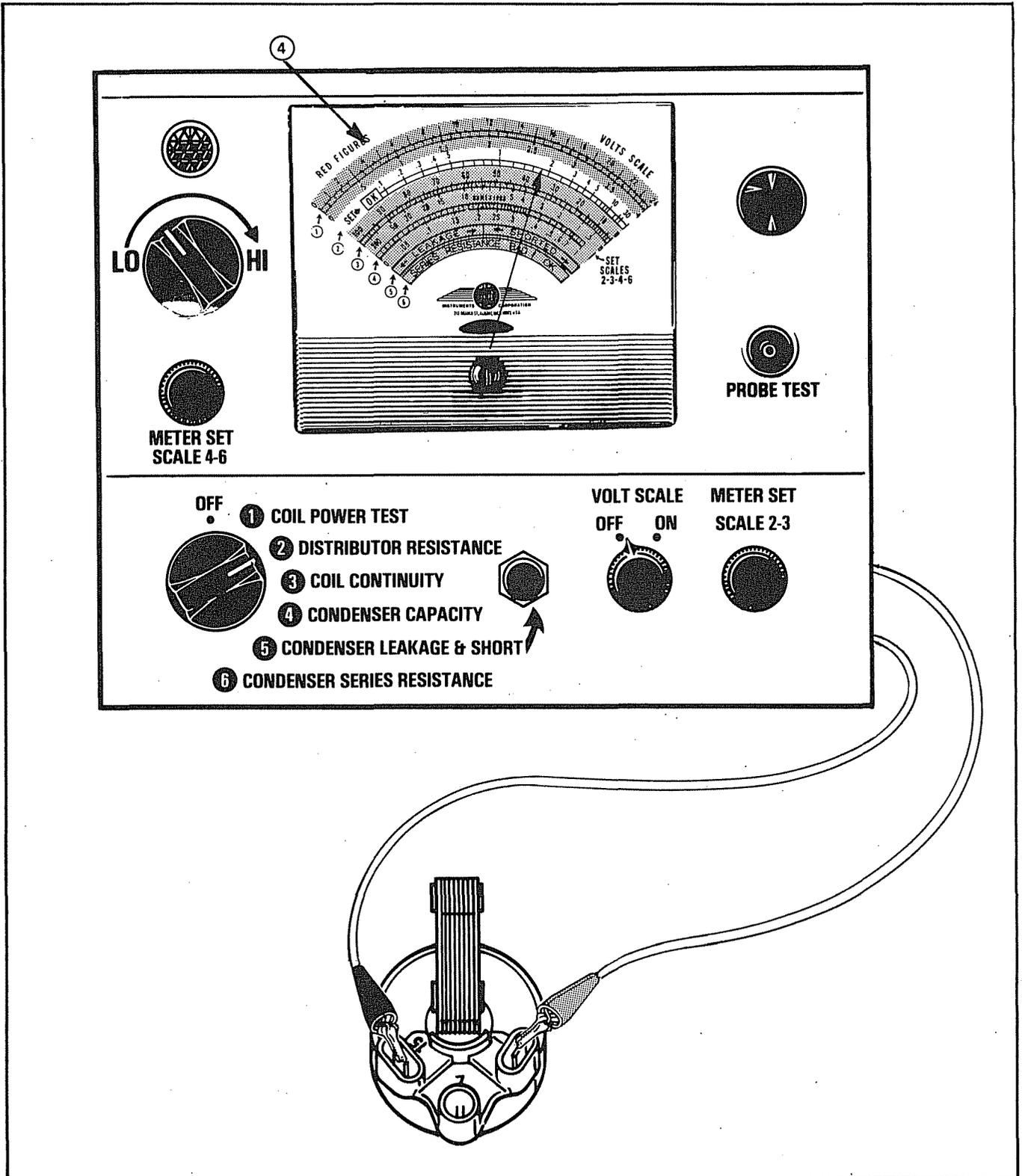
SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 4 IGNITION COIL  
RESISTANCE (PRIMARY)**

1. Turn selector switch to position no. 2 — (DISTRIBUTOR RESISTANCE — for checking low ohm values.)
2. Connect the black test lead to no. 15 terminal of the ignition coil.
3. Connect the red test lead to no. 1 terminal of the ignition coil.
4. Read the RED figures on scale no. 2. Meter reading must be between specification limits. If not, replace the defective coil.

**PRIMARY RESISTANCE: 1.9 Ohms  $\pm$  10%**

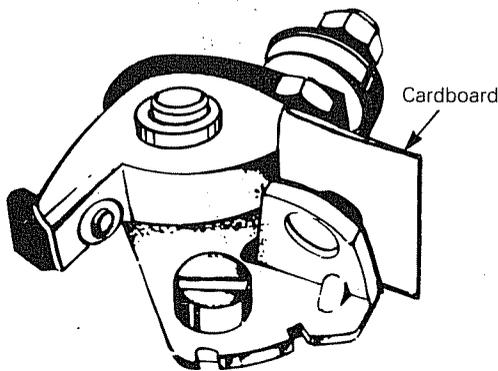
**TEST NO. 4 IGNITION COIL RESISTANCE (PRIMARY)**



SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

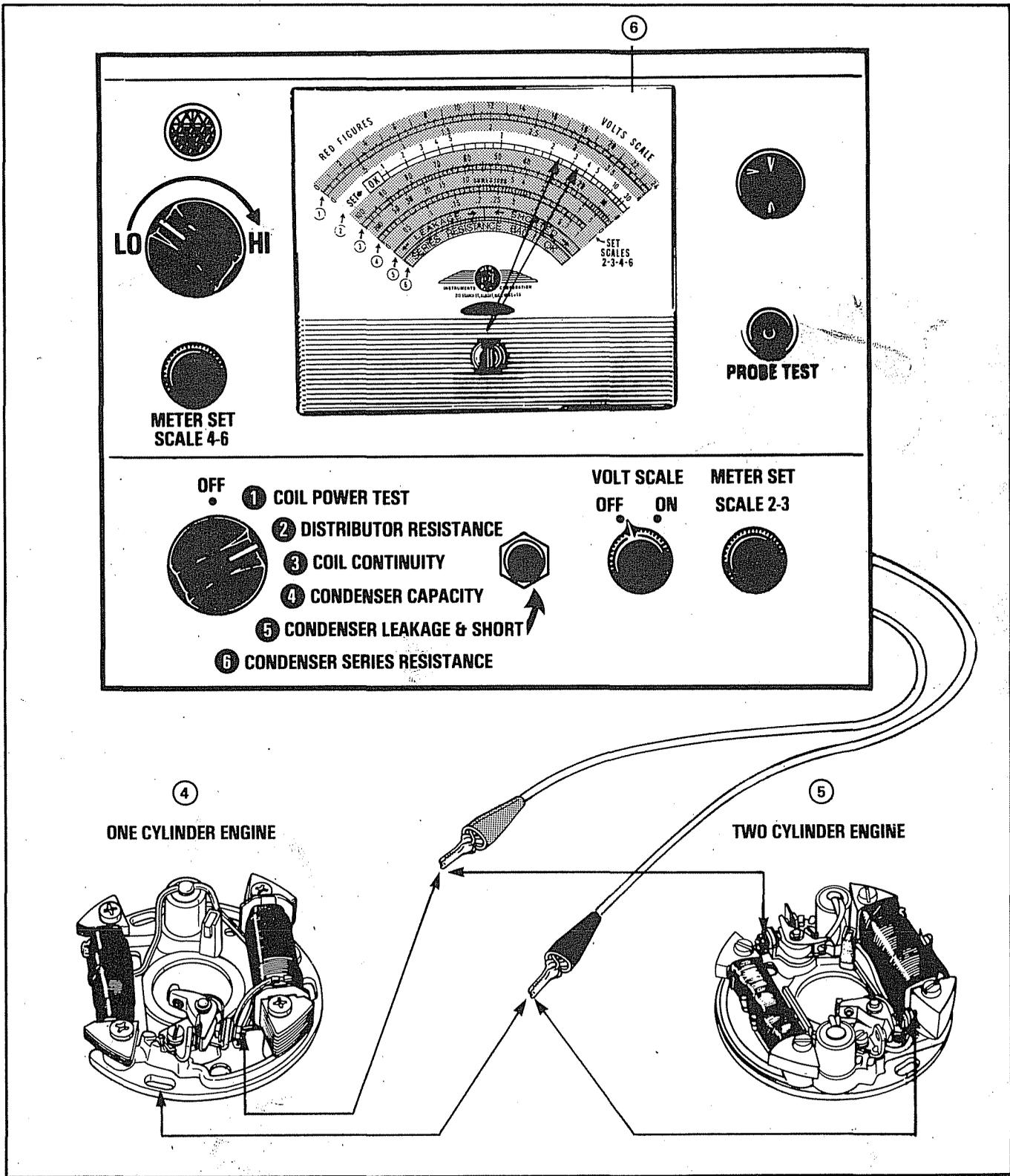
TEST NO. 5A IGNITION GENERATING  
COIL CONTINUITY

1. Turn selector switch to position no. 2 — (DISTRIBUTOR RESISTANCE — for checking low ohm values.)
2. Turn meter adjustment knob for scale no. 2 until meter pointer aligns with set position on right side of scale. (See page 12 & 13).
3. Insulate breaker points by placing a small piece of cardboard between breaker points.



4. On single cylinder engine equipped with an external high tension coil, carry out the following procedure:
  - a) Connect the black test lead to armature plate (ground).
  - b) Connect the red test lead to breaker points terminal.
5. On double cylinder engine carry out the following procedure:
  - a) Connect the black test to one breaker points terminal.
  - b) Connect the red test lead to the other breaker points terminal.
6. Read the RED figures on scale no. 2. Meter reading must be within specification limits. If not, replace the defective coil. (See Technical Data 08.05-03.)

**TEST NO. 5A IGNITION GENERATING COIL CONTINUITY**

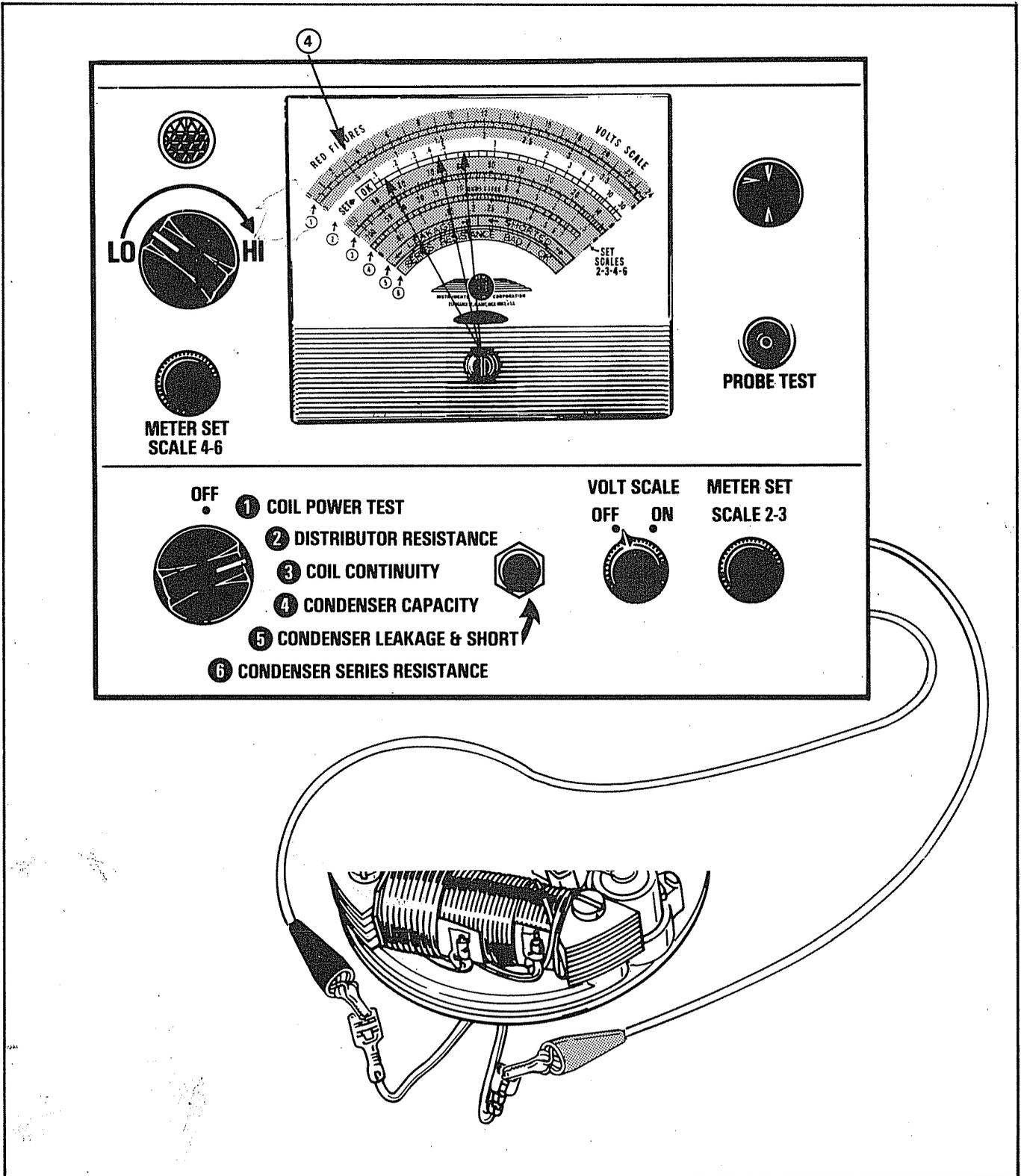


SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 5B LIGHTING COIL  
CONTINUITY**

1. Turn selector switch to position no. 2 — (DISTRIBUTOR RESISTANCE — for checking low ohm values).
2. Turn meter adjusting knob for scale no. 2 until meter pointer aligns with set position on right side of scale. See pages 12 & 13.
3. On all engines, carry out the following procedure:
  - a) Connect the black test lead to one of the yellow wires (yellow/green, yellow/red, yellow/black).
  - b) Connect the red test lead to the other yellow wire (yellow/green, yellow/red, yellow/black).
4. Read the RED figures on scale no. 2. Meter reading must be within specification limits. If not, replace the defective coil. (See Technical Data 08 05-03).

**TEST NO. 5B LIGHTING COIL CONTINUITY**

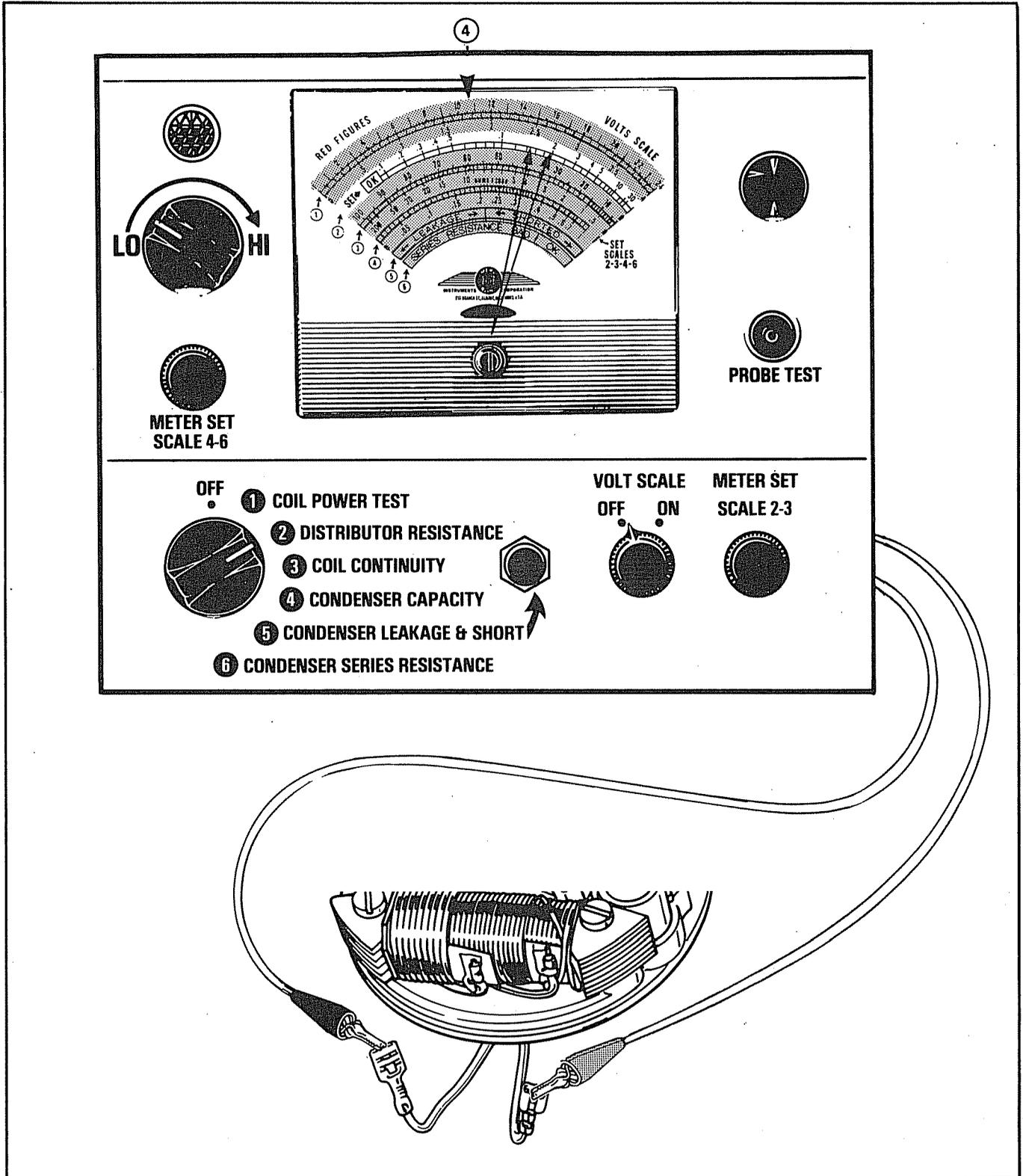


SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 5C BRAKE LIGHT  
COIL CONTINUITY**

1. Turn selector switch to position no. 2 — (DISTRIBUTOR RESISTANCE — for checking low ohm values).
2. Turn meter adjusting knob for scale no. 2 until meter pointer aligns with set position on right side of scale. (See pages 12 & 13).
3. On engines equipped with brake light coil, carry out the following procedure:
  - a) Connect the black test lead to one of the green wires.
  - b) Connect the red test lead to the other green wire.
4. Read the RED figures on scale no. 2. Meter reading must be within specification limits. If not, replace the defective coil. See Technical Data 08 05-03.

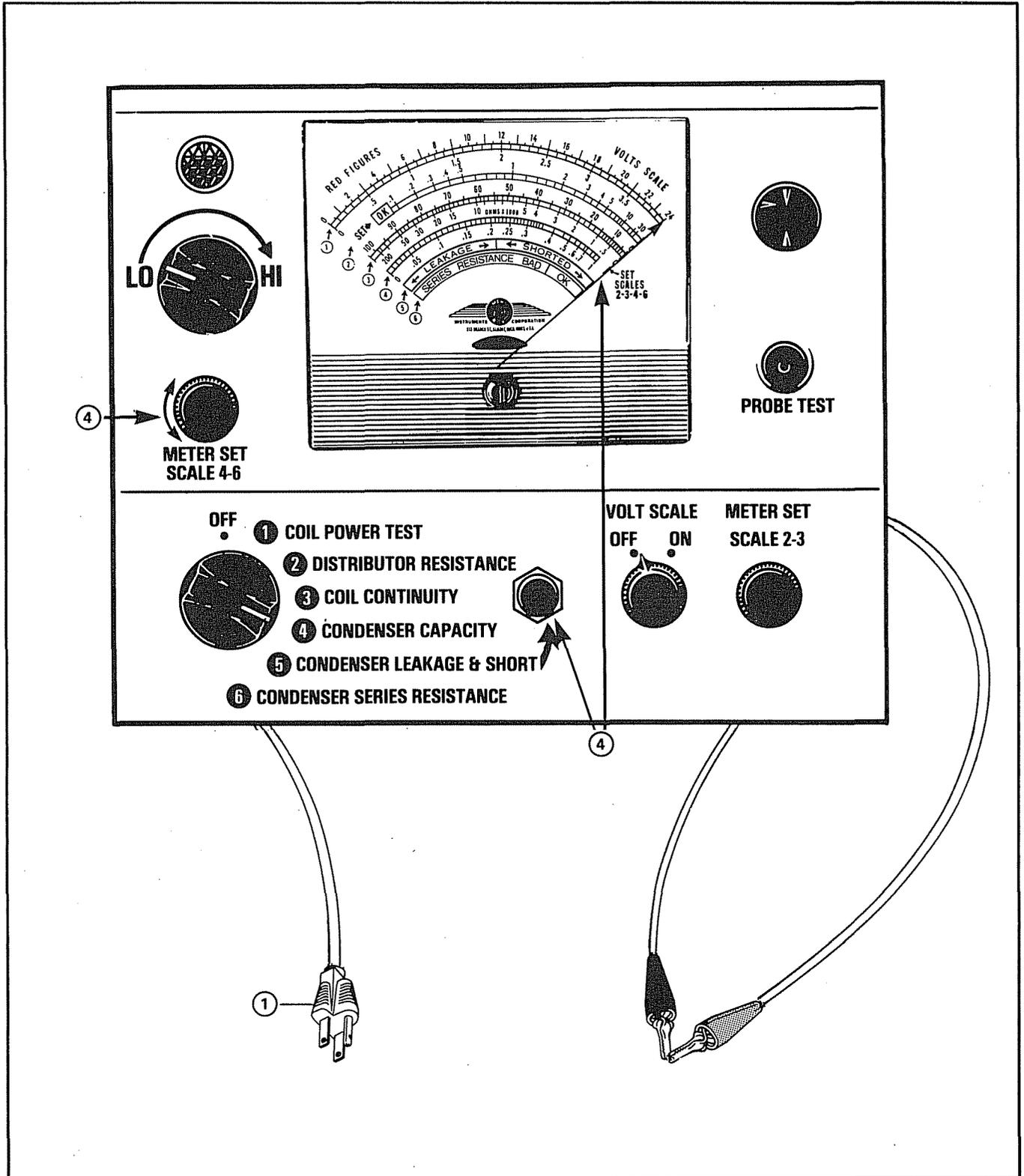
**TEST NO. 5C BRAKE LIGHT COIL CONTINUITY**



**ADJUSTMENT OF SCALE NO. 4  
FOR TEST NO. 6**

1. Plug the analyser cord ⑮ into 115 volts, 60 cycle, AC outlet.
2. Place analyser selector switch to position no. 4 — **CONDENSER CAPACITY.**
3. Temporarily attach the red and black test leads together.
4. Depress red button and turn meter set scale 4-6 knob until needle aligns with set mark on right side. Unclip test leads.
5. Proceed with test no. 6.

**ADJUSTMENT OF SCALE NO. 4 FOR TEST NO. 6**

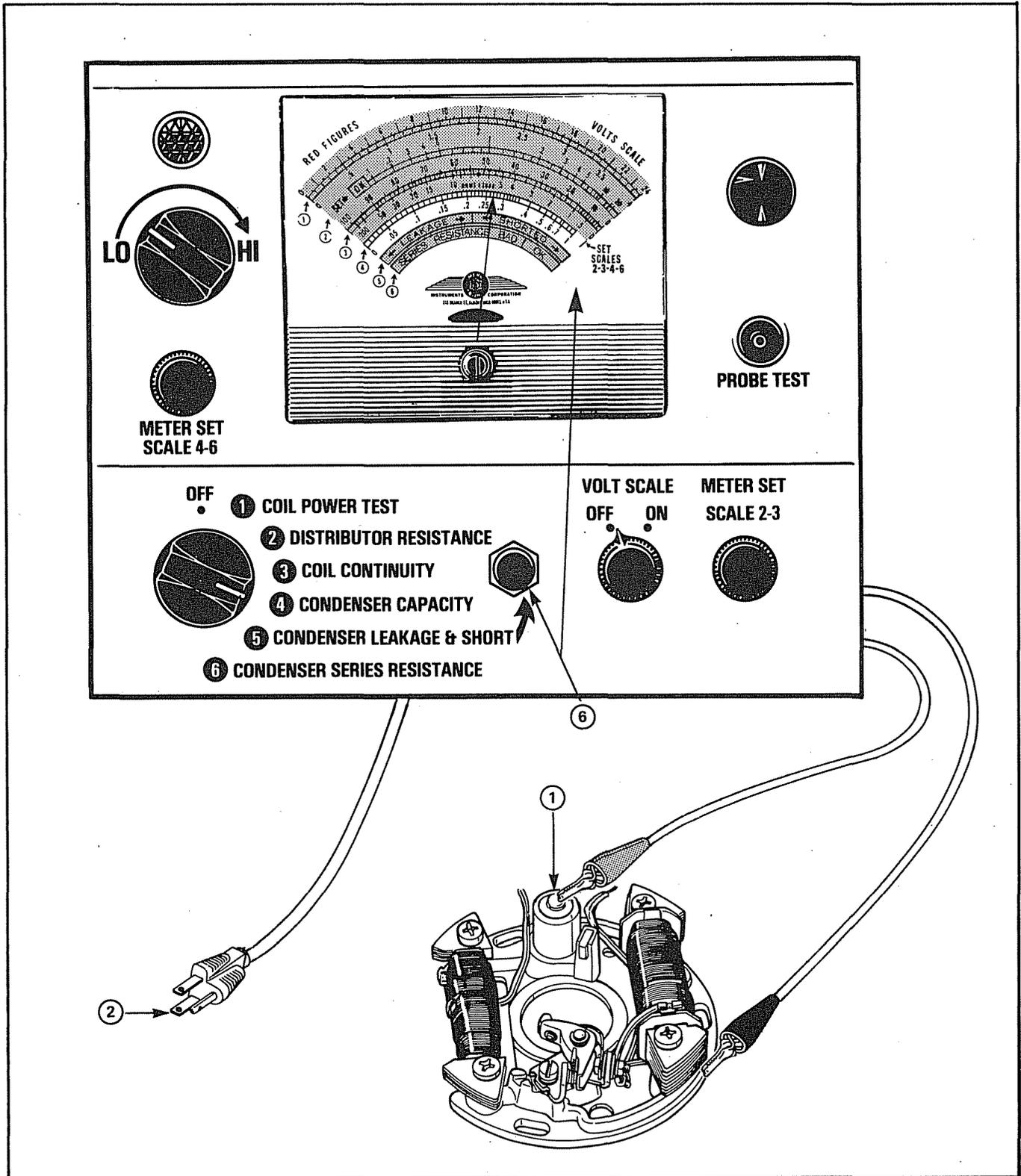


SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

**TEST NO. 6 CONDENSER CAPACITY  
TEST**

1. Unsolder the wire(s) located on top of condenser.
2. Plug the analyser cord into 115 volts, 60 cycle, AC outlet.
3. Place analyser selector switch to position no. 4 — **CONDENSER CAPACITY.**
4. Connect the red test lead to condenser lead weldment.
5. Connect the black test lead to armature plate (ground).
6. Depress red button and read scale no. 4. Condenser capacity must be between **.26 to .30 mfd**, if not, replace the defective condenser. If condenser is within specification do not resolder wire(s) on condenser but proceed with test no. 7.

**TEST NO. 6 CONDENSER CAPACITY TEST**

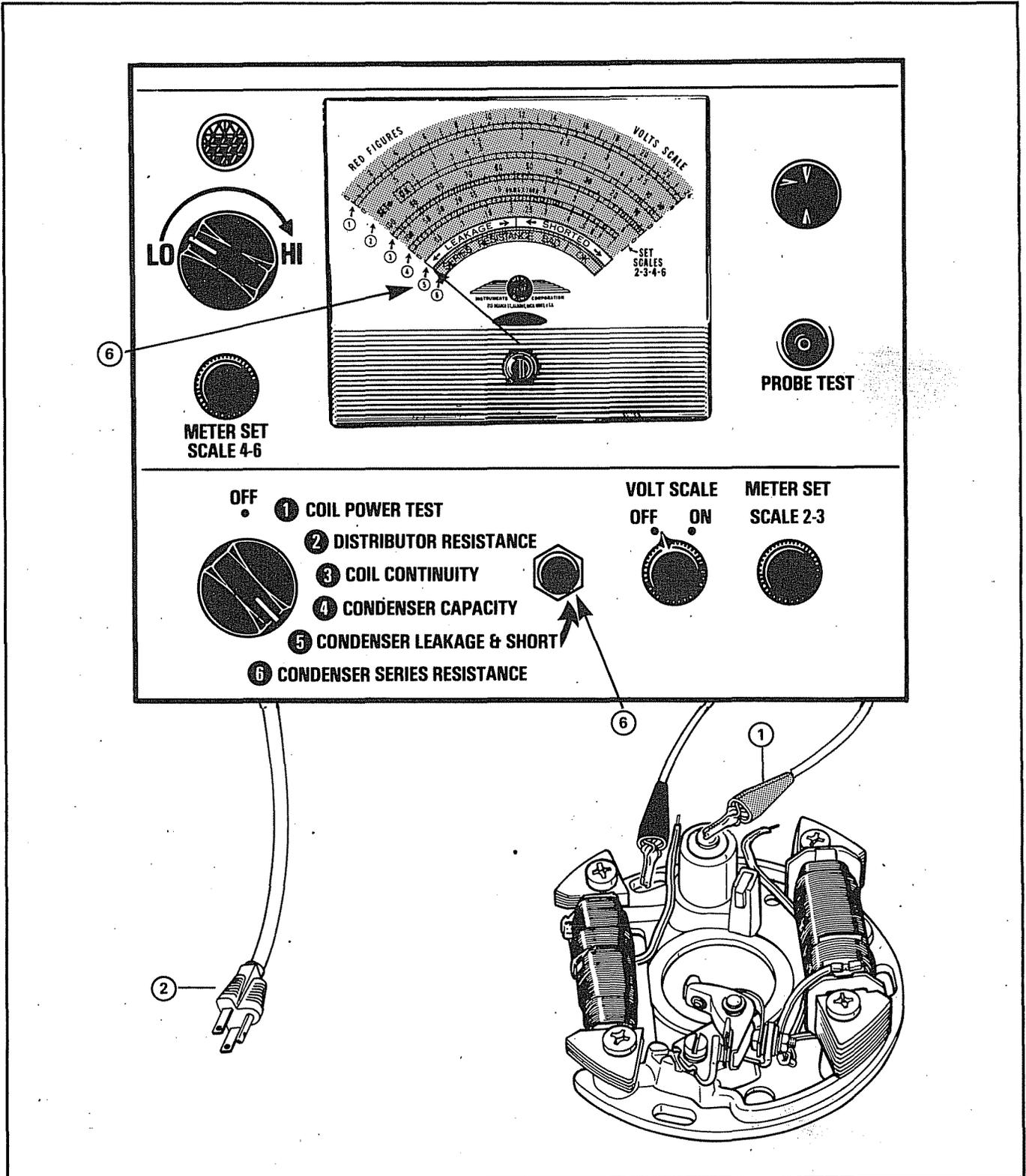


**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

**TEST NO. 7 CONDENSER  
LEAKAGE & SHORT**

1. Unsolder the wire(s) located on top of condenser.
2. Plug the analyser cord into 115 volts, 60 cycle, AC outlet.
3. Connect the red test lead to condenser lead weldment.
4. Connect the black test lead to armature plate (ground).
5. Turn selector switch to position no. 5 — **LEAKAGE AND SHORT.**
6. Depress red button and **hold** for a minimum time of 15 seconds. Read scale no. 5. The meter pointer will move to the right and must return within range of the narrow black bar at the left. If not, read on scale no. 5 and check if condenser is shorted or leaking. In either case, replace condenser.
7. If condenser is good, disconnect analyser cord and resolder wire(s) to the top of the condenser.

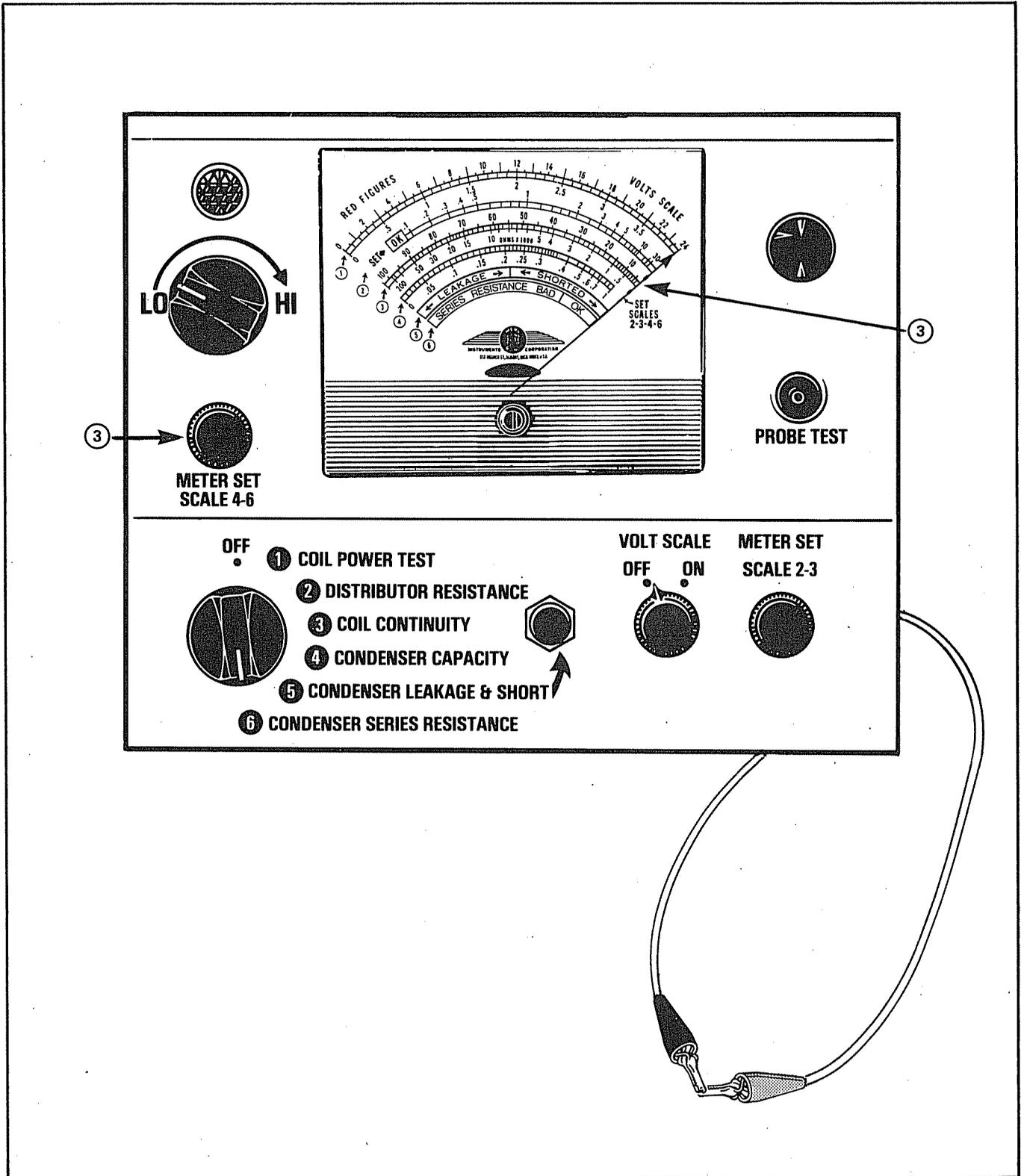
**TEST NO. 7 CONDENSER LEAKAGE & SHORT**



**ADJUSTMENT OF SCALE NO. 6  
FOR TEST NO. 8**

1. Place selector switch to position no. 6 — CONDENSER SERIES RESISTANCE.
2. Temporarily attach the red and black test leads together.
3. Adjust meter set scale no. 6 to set line on right side of dial. Unclip test leads.
4. Proceed with test no. 8.

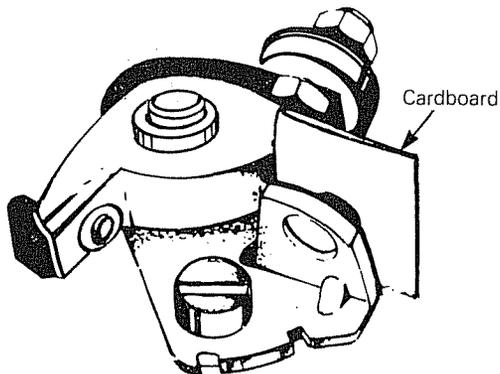
**ADJUSTMENT OF SCALE NO. 6 FOR TEST NO. 8**



SECTION 05  
SUB-SECTION 03, (MERC-O-TRONIC TEST)

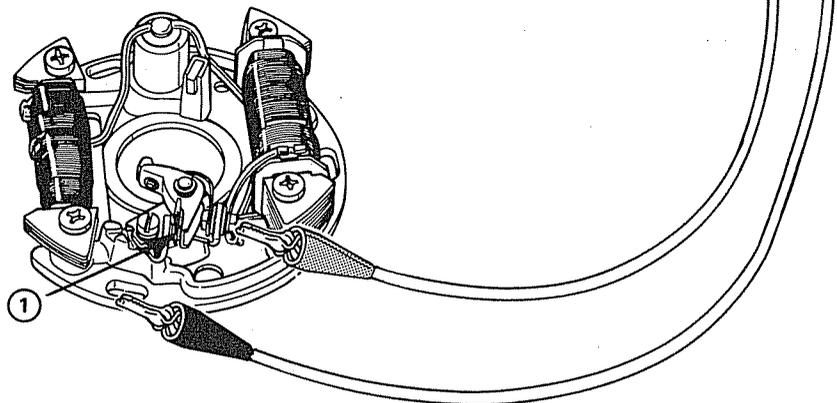
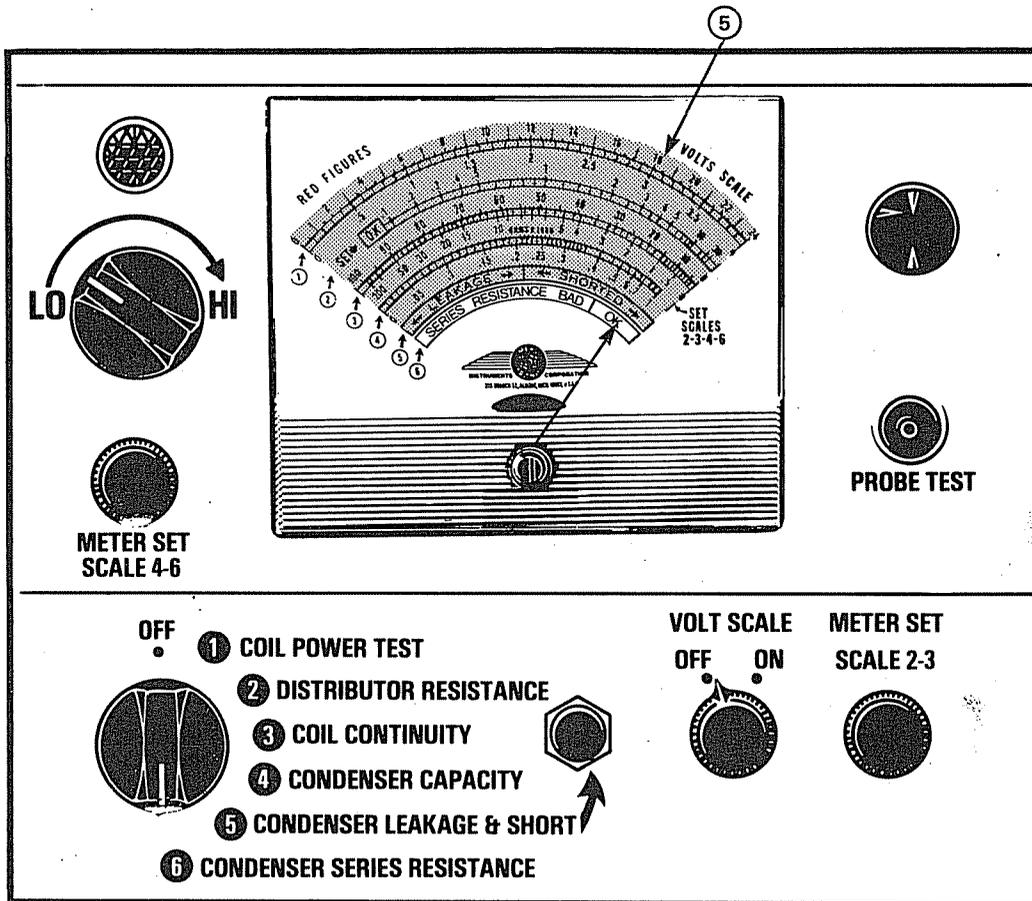
TEST NO. 8 CONDENSER  
SERIES RESISTANCE

1. Insert a piece of cardboard between breaker point(s).



2. Place selector switch to position no. 6 — **CONDENSER SERIES RESISTANCE.**
3. Connect the red test lead to breaker points terminal.
4. Connect the black test lead to armature plate.
5. Meter pointer must be within "OK" green block on scale no. 6 on right side of meter. While testing, move and "wiggle" the condenser lead. Observe meter pointer for movement. Loose connections can cause trouble if the condenser is subjected to vibration. If meter pointer remains within OK green bar on scale no. 6, the condenser is good. If meter pointer moves into the red section on scale no. 6, the condenser is defective and must be replaced.

**TEST NO. 8 CONDENSER SERIES RESISTANCE**



**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

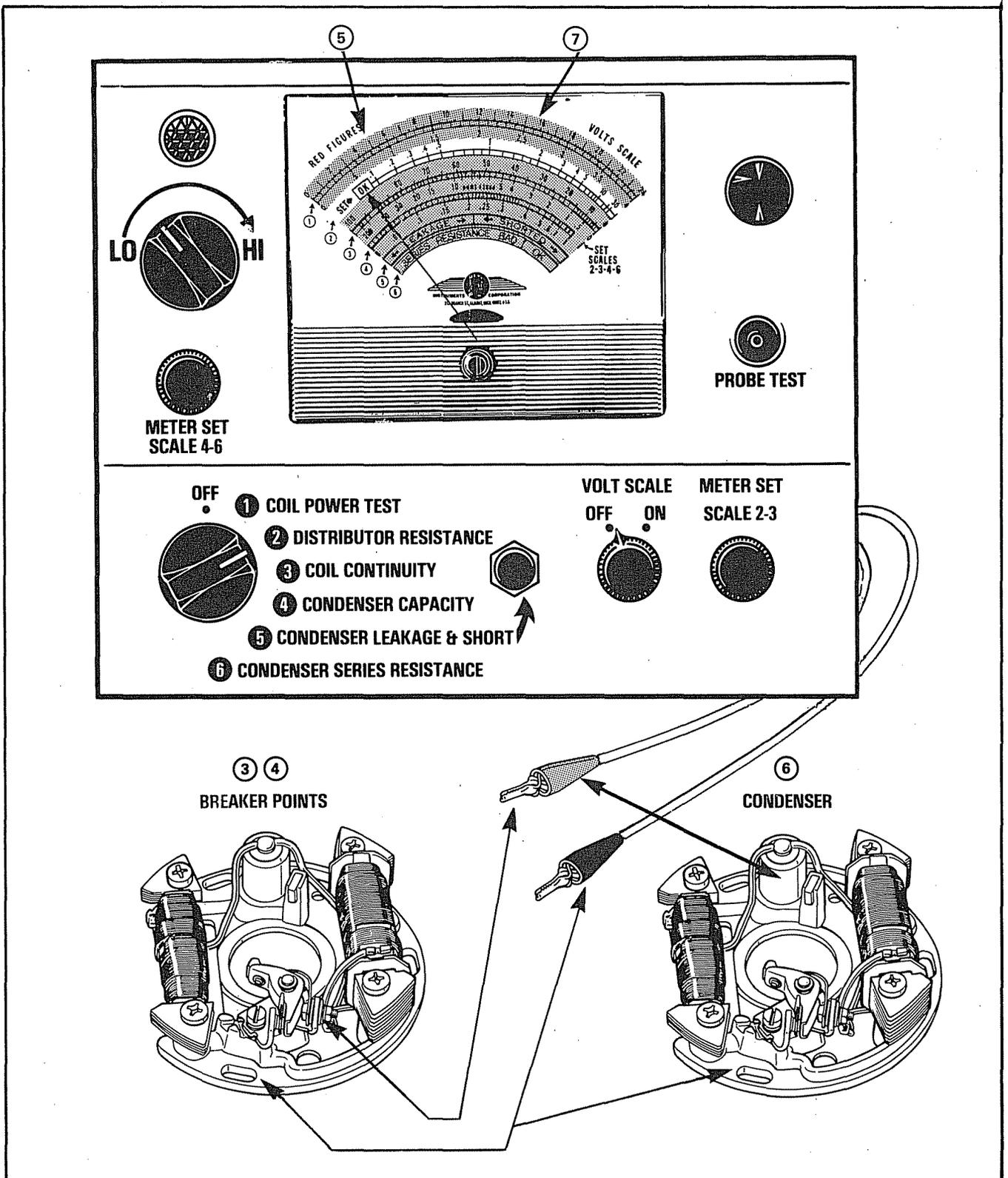
**ADJUSTMENT OF SCALE NO. 3 FOR  
TEST NO. 9 & 10**

1. Turn selector switch to position no. 2 — **DISTRIBUTOR RESISTANCE.**
2. Temporarily attach small black and red test leads together.
3. Turn adjustment knob for scale no. 2 until meter pointer lines up with left side edge of OK block on scale no. 2.
4. Unclip test leads and proceed with test no. 9.

**TEST NO. 9 TESTING FOR HIGH  
RESISTANCE IN PRIMARY CIRCUIT**

1. Turn selector switch to position no. 2 — **DISTRIBUTOR RESISTANCE.**
  2. Connect the red test lead to breaker points terminal.
  3. Connect the black test lead to armature plate.
  4. The meter pointer must return within the OK block. If the meter pointer is in the high resistance band, this indicates that there is foreign matter between the breaker points.
- **NOTE:** If resistance is too high, clean the breaker point tips to remove possible oil or dirt.
5. To check condenser for proper grounding, unclip red test lead from breaker points terminal and connect it to condenser body.
  6. Read scale no. 2, meter pointer must be within the OK block. If not, condenser is not properly ground.

**TEST NO. 9 TESTING FOR HIGH RESISTANCE IN PRIMARY CIRCUIT**



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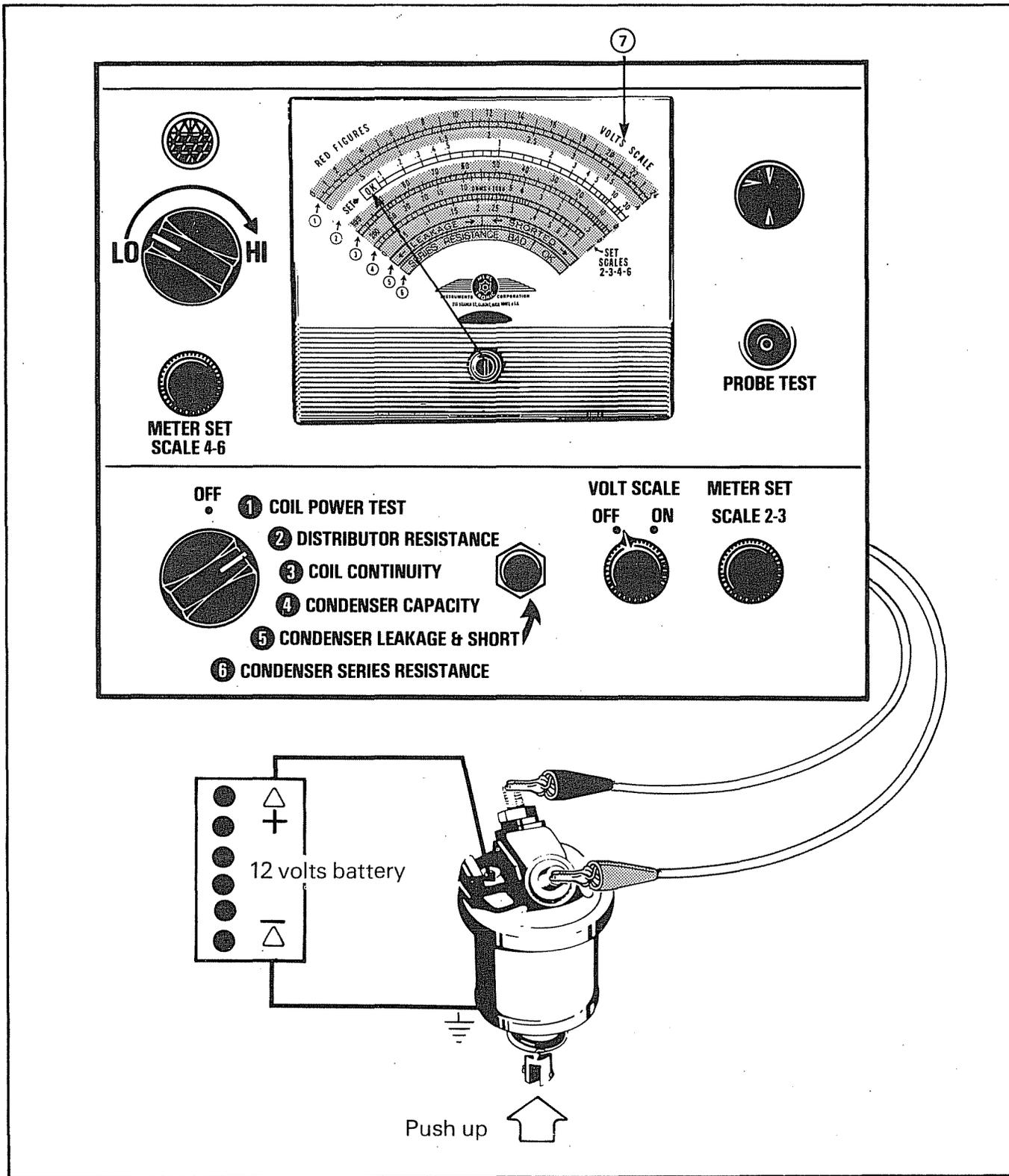
**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

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**TEST NO. 10 SOLENOID TEST**

1. Adjust scale no. 2: See page 32.
2. Turn selector switch to position no. 2 — **DISTRIBUTOR RESISTANCE.**
3. Connect the black test lead to one of the large terminals of solenoid.
4. Connect the red test lead to other large terminal of solenoid.
5. With a 12 volt battery, place two (2) jumper leads on battery posts. Connect the positive jumper lead to small terminal of solenoid.
6. Connect negative jumper lead to solenoid housing and at same time, push-in solenoid plunger until plunger holds itself.
7. The meter pointer must return within the OK block. If not replace solenoid.

**TEST NO. 10 SOLENOID TEST**



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**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

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**TEST NO. 11 RECTIFIER**

1. Adjust scale no. 3: see page 8 & 9.

○ **NOTE:** The full wave rectifier-use on snowmobiles incorporates 4 diodes. To test diodes for shorts and open, each diode must be checked twice. These checks are accomplished by reversing the polarity of the test leads.

2. Turn selector switch to position no. 3 — **COIL CONTINUITY.**

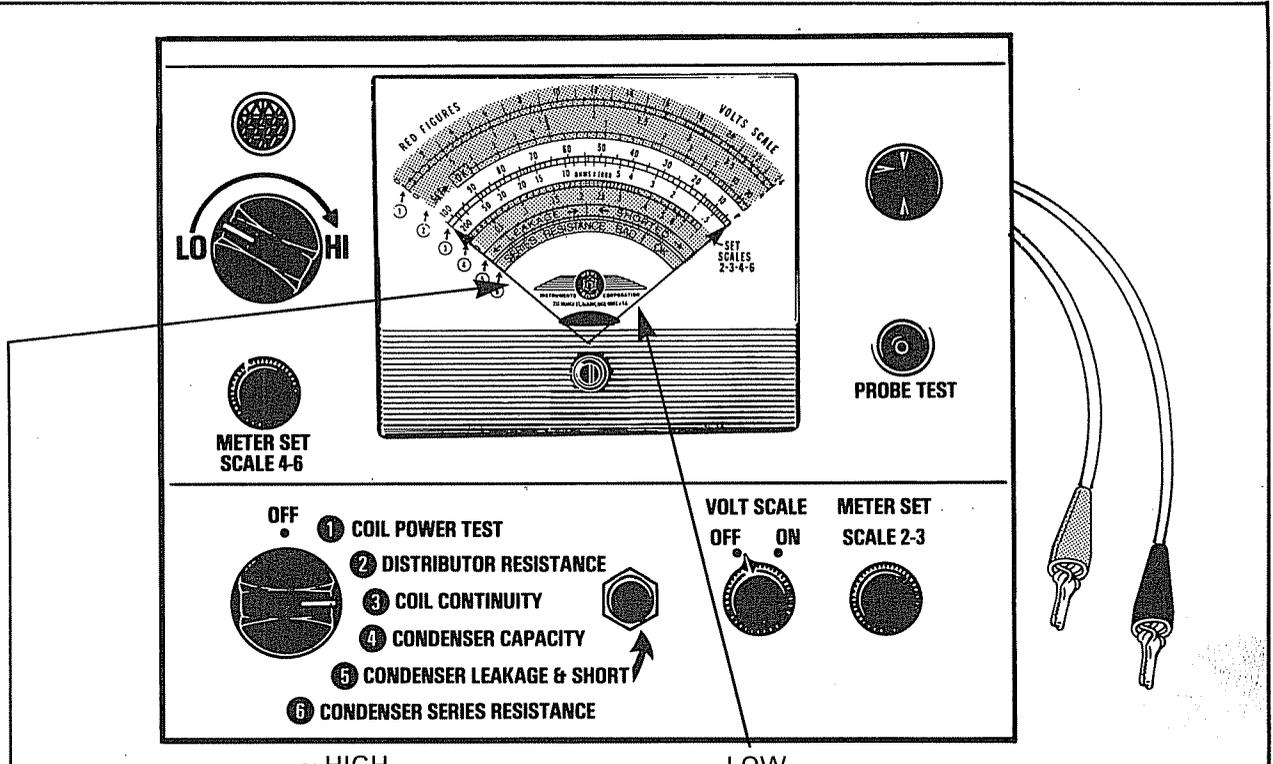
3. Connect tests leads as shown on page 37.

Red     ○  
Black   ●

4. A normal diode will show a HIGH reading in one direction. A zero reading or infinite reading in both tests indicate a defective diode and the rectifier must be replaced.

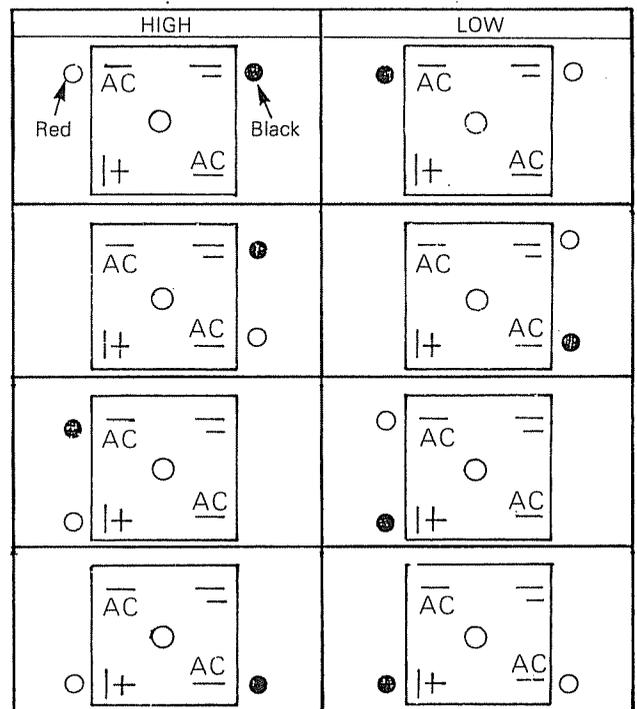
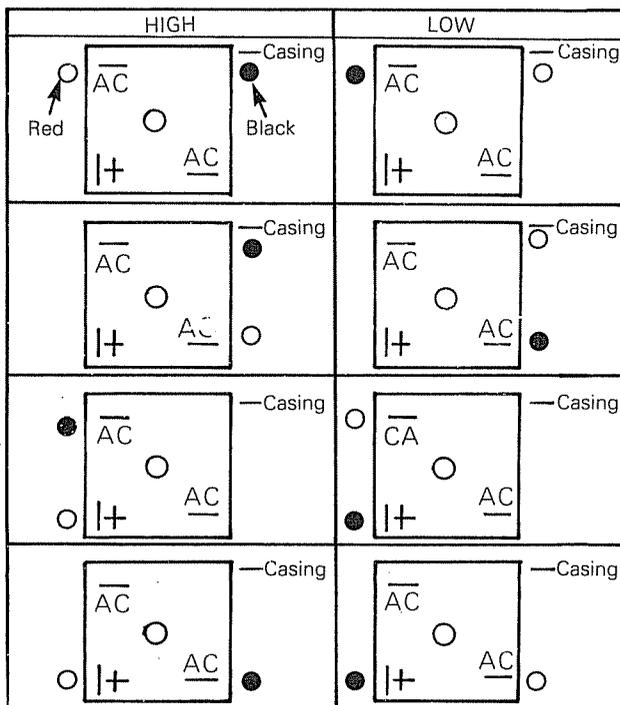
○ **NOTE:** Rectifiers on the Everest, Futura 444 L/C and on the Alpine are grounded through the casing. Make sure the casing is properly grounded to the frame.

**TEST NO. 11 RECTIFIER**



HIGH  
Everest, Futura 444 L/C, Alpine.

LOW  
Olympique, Everest, Nuvik, Futura electric start.



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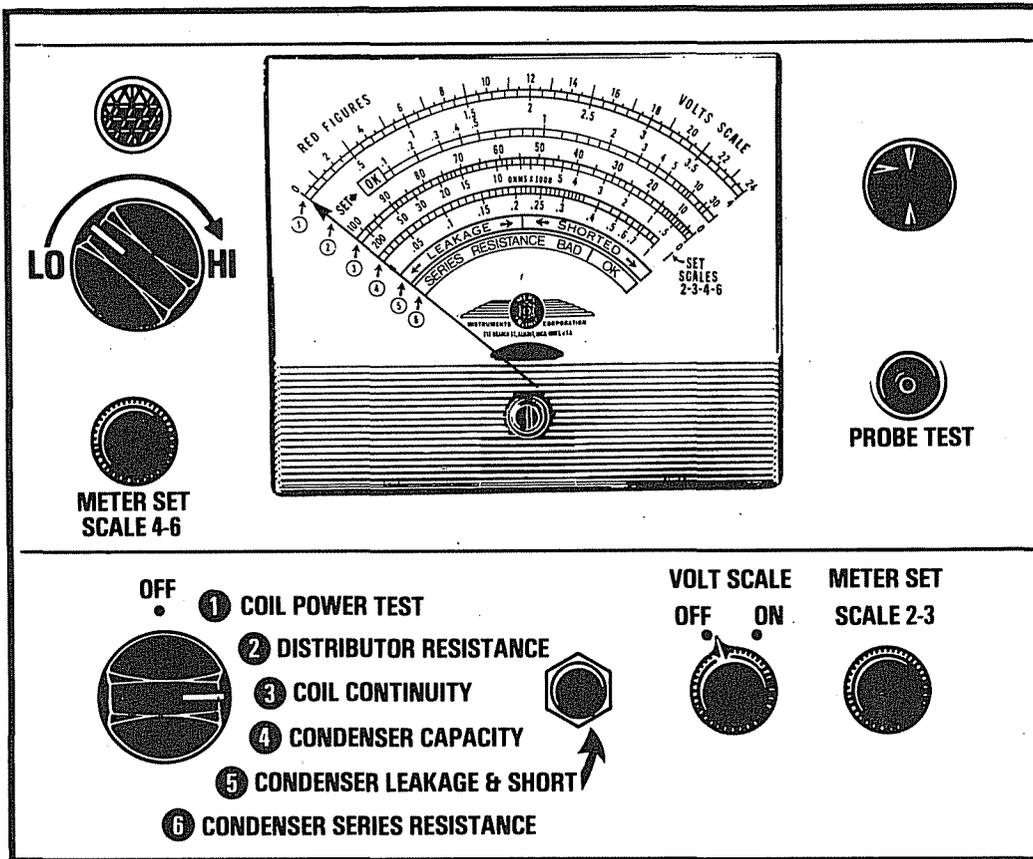
**SECTION 05**  
**SUB-SECTION 03, (MERC-O-TRONIC TEST)**

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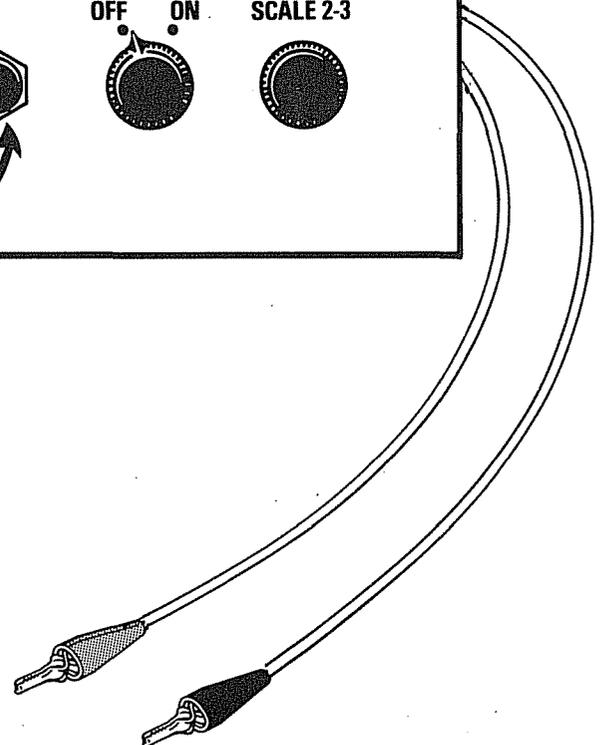
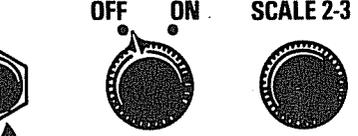
**TEST NO. 12 CONTINUITY TEST**  
**(GENERAL)**

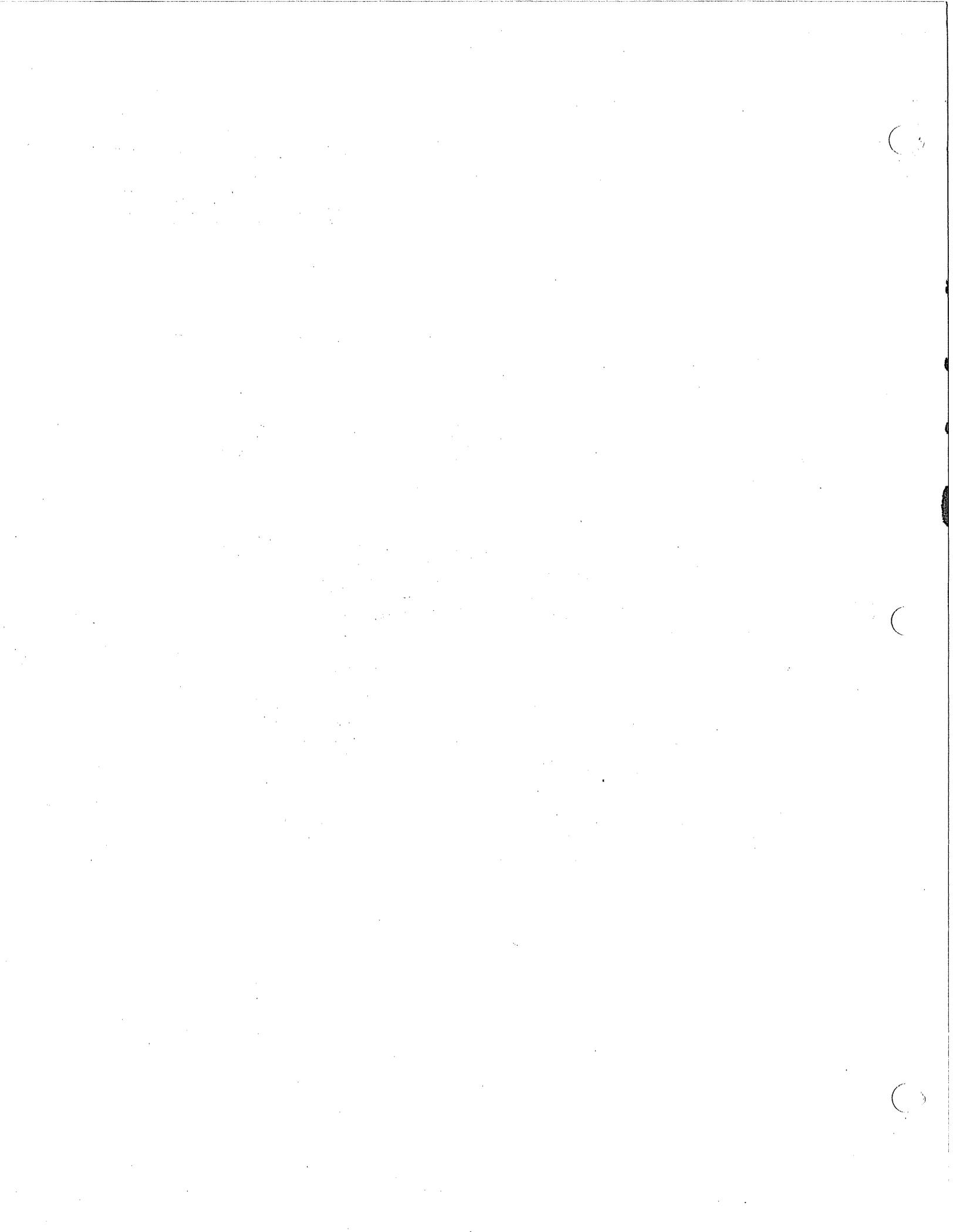
To check any wire, connection or switch for continuity, use position no. 3 — **COIL CONTINUITY**. Any discontinuity in an electrical system will result in an infinite resistance (no reading).

**VÉRIFICATION NO 12: RÉSISTANCE (EN GÉNÉRAL) ET CONTINUITÉ**



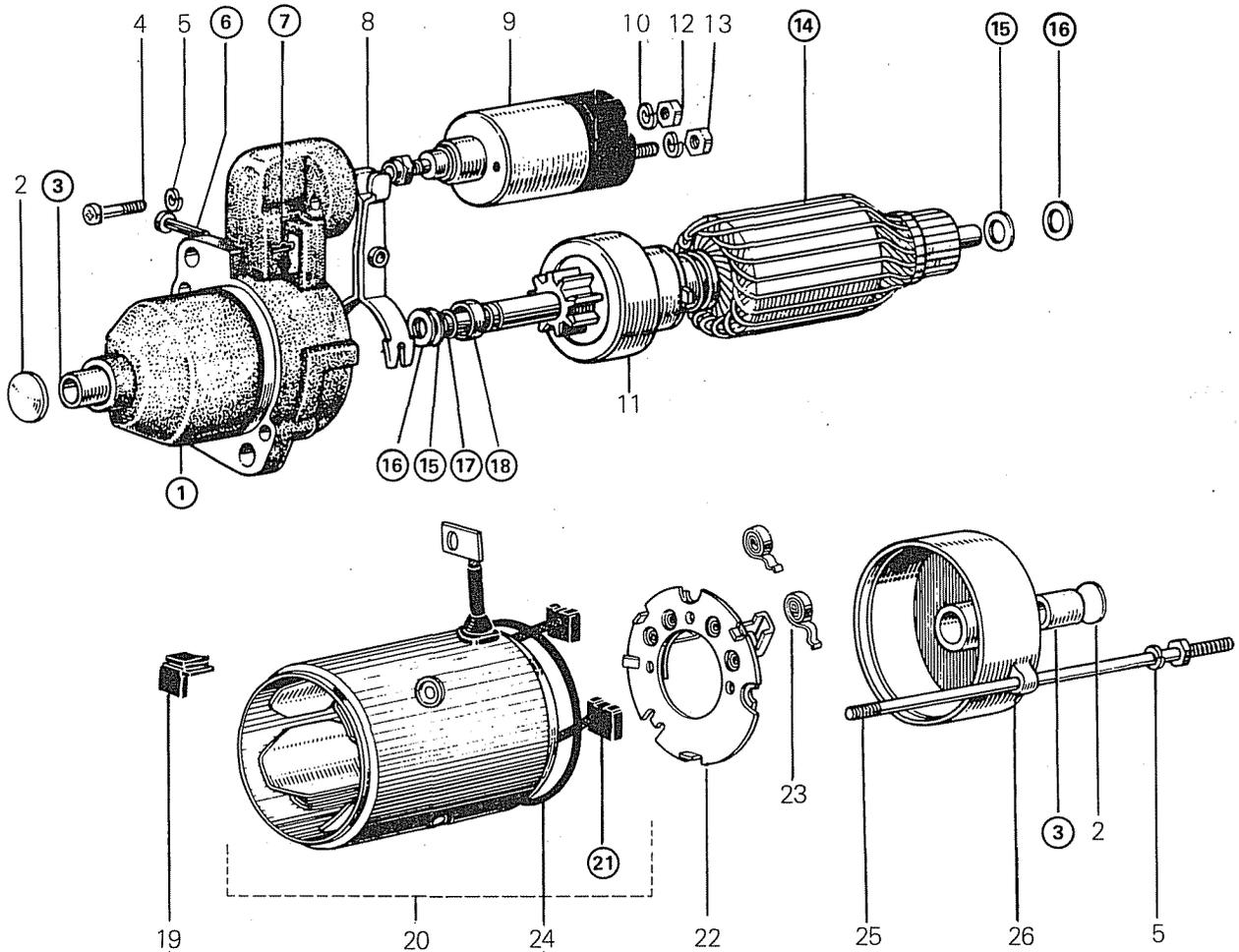
- OFF
- 1 COIL POWER TEST
- 2 DISTRIBUTOR RESISTANCE
- 3 COIL CONTINUITY
- 4 CONDENSER CAPACITY
- 5 CONDENSER LEAKAGE & SHORT
- 6 CONDENSER SERIES RESISTANCE





# ELECTRIC STARTER

## NIPPONDENSO ELECTRIC STARTER



- |                         |                            |
|-------------------------|----------------------------|
| 1. Drive end housing    | 14. Armature               |
| 2. Bushing cover        | 15. Washer                 |
| 3. Bushing              | 16. Thrust washer          |
| 4. Screw                | 17. Snap ring              |
| 5. Lock washer          | 18. Pinion stop collar     |
| 6. Set pin              | 19. Rubber seal            |
| 7. Hair pin             | 20. Starter yoke           |
| 8. Solenoid shift lever | 21. Brush                  |
| 9. Solenoid switch      | 22. Brush holder           |
| 10. Lock washer         | 23. Brush spring           |
| 11. Drive unit (clutch) | 24. Rubber packing         |
| 12. Hex. nut            | 25. Through bolt           |
| 13. Hex. nut            | 26. Commutator end housing |

**SECTION 05**  
**SUB-SECTION 04, (ELECTRIC STARTER)**

**REMOVAL**

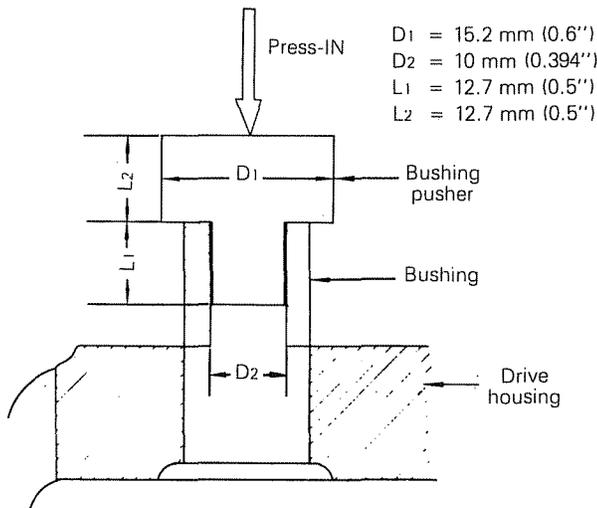
Disconnect black cable ground connection from battery. Disconnect red battery cable and red and green wire from solenoid switch. Remove starter.

**DISASSEMBLY & ASSEMBLY**

**CAUTION:** To carry out some of the following procedures, it is necessary that special equipment be available. If you do not possess such equipment, either replace the damaged components or have the parts overhauled in a workshop equipped with proper tooling.

③ Check the wear on bushings by measuring the amount of side play between the armature shaft and the bushings.

The side play should not exceed 0.20 mm (0.008"). If excessive, replace the bushing. To replace a bushing, press out the old one and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given in the illustration below.

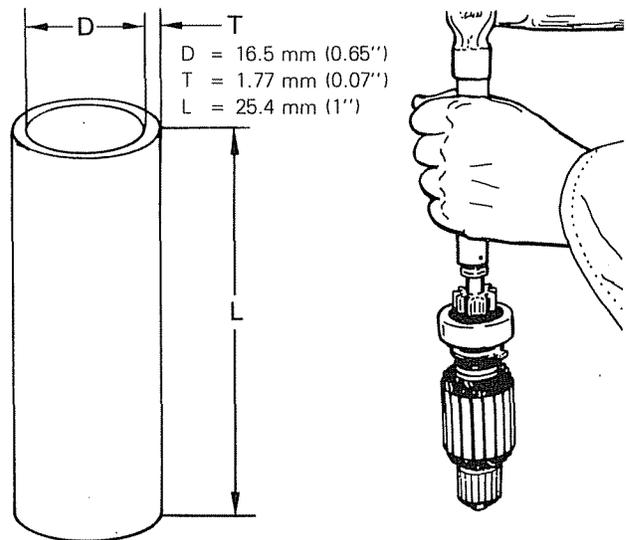


⑥⑦ To pull out the armature with overrunning clutch assembly and the drive lever from the drive housing, remove the hair pin and pull out the drive lever set pin.

⑮⑯ Note the number and the position of the washers and shims located at both ends of the armature.

⑰⑱ To remove the pinion stop collar from the armature, make a tool similar to the illustration below.

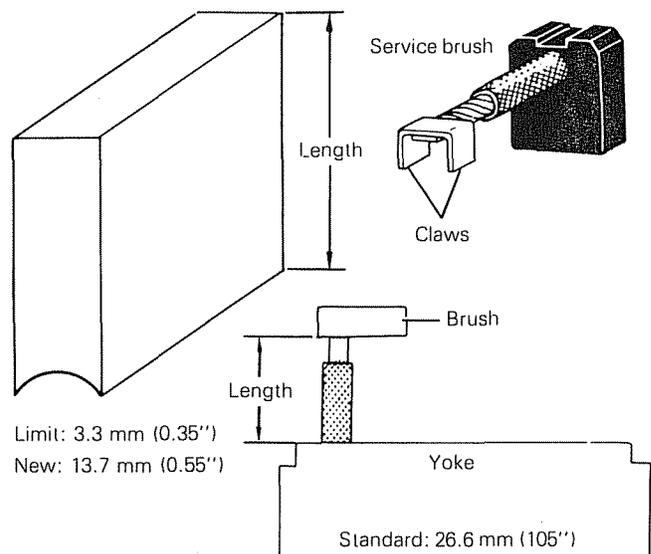
Drive out the pinion stop collar toward the overrunning clutch using the tool as shown below then remove snap ring.



⑳ Check the brush length if less than 9 mm (0.350''), replace the brush. (A new brush is 14 mm (.550'' long).

To replace a brush, cut off the old brush from the yoke and insert the remaining brush lead on the yoke between the claws of the new brush. Solder it in place. Cover the soldered portion with the tube on the new brush lead.

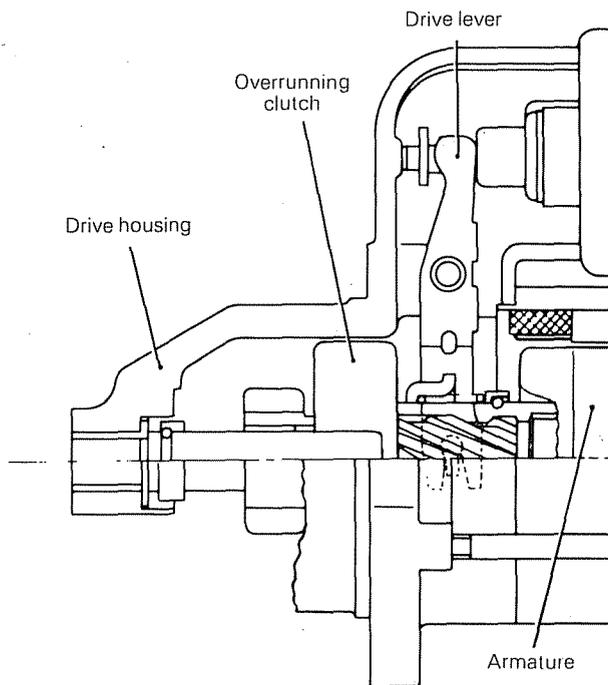
Standard brush lead length is 26.6 mm (1.05'').



For assembly, follow the disassembly procedure in the reverse order, paying attention to the following:

Coat the sliding surfaces and moving portions of the armature splines, overrunning clutch, bushings and the solenoid switch plunger with multipurpose grease (water, climate and coldness resistant).

Reinstall the drive lever as illustrated below.



When reassembling the yoke to the drive housing align the embossment on the yoke with the notch pin on the drive housing.

When reassembling the brush holder to the yoke align the embossment on the brush holder with the notch on the yoke.

○ **NOTE:** Make sure to reinstall the same number of shims on the armature at the place noted during disassembly.

When reassembling the commutator end frame to the brush holder align the notch on the commutator end frame with the pilot embossment on the brush holder.

## CLEANING

▼ **CAUTION:** Armature starter yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth. Blow brush holders clean using compressed air. Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth. Clean engine starter gear teeth and drive unit (clutch).

○ **NOTE:** Bearing bushing of the drive unit must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

## INSPECTION

### Armature

○ **NOTE:** For the following testing procedures, the use of an ohmmeter can be applicable for all tests except for the one concerning the shorted windings in the armature.

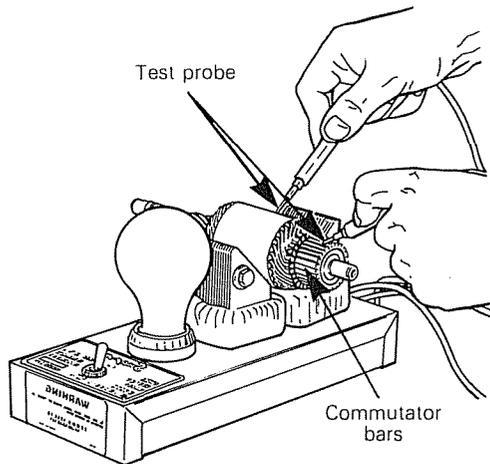
Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator in a lathe, enough to remove grime only.

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016"), the commutator should be turned on a lathe.

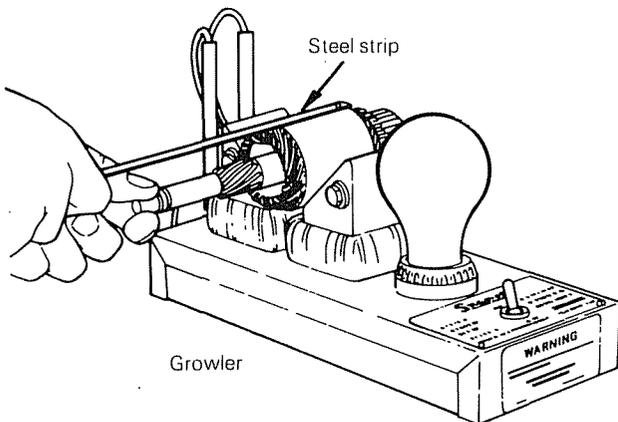
Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008"), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.

**SECTION 05**  
**SUB-SECTION 04, (ELECTRIC STARTER)**

Test for ground circuit in the armature using growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded.



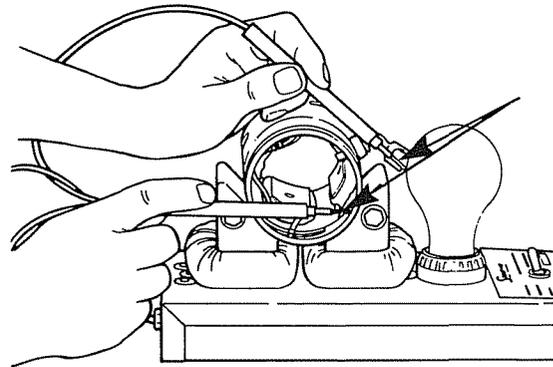
Test armature for shorted windings using a growler. When the armature is rotated in the growler with a steel strip held above it, the strip will vibrate over that area of the armature which has short circuited.



Test the armature for open circuit using growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these two (2) bars has an open circuit. The armature should be replaced or repaired; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuited armature coil.).

**Field windings and brushes**

Test the field winding for open circuit using growler test probes. Place one test probe on the negative brush and the other test probe on the yoke. If growler lamp does not turn on, the field winding has an open-circuit. The yoke has to be repaired or replaced.



Check the dynamic brake winding for open circuit by placing one test probe on the positive brush and the other probe on the negative brush.

If growler lamp does not turn on, the winding circuit is open-circuit and the yoke has to be repaired or replaced.

**Solenoid switch**

The solenoid switch test can be performed as per section 05 sub-section 03 (Merc-O-Tronic) test no. 10.

**Brush holder**

Check the brush holder for insulation performance using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has poor insulation and has to be repaired or replaced.

Check the brush spring tension with a spring scale. This should be done by placing the brush holder into position in the armature with brushes resting on the commutator. The tension reading should be made when the spring has just come off the brush.

The spring tension should be from 850.5-1162.3 grams (30-41 oz).

**Overrunning clutch**

The pinion of the overrunning clutch should turn smoothly in the counter-clockwise direction, and should not slip in a clockwise direction with the armature fixed. If it is defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

## INSTALLATION

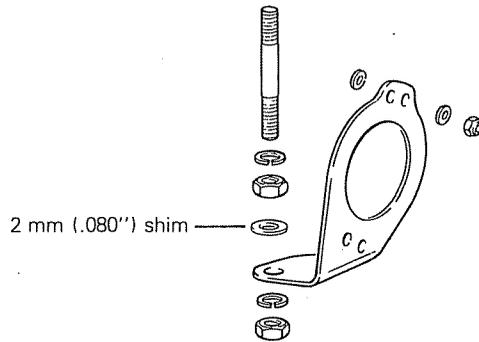
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

Connect the red battery cable and the red wire to the large terminal of the solenoid. Connect green wire to small terminal of solenoid.

Connect black cable to battery.

- **NOTE:** Install a 2 mm shim between crankcase and starter support to avoid possible friction between starter pinion and ring gear. (except model 444 L/C).



## TROUBLE SHOOTING

Causes of troubles are not necessarily in the starting system (starter) but may be due to a faulty battery, switches, electrical cables and/or connections. Trouble may also be attributed to a malfunctioning of the ignition system and/or fuel system. The following trouble shooting table is limited to the starting system.

- ◆ **WARNING:** Short circuiting the electric starter is always a danger, therefore disconnect the ground cable at the battery before carrying out any kind of maintenance on the starting system. Do not place tools on battery.

**SECTION 05**  
**SUB-SECTION 04, (ELECTRIC STARTER)**

SYMPTOM	CAUSE	REMEDY
Starter does not turn.	Poor contact of starter switch contact points.	Repair or replace switch.
Starter turns; but does not crank the engine.	Burnt or poor contact of solenoid switch contact disc. Open circuit of solenoid switch pull-in winding. Open circuit of solenoid switch hold-in winding. Poor contact of brush. Burnt out commutator. Commutator mica too high. Shorted field coil. Shorted armature. Weak brush spring tension. Worn bushings. Weak battery. Shorted battery cell(s). Poor contact of battery terminal(s). Open circuit between starter switch and solenoid switch. Poor battery ground cable connection.	Replace solenoid switch. Replace solenoid switch. Replace solenoid switch. Straighten commutator and brush. Turn commutator in lathe. Undercut mica. Repair or replace yoke. Repair or replace armature. Replace spring. Replace bushings. Recharge battery. Replace battery. Clean and tighten terminal(s). Repair. Clean and tighten.
Starter turns, but overrunning clutch pinion does not mesh with flywheel.	Worn clutch pinion gear. Defective clutch. Poor movement of clutch on splines. Worn clutch bushing. Worn starter bushing(s). Worn ring gear.	Replace clutch. Replace clutch. Clean and correct. Replace clutch. Replace bushing(s). Replace ring gear.
Starter motor keeps running.	Shorted solenoid switch winding(s). Melted solenoid switch contacts. Starter switch returns poorly.	Replace solenoid switch. Replace solenoid switch. Replace ignition switch.

**BATTERY**

**REMOVAL**

◆ **WARNING:** When disconnecting battery cables, always remove the black negative cable first then the positive cable (red). Care should be taken while disconnecting above mentioned cables otherwise battery post breakage could occur.

**CLEANING**

Clean the battery casing, vent caps, cables and battery posts using a solution of baking soda and water.

▼ **CAUTION:** Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

Remove corrosion from battery cable terminals and battery posts using a firm copper brush.

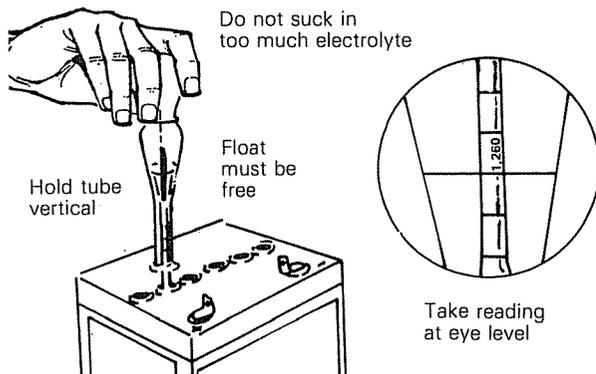
**INSPECTION**

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery.

Inspect battery posts for security of mounting. Inspect for cracked or damaged battery caps. Ensure that vent holes are unobstructed. Replace defective caps. If vent hole is blocked, clean using a firm strand of wire.

◆ **WARNING:** Some battery caps do not have holes. Make sure that overflow tube is unobstructed.

**HYDROMETER TEST**



A hydrometer measures a battery's state of charge in terms of specific gravity. Most hydrometers only read true at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by adding .004 points to the hydrometer readings for each 4°C (10°F) above 27°C (80°F) and by subtracting .004 points for every 4°C (10°F) below 27°C (80°F).

Refer to the following illustration.

THE ILLUSTRATION WILL AID YOU IN FINDING THE CORRECT READING.

	°C	°F			
At	38	100	add	.008	to the reading
	32	90	"	.004	" " "
	27	80			correct reading
	21	70	subtract		.004 from the reading
	16	60	"	"	.008 " " "
	10	50	"	"	.012 " " "
	4	40	"	"	.016 " " "
	-1	30	"	"	.020 " " "
	-7	20	"	"	.024 " " "
	-12	10	"	"	.028 " " "
	-18	0	"	"	.032 " " "
	-23	-10	"	"	.036 " " "
	-29	-20	"	"	.040 " " "
	-34	-30	"	"	.044 " " "
	-40	-40	"	"	.048 " " "

EXAMPLE NO. 1  
Temperature below 27°C (80°F)  
Hydrometer Reading 1.250  
Acid temperature -7°C (20°F)  
Subtract .024 Sp. Gr.  
Corrected Sp. Gr. is 1.226

EXAMPLE NO. 2  
Temperature above 27°C (80°F)  
Hydrometer Reading 1.235  
Acid temperature 38°C (100°F)  
Add .008 Sp. Gr.  
Corrected Sp. Gr. is 1.243

▼ **CAUTION:** Do not install a partially charged battery on a snowmobile since the casing may crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the battery's state of charge.

SECTION 05  
SUB-SECTION 05 (BATTERY)

Temperature-Corrected Specific Gravity	Battery State of Charge	Freezing Point of Battery
1.260	Fully Charged	-59°C (-74°F)
1.230	3/4 charged	-40°C (-40°F)
1.200	1/2 charged	-27°C (-16°F)
1.170	1/4 charged	-18°C (0°F)
1.110	Discharged	-7°C (+ 19°F)

**BATTERY STORAGE**

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water as required (if unavailable use drinkable water).

**CAUTION:** Do not overfill bottom of vent wells.

The battery should always be stored in fully charged condition. If required, recharge until specific gravity of 1.260 is obtained.

**CAUTION:** Battery electrolyte must not exceed 50°C (120°F).

Clean battery terminals and cable connections using a copper brush. Apply a light coat of L.P.S. No 1 Metal Protector on each. (If unavailable use petroleum jelly).

Clean battery casing and vent caps using a solution of baking soda and water. (Do not allow cleaning solution, to enter battery, otherwise it will destroy the electrolyte). Rinse battery with clear water and dry well using a clean cloth.

Store battery in a cool, dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every forty (40) days. As necessary, keep the battery "topped up" and near full charge as possible (trickle charge).

**ACTIVATION OF NEW BATTERY**

**Translucid easing**

For storage purposes each battery is fitted with a temporary sealing tube. Do not remove sealing tube or loosen battery caps unless activation is desired. In case of accidental removal of caps or sealing tube prematurely, battery should be given a full charge.

1. Remove sealing tube from vent elbow. Install overflow tube contained in vehicle kit.

**WARNING:** Failure to remove sealing tube could result in an explosion.

2. Remove caps. Fill battery cells to upper level line with electrolyte.

3. Charge battery until specific gravity of 1.280 at 20°C (68°F) is attained.

**CAUTION:** If cell temperature rises higher than 54°C (127°F) discontinue charging temporarily, or reduce charging rate.

4. Reinstall caps. Wipe battery clean then install on vehicle.

**WARNING:** Overflow tube must be free and open. A kinked or bent tube will restrict ventilation and create gas accumulation that could result in an explosion.

**INSTALLATION OF BATTERY**

Install battery, connect positive cable (red) then negative cable (black).

Coat battery posts with petroleum jelly then slide protective cap over positive post.

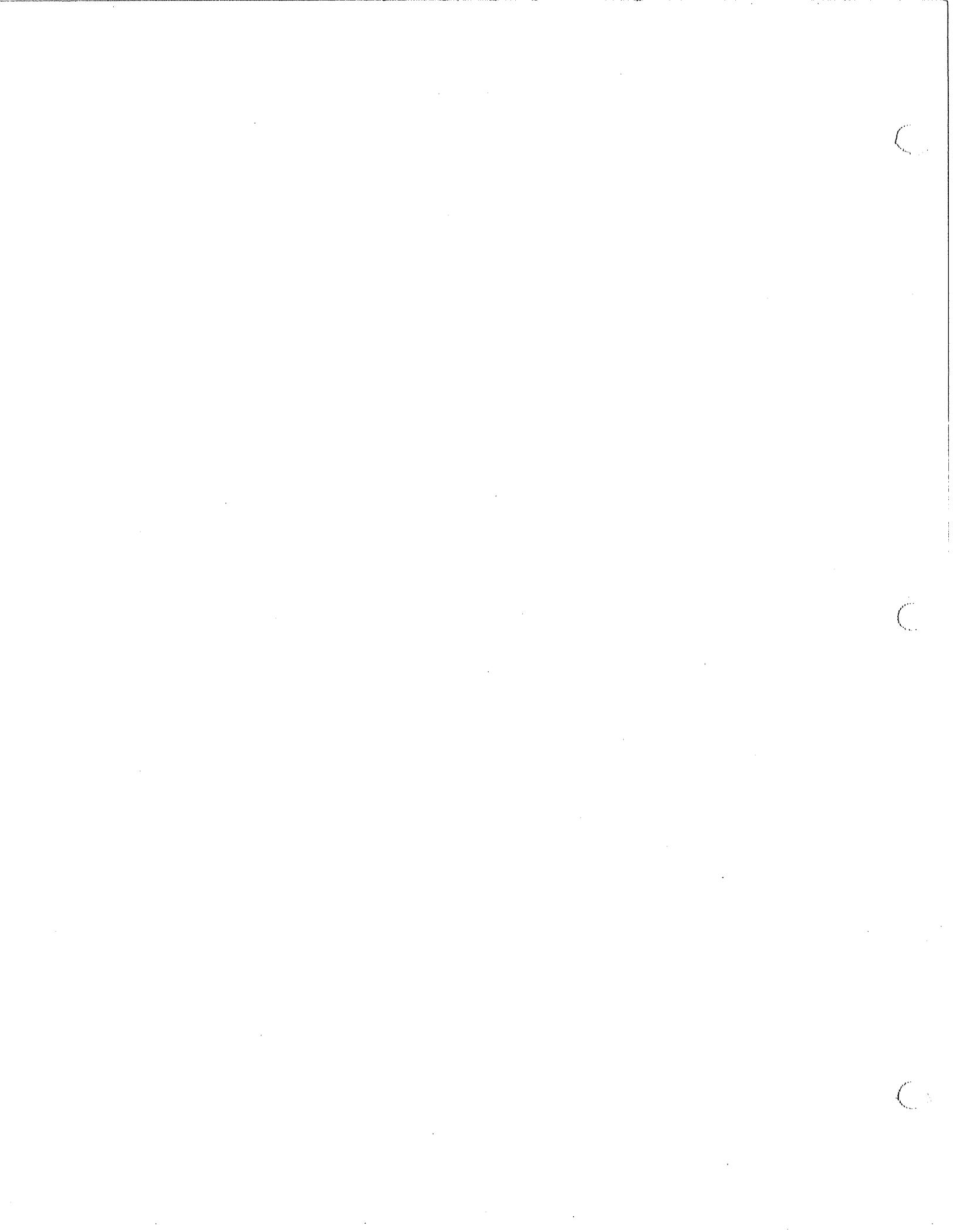
Connect battery overflow tube to outlet tube located on bottom plate.

 **CAUTION:** Ensure that neither the positive or the negative cables touch the muffler.

**TROUBLE SHOOTING:**

<b>SYMPTOM</b>	<b>CAUSE</b>	<b>REMEDY</b>
Discharged or weak battery	<ul style="list-style-type: none"><li>*1. Faulty rectifier</li><li>2. Faulty charging coil</li><li>3. Loose or bad ground connections</li><li>4. Battery poles and/or cable terminals oxidized</li><li>5. Faulty battery (cracked casing, damaged or loose posts)</li></ul>	<ul style="list-style-type: none"><li>1. Replace rectifier</li><li>2. Replace charging coil</li><li>3. Tighten cable terminals</li><li>4. Clean battery posts and cable terminals</li><li>5. Replace battery</li></ul>

\*To test the charging system, disconnect positive cable at the battery, install an ammeter between cable and battery post. If the reading indicates that the charging system operates normally, check items 2, 3 and 4.

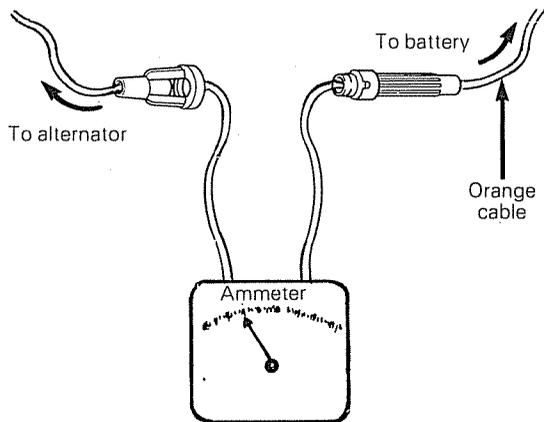


## ALTERNATOR & REGULATOR TEST (Elite model)

Check battery condition  
(refer to section 05-05)

### BATTERY CHARGING RATE TEST

Connect ammeter to fuse holder of the orange cable (between alternator and battery).



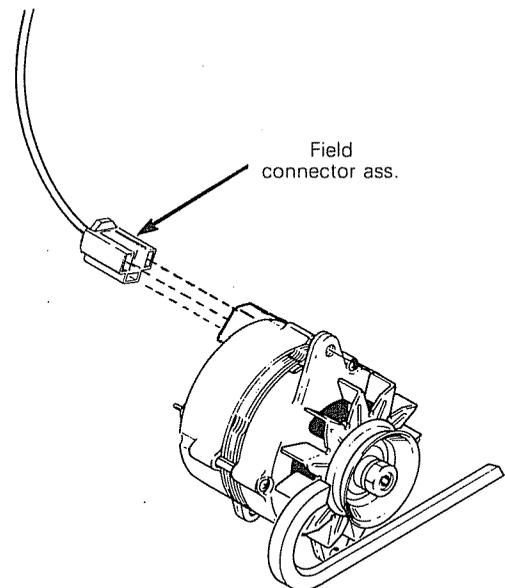
**WARNING:** Before checking output, support rear of vehicle with a mechanical stand. Ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, feet, tools and clothing clear of track.

Run engine at moderate speed and check output.

Battery condition	Output	Diagnosis
A- charged	Low	Normal
B- charged	High	Refer to condition B
C- discharged	High	Normal
D- discharged	Low	Refer to condition D

Condition B (charged battery, high output):

Disconnect field connectors ass. (plastic tab housing) on alternator.



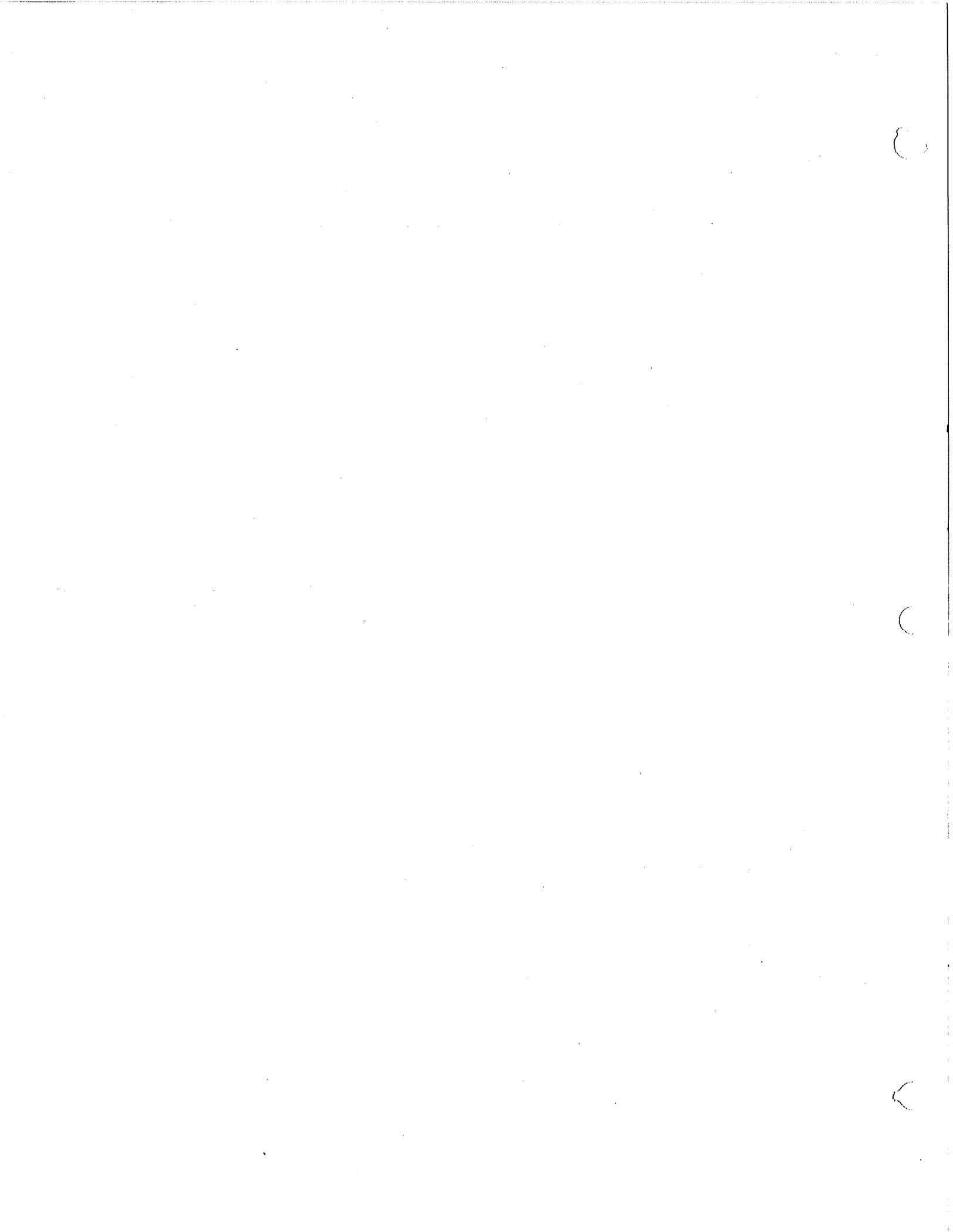
Output drops off: alternator is OK. Check voltage regulator, repair or replace.

Output continues: alternator is faulty, repair or replace.

Condition D (discharged battery, low output)

Check all connectors, drive belt tension, wiring and connections. If problem persists, replace unit.

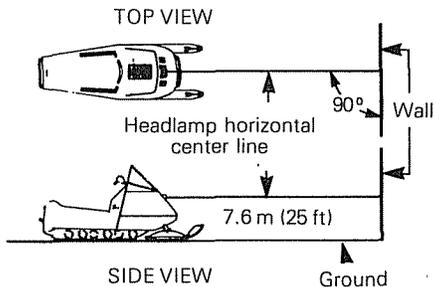
Check output.



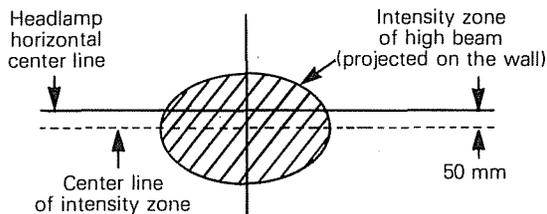
## BODY

### HEADLAMP BEAM AIMING

Place vehicle on a flat surface 7.6 m (25') from a wall or screen.



With the suspension correctly adjusted, the rider seated on the vehicle and the high beam ON (engine must be running on manual start models), check that the center of high intensity zone of high beam is 50 mm (2") below horizontal line of headlamp height.



To adjust, on vehicle so equipped remove headlamp chrome ring, turn upper or lower adjusting screws to obtain desired beam position.

### BULB REPLACEMENT

If headlamp is burnt, tilt cab. Unplug connector from headlamp. Remove rubber boot and unfasten bulb retainer clips. Detach bulb and replace. If taillight bulb is burnt, expose bulb by removing red plastic lens. To remove, unscrew the two (2) Phillips head screws. Verify all lights after replacement.

### CAB MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

**CAUTION:** Plastic alloy components such as fuel tank, windshield, cab, etc., can be cleaned using mild detergents or isopropyl alcohol. Do not use strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc.

Inspect cab and repair damage. Repair kits are available at your authorized dealer.

**NOTE:** Apply wax on glossy finish of cab only. Protect the vehicle with a cover to prevent dust accumulation during storage.

**CAUTION:** If for some reason the snowmobile has to be stored outside it is necessary to cover it with an opaque tarpaulin. This caution will prevent the sun rays affecting the plastic components and the vehicle finish.

### DECAL

To remove decal, pull.

Clean surface.

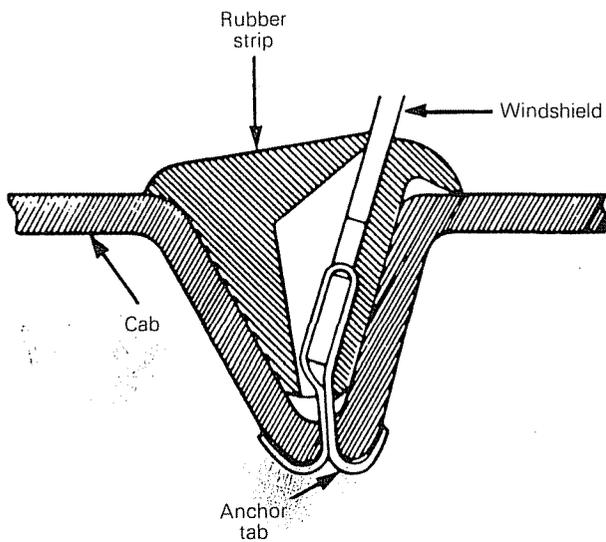
Apply liquid soap on new decal. Position decal and pass a sponge over decal to remove air bubbles and water. Allow to air dry.

### SHEET MOLDED COMPOUND

To repair sheet molded cabs, use appropriate resin compound.

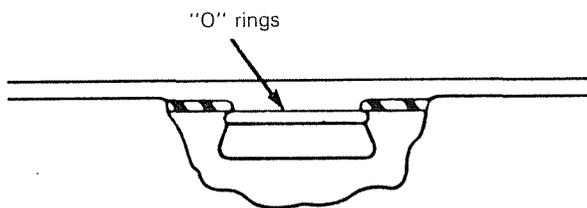
## SECTION 06 SUB-SECTION 01, (CAB)

- Peel off protective film from the new windshield and install windshield trim. Insert anchor tabs into holes of windshield. Install tabs in every retaining holes at the exception of the front center hole.
- Bend each tab in the middle until ends meet. Lubricate rubber strip with liquid soap. Install strip into cab channel. Position windshield in cab channel then from within the cab, pull and fully open anchor tabs. Work from center, outward.



### Citation, Spirit

- Peel off protective film from the new windshield and install windshield trim.
- Position windshield on cab then push tabs in their slots. Lock in place using the "O" rings supplied in kit.



### Olympique, Everest, Futura, Everest 444, Futura 444, T'NT, Blizzard, Sonic

- Peel off protective film from the new windshield.
- Position windshield on cab then push down until tabs are locked in their holes.
- Install windshield trim on outer edge.

### Nuvik

- Peel off protective film from the new windshield.
- Position windshield on cab then push until tabs are fully inserted into cab slots. Lock windshield tabs in position using the four (4) "O" rings supplied in kit.
- Using the windshield holes as a guide, drill 7/32" dia. holes through cab. Install the two (2) retaining bolts and the two (2) push nuts.
- Install windshield trim on outer edge.

### Alpine

- Peel off protective film from the new windshield.
- Position windshield on cab then push until tabs are fully inserted into cab slots. Lock windshield tabs in position using the eleven (11) "O" rings supplied in kit (install two (2) "O" rings on outer tabs.)

### Elite

- Rebore the windshield retaining holes to 17/64".
- Align the windshield in position (in order to have the windshield deflector pleat on each side in line with the body side).
- Mark the body, and drill 17/64" holes. Secure the windshield in place.
- Install windshield trim on outer edge.
- Install the hood stopper in place by drilling a 1/8" hole in the center of the windshield at exactly 23 mm (9") from bottom edge of windshield and push the hood stopper in place.

## FRAME

### FRAME WELDING

#### Steel frame:

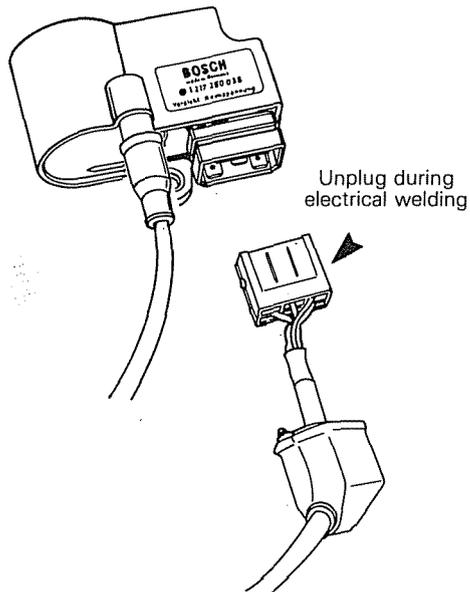
- Electric Welding
- Amperage: 70-110 Amp.
- Voltage: 20-24 volts
- Rod: E-7014 (3/32")

#### Aluminum frame: (refer to specialized welding shop)

- Argon-oxygen/acetylen welding
- Rod: ER-4043 (3/32")

**CAUTION:** When electrical welding is to be performed anywhere on the vehicle, unplug the multiple connector at the electronic box prior to connecting the welding wire to the vehicle. This will protect the electronic box against damage caused by flowing current when welding.

**NOTE:** This procedure applies to all electronic ignition systems.



### FRAME WELDING

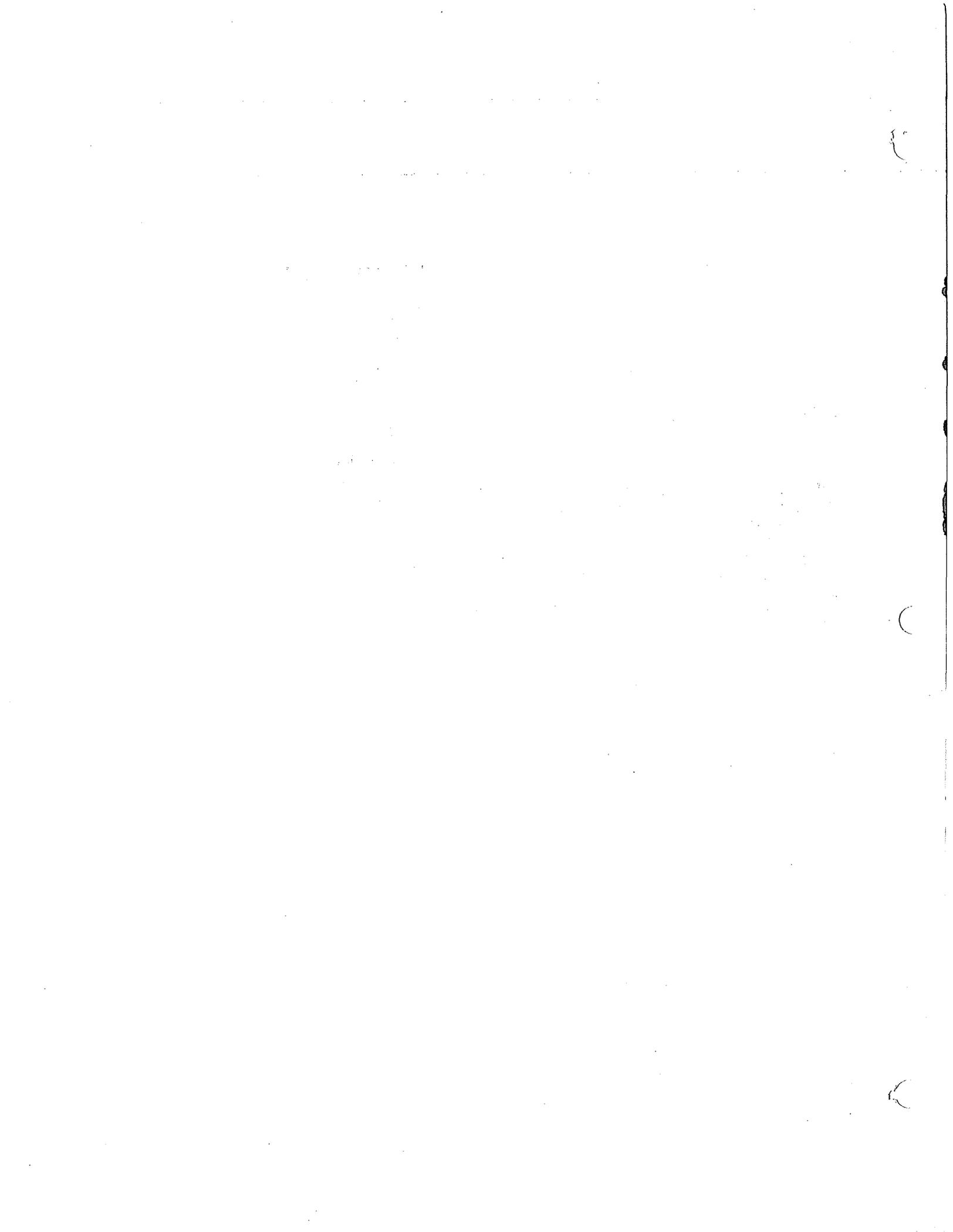
Clean frame. For aluminum frame use only "Aluminum cleaner" and follow instructions on container. (Dursol cleaner or equivalent).

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

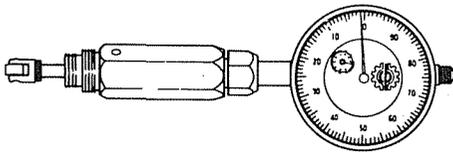
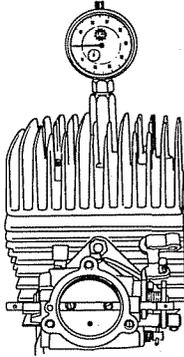
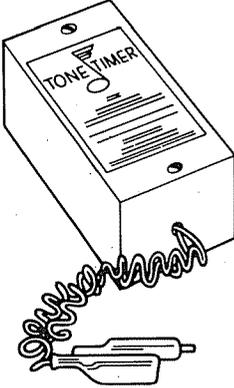
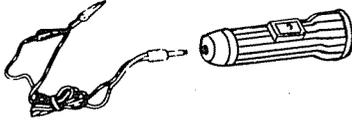
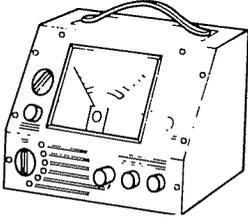
### SEATS

#### Elite model

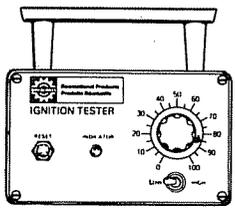
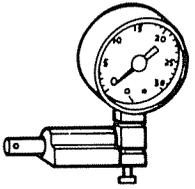
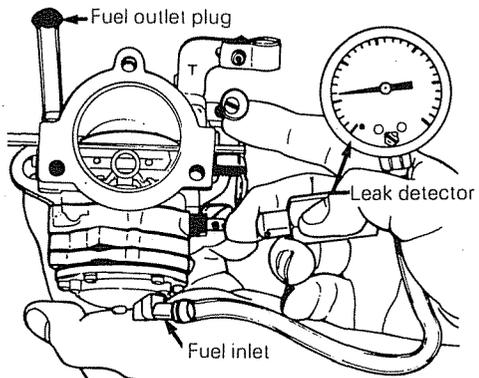
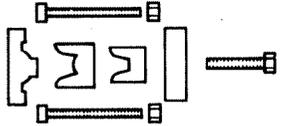
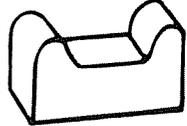
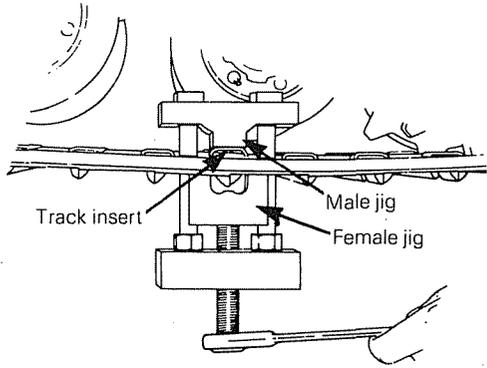
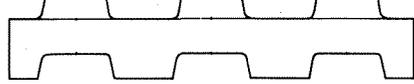
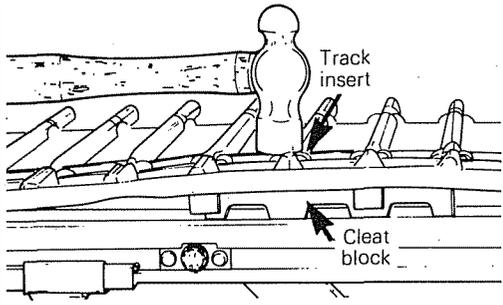
To remove the backrest, unscrew the two (2) wing nuts located in the engine compartment.



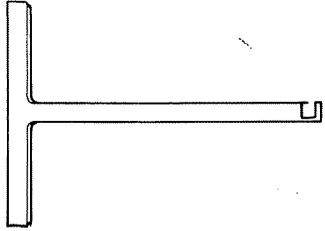
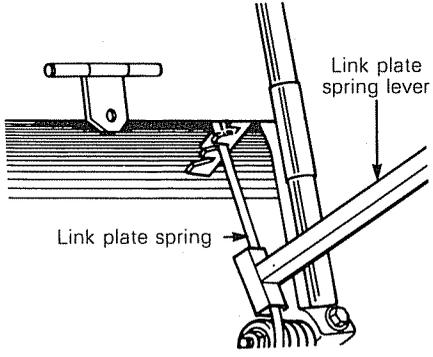
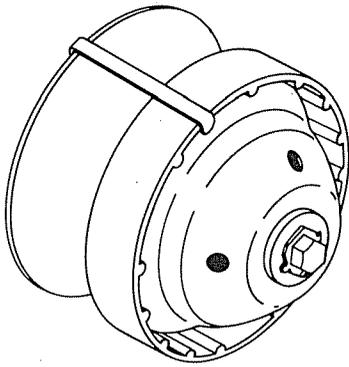
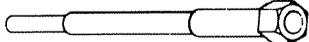
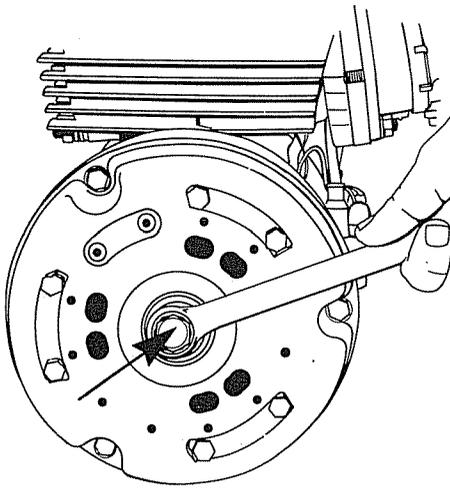
**TOOLS**

ITEM	USE	APPLICABLE TO
<p>Dial indicator (T.D.C. gauge). 414 1047 00</p> 	<p>Engine timing, to determine T.D.C.</p> 	<p>All engine types.</p>
<p>Tone timer. 414 0990 00</p> 	<p>Engine timing (static).</p>	<p>All engine types.</p>
<p>Circuit tester (continuity light). 414 0122 00</p> 	<p>Engine timing (static). Continuity tests.</p>	<p>All engine types.</p>
<p>Magneto ignition analyser (Merc-O-Tronic). 414 0192 00</p> 	<p>Engine electrical components tests.</p>	<p>All engine types.</p>

SECTION 07  
(TOOLS)

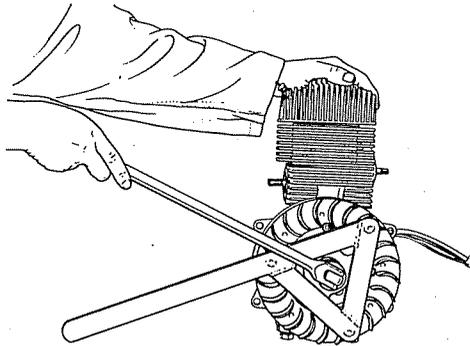
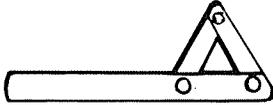
<p>Bombardier ignition tester. 419 0033 00</p>  <p>The image shows a rectangular device with a handle on top. The front panel features a large circular gauge with a needle and a scale from 0 to 100. There are two smaller gauges on the left and right sides. The text 'IGNITION TESTER' is printed on the front panel.</p>	<p>Engine electrical components tests.</p>	<p>All engine types.</p>
<p>Carburetor leak detector. 404 0163 00</p>  <p>The image shows a cylindrical device with a gauge on top. The gauge has a needle and a scale from 0 to 30. The device has a threaded end on the left side.</p>	 <p>The image shows a carburetor with a leak detector attached. Labels include 'Fuel outlet plug' pointing to a small hole on top, 'Leak detector' pointing to the gauge, and 'Fuel inlet' pointing to the bottom connection. A hand is shown holding the leak detector.</p>	<p>All Tillotson carburetors.</p>
<p>Track insert installer Heavy duty 419 0027 00</p>  <p>The image shows a track insert installer assembly consisting of a central block, two long screws, and a nut.</p> <p>Insert block 529 0003 00</p>  <p>The image shows a U-shaped metal insert block.</p>	 <p>The image shows a track insert being installed on a track. Labels include 'Track insert' pointing to the U-shaped block, 'Male jig' pointing to the upper part of the installer, and 'Female jig' pointing to the lower part. A hand is shown using a screwdriver to tighten the nut.</p>	<p>All types of track.</p>
<p>Cleat block 529 0026 00</p>  <p>The image shows a long metal block with several rectangular protrusions along its top edge.</p>	 <p>The image shows a cleat block being used to secure a track insert. Labels include 'Track insert' pointing to the U-shaped block and 'Cleat block' pointing to the long metal block. A hand is shown using a screwdriver to tighten a screw.</p>	<p>All types of track.</p>

SECTION 07  
(TOOLS)

<p>Link plate spring lever. 529 0006 00</p> 	 <p>Link plate spring lever</p> <p>Link plate spring</p>	<p>All models with link plate springs.</p>
<p>Drive pulley retainer 529 0017 00</p> 	<p>For indexation of governor cup.</p> 	<p>Square shaft drive pulley.</p>
<p>Drive pulley puller. 529 0021 00</p> 	<p>To remove drive pulley from crankshaft.</p> 	<p>Taper shaft engines.</p>

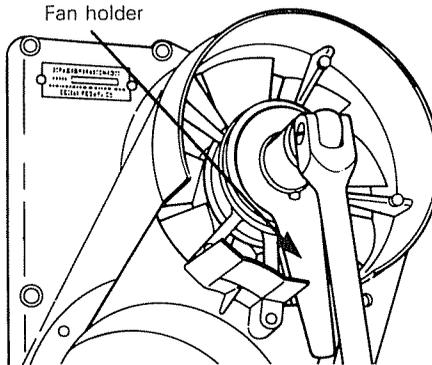
SECTION 07  
(TOOLS)

Magneto housing holder.  
420 976 550



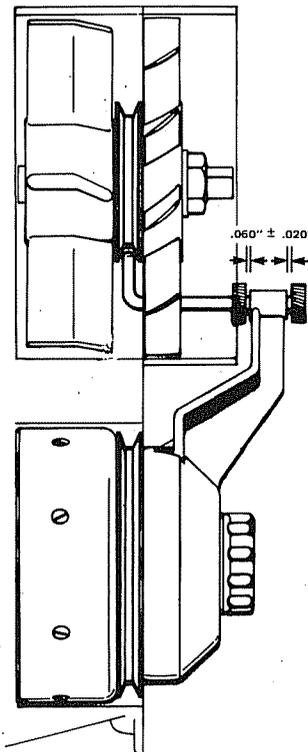
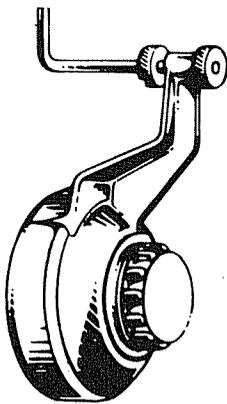
Single cylinder engine types.

Fan holder  
420 977 880



Twin cylinders.

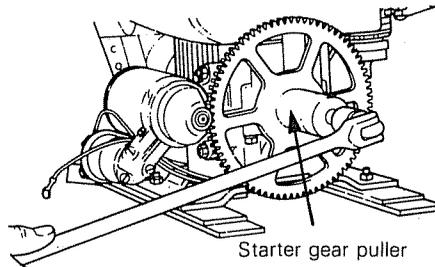
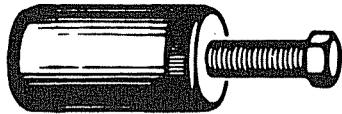
Fan pulley aligning tool.  
420 876 440



248, 249, 294 engine types.

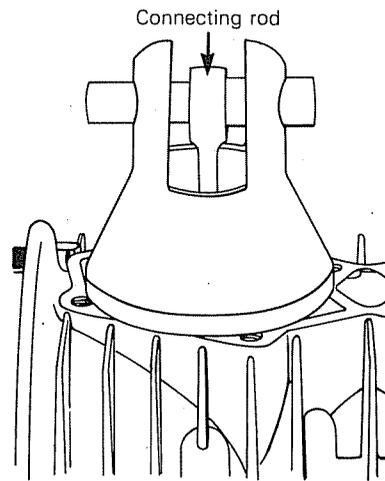
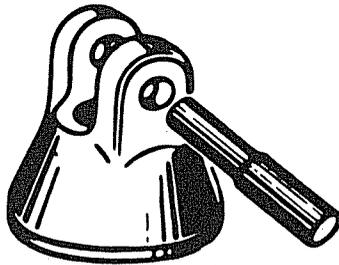
SECTION 07  
(TOOLS)

Starter gear puller.  
420 876 145



Twin cylinder electric  
start engines.

Connecting rod holder.  
420 977 900

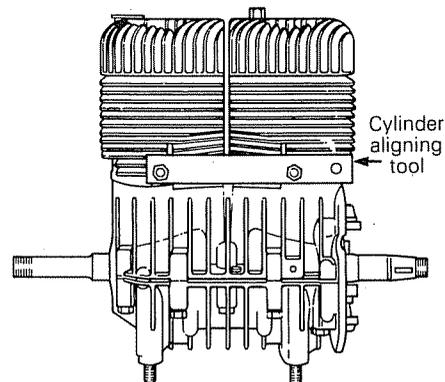


All single cylinder models.

Cylinder aligning tool.  
420 876 170

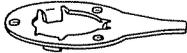
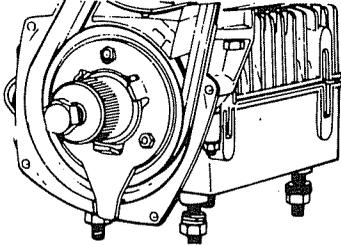
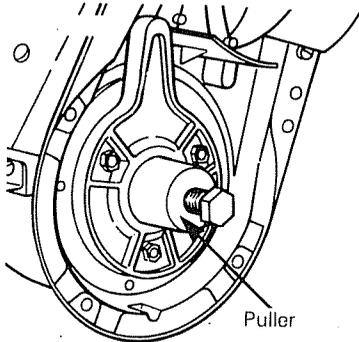
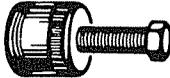


420 842 160

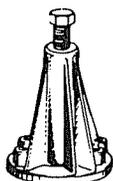


Twin cylinder engine  
types.

SECTION 07  
(TOOLS)

<p>Magneto housing holder. 420 876 350</p> 		<p>Twin cylinder engine types.</p>
<p>Magneto housing holder. All twin cylinders F.C. Except 248, 294 420 876 080</p>  <p>345 engine 420 876 085</p>	 <p>Puller</p>	<p>Twin cylinder engine types.</p>
<p>Bearing puller 247 engine 420 976 350</p>  <p>All twin cylinders 420 876 065</p>	<p>To remove magneto ring from engine</p>	<p>All engines.</p>
<p>Bearing simulator. 305, 343, 402, 440 engine 420 876 155 640 engine 420 876 160 248, 294 420 876 380</p> 	<p>When adjusting crankshaft play.</p>	<p>All engine types.</p>

Puller assembly.  
420 876 296  
With 145 mm screw.



Screw

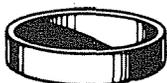
420 940 755  
M16 x 1.5 x 145



420 841 200  
M8 x 70



420 840 680  
M8 x 40



Ring for puller ball bearing.  
420 977 480  
All models since 1971  
Except 292, 337, 640, 641, 775

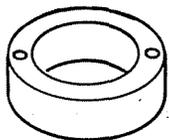
420 977 490  
Since 1971  
292, 337, 640, 641, 775



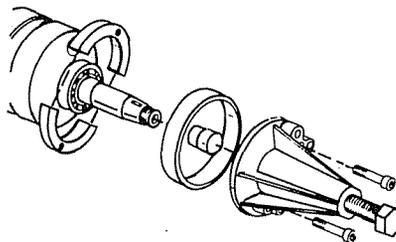
Ring for roller bearing  
420 276 020  
Since 1971  
All models except:  
248, 249, 292, 294, 337, 640,  
641, 775

420 977 470  
Since 1971  
292, 337, 640, 641, 775

420 876 330  
Since 1971  
248, 249, 294

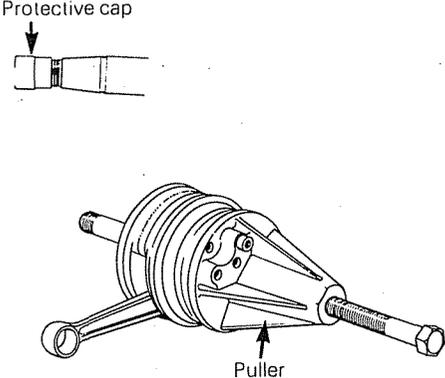
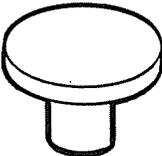
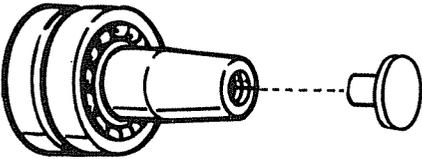
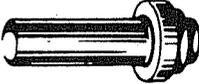
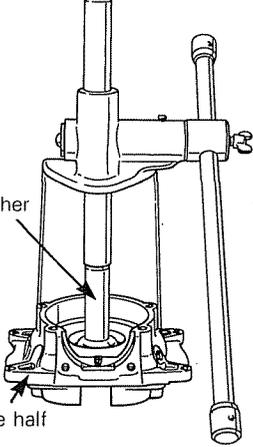


Distance ring for puller. 420 876 560

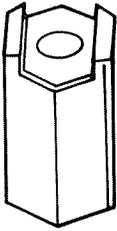
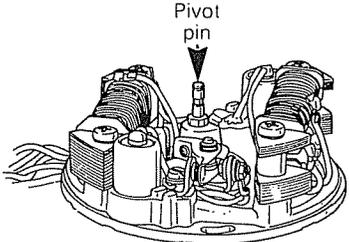
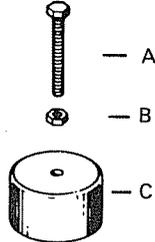
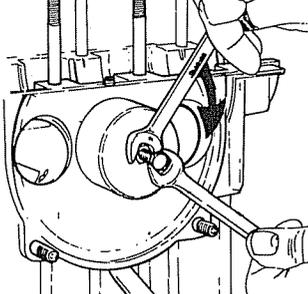
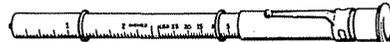
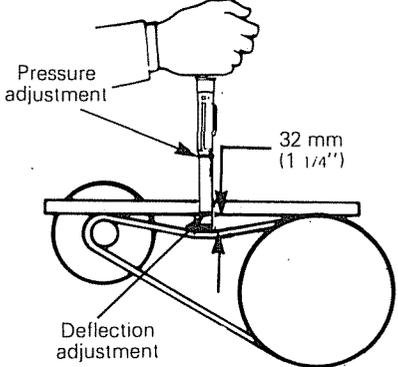
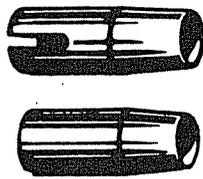
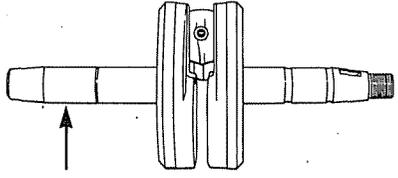


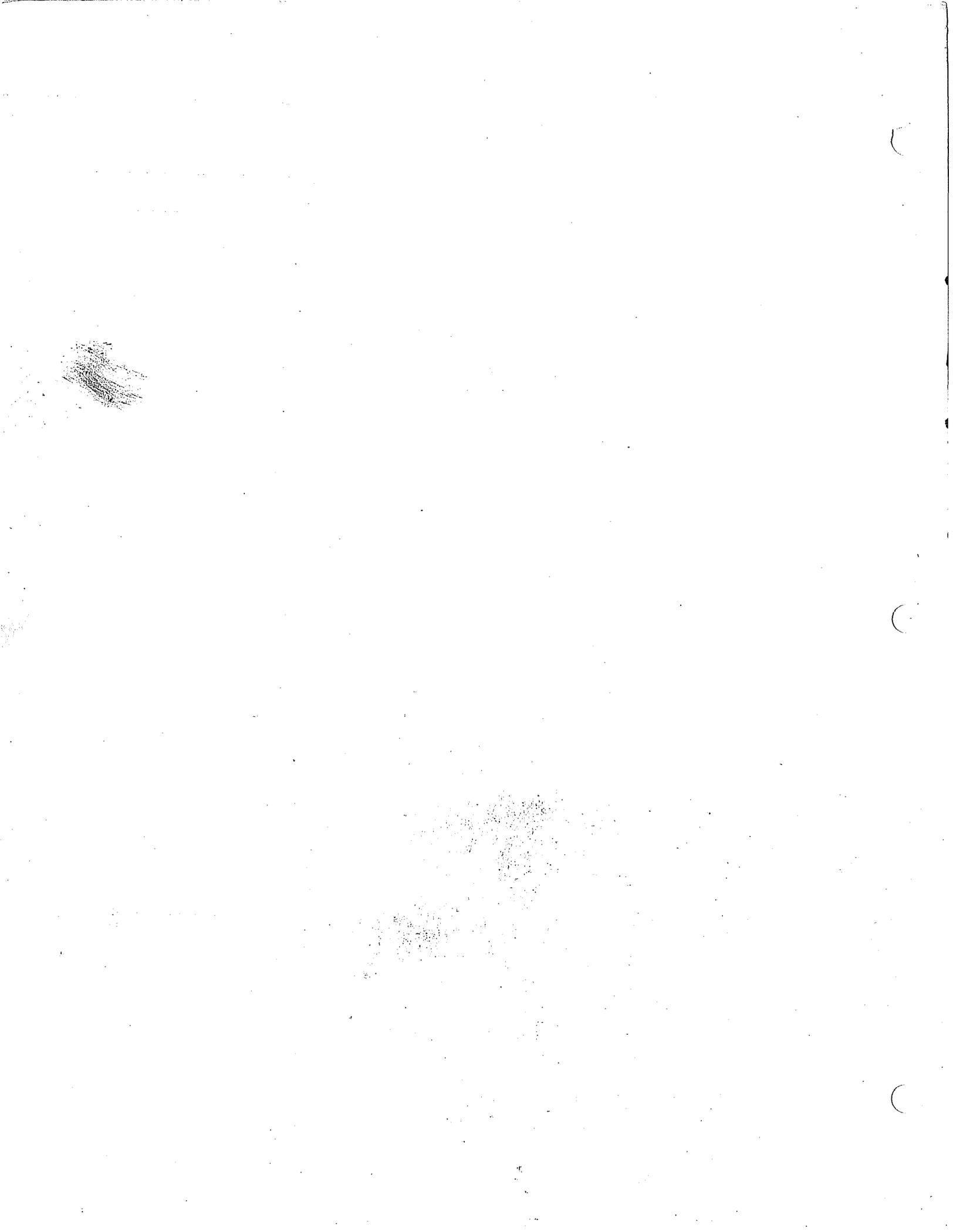
All engine types.

SECTION 07  
(TOOLS)

<p>Protection cap.</p>  <p>12 mm 420 676 120 14 mm 420 976 880 18 mm 420 976 890 22 mm 420 876 402 248, 294 420 876 390</p>	<p>Protect crankshaft end, when using bearing puller.</p> <p>Protective cap</p>  <p>Puller</p>	<p>All engine types.</p>
<p>Protection end cap. 420 876 550</p> 	<p>To protect crankshaft end, when using bearing puller.</p> 	<p>All taper shaft engine type.</p>
<p>Oil seal pusher. 247 engine 420 977 920</p> 	<p>Oil seal pusher</p>  <p>Crankcase half</p>	<p>All single cylinder engine type.</p>

SECTION 07  
(TOOLS)

<p>Armature plate contact set pivot pin remover (socket). 420 876 530</p> 	<p>To remove contact set pivot pin from armature plate.</p>  <p>Pivot pin</p>	<p>All engine types using breaker point type ignition.</p>
<p>Rotary valve shaft puller 420 876 485</p>  <p>A B C</p>	<p>To remove rotary valve shaft assembly from crankcase.</p> 	<p>RV engines.</p>
<p>Belt tension tester. 414 3482 00</p> 	 <p>Pressure adjustment</p> <p>32 mm (1 1/4")</p> <p>Deflection adjustment</p>	
<p>Oil seal sleeve. 247 engine: mag. side 420 276 900 PTO side 420 977 910</p>  <p>444 LC engine water pump 420 876 490 rotary valve 420 876 495</p> 	<p>To avoid oil seal damage during crankshaft installation.</p>  <p>Oil seal sleeve (on crankshaft)</p>	<p>All single cylinder engine types.</p>



## TECHNICAL DATA LIST

TRACK TENSION SPECIFICATIONS (SLIDE SUSPENSION)

TRACK TENSION SPECIFICATIONS (BOGIE WHEEL SUSPENSION)

TRACK SPECIFICATIONS

VEHICLE MODEL/DRIVE BELT NUMBER

DRIVE PULLEY SPECIFICATIONS

DRIVEN PULLEY SPRING TENSION

PULLEY ALIGNMENT SPECIFICATIONS

SPROCKET AND CHAIN SPECIFICATIONS

STEERING SYSTEM TORQUE SPECIFICATIONS

SKI SYSTEM TORQUE SPECIFICATIONS

TOLERANCE AND WEAR LIMIT — ENGINES

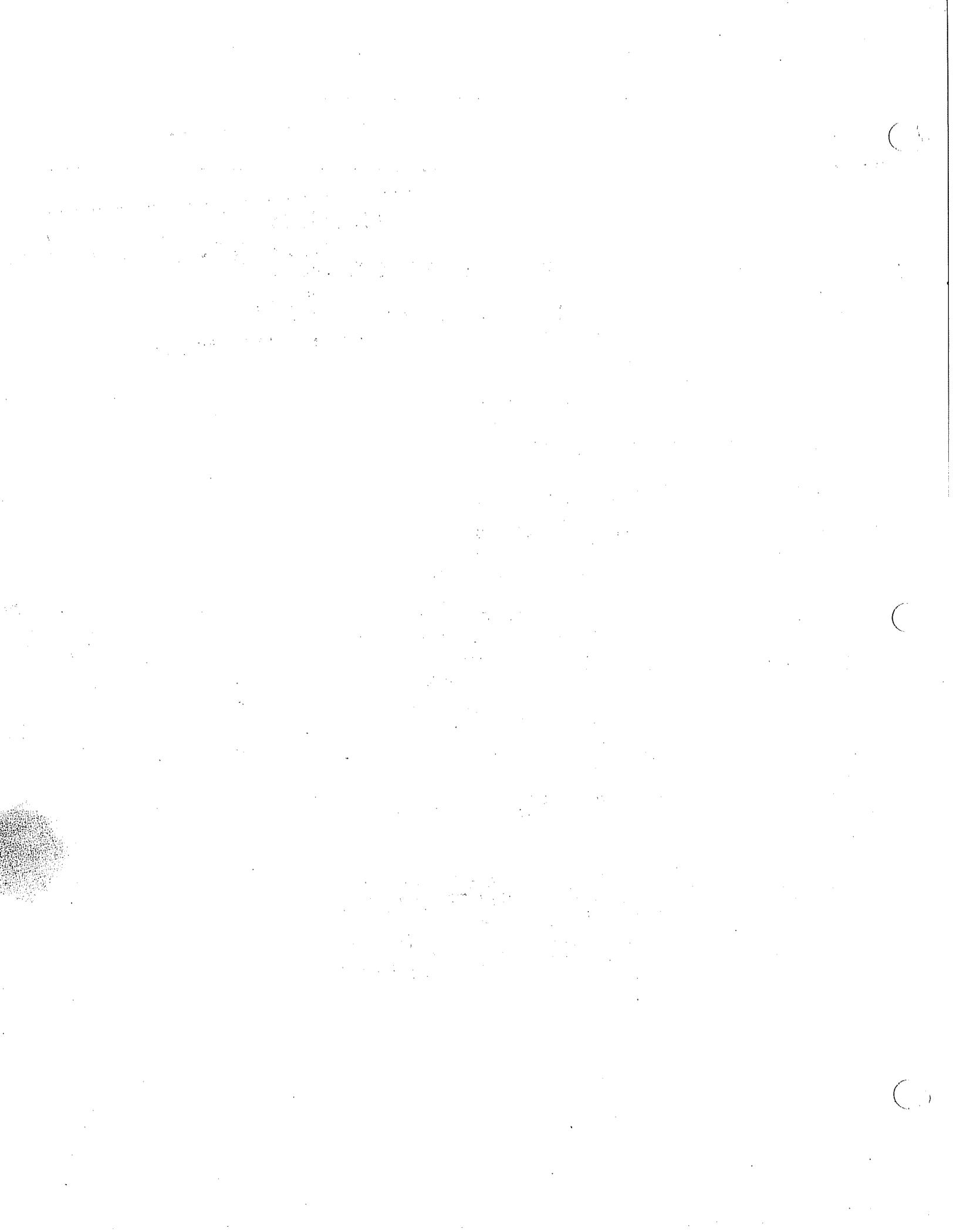
IGNITION TIMING SPECIFICATIONS

CARBURETOR SPECIFICATIONS

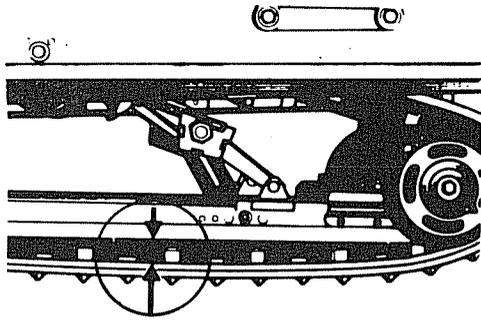
BOSCH SPARK PLUG CHART

IGNITION GENERATING COIL, TRIGGER COIL AND  
LIGHTING COIL RESISTANCE CHART

BOMBARDIER IGNITION TESTER DIAL POSITIONS

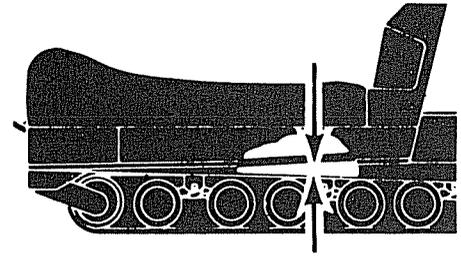


### TRACK TENSION SPECIFICATIONS (SLIDE SUSPENSION)

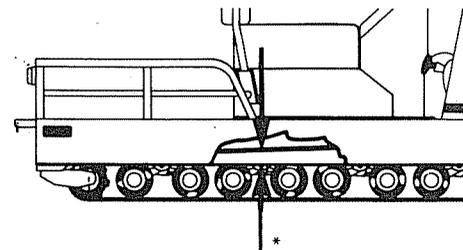


		1978
ÉLAN	250 DL	13 mm (1/2'')
CITATION	300	13 mm (1/2'')
OLYMPIQUE	340	
NUVIK	340	
EVEREST	340, 400	13 mm (1/2'')
FUTURA	440, 444 LC	
T'NT	340 F/A 440 F/C	13 mm (1/2'')
RV and Sonic	340	13 mm (1/2'')
BLIZZARD	6500 PLUS	13 mm (1/2'')
ÉLITE	450 LC	13 mm (1/2'')

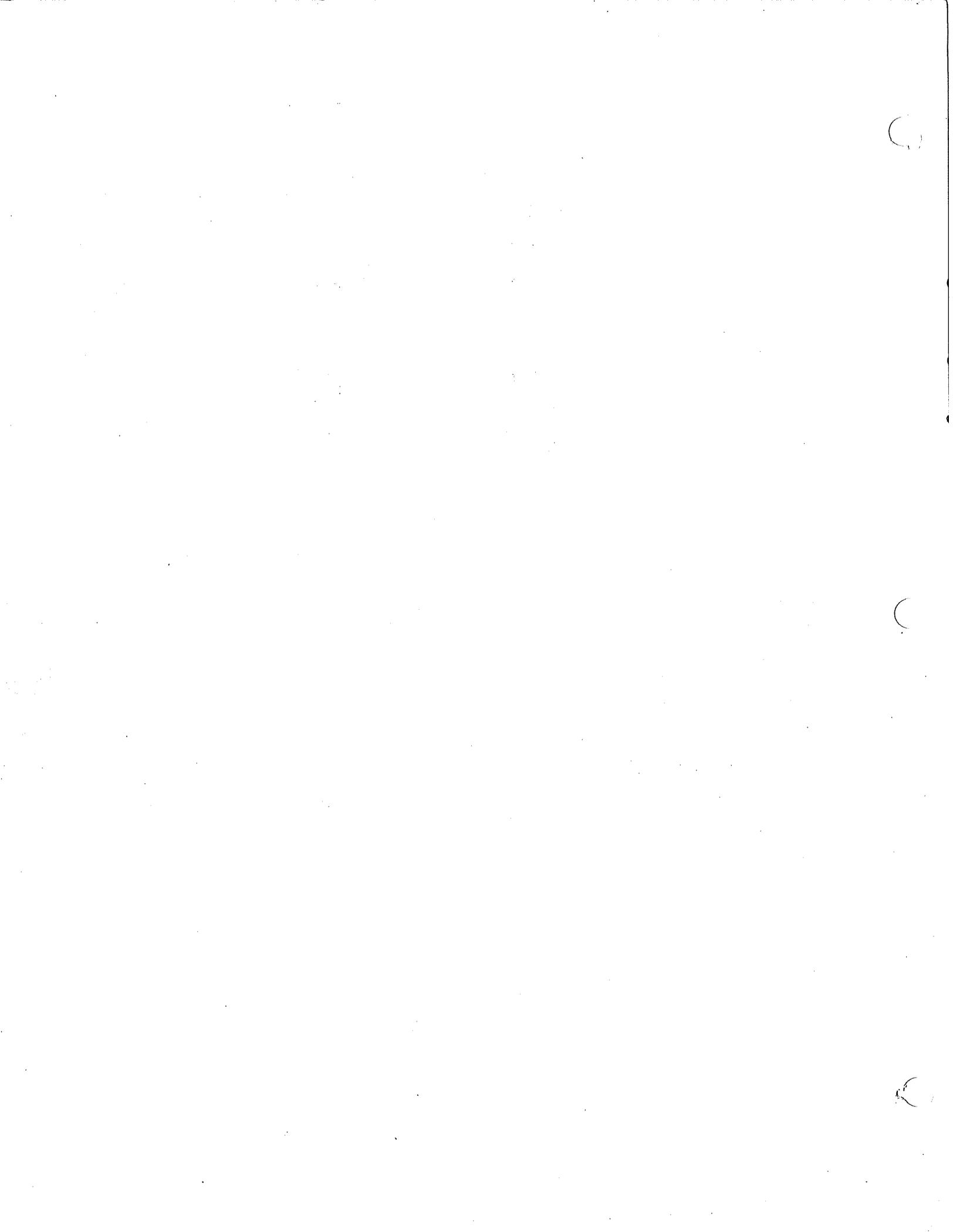
### TRACK TENSION SPECIFICATIONS (BOGIE WHEEL SUSPENSION)



		1978
ELAN and SPIRIT	250	35 mm (1 3/8'')
ÉLAN	250 DL	
OLYMPIQUE	300T	57 mm (2 1/4'')
ALPINE	640 ER	*57 mm (2 1/4'')

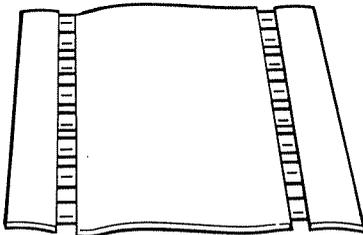


\*Between top inside edge of track and center of second bogie wheel set retaining bolt (from rear).

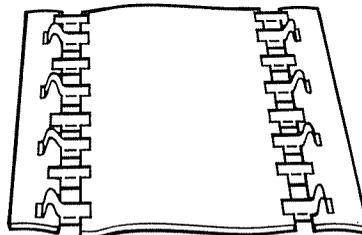


## 1978 TRACK SPECIFICATIONS

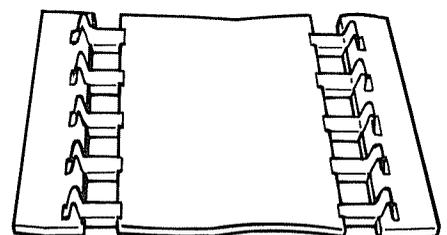
### CLEAT AND GUIDE ARRANGEMENT



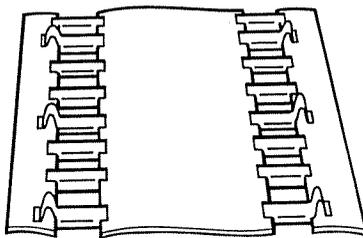
TYPE 1: Narrow insert.



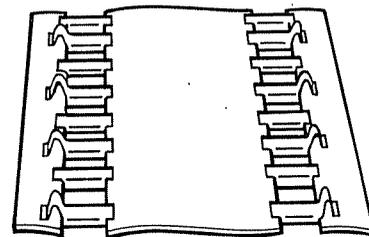
TYPE 2: Narrow insert with shoulder.



TYPE 3: Narrow guide with shoulder.

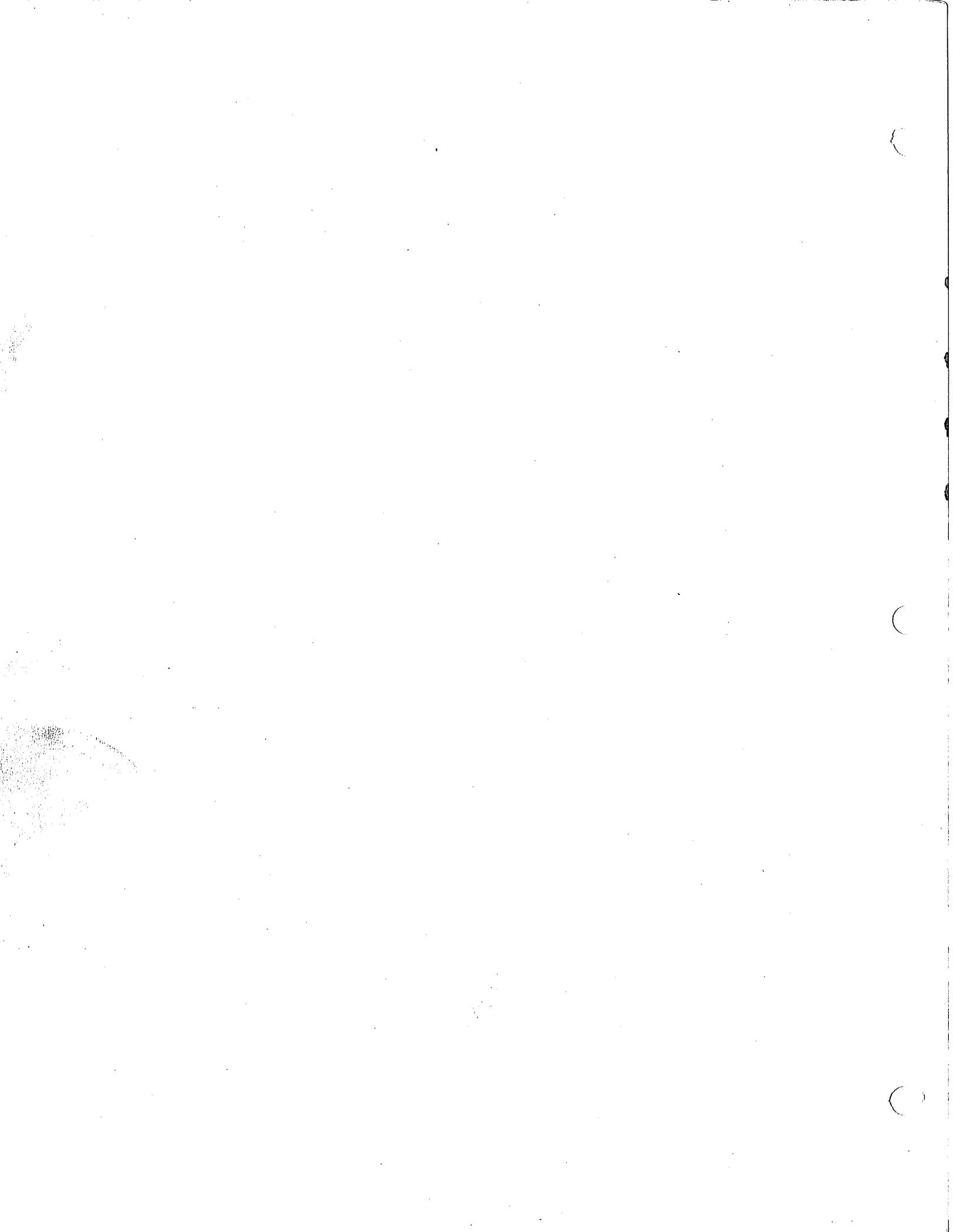


TYPE 4: Wide guide (large track hole).



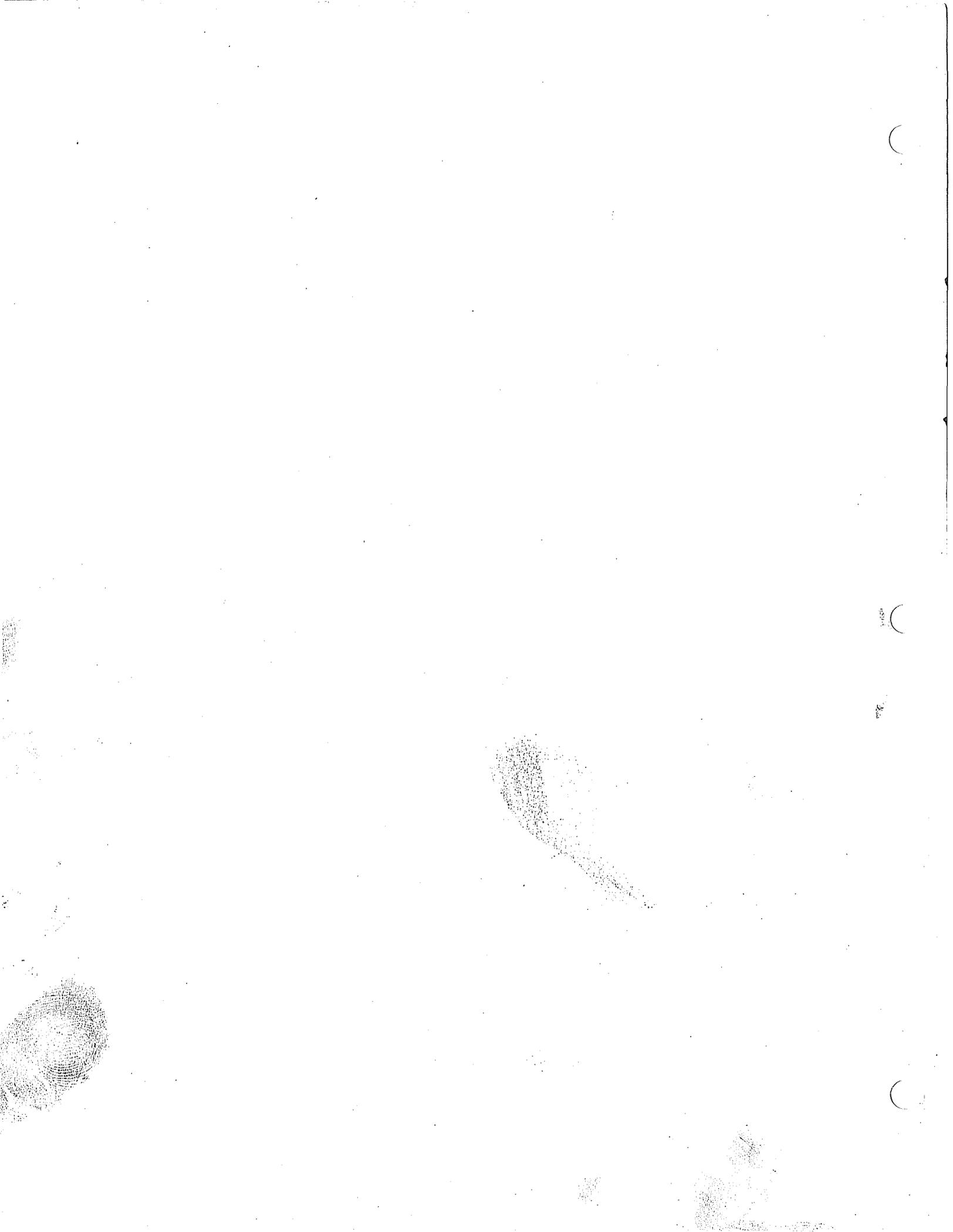
TYPE 5: Wide guide (large track hole).

		TRACK NUMBER	WIDTH	LENGTH (INSIDE)	
ELAN and SPIRIT	250	TYPE 1	570 0006	38 cm (15'')	290 cm (114'')
ELAN	250 DL (Slide suspension)	TYPE 2	570 0077	38 cm (15'')	305 cm (120'')
OLYMPIQUE	300T	TYPE 1	570 0006	38 cm (15'')	290 cm (114'')
OLYMPIQUE	340	TYPE 4	570 0056	38 cm (15'')	305 cm (120'')
INUVIK	340	TYPE 5	570 0071	38 cm (15'')	305 cm (120'')
CITATION	300	TYPE 2	570 0081	38 cm (15'')	290 cm (114'')
EVEREST	340, 440	TYPE 4	570 0045	42 cm (16.5'')	315 cm (124'')
EVEREST	444 LC	TYPE 4	570 0045	42 cm (16.5'')	315 cm (124'')
FUTURA	400, 440, 444 LC	TYPE 4	570 0060	42 cm (16.5'')	315 cm (124'')
T'NT	340 F/A and 440 F/C	TYPE 5	570 0072	42 cm (16.5'')	290 cm (114'')
RV	340	TYPE 2	570 0069	38 cm (15'')	290 cm (114'')
SONIC	340	TYPE 2	570 0068	38 cm (15'')	290 cm (114'')
BLIZZARD	6500 PLUS	TYPE 3	570 0079	42 cm (16.5'')	290 cm (114'')
ALPINE	640 ER	TYPE 1	570 0014	38 cm (15'')	355 cm (139.5'')
ELITE	450 LC	TYPE 4	570 0056	38 cm (15'')	305 cm (120'')



**VEHICLE MODEL/DRIVE BELT NUMBER**

		1978	WIDTH
ELAN and SPIRIT	250	570 0411	30 mm (1 3/16")
OLYMPIQUE NUVIK CITATION		414 2327	33 mm (1 5/16")
EVEREST	340	414 2327	33 mm (1 5/16")
EVEREST FUTURA	400, 440	414 2417	33 mm (1 5/16")
EVEREST FUTURA	444 LC	414 2277	33 mm (1 5/16")
T'NT	340 F/A	414 2327	33 mm (1 5/16")
T'NT	440 F/C	414 2417	33 mm (1 5/16")
RV and SONIC	340	414 2277	33 mm (1 5/16")
BLIZZARD	6500 PLUS	414 2277	33 mm (1 5/16")
ALPINE	640 ER	414 2277	33 mm (1 5/16")
ELITE	450 LC	414 2277	33 mm (1 5/16")



		PULLEY TYPE	GOVERNOR CUP NUMBER	COUNTERWEIGHT	ROLLER IDENTIFICATION dia. mm (in.)	SPRING COLOR AND LENGTH	SPRING LENGTH ±1.5 mm (.060")	ENGAGEMENT SPEED R.P.M.	RETAINING BOLT TORQUE N•m (ft•lbs)
ELAN & SPIRIT ELAN	250 250 Deluxe	Roller round shaft	504 2186 504 2186	E-4 D-2	Nylon 32 (1.250) ① Nylon 32 (1.250)	414 2580 Bronze 414 2581 Blue	83.1 (3.200) 77.7 (3.060)	2000-2200 3300-3500	*61 (45) *61 (45)
OLYMPIQUE OLYMPIQUE & NUVIK CITATION	300T 340 300	▶ Roller square shaft ▶ Roller square shaft	504 2289 504 2289 504 2289	C-3-L C-3-L ③ A-3-S	Fibre 34 (1.340) Fibre 34 (1.340) Fibre 34 (1.340)	414 1967 Light blue 414 1967 Light blue 414 1967 Light blue	118.9 (4.680) 118.9 (4.680) 118.9 (4.680)	3800-4100 3800-4100 3900-4300	**85 (63) **85 (63) *85 (63)
EVEREST FUTURA EVEREST & FUTURA EVEREST & FUTURA	340 400 440 444 LC	▶ Roller square shaft	504 2289 504 2289 504 2289 504 2289	C-3-L C-4-L C-4-L C-7-L	Fibre 34 (1.340) Fibre 34 (1.340) Fibre 34 (1.340) Fibre 34 (1.340)	414 1967 Light blue 414 1967 Light blue 414 1966 Pink 414 1995 Yellow	118.9 (4.680) 118.9 (4.680) 122.2 (4.810) 100.1 (3.940)	3800-4100 3600-3900 2900-3200 3400-3700	**85 (63) **85 (63) **85 (63) **85 (63)
T'NT T'NT	340 F/A 440 F/C	▶ Roller square shaft	504 2289 504 2289	C-4-L C-4-L	Fibre 34 (1.340) Fibre 34 (1.340)	414 1995 Yellow 414 1966 Pink	100.1 (3.940) 122.2 (4.810)	4100-4400 2900-3200	**85 (63) **85 (63)
RV & SONIC	340	▶ Roller square shaft	504 2303	A-3-S	Fibre 34 (1.340)	414 2835 Red	88.9 (3.500)	4700-5000	**85 (63)
BLIZZARD	6500 PLUS	▶ Roller square shaft	504 2398	A-3-S	Steel 4130, 16 (0.62)	414 3412 Brown	76.9 (3.030)	4200-4500	**85 (63)
ALPINE	640 ER	▶ Roller square shaft with bearing	504 2302	② C-8-Double	Fibre 34 (1.340) Width 19 mm (3/4")	414 1966 Pink	122.2 (4.810)	2250-2400	*118 (87)
ELITE	450 LC	▶ Roller square shaft	504 2374	C-8	Fibre 34 (1.340)	414 1967 Light blue	118.9 (4.680)	3200-3500	**85 (63)

▶ Hub plug with "Duralon" bushing.

▷ With "Duralon" bushing.

⊙ With 36 mm (7/16") slot.

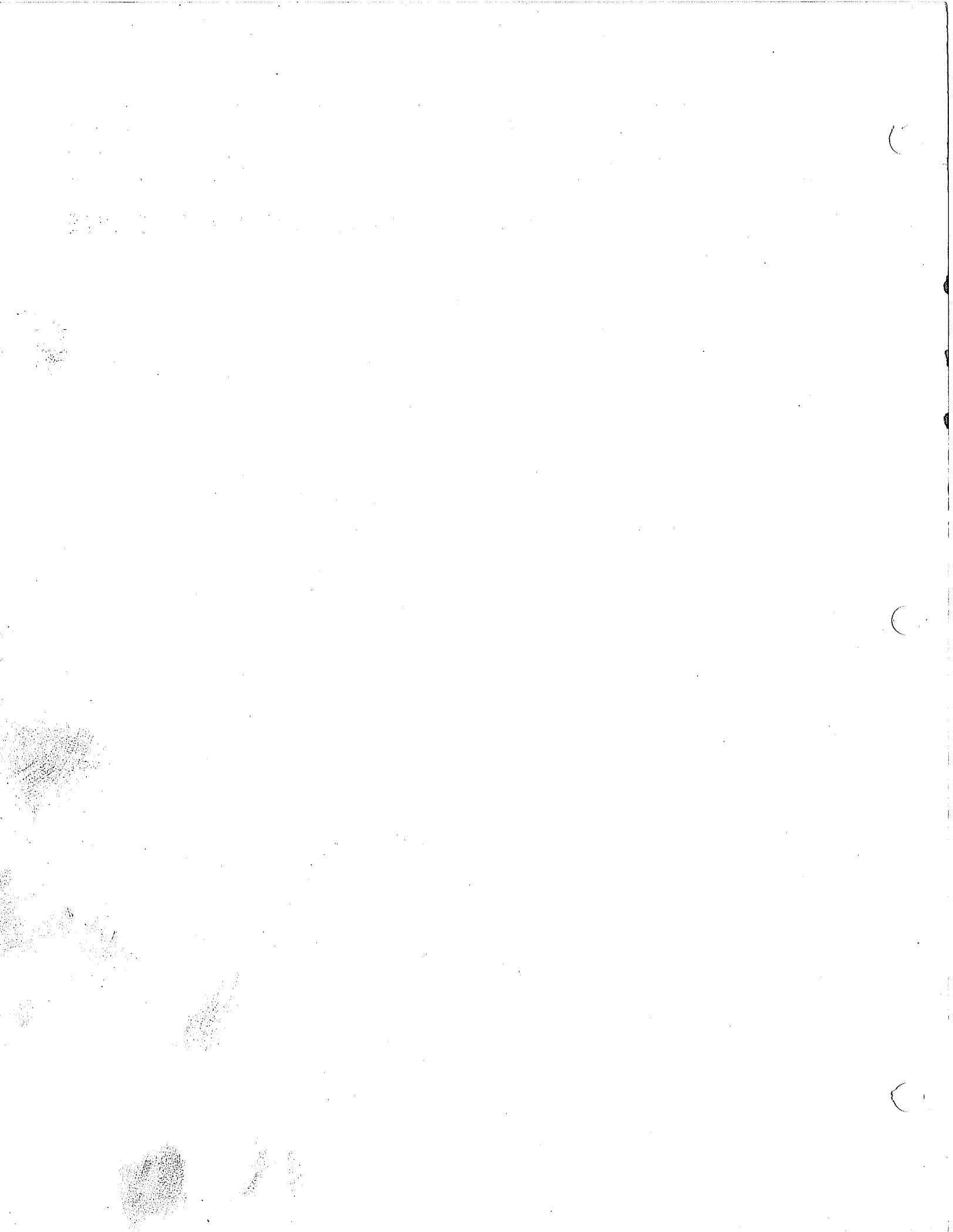
⊗ With 4 washers p/n 504 2273 00.

⊗ With 4 washers p/n 399 9015 00.

- \* Torque retaining bolt to specification then loosen and retorque to specific value.
- \*\* After bolt is torqued, start engine and repeatedly apply throttle and brake. Stop engine and retorque.

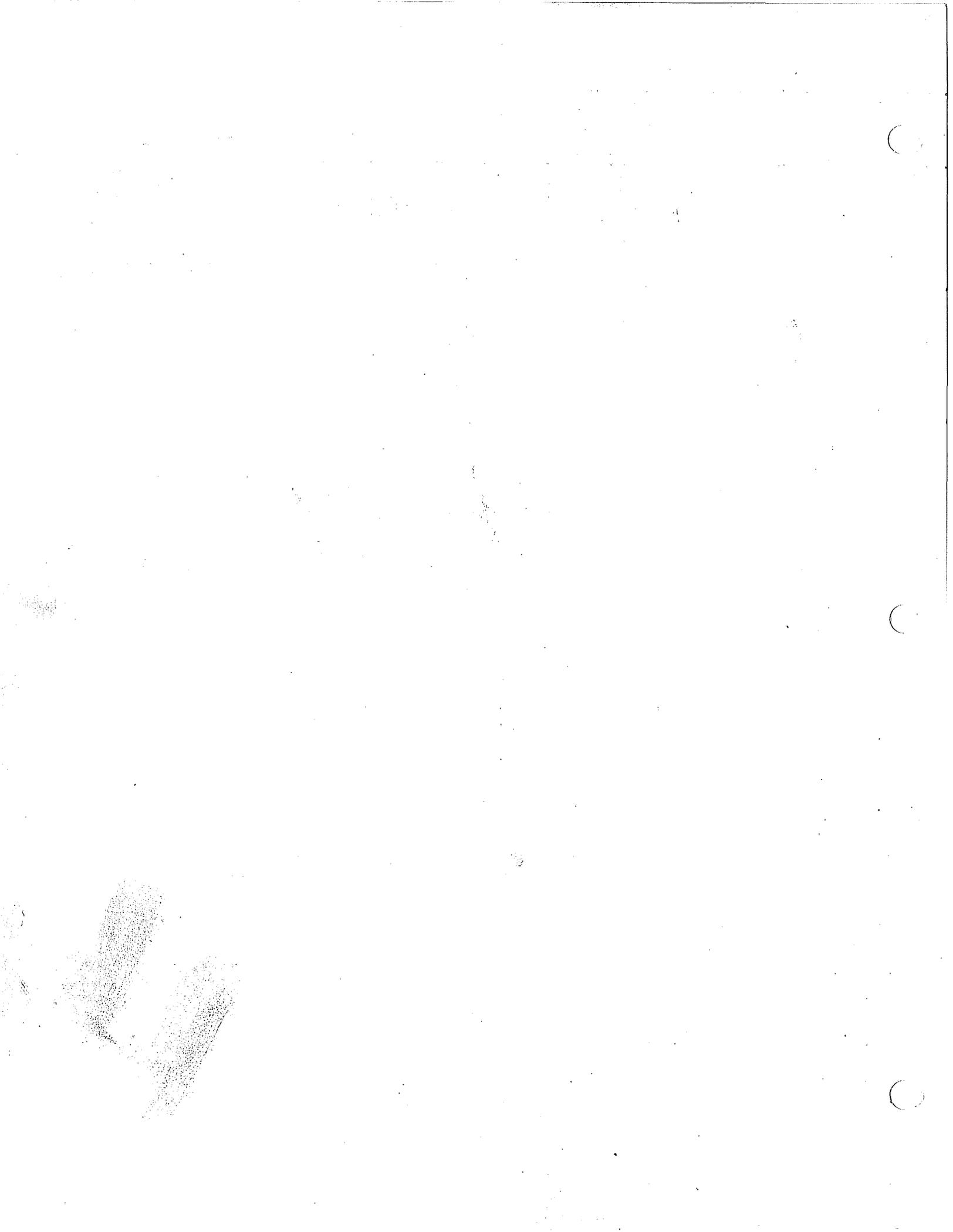
## 1978 DRIVE PULLEY SPECIFICATIONS

SECTION 08  
SUB-SECTION 02-03

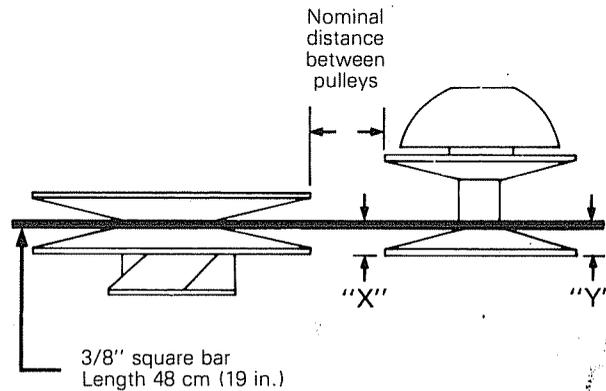


## DRIVEN PULLEY SPRING TENSION

	1978 kg $\pm$ 1 (lbs $\pm$ 2)
ELAN and SPIRIT	3.6 (8)
OLYMPIQUE NUVIK CITATION	3.6 (8)
EVEREST and FUTURA	3.6 (8)
T'NT F/A and F/C	3.6 (8)
RV and SONIC	5.9 (13)
BLIZZARD 6500 PLUS	5.9 (13)
ALPINE	5.4 (12)
ELITE 450 LC	5.4 (12)

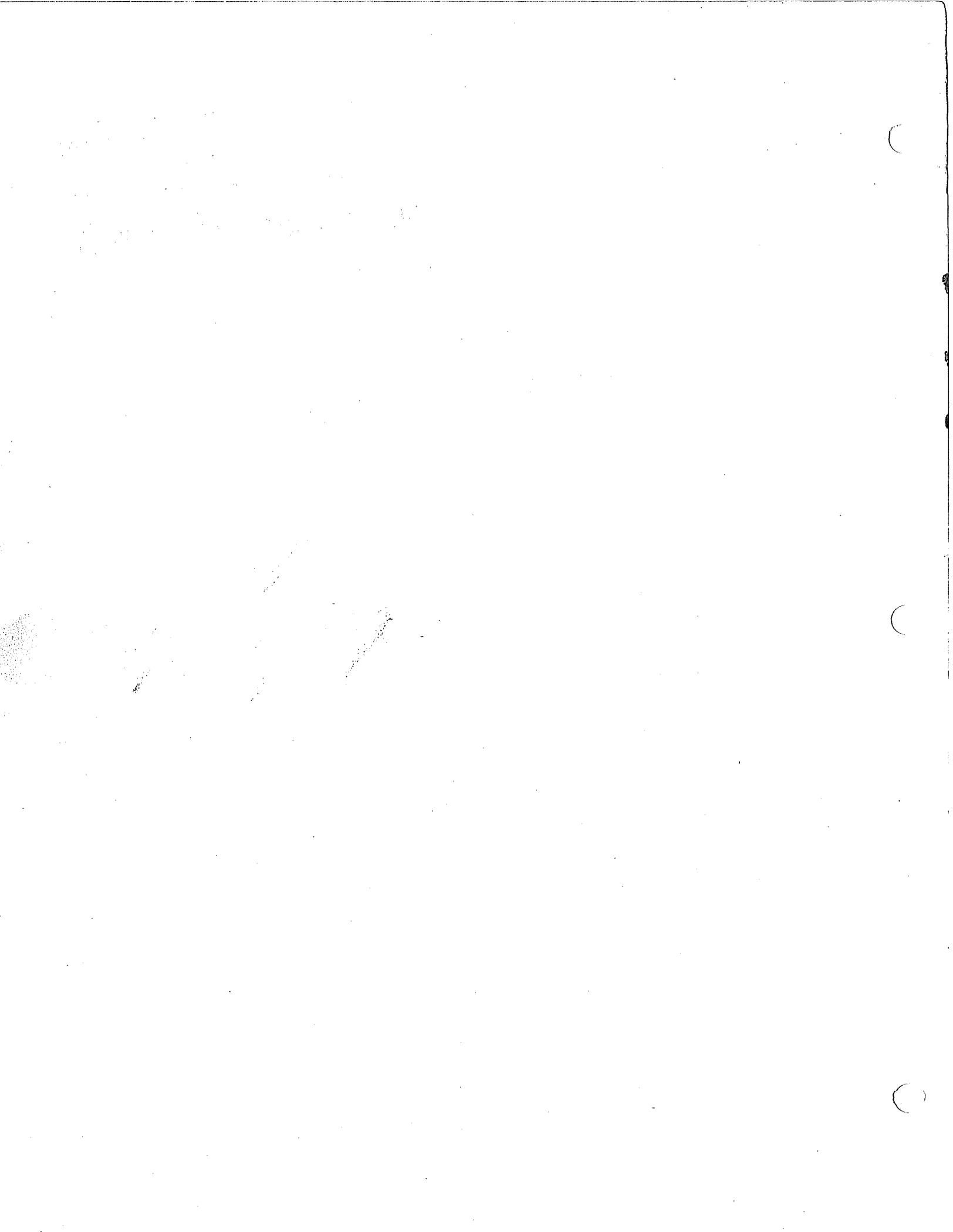


## 1978 PULLEY ALIGNMENT



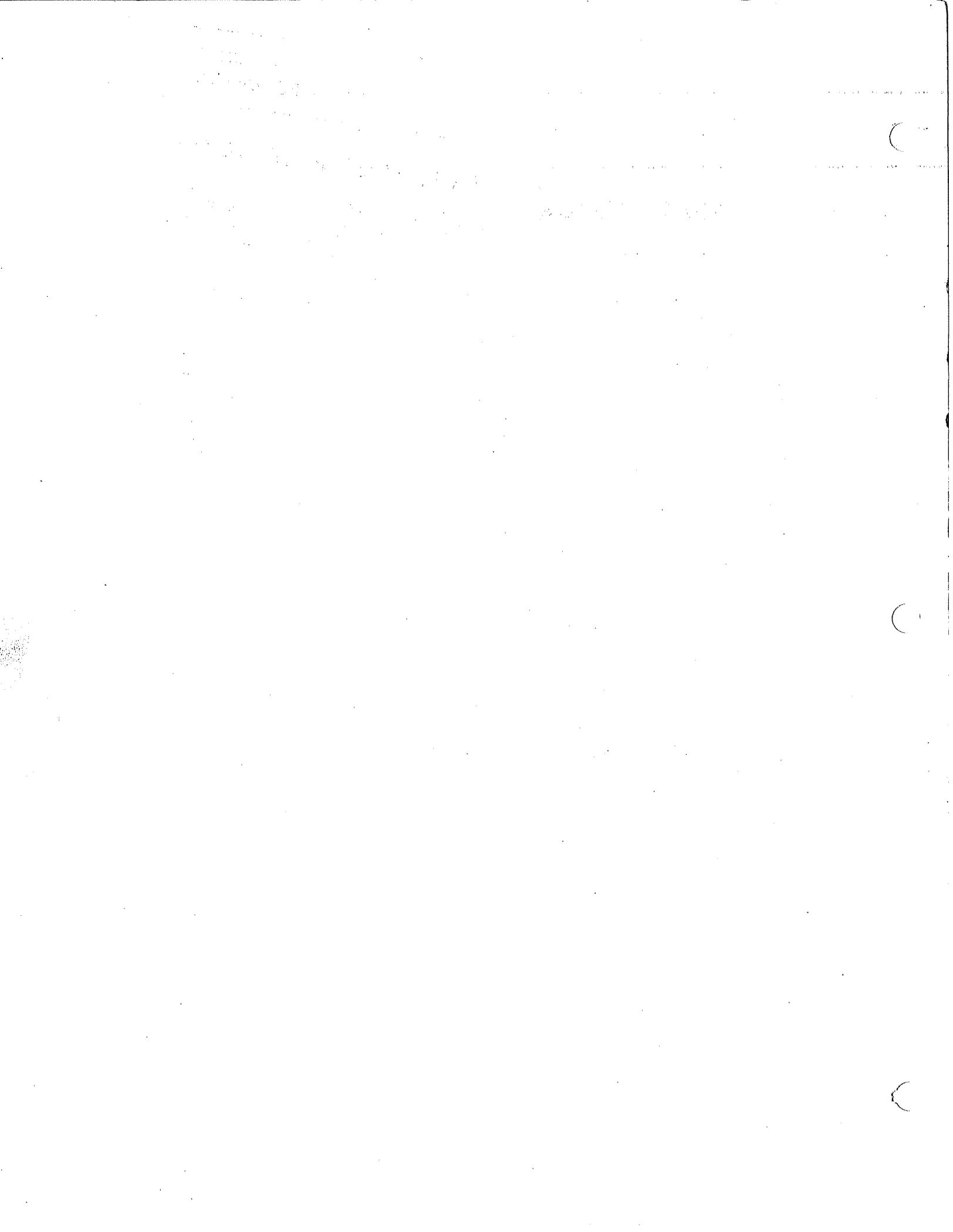
- Dimension "X" must never exceed dimension "Y".
- Dimension "Y" can exceed dimension "X" by 1.6 mm (1/16").

	DIMENSIONS X and Y (Offset)	NOMINAL DISTANCE (between pulleys)
ELAN and SPIRIT	33-35 mm (1 5/16" - 1 3/8")	44 mm (1 3/4")
OLYMPIQUE and NUVIK CITATION EVEREST and FUTURA T'NT RV and SONIC	F/A and F/C 33-35 mm (1 5/16" - 1 3/8")	36 mm (1 7/16")
BLIZZARD	6500 PLUS 33-35 mm (1 5/16" - 1 3/8")	33 mm (1 5/16")
ALPINE	33-35 mm (1 5/16" - 1 3/8")	44 mm (1 3/4")
ELITE	450 LC 33-35 mm (1 5/16" - 1 3/8")	41 mm (1 5/8")



## 1978 SPROCKET AND CHAIN SPECIFICATIONS

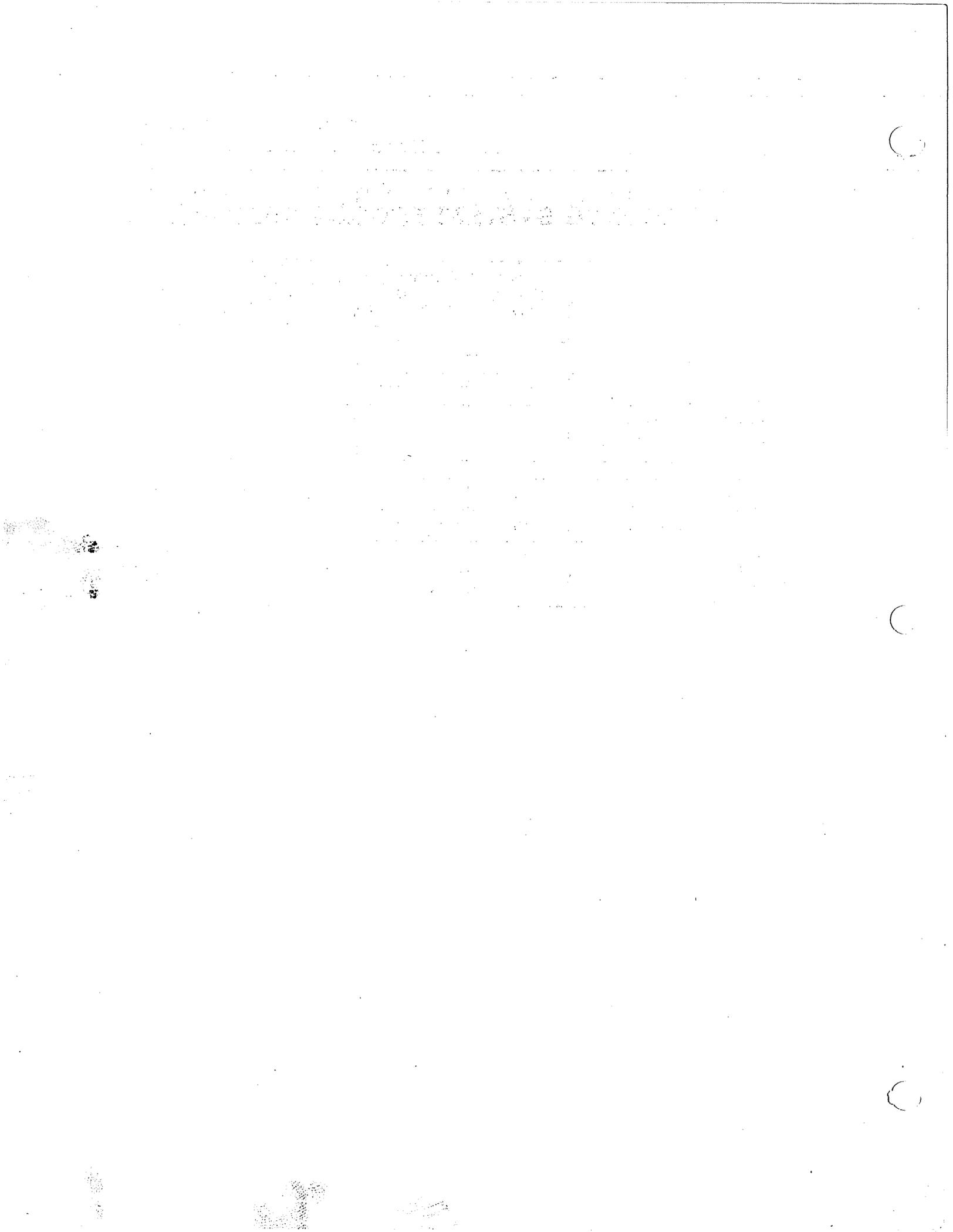
		SPROCKET UPPER/LOWER	CHAIN PITCH AND NUMBER OF LINKS
ELAN and SPIRIT	250	10/25	1/2" single, 62
ELAN	250 DL	14/35	3/8" double, 84
OLYMPIQUE	300 T	16/34	3/8" double, 88
CITATION	300	17/33	3/8" double, 88
OLYMPIQUE	340	17/33	3/8" double, 88
NUVIK			
EVEREST	340	16/34	3/8" double, 88
FUTURA	400	18/34	3/8" double, 90
EVEREST	440	21/38	3/8" triple, 94
FUTURA			
EVEREST	444 L/C	20/34	3/8" triple, 90
FUTURA			
T'NT	340 F/A	15/34	3/8" double, 88
T'NT	440 F/C	18/38	3/8" triple, 92
RV and SONIC	340	18/38	3/8" triple, 92
BLIZZARD	6500 PLUS	19/38	3/8" triple, 92
ALPINE	640 ER	17/38	3/8" triple, 90
ELITE	450 LC	17/38	3/8" triple, 188



## 1978 STEERING SYSTEM TORQUE SPECIFICATIONS

	STEERING SYSTEM TYPE	HANDLEBAR RETAINING BOLT N•m (ft-lbs)	STEERING ARM TO SKI LEG N•m (ft-lbs)	TIE ROD END TO STEERING ARM N•m (ft-lbs)
ELAN and SPIRIT	1	---	27 (20)	27 (20)
CITATION	2	---	42 (31)	27 (20)
OLYMPIQUE and NUVIK EVEREST and FUTURA T'NT	3	---	42 (31)	27 (20)
RV and SONIC	4	---	42 (31)	27 (20)
BLIZZARD 6500 Plus	5	---	42 (31)	27 (20)
ALPINE	6	42 (31)	42 (31)	*61 (45)
ELITE	7	42 (31)	42 (31)	27 (20)

\*Ball bushing nut torque value.



## 1978 SKI SYSTEM TORQUE SPECIFICATIONS

	SKI SYSTEM TYPE	SPRING LEAF/ LEAF COUPLER RETAINING BOLT N•m (ft-lbs)	RUNNER SHOE NUT N•m (ft-lbs)	LEAF COUPLER TO SKI LEG
ELAN & SPIRIT ELAN DELUXE	1 2	50 (37)	7 ( 5)	Tighten bolt, move ski by hand to check that it pivots easily on ski leg. Then tighten locking nut to 61 N•m (45 ft-lbs).
CITATION	3	50 (37)	14 (10)	
OLYMPIQUE & NUVIK EVEREST 340, FUTURA 400	4	50 (37)	14 (10)	
EVEREST & FUTURA 440 & 444 LC T'NT	5	-----	14 (10)	
RV & SONIC BLIZZARD 6500 PLUS	6	-----	14 (10)	
ALPINE	7	50 (37)	14 (10)	
ELITE	8	50 (37)	14 (10)	

(1)

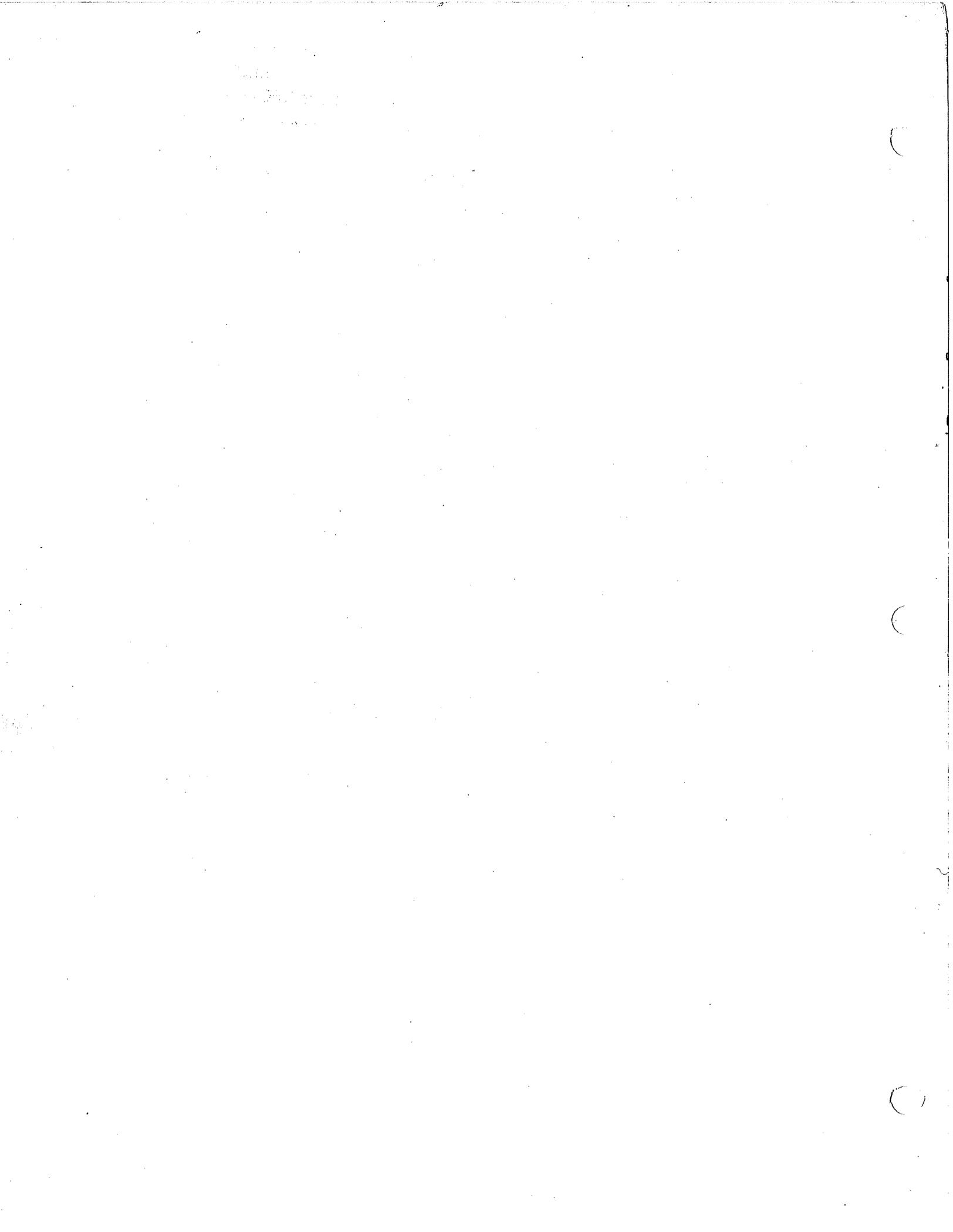
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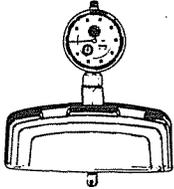
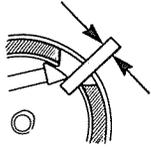
## TOLERANCES AND WEAR LIMIT — ENGINES

YEAR	ENGINE TYPE	CYL. BORE (MIN. NOMINAL)		PISTON TO WALL CLEARANCE		MAXIMUM RING END GAP	MAXIMUM CRANKSHAFT END PLAY
		STANDARD	OVERSIZE	FITTED TOLERANCE	WEAR LIMIT		
1978	247	69.0 mm (2.7165")	69.5 mm (2.7362")	0.063-0.099 mm (.0025-.0039")	0.162 mm (.0064")	0.20-0.40 mm (.008-.016")	0.1 mm (.004")
1978	248	54.0 mm (2.159")	54.5 mm (2.1456")	0.048-0.083 mm (.0019-.0033")	0.132 mm (.0052")	0.15-0.35 mm (.006-.014")	0.1 mm (.004")
1978	294	57.0 mm (2.2441")	57.5 mm (2.2638")	0.050-0.085 mm (.0020-.0033")	0.135 mm (.0053")	0.15-0.35 mm (.006-.014")	0.1 mm (.004")
1978	305	55.5 mm (2.1850")	56.0 mm (2.2047")	0.068-0.104 mm (.0027-.0041")	0.173 mm (.0068")	0.15-0.35 mm (.006-.014")	0.1 mm (.004")
1978	343	59.5 mm (2.3425")	60.0 mm (2.3622")	0.078-0.114 mm (.0031-.0045")	0.198 mm (.0078")	0.15-0.35 mm (.006-.014")	0.1 mm (.004")
1978	345	63.0 mm (2.4803")	63.25 mm (2.4901")	0.048-0.083 mm (.0019-.0033")	0.132 mm (.0052")	0.20-0.40 mm (.008-.016")	N.A.
1978	346	59.5 mm (2.3425")	59.75 mm (2.3524")	0.099-0.134 mm (.0039-.0053")	0.233 mm (.0092")	0.15-0.35 mm (.006-.014")	N.A.
1978	354	59.5 mm (2.3425")	59.75 mm (2.3524")	0.080-0.115 mm (.0032-.0045")	0.195 mm (.0077")	0.15-0.35 mm (.006-.014")	N.A.
1978	402	64.5 mm (2.5394")	65.0 mm (2.5590")	0.068-0.104 mm (.0027-.0041")	0.172 mm (.0068")	0.20-0.40 mm (.008-.016")	0.1 mm (.004")
1978	440	67.5 mm (2.6574")	68.0 mm (2.6771")	0.070-0.105 mm (.0028-.0041")	0.175 mm (.0069")	0.20-0.40 mm (.008-.016")	0.1 mm (.004")
1978	444	69.5 mm (2.7362")	69.75 mm (2.7461")	0.070-0.105 mm (.0028-.0041")	0.175 mm (.0069")	0.20-0.40 mm (.008-.016")	N.A.
1978	640	76.0 mm (2.9921")	76.5 mm (3.0118")	0.068-0.104 mm (.0027-.0041")	0.173 mm (.0068")	0.25-0.45 mm (.010-0.018")	0.1 mm (.004")

N.A.: Non applicable.

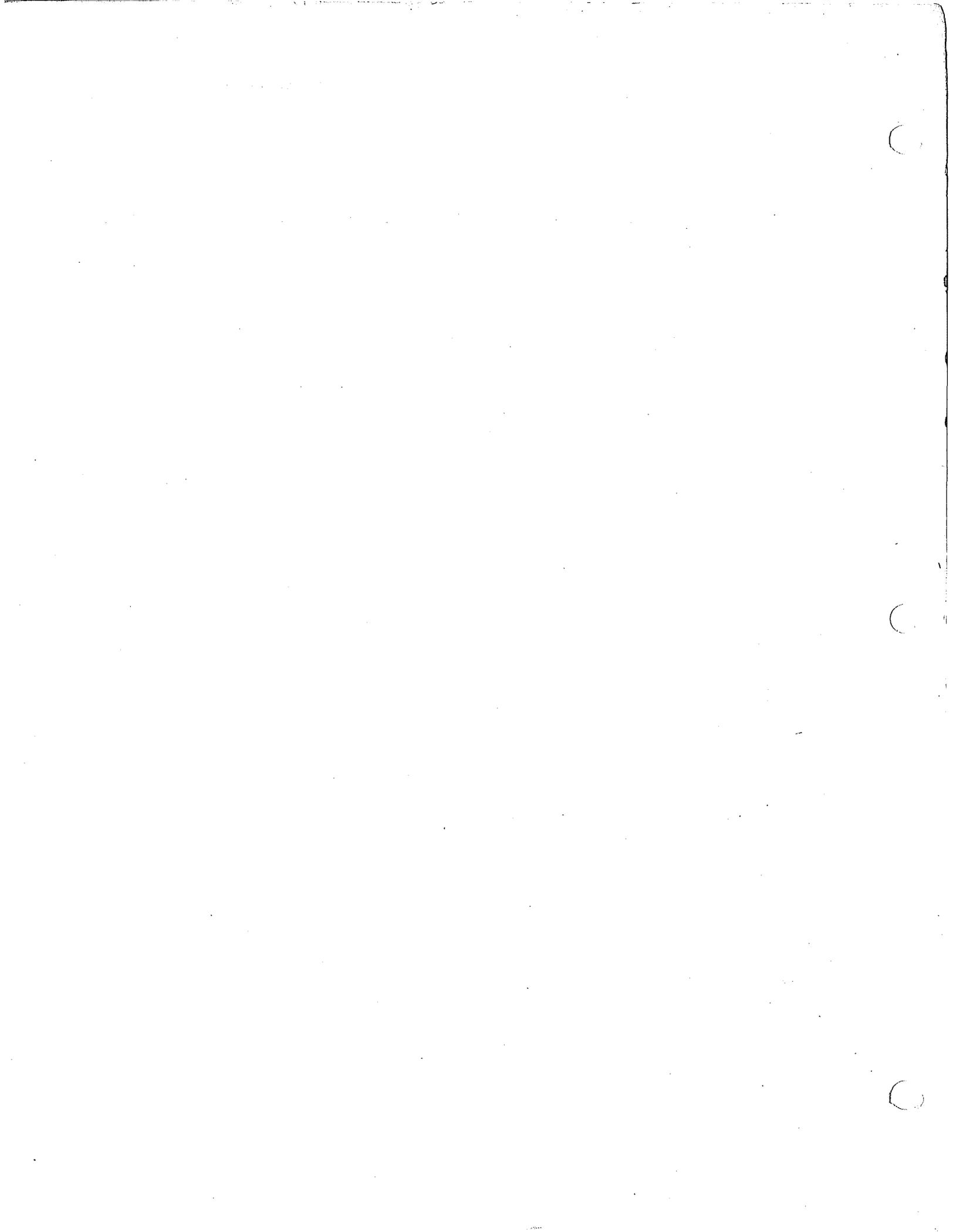


## 1978 IGNITION TIMING SPECIFICATIONS

ENGINE TYPE	IGNITION TYPE	DIRECT MEASUREMENT B.T.D.C. 	INDIRECT MEASUREMENT B.T.D.C. 	EDGE GAP 
247	Breaker points	3.98 mm ± 0.25 (.157" ± .010)	N.A.	6.6 mm ± 1.5 (.260" ± .060)
248	Breaker points	2.22 mm ± 0.25 (.087" ± .010)	2.29 mm ± 0.25 (.090" ± .010)	9.0 mm ± 2.0 (.354" ± .079)
294	Breaker points	2.39 mm ± 0.25 (.094" ± .010)	2.49 mm ± 0.25 (.098" ± .012)	9.0 mm ± 2.0 (.354" ± .079)
305	Breaker points	2.11 mm ± 0.25 (.083" ± .010)	2.46 mm ± 0.25 (.097" ± .010)	6.6 mm ± 1.5 (.260" ± .060)
343	Breaker points	2.11 mm ± 0.25 (.083" ± .010)	2.46 mm ± 0.25 (.097" ± .010)	6.6 mm ± 1.5 (.260" ± .060)
345	CD *	1.12 mm ± 0.25 (.044" ± .010)	N.A.	N.A.
346	Breaker points	2.52 mm ± 0.25 (.100" ± .010)	N.A.	6.6 mm ± 1.5 (.260" ± .060)
354	CD *	1.39 mm ± 0.25 (.055" ± .010)	N.A.	N.A.
402	Breaker points	2.11 mm ± 0.25 (.083" ± .010)	2.46 ± 0.25 (.097" ± .010)	6.6 mm ± 1.5 (.260" ± .060)
440	Breaker points	3.07 mm ± 0.25 (.121" ± .010)	3.30 mm ± 0.25 (.130" ± .010)	6.6 mm ± 1.5 (.260" ± .060)
444	Breaker points	2.35 mm ± 0.25 (.092" ± .010)	N.A.	8.0 mm ± 2.0 (.315" ± .080)
640	Breaker points	3.95 mm ± 0.25 (.156" ± .010)	4.11 mm ± 0.25 (.162" ± .010)	6.6 mm ± 1.5 (.260" ± .060)

N.A.: non applicable

\*Stroboscopic timing at 6000 R.P.M.

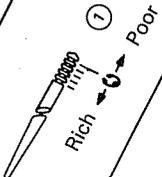
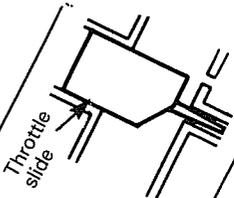


## CARBURETOR SPECIFICATIONS

YEAR	MODEL	ENGINE TYPE	CARBURETOR TYPE	LOW SPEED ADJ. $\pm$ 1/4	IDLE SPEED R.P.M.
1978	ELAN & SPIRIT 250	247	Tillotson HR 173A	1 turn + 1/4 - 0	1500-1800
	ELAN 250 DL	248	Tillotson HR 172A	1 turn + 1/4 - 0	1800-2200
1978	OLYMPIQUE 300T	305	Mikuni VM 30-90	1 1/2 turn	1500-1800
	OLYMPIQUE & NUVIK 340	343	Mikuni VM 30-91	1 1/2 turn	1500-1800
	CITATION 300	294	Mikuni VM 30-94	1 1/2 turn	1800-2200
1978	EVEREST 340	343	Mikuni VM 30-98	1 1/2 turn	1500-1800
	FUTURA 400	402	Mikuni VM 30-92	1 1/2 tour	1500-1800
	EVEREST 440	440	Mikuni VM 34-165	2 turns	1500-1800
	FUTURA 444 LC	444	Mikuni VM 34-150	1 1/2 turn	1500-1800
	FUTURA				
1978	T'NT 340 F/A	346	Mikuni VM 34-118	1 turn	1800-2000
	T'NT 440 F/C	440	Mikuni VM 34-165	2 turns	1500-1800
1978	RV & SONIC 340	345	Mikuni VM 34-135	1 turn	3000-3200
1978	BLIZZARD 6500 Plus	354	Mikuni VM 34-184	1 1/2 turn	2800-3200
1978	ALPINE 640 ER	640	Tillotson HRM-7A	*1 1/8 + 1/4 - 0	1500-1800
1978	ELITE 450 LC	444	Mikuni VM 34-177		

\* High Speed = 1 1/4 turn + 1/4 - 0

# MIKUNI CARBURETOR SPECIFICATIONS

YEAR	CARBURETOR	MAIN JET 	NEEDLE 	NEEDLE JET 	CUTAWAY 	PILOT JET 	AIR SCREW  ② ± 1/4
1978	VM 30-90	260	6DH2-3	159 P-6	1.5	25	1 1/2 turn
1978	VM 30-91	260	6DH2-3	159 Q-0	2.0	25	1 1/2 turn
1978	VM 30-92	220	6DH7-4	159 Q-0	3.5	45	1 1/2 turn
1978	VM 30-94	220	6DH4-3	159 P-2	2.0	30	1 1/2 turn
1978	VM 30-98	250	6F9-3	159 Q-2	3.5	35	1 1/2 turn
1978	VM 34-118	300	6F9-3	159 Q-2	3.5	35	1 turn
1978	VM 34-135	320	6DH2-4	159 P-0	1.5	30	1 turn
1978	VM 34-150	450	6EJ1-4	159 P-4	3.0	45	1 1/2 turn
1978	VM 34-165	320	6F9-3	159 P-6	3.0	35	2 turns
1978	VM 34-177	370	6EJ1-3	159 P-2	2.5	30	1 turn
1978	VM 34-184	240	6F9-2	159 P-4	3.5	50	1 1/2 turn

① Jet needle last digit indicates "E" clip position from top.

Ex.: 6HD2-3: 3rd slot from top

② Turning clockwise will enrich the mixture and counterclockwise will lean it.

## 1978 340 RV AND SONIC MAIN JET APPLICATION CHART

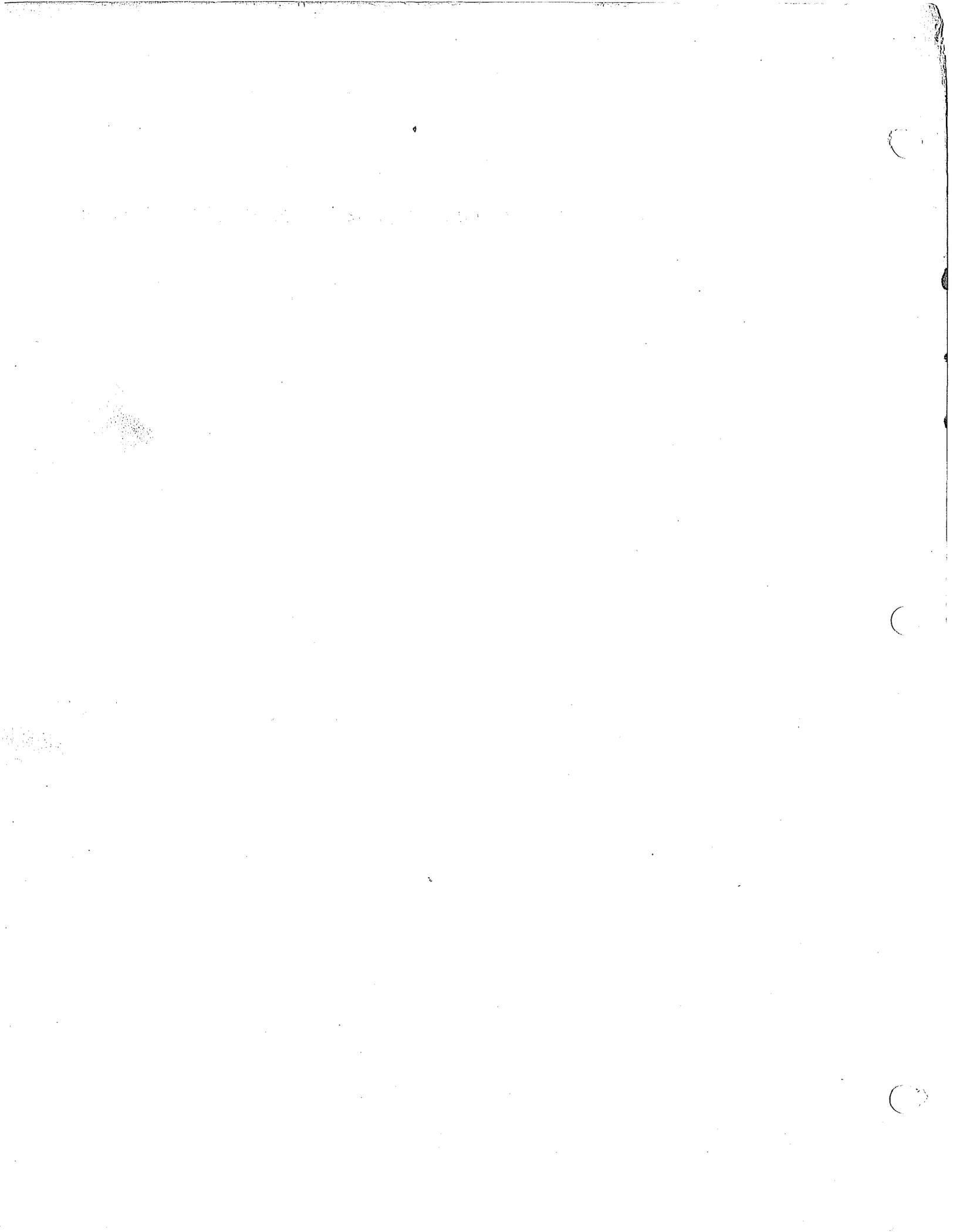
TEMPERATURE °C (°F)	-45°C (-50)	-35°C (-30)	-25°C (-10)	-15°C (10)	0°C (30)	10°C (50)	20°C (70)	30°C (90)
ALTITUDE Meters (feet)								
0 Sea level	350	340	330	320	310	300	280	270
600 m (2,000)	340	330	310	300	290	280	270	260
1,200 m (4,000)	320	310	300	290	270	260	250	240
1,800 m (6,000)	305	290	280	270	260	250	230	220
2,400 m (8,000)	290	280	260	250	240	230	220	210
3,000 m (10,000)	270	260	250	240	220	210	200	190

 CAUTION: These adjustments are guideline only, specific adjustments vary with temperature, altitude, atmospheric pressure and humidity. Always observe spark plug condition for proper jetting.

## 1978 BLIZZARD 6500 PLUS MAIN JET APPLICATION CHART

TEMPERATURE °C (°F)	-45°C (-50)	-35°C (-30)	-25°C (-10)	-15°C (10)	0°C (30)	10°C (50)	20°C (70)	30°C (90)
ALTITUDE Meters (feet)								
0 Sea level	270	260	250	240	230	220	210	200
600 m (2,000)	250	240	230	230	220	210	200	190
1,200 m (4,000)	240	230	220	210	200	200	190	180
1,800 m (6,000)	230	220	210	200	190	180	170	160
2,400 m (8,000)	220	210	200	190	180	170	160	150
3,000 m (10,000)	210	200	190	180	170	160	150	140

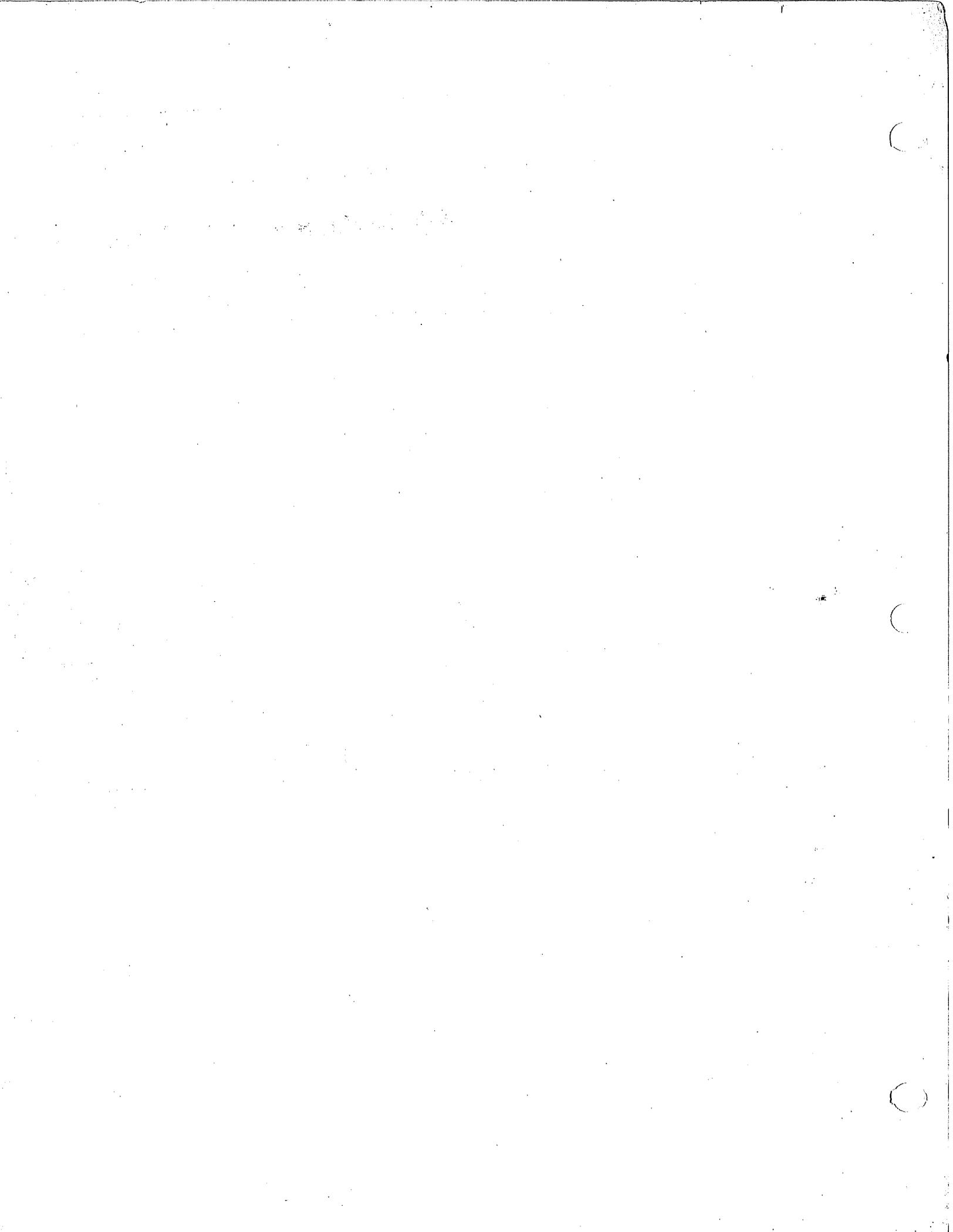
 CAUTION: These adjustments are guideline only, specific adjustments vary with temperature, altitude, atmospheric pressure and humidity. Always observe spark plug condition for proper jetting.



## 1978 BOSCH SPARK PLUG CHART

		ENGINE TYPE	FULL LOAD	PARTIAL LOAD
ELAN & SPIRIT	250	247	M175T1	M175T1
ELAN	250 DL	248	W240T1	W240T1
OLYMPIQUE	300T	305	W280MZ1	W260MZ1
OLYMPIQUE & NUVIK	340	343	W280MZ1	W260MZ1
CITATION	300	294	W280MZ1	W260MZ1
EVEREST	340	343	W280MZ1	W260MZ1
FUTURA	400	402	W280MZ1	W260MZ1
EVEREST	440	440	M260T1	M260T1
FUTURA				
EVEREST	444 LC	444	W280MZ2*	W280MZ2*
FUTURA				
T'NT	340 F/A	346	W260MZ2	W260MZ2
T'NT	440 F/C	440	M260T1	M260T1
RV & SONIC	340	345	W280MZ2	W280MZ2
BLIZZARD	6500 Plus	354	W340S2S	W340S2S
ALPINE	640 ER	640	M240T1	M240T1
ELITE	450 LC	444	W260MZ2	W260MZ2

\*With 2 gaskets.

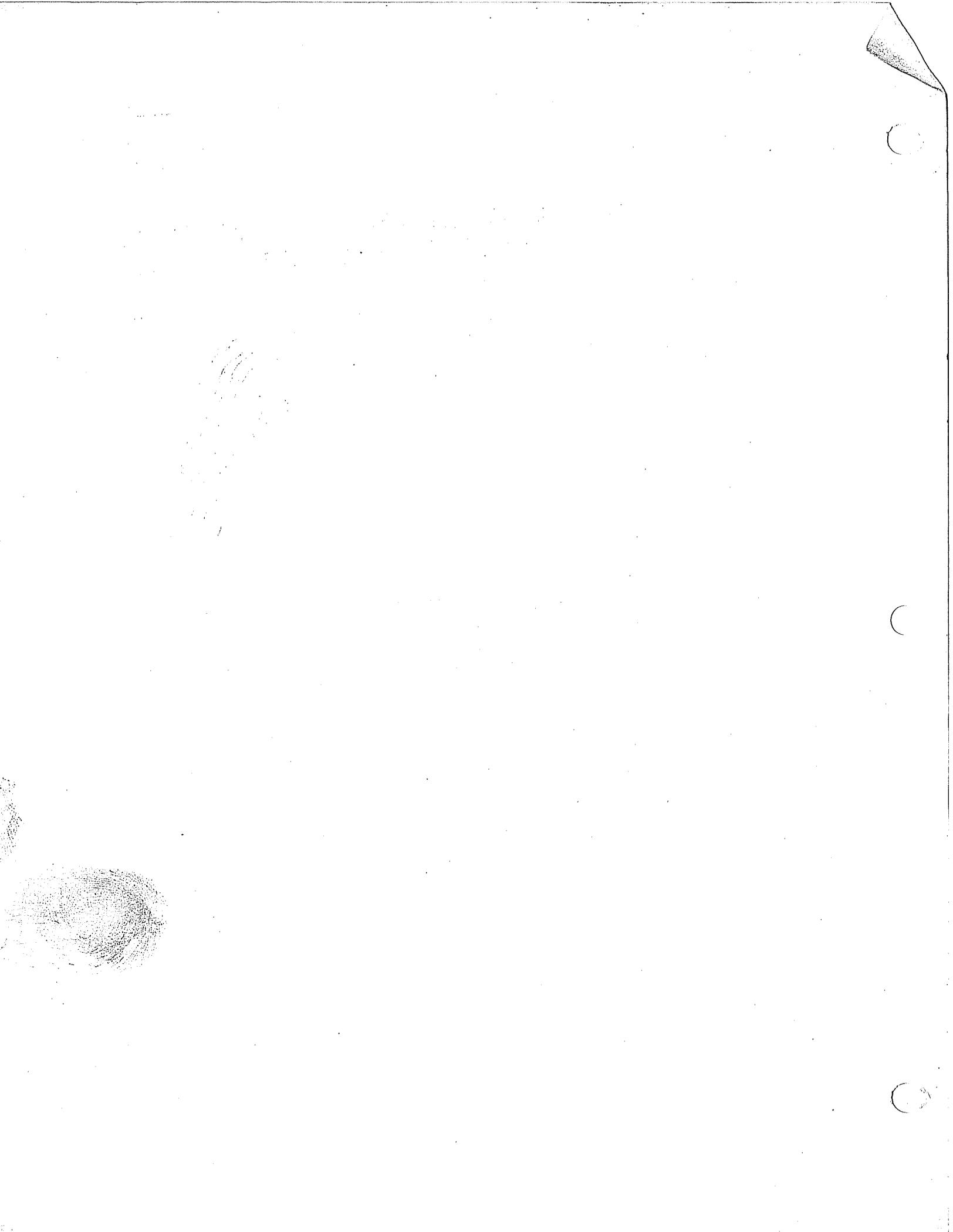


## IGNITION GENERATING COIL, TRIGGER COIL AND LIGHTING COIL RESISTANCE CHART

1978 MODELS	ENGINE	IGNITION GENERATING COIL	TRIGGER COIL	LIGHTING COIL	BRAKE LIGHT COIL
ELAN & SPIRIT 250	247	3.4	---	0.45	1.85
ELAN 250 Deluxe	248	1.15	---	0.45	1.90
CITATION 300	294	1.15	---	0.45	1.90
OLYMPIQUE 300T	305	3.3	---	0.23	---
OLYMPIQUE & NUVIK 340	343	3.3	---	0.23	---
EVEREST 340	343	3.3	---	0.23	---
FUTURA 400	402	3.3	---	0.23	---
EVEREST & FUTURA 440	440	3.3	---	0.23	---
EVEREST & FUTURA 444 LC	444	3.3	---	0.23	2.15 ①
T'NT 340 F/A	346	3.3	---	0.23	---
T'NT 440 F/C	440	3.3	---	0.23	---
RV & SONIC 340	345	340-370	55-60	0.23	2.15 ①
BLIZZARD 6500 Plus	354	440-480	220-230	0.17	---
ALPINE 640 ER	640	3.3	---	0.23	2.15 ①
ELITE 450 LC	444	3.3	---	0.23	---

All values are given in ohms, with a tolerance of  $\pm 20\%$ , at a temperature of 20°C (70°F).

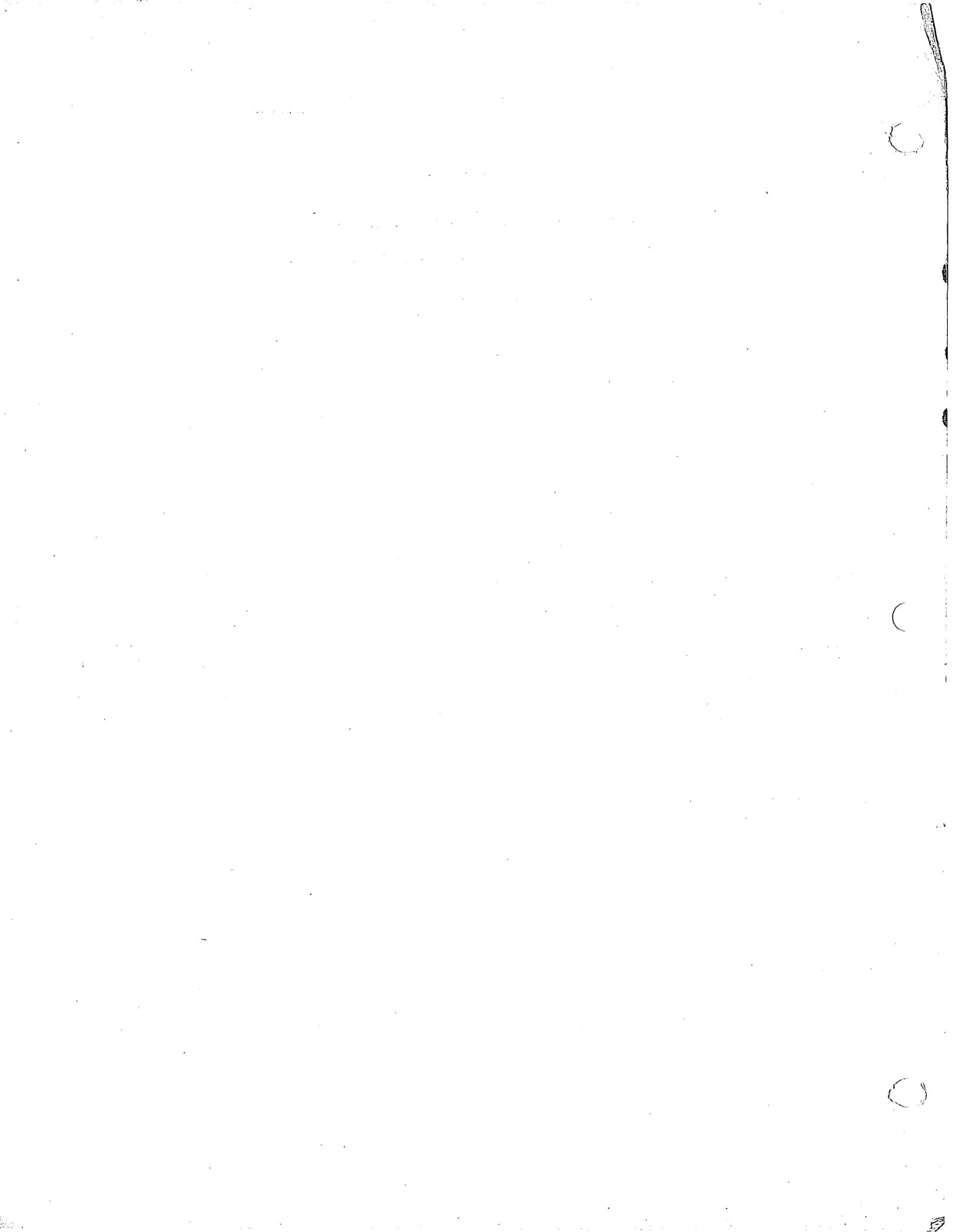
① Additional lighting coil 30W.



## BOMBARDIER IGNITION TESTER ADJUSTMENTS FOR 1978 COMPONENTS

1978 Models	Engine	Ignition coil	Electronic box	Generating coil	Trigger coil	Lighting coil	Brake light coil
ELAN & SPIRIT	250	247	LOW*	----	HIGH 75	----	LOW 85
ELAN	250De Luxe	248	LOW*	----	HIGH 75	----	LOW 80
CITATION		294	LOW*	----	HIGH 75	----	LOW 80
OLYMPIQUE	300T	305	LOW*	----	HIGH 80	----	LOW 85
OLYMPIQUE & NUVIK	340	343	LOW*	----	HIGH 80	----	LOW 85
EVEREST	340	343	LOW*	----	HIGH 80	----	LOW 85
FUTURA	400	402	LOW*	----	HIGH 80	----	LOW 85
EVEREST & FUTURA	440	440	LOW*	----	HIGH 80	----	LOW 85
EVEREST & FUTURA	444 LC	444	LOW*	----	HIGH 80	----	LOW 85
T'NT	340 F/A	346	LOW*	----	HIGH 80	----	LOW 85
T'NT	440 F/C	440	LOW*	----	HIGH 80	----	LOW 85
RV & SONIC	340	345	----	LOW*	HIGH 55	LOW 65	LOW 85
BLIZZARD	6500 Plus	354	----	LOW*	HIGH 55	LOW 45	LOW 70
ALPINE	640 ER	640	LOW*	----	HIGH 80	----	LOW 85
ELITE	450 LC	444	LOW*	----	HIGH 80	----	LOW 85

\*Refer to section 05-03 "Bombardier ignition tester."



## WARRANTY

### LIMITED WARRANTY SKI-DOO® SNOWMOBILES

BOMBARDIER Limited as manufacturer, warrants FROM THE DATE OF FIRST CONSUMER SALE, every Ski-Doo® snowmobile, sold AFTER MAY 1ST, 1977, as NEW AND UNUSED, by an authorized SKI-DOO dealer, subject to the following limitations and conditions, for a period of:

- two (2) seasons maximum for models:  
1976-77-78 Elan®, Olympique\*, T'NT® F/A-F/C, Everest®, Elite® ,
- Warranty STARTS on DECEMBER 1ST of the year of sale if sold between APRIL 30TH and before DECEMBER 1ST of the same year, or from the date of sale if sold between DECEMBER 1ST of one year and APRIL 30TH of the following year.
- The warranty period ENDS the SECOND APRIL 30TH following the date warranty coverage started.
- Ninety (90) consecutive days for models:  
1976-77-78 RV\*, Blizzard® 6500, Alpine®

Subject to the following:

1. When a sale is made after MARCH 31ST of a given year but before THE 1ST DAY OF DECEMBER of the same year, the warranty will start on DECEMBER 1ST following the date of sale.
2. When a sale is made on/or after JANUARY 2ND of a given year, the unused portion of the 90 days warranty as of MARCH 31ST, of that year will be carried over to the next season, beginning the 1ST DAY OF DECEMBER.

Any models not listed above are covered by the original manufacturer warranty (if any) in effect at the time of manufacturing.

### WHAT WE 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 or labour at any authorized SKI-DOO dealer during the specified period.

### EXCLUSION

#### Items and components:

Any expendable items and/or components that are damaged or worn due to normal use or lack of proper maintenance, are excluded from this warranty.

Bombardier under this warranty, will not remedy or pay for the following:

- Damage resulting from installation of parts other than genuine BOMBARDIER parts.
- Damage caused by failure to provide proper maintenance as detailed in the Operator Manual supplied with each SKI-DOO snowmobile. The labour, parts and lubricants cost of all maintenance services, including tune-ups and adjustments will be charged to the owner.
- Damage resulting from improper servicing or adjustment of the drive pulley assembly. The drive pulley assembly is factory sealed, and can only be serviced by an authorized SKI-DOO dealer.
- Damage resulting from operation of the snowmobile on surfaces other than snow.
- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- Damage resulting from modification to the snowmobile not approved in writing by BOMBARDIER.
- Losses incurred by the snowmobile owner other than parts and labour, such as, but not limited to, transportation, towing, telephone calls, taxis, or any incidental or consequential damages.

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

### CONDITION TO HAVE WARRANTY WORK PERFORMED

Present, to the servicing dealer, the hard copy of the SKI-DOO Customer Registration card given by the selling dealer at time of purchase.

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## SECTION 09 (WARRANTY)

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### 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.

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 do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

Neither the distributor, the selling dealer, nor 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.

### CONSUMER ASSISTANCE

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

1. Try to resolve the problem at the dealership with the Service Manager or Owner.
2. If this fails, contact your area distributor listed in the operator manual.
3. Then if your grievance still remains unsolved, you may write to us:

Bombardier Limited  
Customer Relations Department  
Recreational Product Group  
Valcourt, Québec, Canada, JOE 2L0

Bombardier Limited 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.

MARCH 1977

BOMBARDIER LIMITED  
Valcourt, Québec, Canada, JOE 2L0

\*Trademark of Bombardier Limited  
® Registered Trademark of Bombardier Limited

## LIMITED WARRANTY MOTO-SKI® SNOWMOBILES

BOMBARDIER Limited as manufacturer, warrants FROM THE DATE OF FIRST CONSUMER SALE, every Moto-Ski® snowmobile, sold AFTER MAY 1ST, 1977, as NEW AND UNUSED, by an authorized MOTO-SKI dealer, subject to the following limitations and conditions, for a period of:

- two (2) seasons maximum for models:  
1976-77-78 Spirit\*, Nuvik\*, Futura®
- Warranty STARTS on DECEMBER 1ST of the year of sale if sold between APRIL 30TH and before DECEMBER 1ST of the same year, or from the date of sale if sold between DECEMBER 1ST of one year and APRIL 30TH of the following year.
- The warranty period ENDS the SECOND APRIL 30TH following the date warranty coverage started.
- Ninety (90) consecutive days for models:  
1976-77-78 Sonic\*.

Subject to the following:

1. When a sale is made after MARCH 31ST of a given year but before THE 1ST DAY OF DECEMBER of the same year, the warranty will start on DECEMBER 1ST following the date of sale.
2. When a sale is made on/or after JANUARY 2ND of a given year, the unused portion of the 90 days warranty as of MARCH 31ST, of that year will be carried over to the next season, beginning the 1ST DAY OF DECEMBER.

Any models not listed above are covered by the original manufacturer warranty (if any) in effect at the time of manufacturing.

### WHAT WE 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 or labour at any authorized MOTO-SKI dealer during the specified period.

## EXCLUSIONS

### Items and components:

Any expendable items and/or components that are damaged or worn due to normal use or lack of proper maintenance, are excluded from this warranty.

Bombardier under this warranty, will not remedy or pay for the following:

- Damage resulting from installation of parts other than genuine BOMBARDIER parts.
- Damage caused by failure to provide proper maintenance as detailed in the Operator Manual supplied with each new MOTO-SKI snowmobile. The labour, parts and lubricants cost of all maintenance services, including tune-ups and adjustments will be charged to the owner.
- Damage resulting from improper servicing or adjustment of the drive pulley assembly. The drive pulley assembly is factory sealed, and can only be serviced by an authorized MOTO-SKI dealer.
- Damage resulting from operation of the snowmobile on surfaces other than snow.
- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- Damage resulting from modification to the snowmobile not approved in writing by BOMBARDIER.
- Losses incurred by the snowmobile owner other than parts and labour, such as, but not limited to, transportation, towing, telephone calls, taxis, or any incidental or consequential damages.

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

### CONDITION TO HAVE WARRANTY WORK PERFORMED

Present, to the servicing dealer, the hard copy of the MOTO-SKI Customer Registration card given by the selling dealer at time of purchase.

