



# ATV SERVICE MANUAL

## Foreword

This manual is designed primarily for use by ATV service technicians in a properly equipped shop. Since a certain knowledge of mechanical theory, tool use, and shop procedures are necessary to perform the servicing work safely, all operations should be carried out only by qualified service personnel. In order to perform the work efficiently and prevent costly errors, the technician should read the text, thoroughly familiarizing himself with procedures before starting the work. Cleanliness of both the component to be repaired and the work area is of major importance.

The following special notations are used throughout this manual to identify instructions or procedures which are safety related or require special attention.

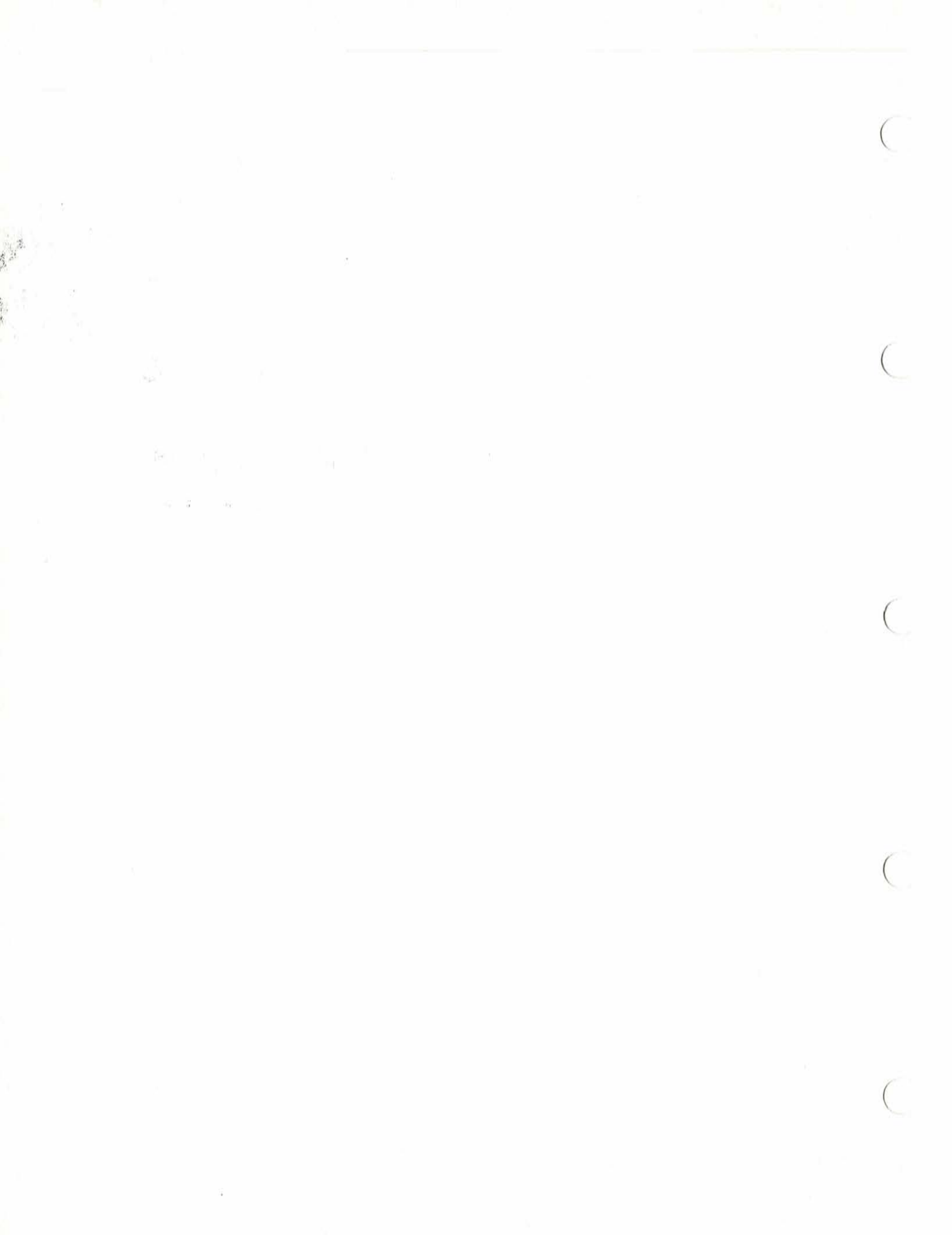
 **THIS SYMBOL IS USED TO IDENTIFY SPECIAL INSTRUCTIONS OR SAFETY PROCEDURES**

**"NOTE:" INDICATES SPECIAL POINTS OF PARTICULAR INTEREST**

This manual is organized by component section number and contains an exploded parts drawing for which service procedures are explained within each section. In addition, general service tips and diagnostic procedures along with any special or uncommon service tools needed are also noted at the beginning of each section.



Technical Training Center  
Roseau, MN 56751



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# General Information

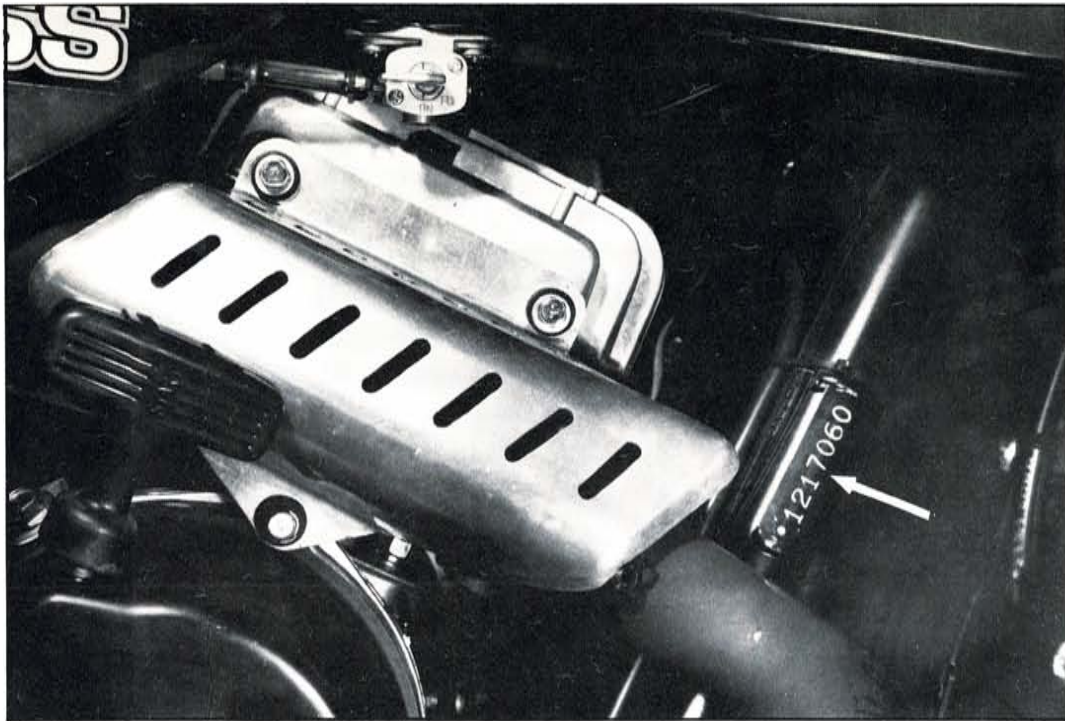
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Model Identification 1-1

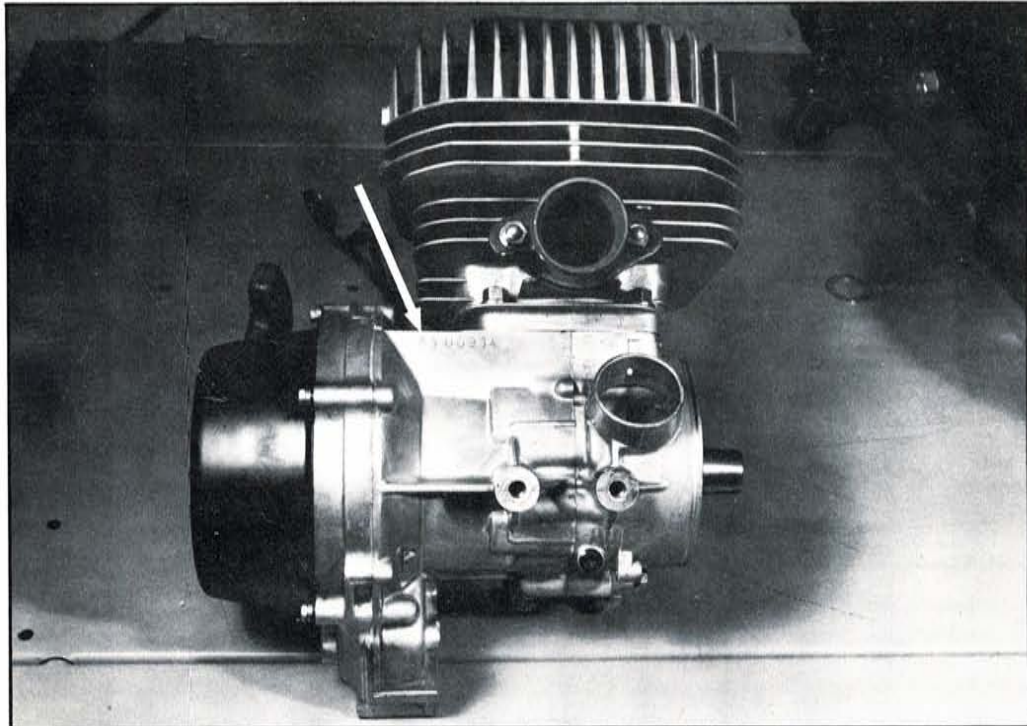
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**1**



FRAME SERIAL NUMBER (VIN)



ENGINE SERIAL NUMBER

## SPECIFICATIONS

<u>Specification</u>	<u>Scrambler</u>	<u>Trail Boss</u>
Height	42"	42"
Width	43"	43"
Length	74"	74"
Wheel Base	48"	48"
Seat Height	33-1/2"	33-1/2"
Foot Pad Height	9-1/2"	9-1/2"
Ground Clearance	5-3/4"	5-3/4"
Weight	380	440
Front Suspension/Travel	Fork/5.1"	Strut/6-1/4"
Rear Suspension/Travel	Coil Over Shock/6"	Coil Over Shock/6"
Front Fork Oil	5 oz. 10 Wt.	Sealed
Castor/Camber		-0" TO +1/4"/+1-1/4° to 2°
Front Tire - PSI	22x11.00x8 - 3PSI	22x8.00x10 - 3PSI
Rear Tire - PSI	22x11.00x10 - 4PSI	22x11.00x10 - 4PSI
Front Brake	Drum	Drum
Rear Brake	Disc	Disc
Park Brake	Standard	Standard
Air Filter	Paper Element	Paper Element
Fuel Capacity	3 Gallons	4 Gallons
Oil Capacity	2 Quarts	2 Quarts
Headlight	12V - 45/45 W	12V - 45/45 W
Taillight	12V - 5W	12V - 5W
Exhaust	Tuned USDA Approved	Tuned USDA Approved
Front Rack	Standard	Standard
Rear Rack	Standard	Standard
Hitch	Standard	Standard
Tool Kit	Standard	Standard
Foot Rest	Platform	Platform
Transmission Gear Box	Forward - Neutral - Reverse 18-52 Sprockets Silent Chain 15L-60 Pitch Forward Ratio 2.88 : 1 Reverse Ratio 2.5 : 1	
PVT Convertor	Ratios - 3.8 Low to 1.32 High Sheave Diameter 7-1/2" primary - 9-1/2" secondary Belt width 1-3/16" OC 40.87" Part No. 3211048 10" Center Distance 1/2" Offset Shift Weight - 43 grams Part No. 5630279 Spring - Blue/Green - .177 inch wire 2.53 in. Free Length Part No. 7041157	
Final Drive	13-42 Sprockets 3.2 : 1 Ratio No. 520 Chain 5/8 - 74 Pitch	

Specification

Scrambler

Trail Boss

Engine

Bore Stroke - 72 x 60mm - 22 Hp @ 6000 RPM  
 Displacement 244cc Single cylinder, two cycle  
 Lubrication - Oil Injection  
 Cooling - Free Air  
 Starting - 12 volt electric with manual recoil  
 Ignition - CDI  
 Ignition Timing - 23.5° @ 3000 - 18° @ 6000  
 Spark Plug - RN-4YC  
 Piston Ring - 2 Keystone 1.5 mm U/S  
 End Gap .008" - .016"  
 Alternator - 100 Watt  
 Fuel 88 R +  $\frac{M}{2}$  Octane (Min.) leaded or unleaded

Carburetion

VM30SS  
 Main Jet - 155 Hex  
 Pilot Jet 30  
 Jet Needle - 5DP7-3  
 Needle Jet - O-6 (169)  
 Throttle Valve C.A. - 2.5  
 Air Screw - 1



Heavy loads can cause braking and control problems.

Total Load Capacity	Front Rack Maximum	Rear Rack Maximum
Trail Boss 400 Lbs.	75 Lbs.	125 Lbs.
Scrambler 330 Lbs.	25 Lbs.	125 Lbs.

Always distribute the rack loads placing one third on the front rack and two thirds on the rear.

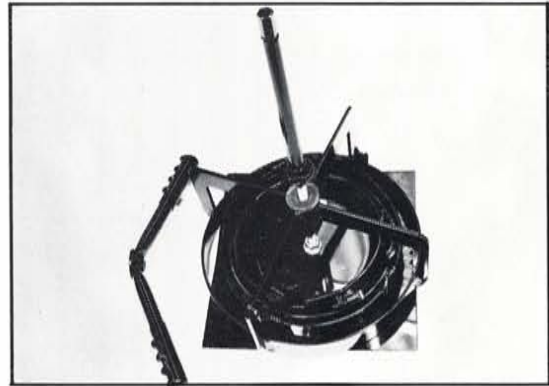


TOOL

PN 2870659 – Fluke 73 Analog/Digital Multitester  
Tests all electrical circuits and components



PN 2870665 – Bead Breaker  
Fits 8"-9"-10" rim with manual or impact adapter



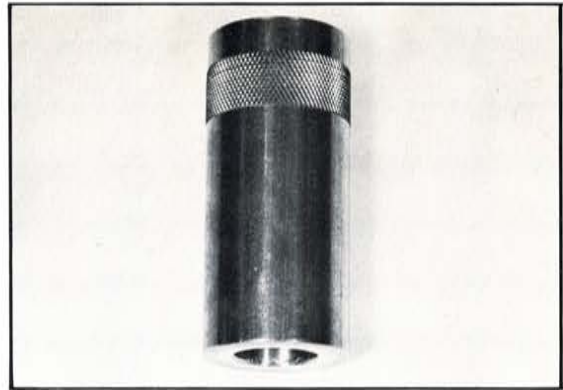
PN 2870674 – Transmission Overhaul Fixture  
Holder for transmission reassembly



PN 2870464 – Transmission Lubricant  
and  
PN 2870465 -- Oil Pump  
Lubricant for transmission gearcase



PN 2870676 – Transmission Seal/Bearing Driver  
For installing bearings and case seals during transmission gearcase overhaul



PN 2870587 – 515 Gasket Eliminator  
Used to seal case mating halves on engine crankcase and transmission gearcase



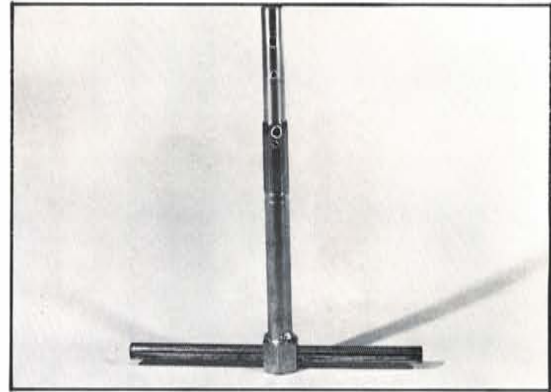
PN 2870660 – Black Max Adhesive  
Sealer between engine and rubber clutch seal



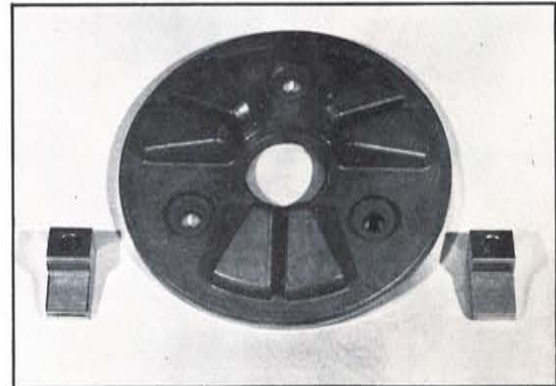
PN 2870661 – R.V. Adhesive Sealant  
Sealer between rubber clutch seal and inner clutch cover



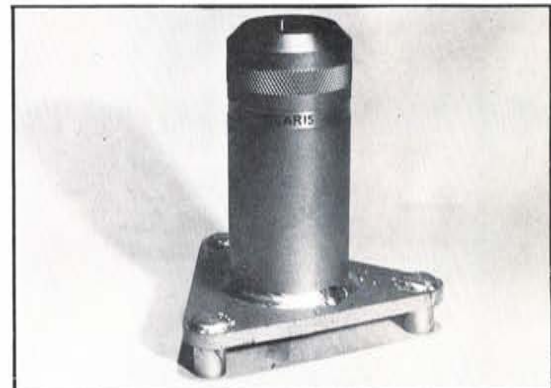
PN 2870506 – T Handle Drive Clutch Puller



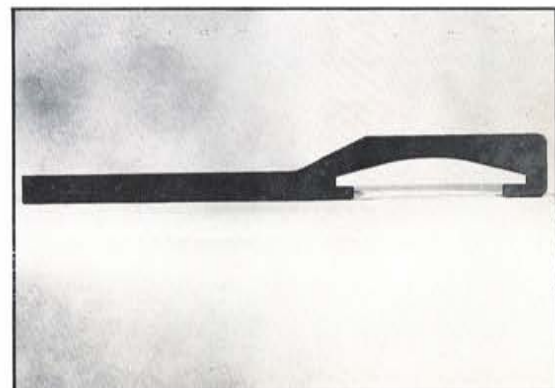
PN 2870547 – Drive Clutch Holding Fixture  
Used for disassembly and reassembly of the drive clutch



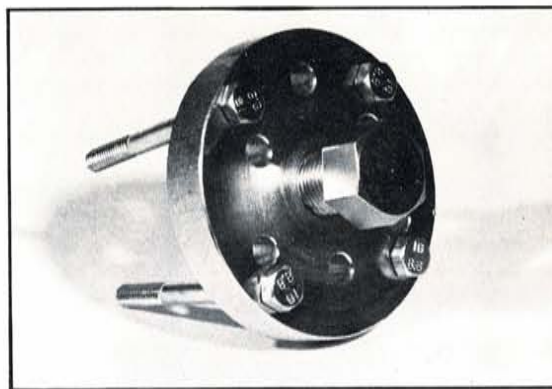
PN 2870341 – Drive Clutch Spider Tightening Tool  
For removal and retorquing the clutch spider



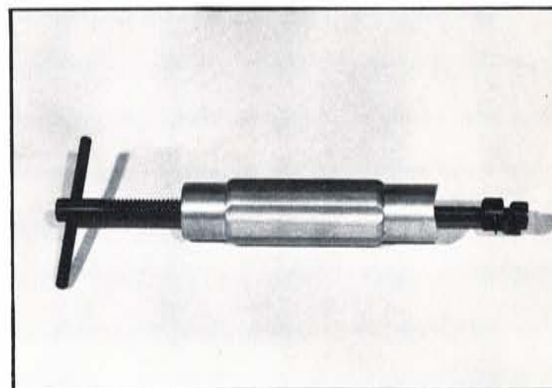
PN 2870654 – Converter Offset Tool  
Establishes the correct 1/2" offset converter alignment



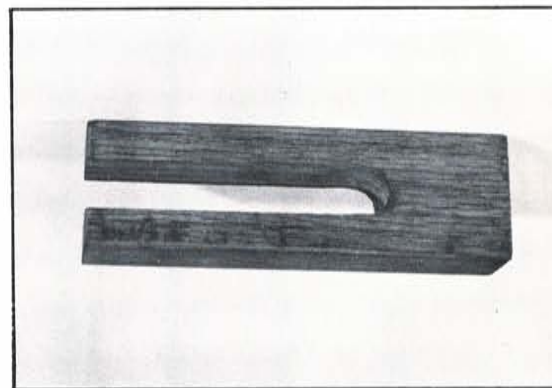
PN 2870159 – Flywheel Puller



PN 2870386 – Piston Pin Puller  
For removing tight wrist pins



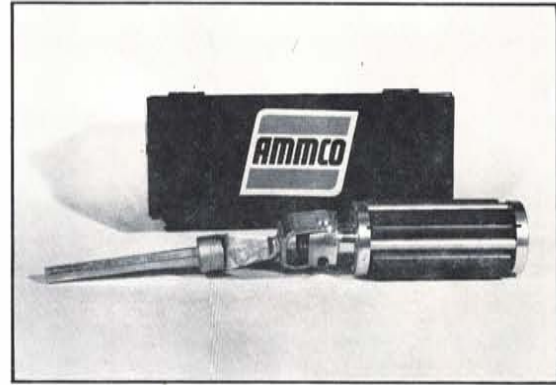
PN 2870390 – Piston Support Block  
Supports piston and prevents piston skirt damage  
during cylinder installation



PN 2870630 – Strobe Timing Light  
High intensity strobe, works on all types of ignition  
systems (self contained)



PN 2870303 – Cylinder Hone Ammco Model 3950  
Rigid cylinder hone for deglazing and truing heat distorted cylinders



Replacement Ammco Hone Sets

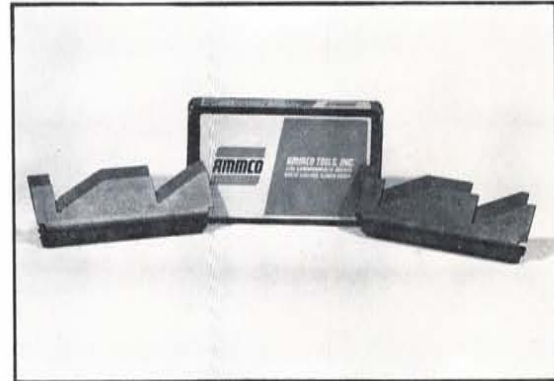
Cylinder Hone Fine Stone Set Std. (Ammco No. 3952) PN 2870305

Cylinder Hone Coarse Stone Set Std. (Ammco No. 3951) PN 2870304

Cylinder Hone Fine Stone Set O.S. (Ammco No. 3954) PN 2870307

Cylinder Hone Coarse Stone Set O.S. (Ammco No. 3953) PN 2870306

O.S. Stone Sets range from 2 1/2" – 3 3/8"

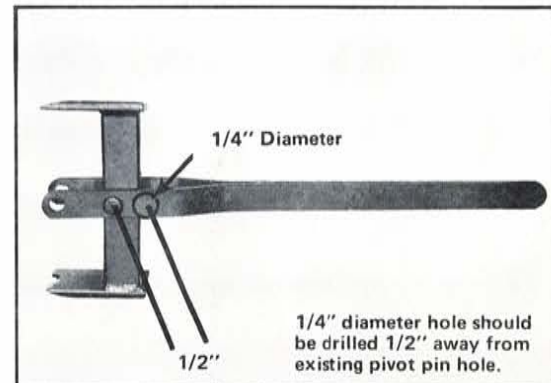


PN 2870588 – Honing Oil

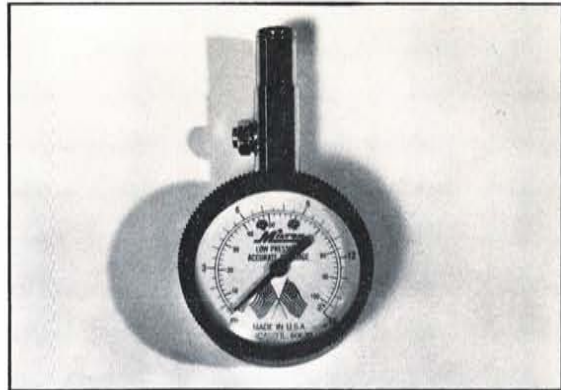
Improves hone operation and prevents stone loading



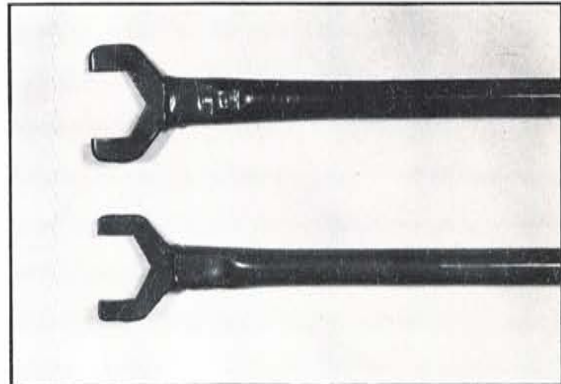
PN 2870623 – Shock Absorber Spring Compression Tool



PN 2870658 – Precision Air Gauge for accurate low pressure readings



Uncommon rear axle nut wrenches  
1 3/4" tool for rear axle service



#### RECOMMENDED SHOP SUPPLIES/ACCESSORIES

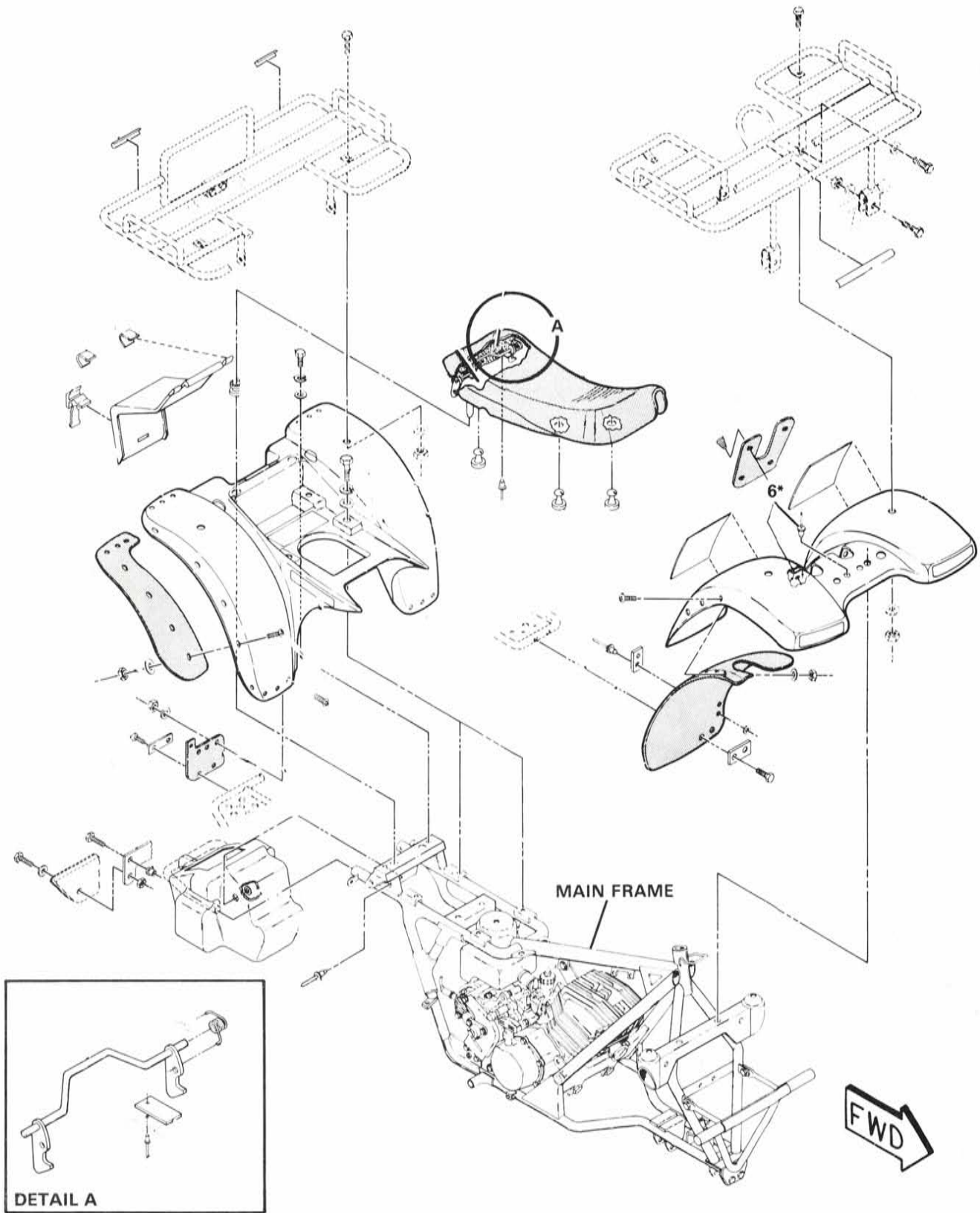
<u>Description</u>	<u>Part Number</u>
Flywheel Puller Bolts	3080706
Chaincase Oil – 1 Gallon	2870464
Chaincase Oil Pump	2870465
Ammco 3880 Honing Oil	2870588
Low Temp Grease – 14 1/2 oz. Cartridge	2870577
Loctite 515 Gasket Eliminator	2870587
Loctite Chisel Gasket Remover	2870601
Loctite RC 680 – 10cc Retaining Compound	2870584
Loctite Black Max – 1 oz. Bottle	2870660
R.V. Silicone	2870661

# Body and Frame

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Gas & Oil Tank Removal	2-2
Exploded View Scrambler	2-3
Gas & Oil Tank Removal	2-4

TRAIL BOSS



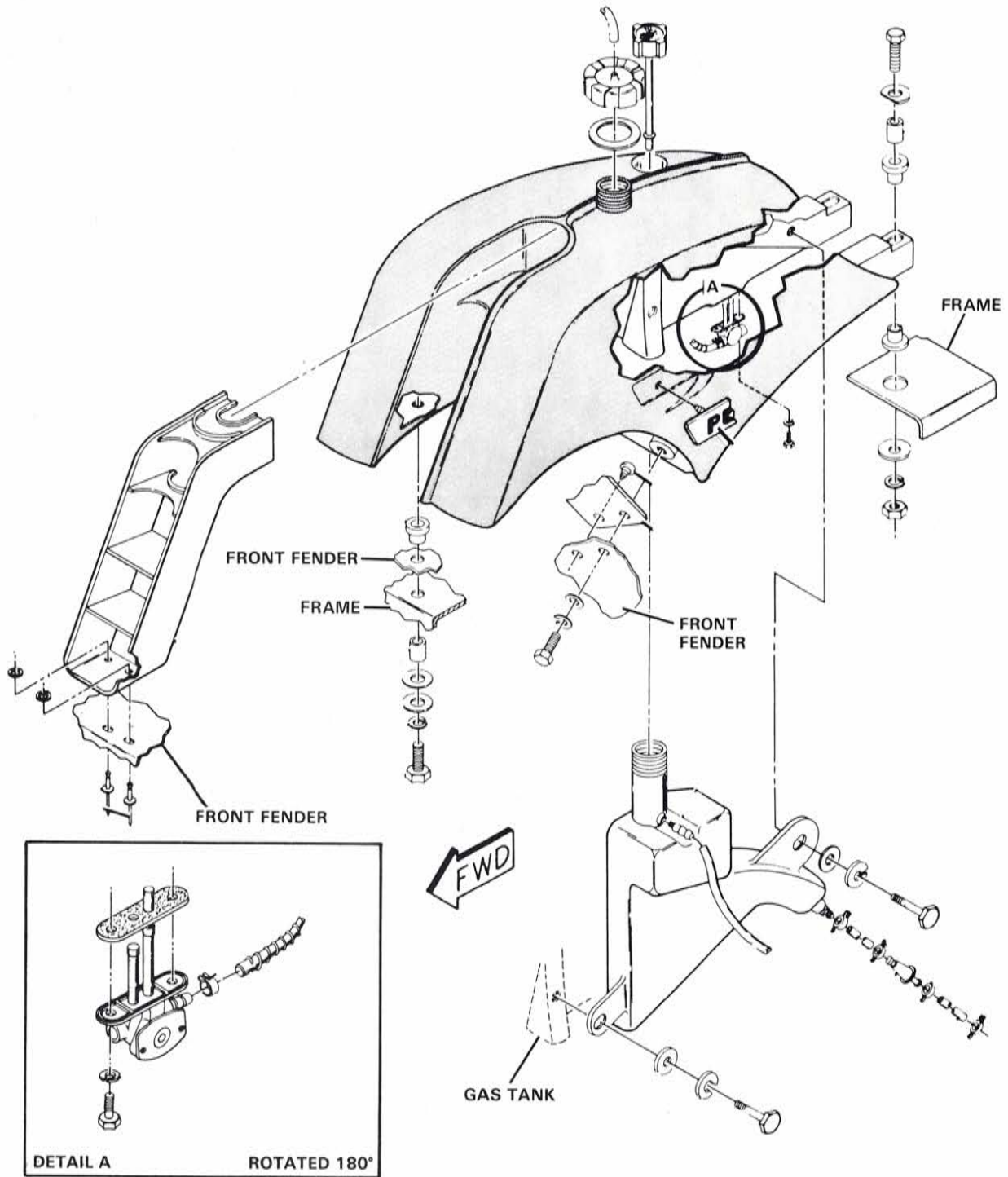


### TRAIL BOSS

When removing the fuel tank, turn the tank valve to the "off" position. The front fuel tank retaining nuts are molded into the fuel tank body.

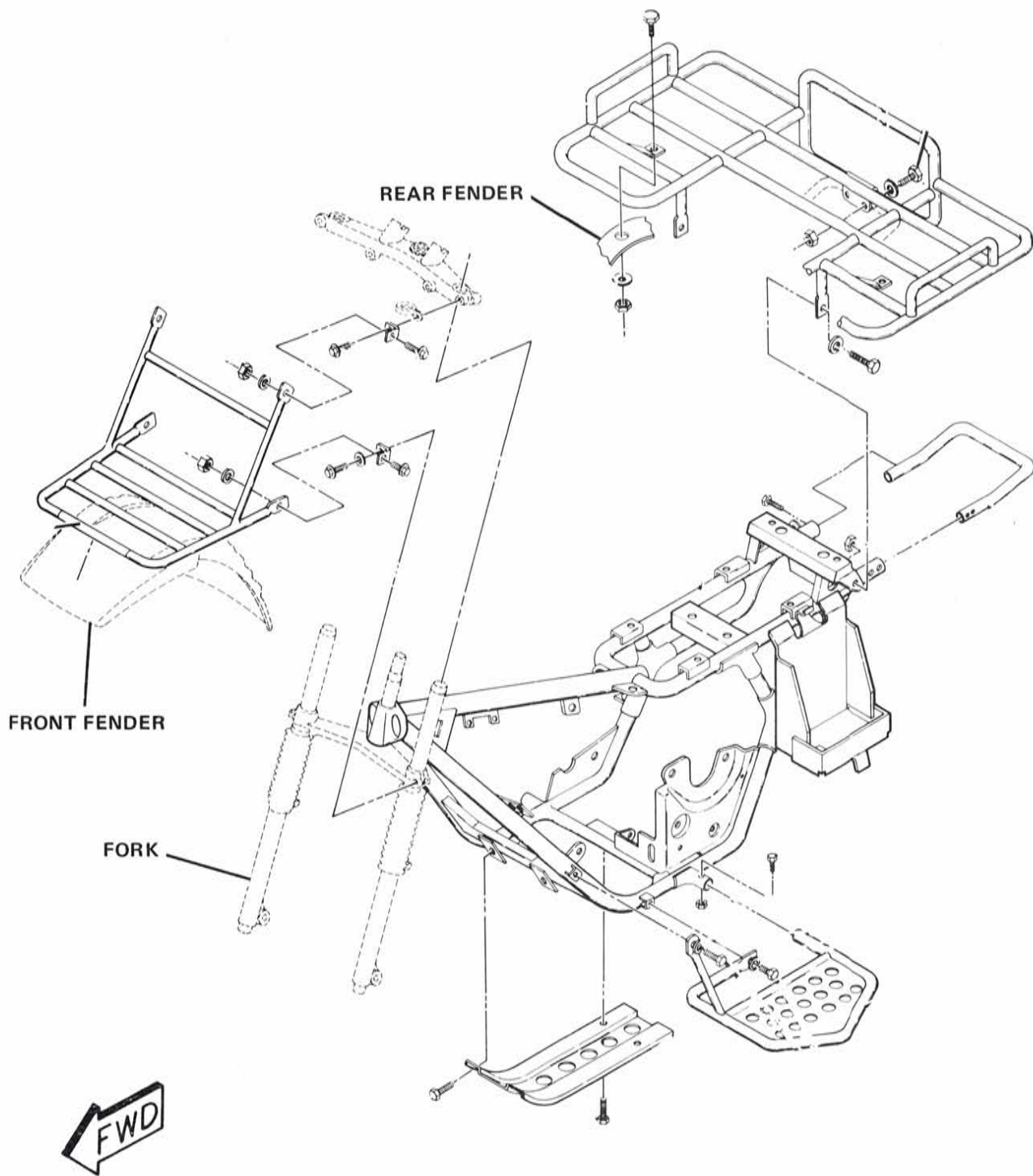
**⚠** Do not overtighten the front mounting bolts as the retaining nut can turn in the molding.

The oil tank is mounted to the fuel tank and must be drained or the main line plugged prior to removal.



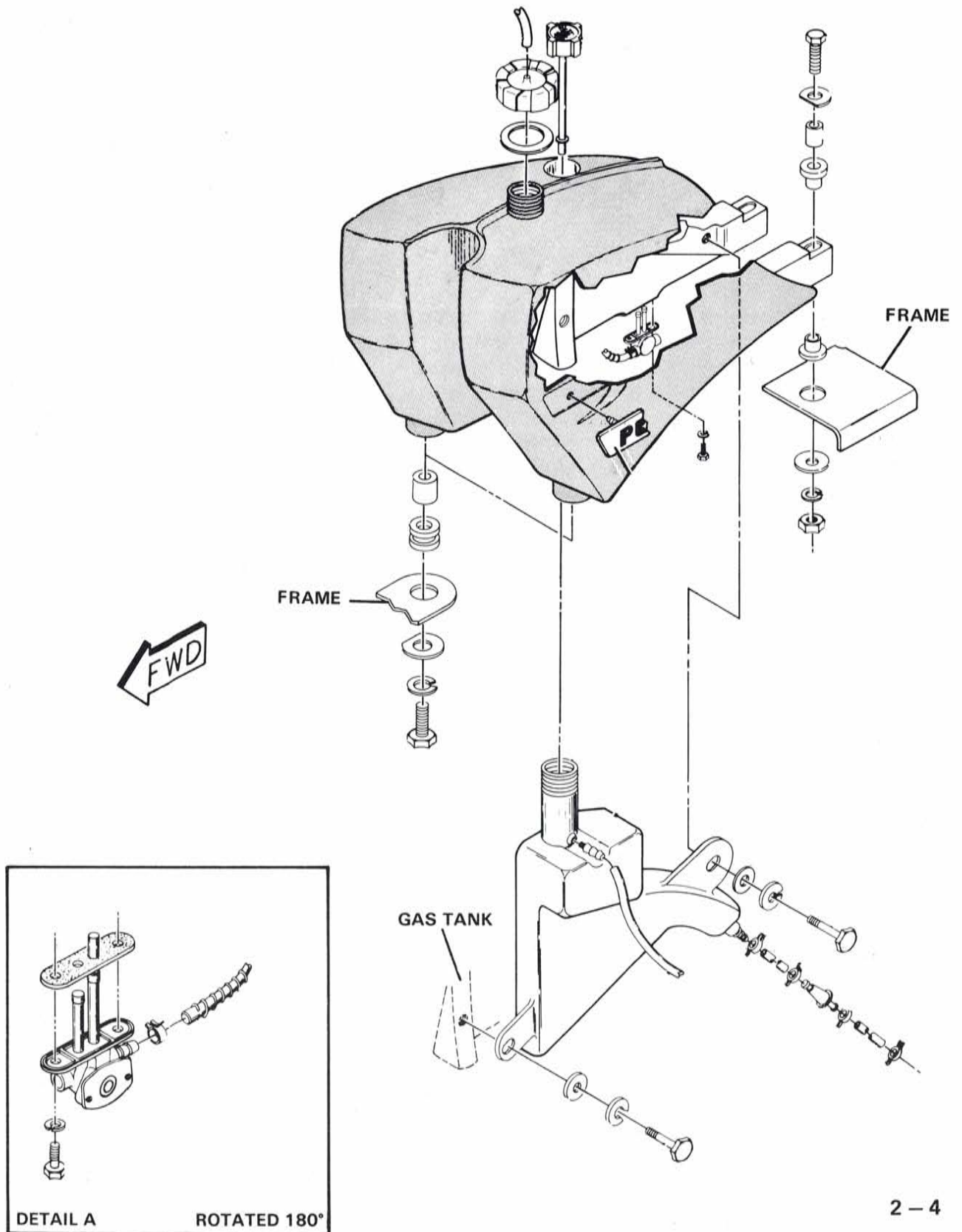
SCRAMBLER

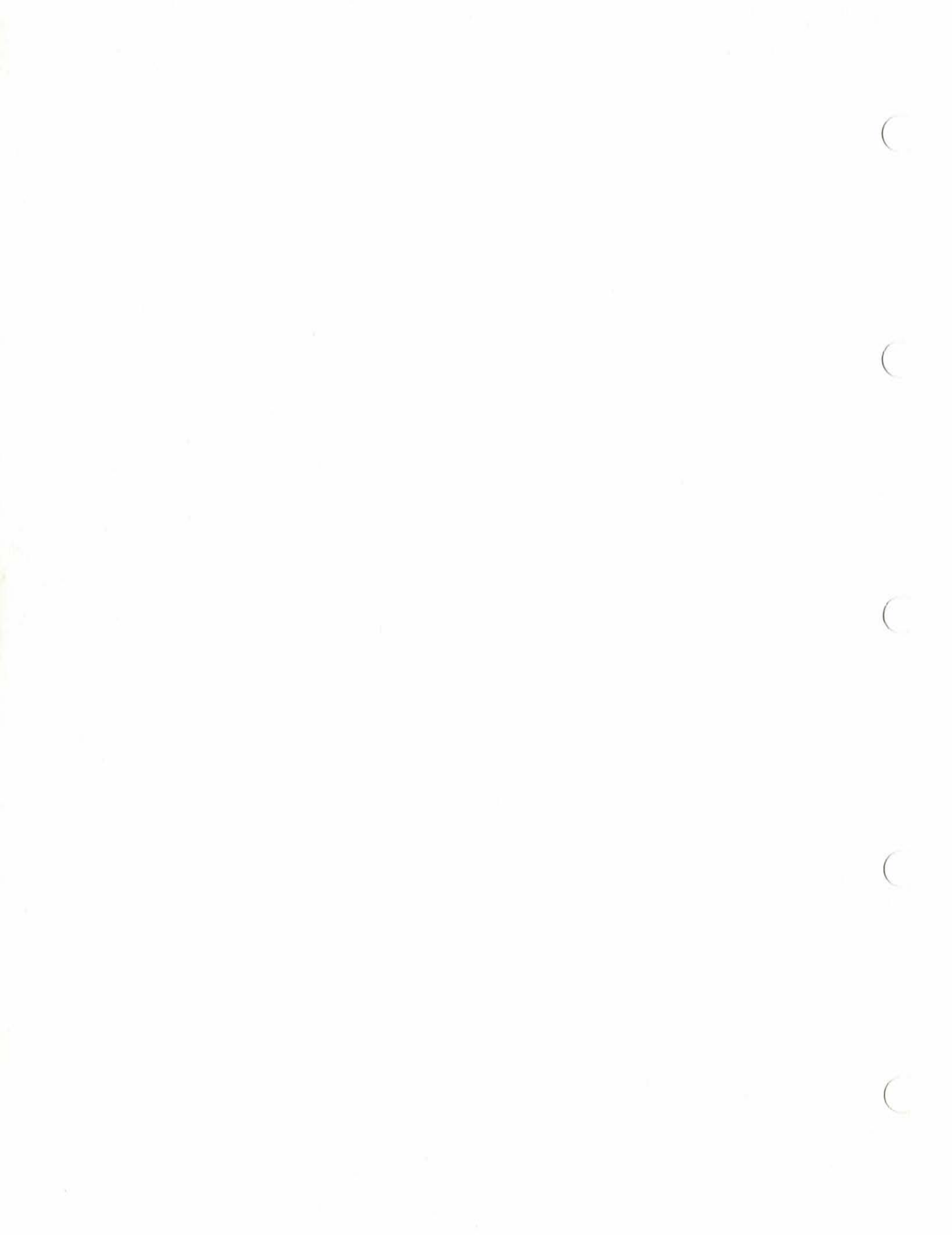
NOTE: The rear cab, rack, tool box, and seat are mounted and secured the same as the Trail Boss.



Prior to fuel tank removal, the shutoff valve should be turned to the "off" position. The oil tank should be drained or the main line plugged prior to removal.

**⚠** The oil tank and the front fuel tank retaining nuts are molded into the main fuel tank body and should not be overtightened.





# Swing Arm and Rear Dampening

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Swing Arm-Rear Dampening-Rear Axle 3-1

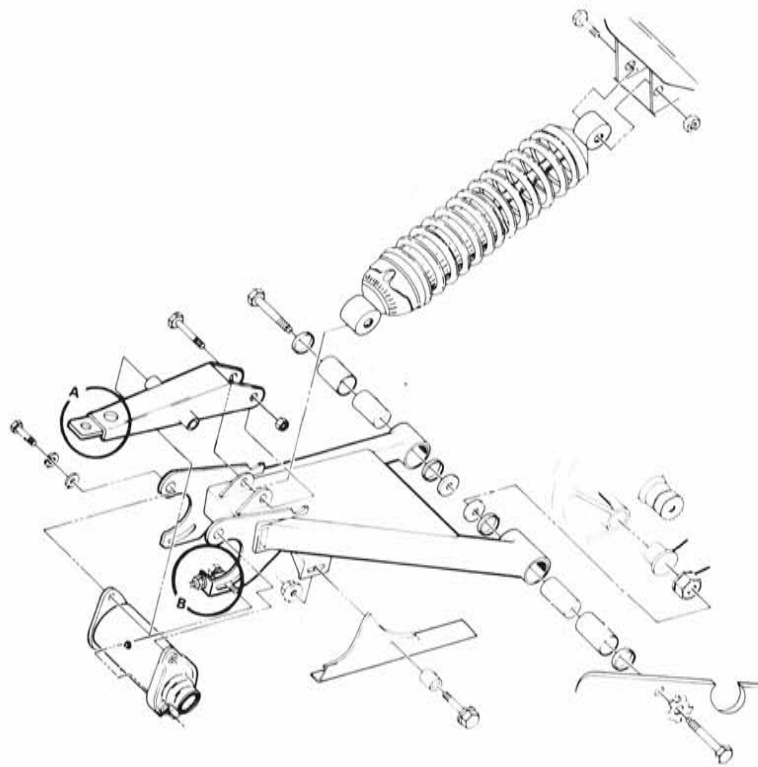
Swing Arm Removal & Inspection 3-2 - 3-5

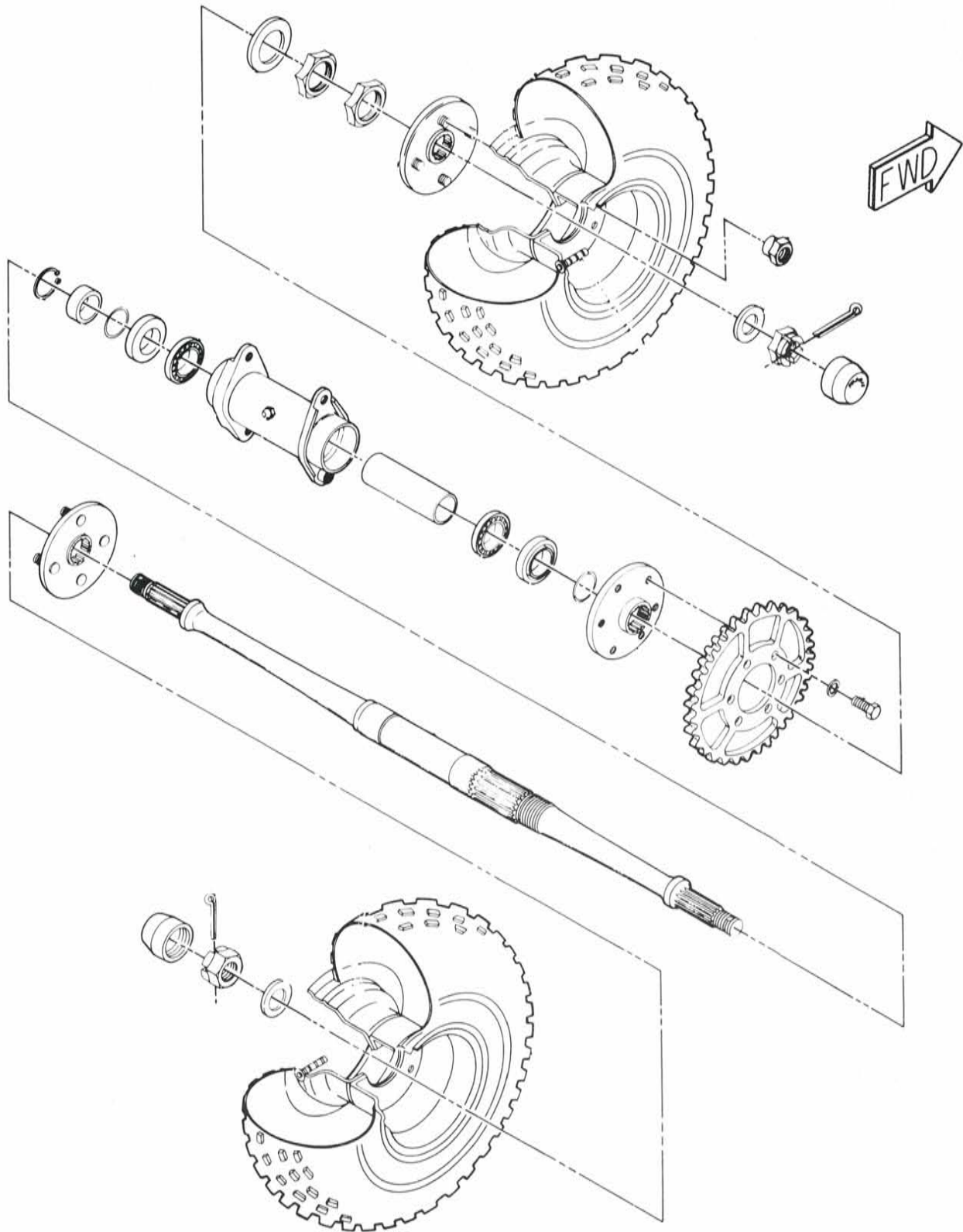
## SPECIAL OR UNCOMMON TOOLS

<u>DESCRIPTION</u>	<u>PART NUMBER</u>
Axle Nut Tools - 1-3/4" Open End Wrench	
Shock Absorber Spring Compression Tool	2870623

3

## Exploded View Swing Arm

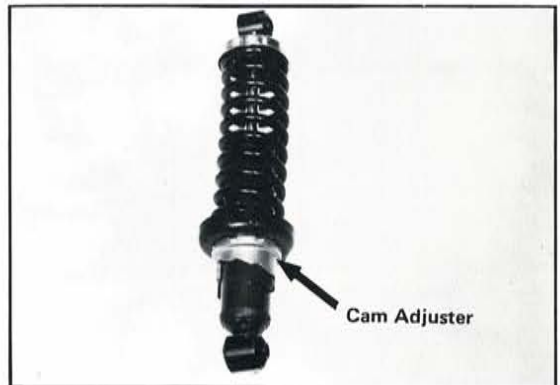
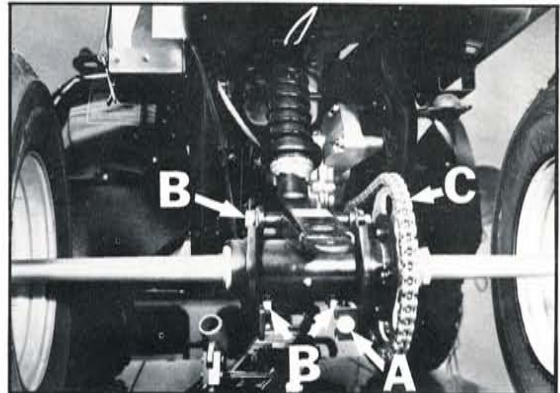
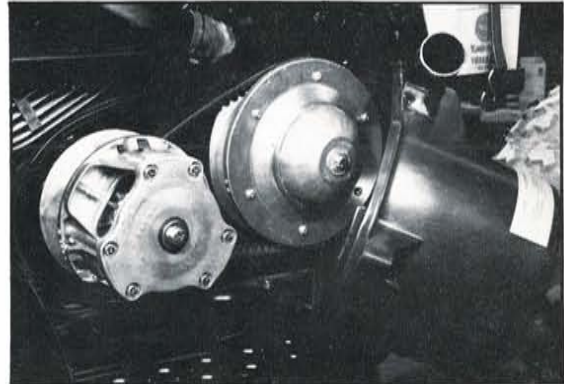
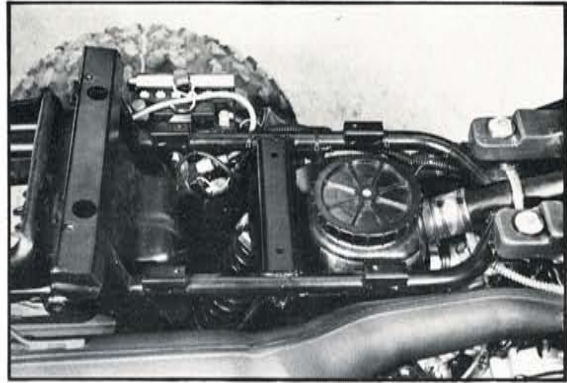




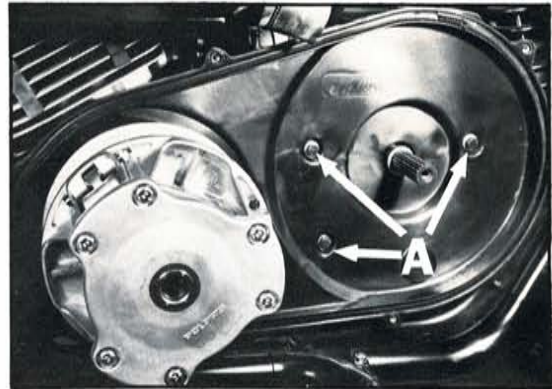
## REMOVAL AND INSPECTION

1. Remove the rear rack and rear cab.
2. Remove the outer cover PVT system and remove the driven clutch.
3. Support the rear of the vehicle off the ground.
  - (A) Loosen the chain adjuster.
  - (B) Remove the pinch bolts.
  - (C) Remove the chain clip, master link and drive chain.
4. Remove the rear shock assembly. The shock cam should be set in its most firm position. Tension should be reduced only if used for extremely smooth operation.
 

**NOTE:** Using the vehicle extremely hard in rough terrain, with the cam set in the softest position, can damage the suspension.



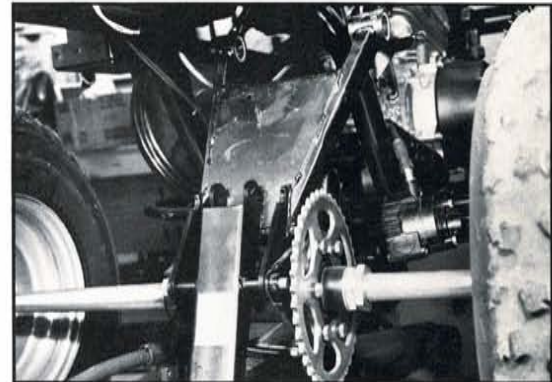
5. Remove the three rear cover mounting bolts (A).



6. To gain access to the left side front swing arm bolt, move the rear cover outward as shown. Remove the left and right swing arm bolts.



7. By pivoting back and forth, the swing arm assembly can be removed from the main frame.

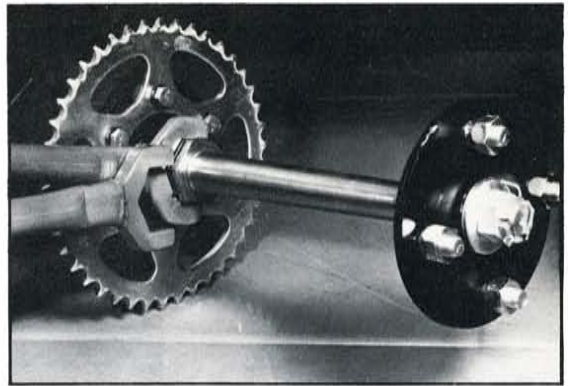


8. Remove the swing arm bushings. Inspect and replace, if necessary.

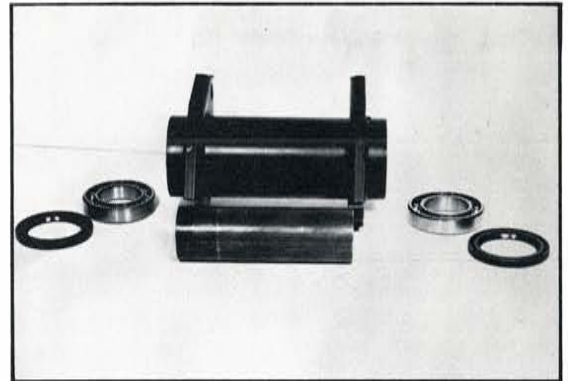




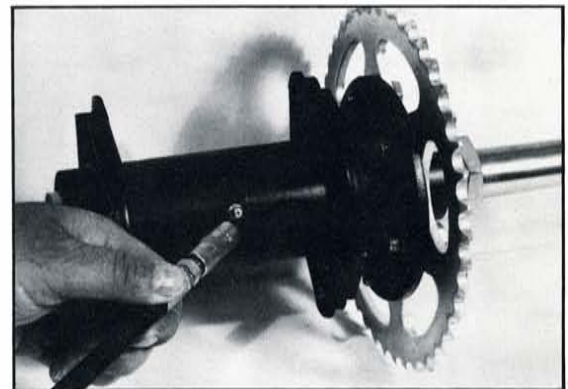
9. Remove the rear axle housing from the swing arm. Remove the axle from the housing. Axle nuts are 1 3/4". Remove the sprocket from the axle housing.



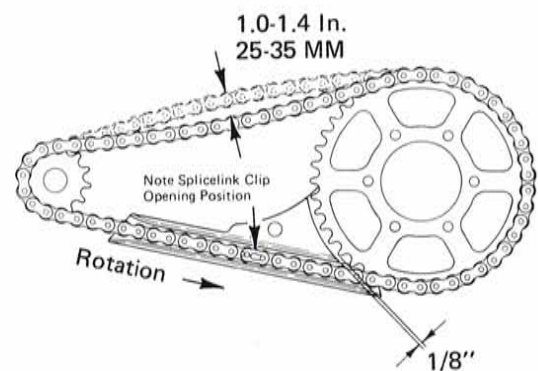
10. Inspect the axle and seal. Replace parts if necessary.



11. When reassembling, grease with all-purpose automotive chassis lube. This cavity holds a large amount of grease and should be filled until the grease protrudes from the seal.



12. Reassemble the swing arm using the reverse procedure of disassembly. Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side. Then pull up and down on the chain, total slack should be 25-35mm, 1.0-1.4 inches. If slack is not within this range it must be adjusted.



**DRIVE CHAIN INSPECTION/ADJUSTMENT**

**⚠ WARNING!**

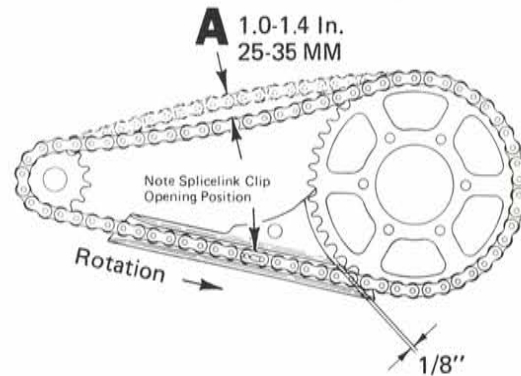
Polaris ATV drive chains are equipped with "O" ring sealed permanently greased pins and rollers.

**DO NOT!**

1. Wash the chain with a high pressure washer or gasoline or any type of petroleum solvents as damage to the "O" rings and loss of lubricant will cause premature wear and failure.
2. Do not use any type of lubricant on the chain.

**ALWAYS!**

Inspect the drive chain prior to operating the vehicle checking for damaged or missing "O" rings, rollers and correct slack adjustment and maintain the stone-guard to rear sprocket clearance at 1/8".



**DRIVE CHAIN SLACK ADJUSTMENT**

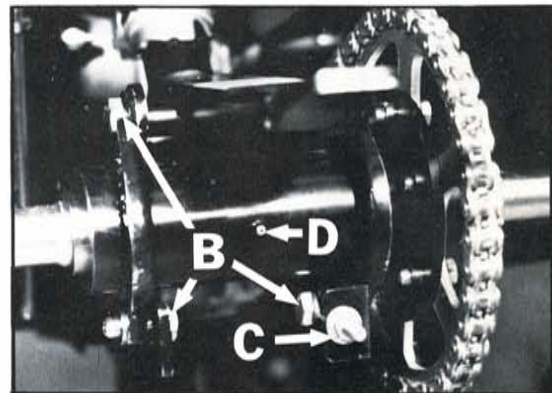
1. Check the amount of chain slack by moving the vehicle slightly forward to gain slack at the top side. Then pull up and down on the chain, total slack should be 25-35mm, 1.0-1.4 inches. If slack is not within this range it must be adjusted (A).

**Procedure**

2. Loosen the three (3) pinch bolts (B).
3. Turn the adjuster bolt nut to achieve correct slack (C).
4. Retighten pinch bolts. (70 Ft. Lbs. Torque)
5. Lubricate the rear axle bearings until grease is visible. (Multi purpose automotive chassis lube) (D).

**⚠ WARNING!**

Never adjust or operate the vehicle with the drive chain slack out of the specified 1.0-1.4 inch (25-35mm) range as severe damage to the transmission and drive components can result.

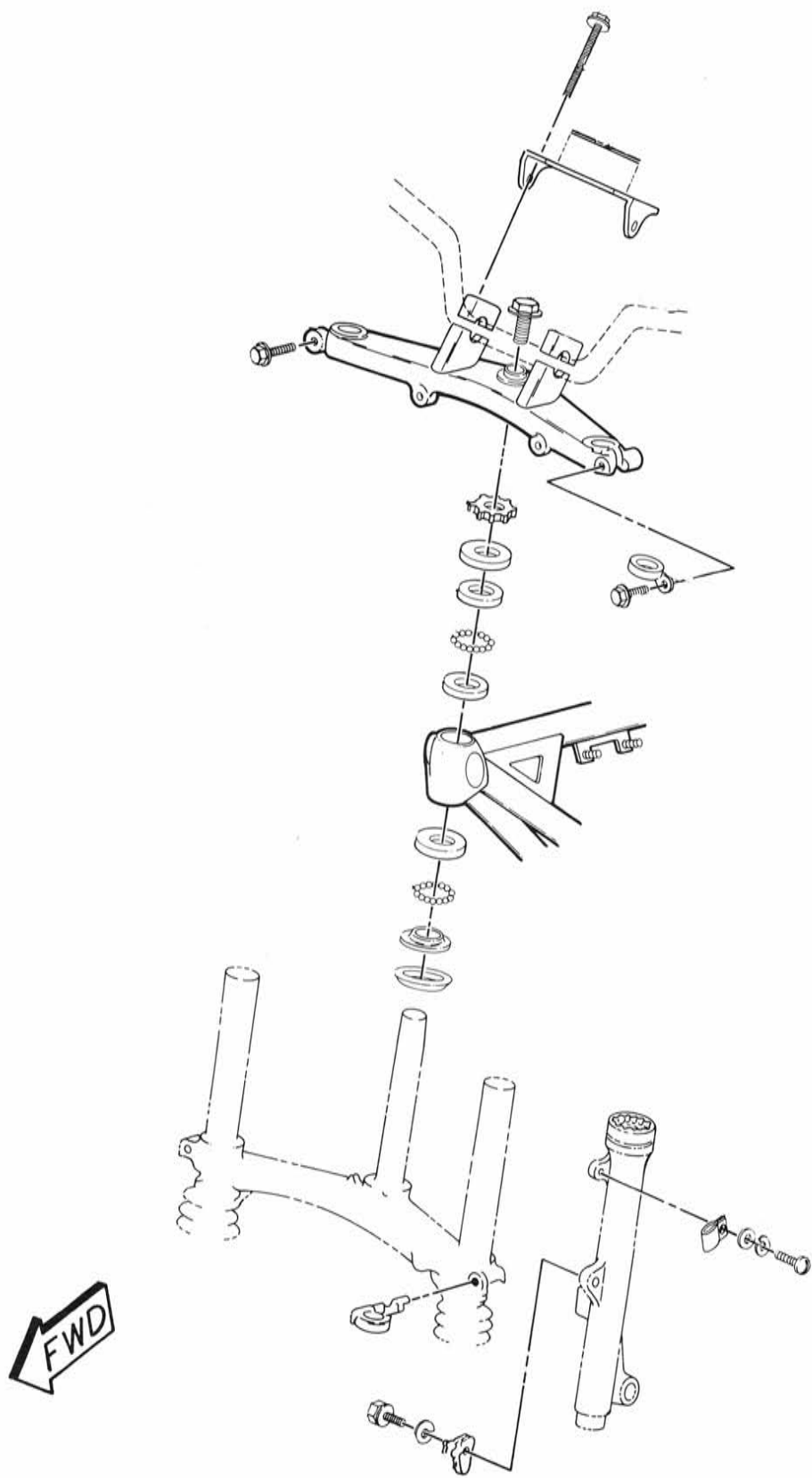


# Steering and Front Brake

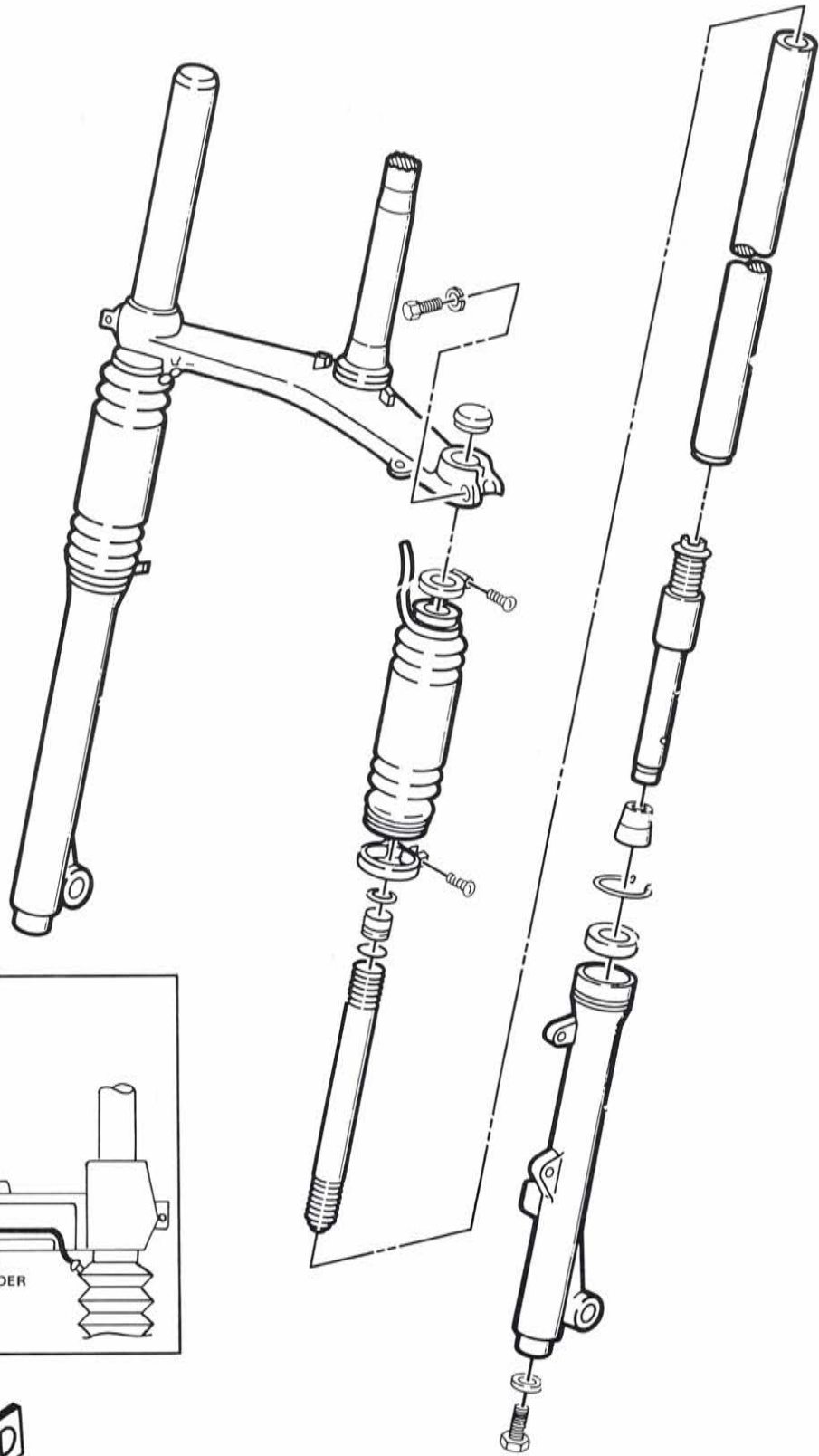
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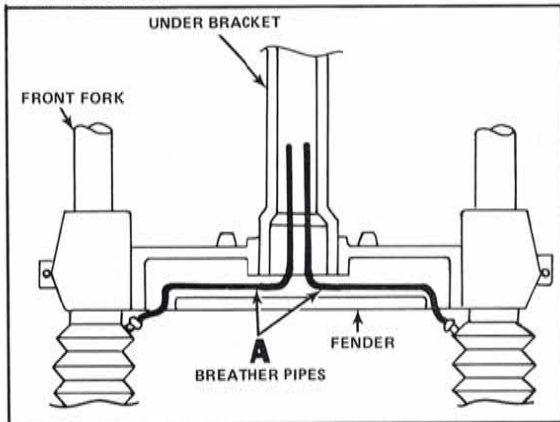
SCRAMBLER



SCRAMBLER



**▲ IMPORTANT**



## SCRAMBLER

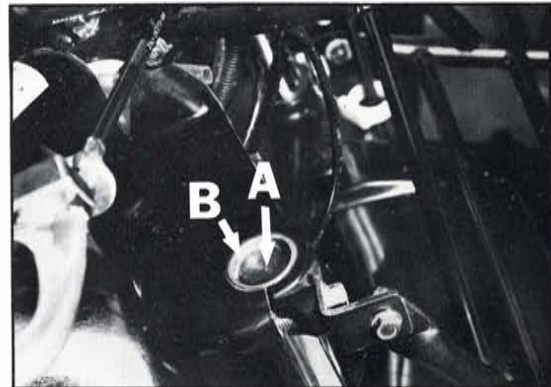
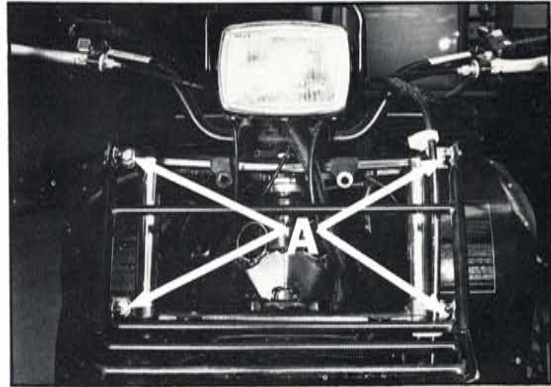
**REMOVAL AND DISASSEMBLY**

1. Raise the front wheel by placing the suitable stand under each footrest.

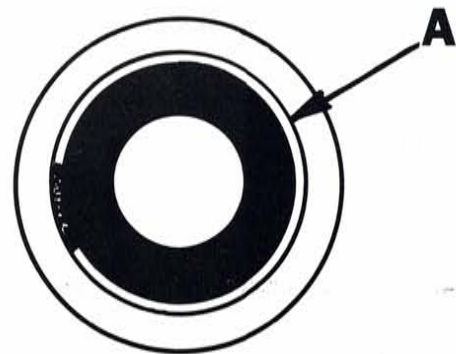
**WARNING**

Securely support the machine so there is no danger of it falling over.

2. Remove the front wheel assembly and front fender.
3. Loosen the pinch bolts and remove the brake cable holder securing bolts (A). Remove the fork(s).
4. Loosen the dust-boot-clamp screws, and remove the dust boot from each fork.
5. Remove the rubber cap and stopper ring (Spring wire circlip) from the top of each fork.
6. The spring seat (A) and fork spring are retained by a stopper ring (Spring wire circlip) (B). It is necessary to depress the spring seat and fork spring to remove the stopper ring. Remove the stopper ring by carefully prying out one end with a small screwdriver.
7. Remove the fork spring and remove the cylinder securing bolt from the bottom of the fork assembly. Remove the damper rod assembly and inner fork tube.



8. Remove the retaining clip from the outer fork tube, (A) and pry out the fork seal. Be careful not to damage the fork tube surface.



## SCRAMBLER

## INSPECTION

1. Examine the inner fork tube. If the tube is severely scratched or bent, it should be replaced.

**WARNING**

Do not attempt to straighten a bent fork tube; this may dangerously weaken the tube.

2. Inspect the outer surface of the fork seal seat in the outer fork tube. If this surface is damaged, replace the outer fork tube. If it is not damaged, replace the fork seal.
3. Check the outer fork tubes for dents. Replace the tube if it is dented.
4. Check the free length of the springs.

Fork spring free length limit:

501.1 mm (19.73 in)

5. Check the O-ring on the spring seat. If it is damaged, replace it (A).



## ASSEMBLY

1. Make sure all components are clean before assembly. Always install a new fork seal. Do not reuse a seal.
2. Apply oil to the fork seal, and install the fork seal by pressing it in with a large socket. Install the retaining clip.
3. Install the damper rod assembly into the inner fork tube. Hold the damper rod of the front fork cylinder.
4. Put the taper spindle on the damper rod.
5. Hold the inner fork tube, and carefully install the outer fork tube over the taper spindle.
6. Apply Loctite<sup>®</sup> 680 to the cylinder securing bolt, and install the bolt and a copper washer into the outer fork tube. Torque the bolt to specification.

TIGHTENING TORQUE:

23 Nm (2.3 m/kg, 17 ft./lb)

7. Pour the specified amount of fork oil into the inner fork tube.

Fork oil capacity:

117 cm<sup>3</sup> (4.12 Imp oz, 3.96 US oz)

Fork oil level:

419.6 mm (16.5 in)

(From top of inner tube fully compressed without spring.)

Recommended oil:

10 wt or equivalent

SCRAMBLER

8. Install the fork spring, spring seat, and stopper ring into the inner tube.

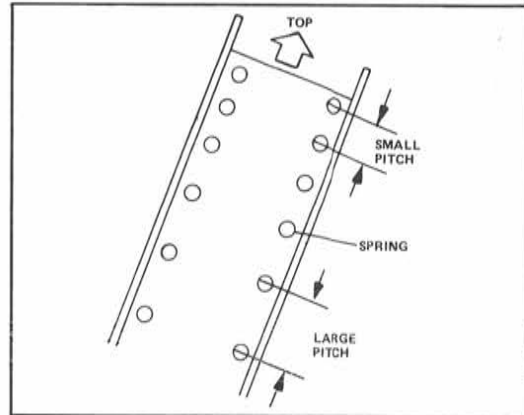
**NOTE:**

The fork spring must be installed with the smaller pitch side facing upward as shown.

**CAUTION**

Always use a new stopper ring (Spring wire circlip).

Be sure the stopper ring is properly seated in the groove in the fork tube.



9. Install the dust boot onto the outer tube. Do not tighten the screws at this point.
10. Install the fork into the brackets. Make the top of the inner fork tube level with the top of the handle crown.

11. Tighten the pinch bolts to specification.

**TIGHTENING TORQUE:**

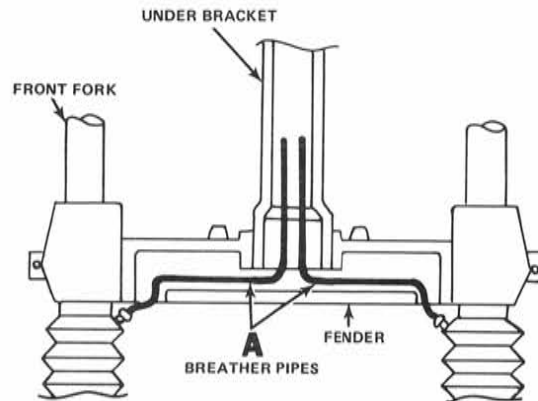
Under bracket & Inner fork tube:  
30 Nm (3.0 m/kg, 22 ft/lb)

Steering crown & Inner fork tube:  
20 Nm (2.0 m/kg, 14 ft/lb)

12. Tighten the dust boot clamps.
13. Reinstall the front fender and front wheel.

**NOTE:**

When installing the front fender, make sure the breather pipes are properly connected and routed (A).






## SCRAMBLER

## FRONT WHEEL REMOVAL

## Removal

1.  Place the transmission in gear.
2. Loosen all cable adjusters and remove the cable from the handlebar lever, then remove the cable from the brake shoe lever.


Remove the cotter pin from the front wheel axle nut and remove the nut.

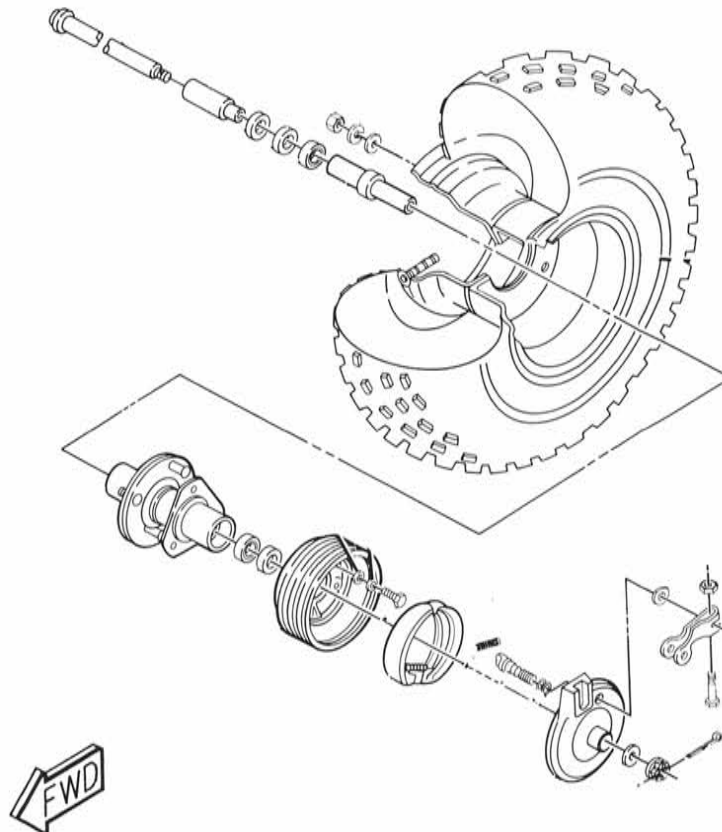
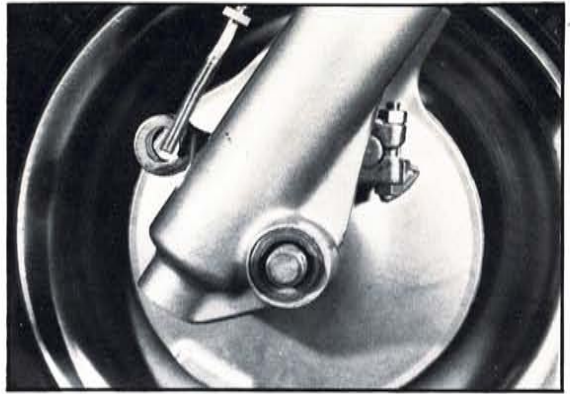
Support the front wheel off the floor using a suitable stand.

Remove the front axle, collar and wheel from the fork.

## Installation

Reverse the removal procedure for wheel installation noting the following:

1. Check for proper entry of the fork tube boss into the slot on the brake shoe plate.
2. Torque the axle nut (36 Ft./Lbs.)
3.  Always install a new cotter pin into the axle nut.




## SCRAMBLER

## FRONT BRAKE ADJUSTMENT

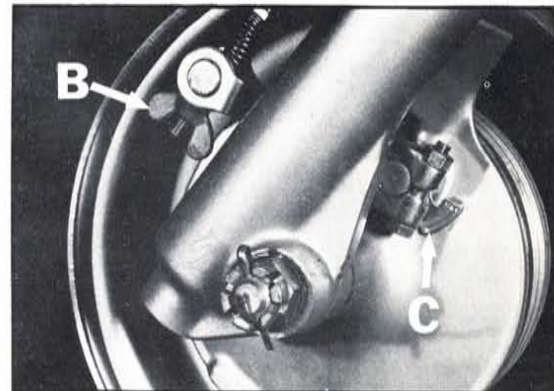
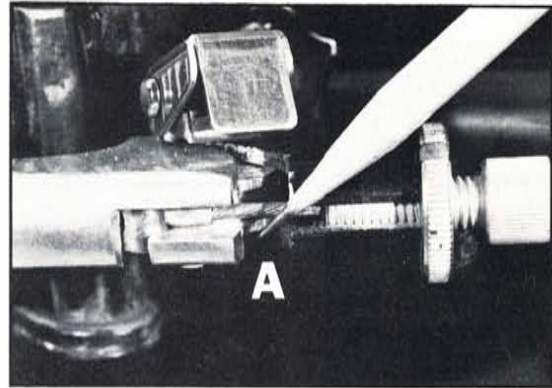
The front brake cable should be adjusted to maintain a range of 5–8mm (0.2–0.3 in.) of free play at the handlebar lever.

Procedure:

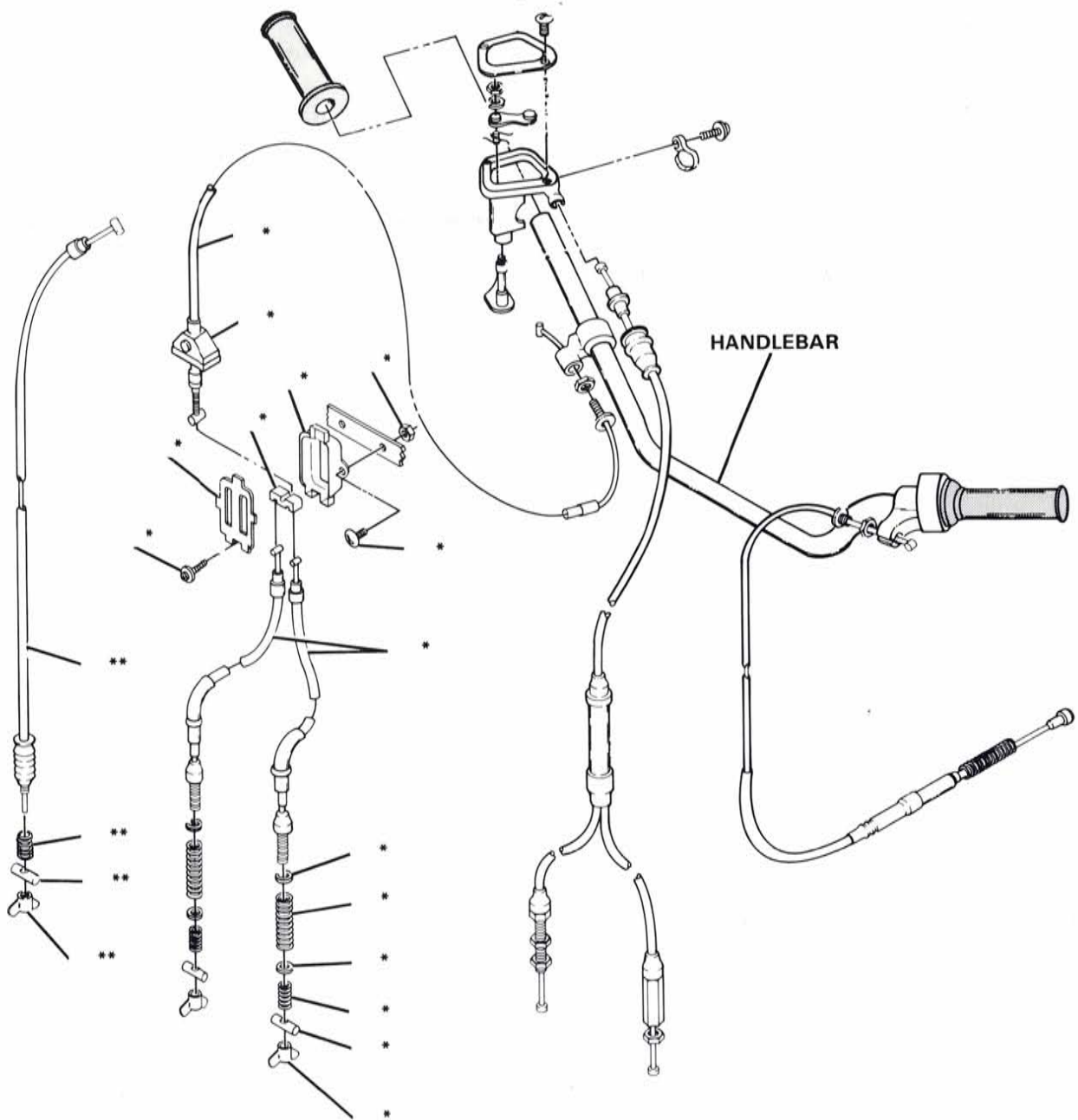
1. Loosen the locknut on the brake lever holder and turn the adjuster in fully for a large amount of free play (A).
2.  With the front wheel safely supported off the floor, turn the adjuster on the wheel brake shoe lever in until a slight drag is noted while rotating the wheel, then back off the adjuster slightly. Adjust the lever for proper free play and tighten the locknut (B).

Front Brake Lining Inspection

3. To check brake lining, pull the brake lever and note the position of the wear indicator. If the indicator reaches the wear limit line, contact your Polaris dealer for brake shoe replacement (C).

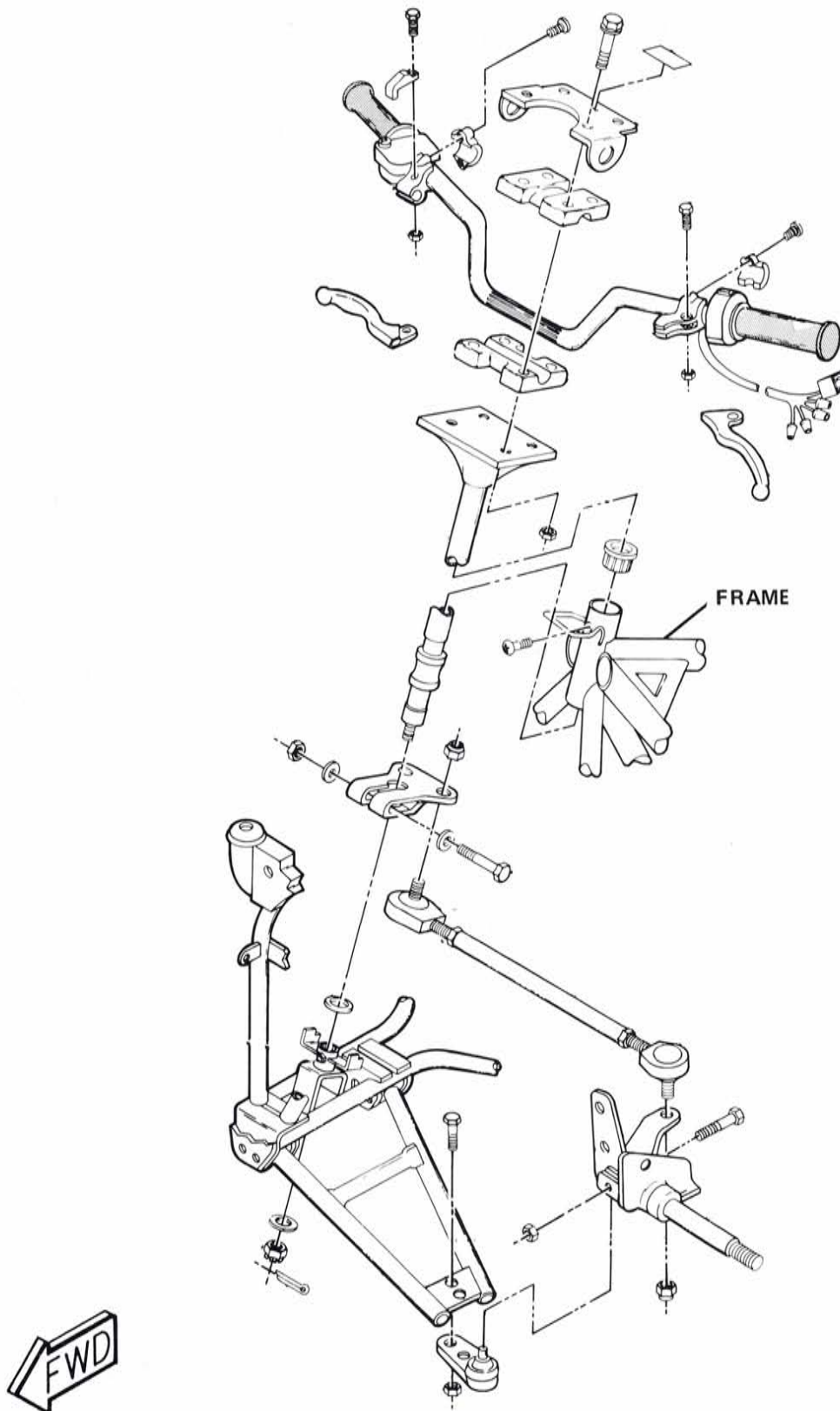


TRAIL BOSS AND SCRAMBLER



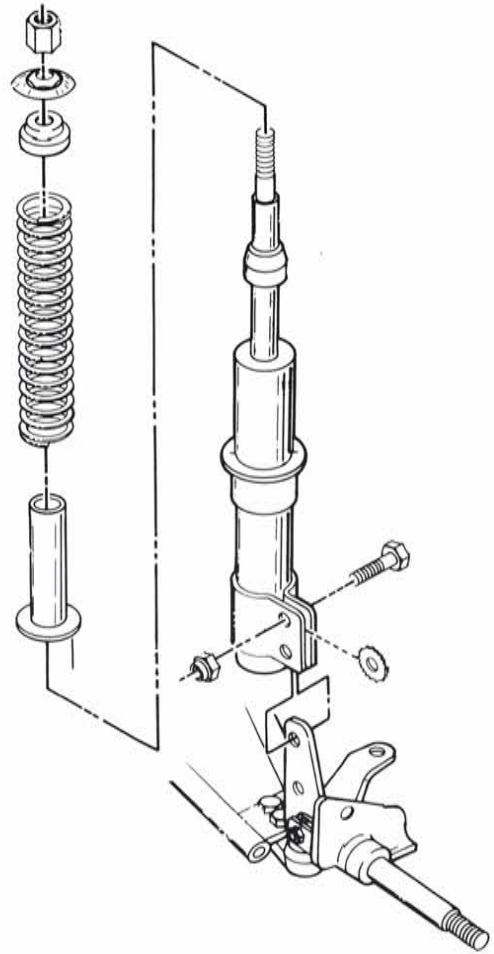
\*USED ON TRAIL BOSS ONLY.  
\*\*USED ON SCRAMBLER ONLY.

TRAIL BOSS



## TRAIL BOSS

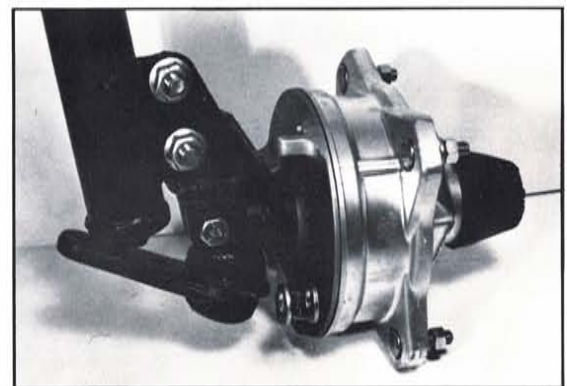
1. The front suspension on the Trail Boss is a strut type consisting of a strut tube weldment, a coil spring and the necessary hardware to secure the assembly to the frame weldment and spindle assembly.



2. Remove the dust cap, cotter pin and castle nut. Pull the hub and brake assembly off of the spindle. Inspect the brake shoes, bearings and seals. Replace worn or damaged parts.



3. Reassemble the brake assembly, brake drum and install onto the spindle. Torque the spindle castle nut to 40 ft./lbs. Install a new cotter pin, whenever the nut is removed.



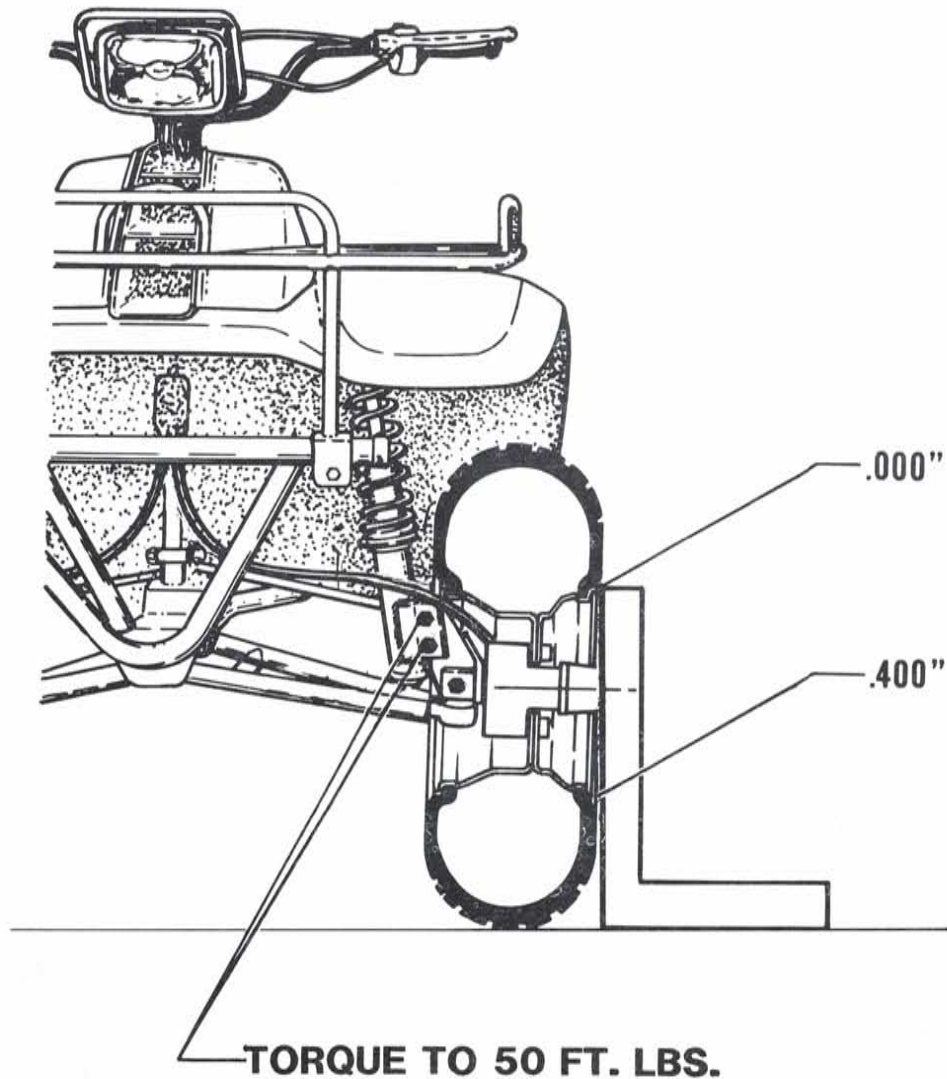
## TRAIL BOSS

## CAMBER ADJUSTMENT

When aligning the front end on a Trail Boss, there are two adjustments to be concerned about, camber and toe alignment. Camber adjustment must be performed first.

Step

1. Position the vehicle on a smooth, level surface.
2. Set the handlebars in a straight ahead position and secure the handlebars in this position.
3. Loosen the strut nuts. Move the top of the wheel either inward or outward of the vehicle to maintain a .400" difference in rim measurements at the square as illustrated in the drawing. .400 equals approximately 2° positive camber.
4. When .400" is obtained, tighten the nuts to 50 ft./lbs.
5. Proceed to the other wheel.



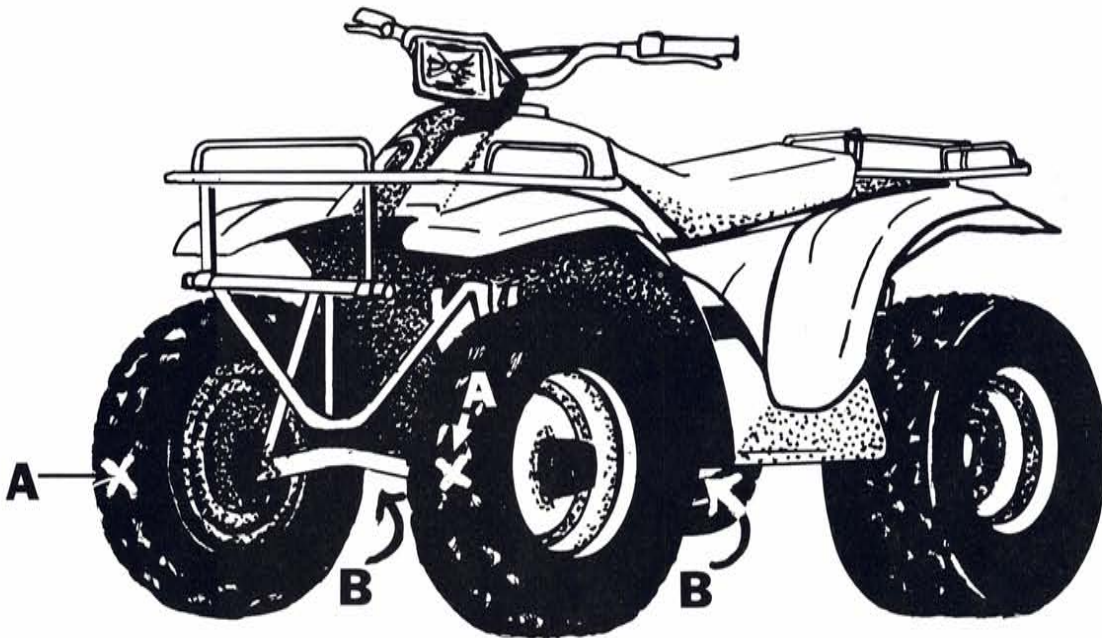
## TRAIL BOSS

## TOE ALIGNMENT

Toe alignment is usually checked or adjusted after camber adjustments have been performed. Toe alignment must be accurate to obtain easy handling when driving on various types of terrain.

Step

1. Position the vehicle on a smooth, level surface.
2. Set the handlebars in a straight ahead position and secure the handlebars in this position.
3. Place a chalk mark on the face of the front tires and as close to the horizontal center line as possible. (Approximately 10") (A). IMPORTANT: Both marks must be equally positioned from the base measuring point. Measure the distance between the "X" marks.
4. Rotate the wheels 180° by moving the vehicle forward or backward (B). Again, measure the center distance of the "X" marks. The difference between the measurement in the front of the tire and the measurement in the rear of the tire is called "vehicle toe."
5. The recommended vehicle toe tolerance is 1/8" to 1/4" toe out. This means the measurement between the "X" mark measurement at the front of the tire is 1/8" to 1/4" wider than the measurement at the rear.
6. If this measurement is to be adjusted, measure the distance between the vehicle center and each wheel hub. This will tell you which tie rod needs the adjustment.
7. Loosen the tie rod jam nuts and adjust the tie rods until vehicle toe alignment is correct.




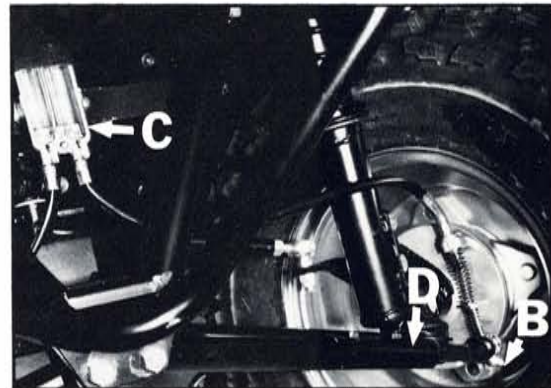
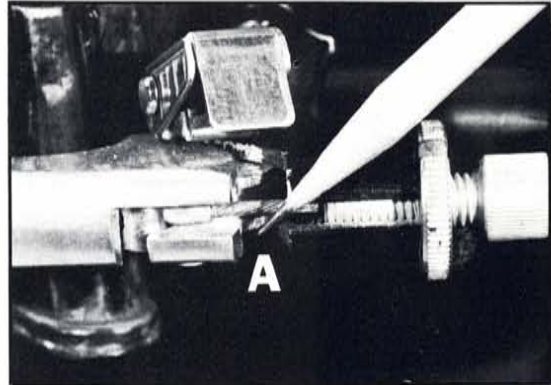
## TRAIL BOSS

## FRONT BRAKE ADJUSTMENT

The front brake cable should be adjusted to maintain 5–8mm (0.2–0.3 in.) of free play at the handlebar lever.

Procedure:

1. Loosen the locknut on the brake lever holder and turn the adjuster in fully for a large amount of free play (A).
2.  With the front wheels safely supported off the floor, turn the adjuster on each brake shoe lever until a slight drag is noted while rotating the wheel, then back off the adjuster slightly (B).
3. Note position of the cable joint completing adjustment so it is horizontal, (C), as shown, then adjust the lever for proper free play and tighten the locknut.
4. Check the wear indicator while pulling the brake lever. If the indicator reaches the limit line, contact your Polaris dealer for brake shoe replacement (D).





# Gearcase and Rear Brake

## Gearcase Disassembly & Service

5-1 - 5-7

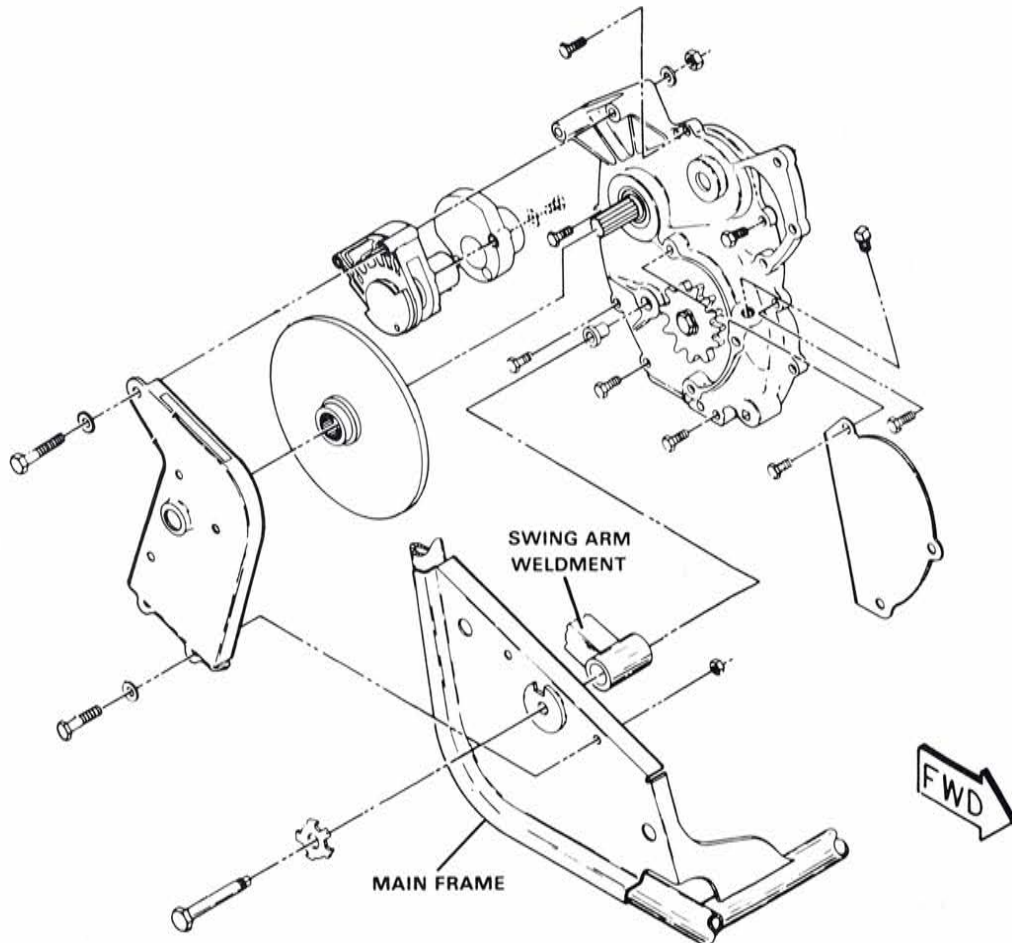
## Rear Brake Disassembly & Service

5-7 - 5-8

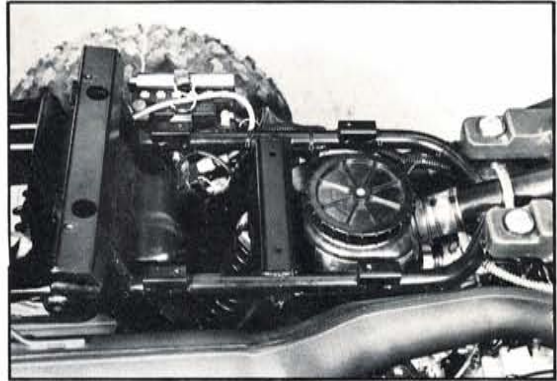
### SPECIAL TOOLS

<u>DESCRIPTION</u>	<u>PART NUMBER</u>
Trans. Holding Fixture	2870674
Bearing Seal Driver	2870676
515 Loctite	2870587

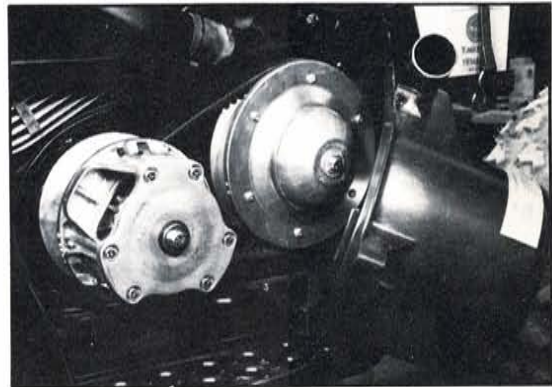
## Exploded View Gearcase & Rear Brake



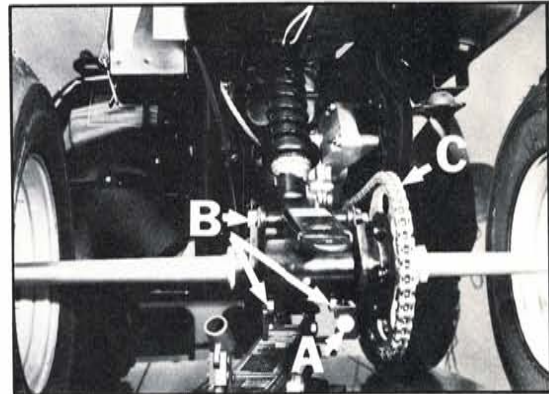
1. Remove the rear rack and rear cowling.



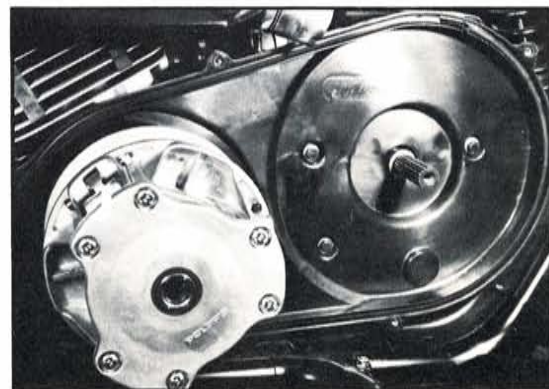
2. Remove the outer cover and remove the driven clutch.



3. Loosen the chain adjuster (A) and pinch bolt (B). Remove the chain clip and remove the drive chain (C).



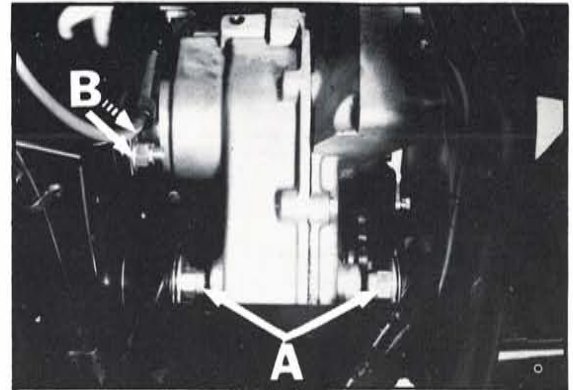
4. Remove the three (3) rear cover bolts.



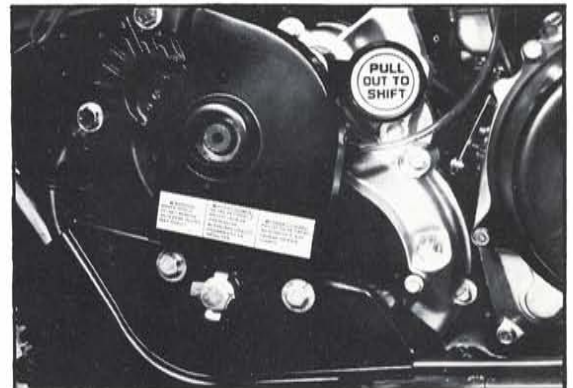
5. To gain access to the left side front swing arm bolt, move the back part of the rear cover outward, as shown.



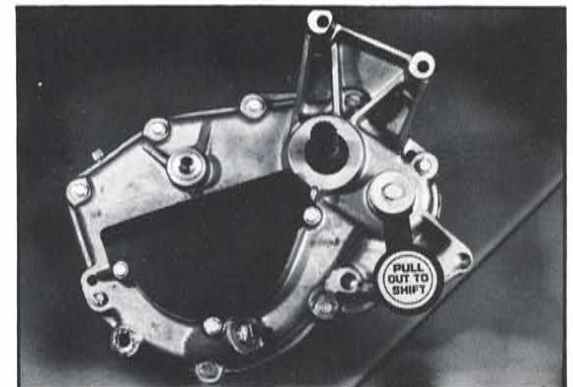
6. A. Loosen the left and right swing arm bolts just enough so the transmission will clear the mount.  
B. Remove the two left side bulkhead retainer bolts. Remove the bottom transmission retainer bolt.

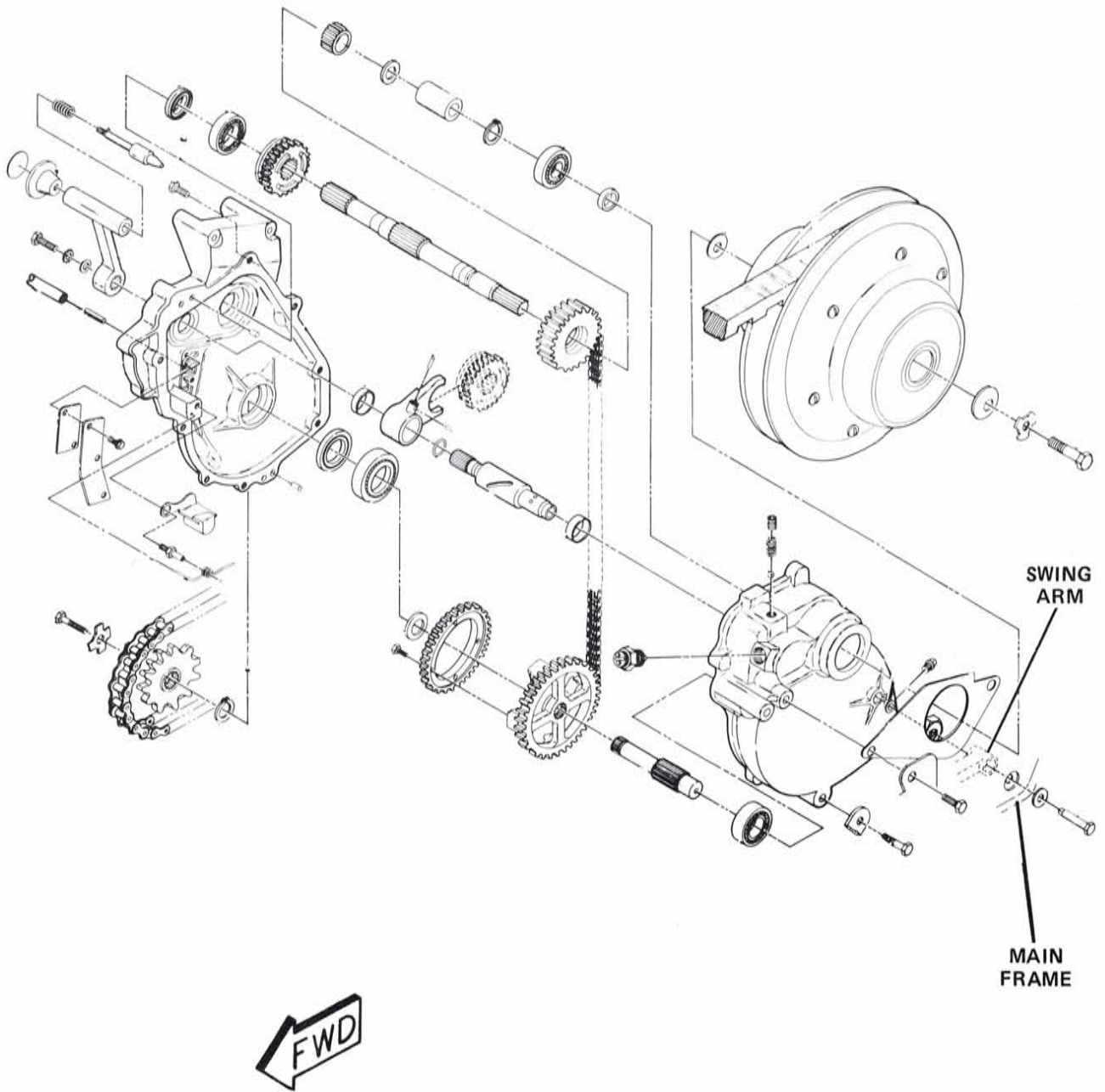


7. Remove the brake disc cover and the caliper assembly bolts. Slide the brake disc and caliper assembly over the splined shaft from the transmission.

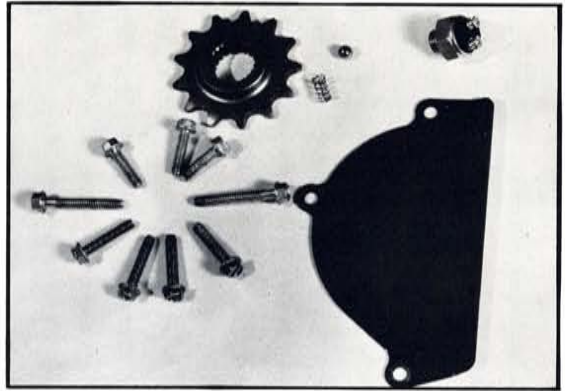


8. Remove the air box assembly from the carburetor and the inlet frame tube. The transmission can now be removed from the chassis and prepared for disassembly.

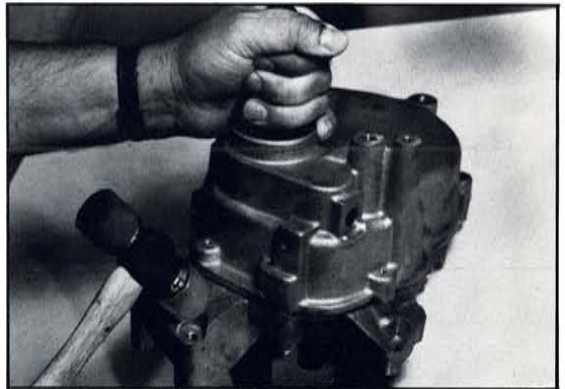




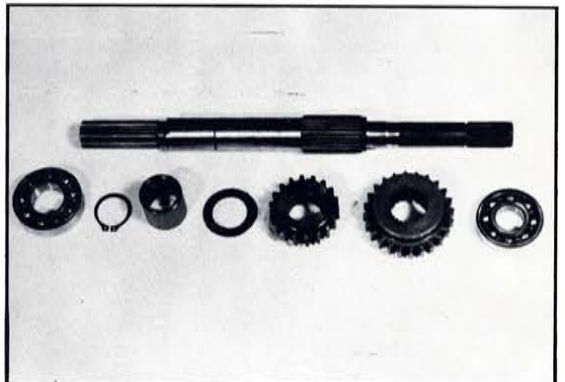
9. Drain all oil from the gearcase and remove the case half retaining bolts. Remove detent ball and spring and reverse switch. Remove the chain sprocket guard and sprocket.



10. Split the case by tapping and prying (in areas where sealing damage will not occur.)  
**NOTE:** Case halves must come apart evenly, as internal bearing surface damage could occur.



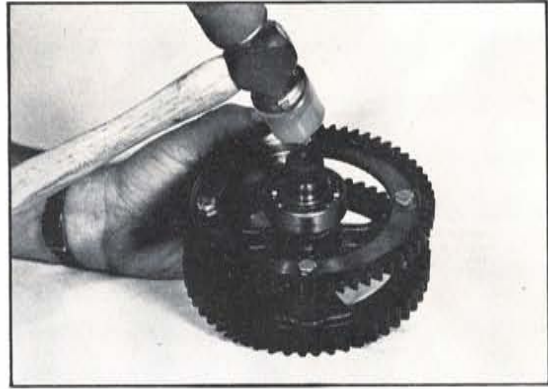
11. Disassemble the input shaft by pressing off both outer bearings and removing the snap ring.  
**NOTE:** Check condition of sliding bearing gear and condition of engagement shifter dogs, etc.



12. Reassemble the shaft using new parts where required. Install the outer bearings using the Polaris bearing/seal driver, PN 2870676, as shown.

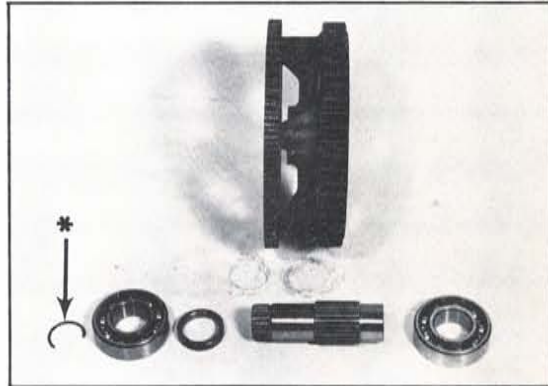


13. Remove the bearings from the output shaft.



14. Inspect the output shaft and outer end bearings.

\*1985 Models Only

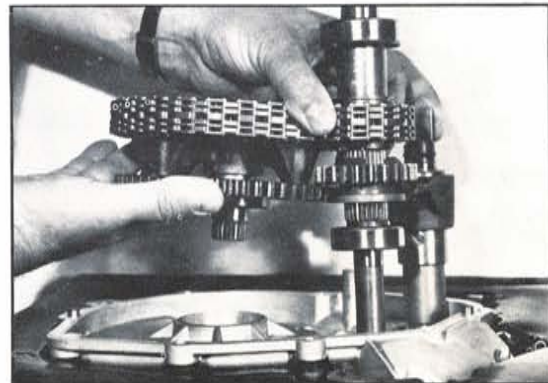


15. Reassemble the output shaft into the forward and reverse gear assembly. Install the spacer where used. Install bearings. Drive the bearings onto the output shaft, using the bearing seal driver, PN 2870676.

NOTE: Support the inner race of the bottom bearing when installing. Install the snap ring to the output shaft.

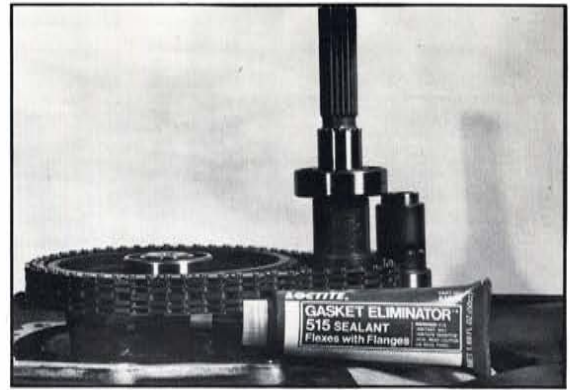


16. Before reassembly, clean the internal parts and case halves thoroughly. Oil case half bearing surfaces. Install the right side case half into the holding fixture, PN 2870674. Assemble the forward and reverse gear, the input shaft assembly, the primary chain and the shifter fork into a cluster. Install the cluster into the half.

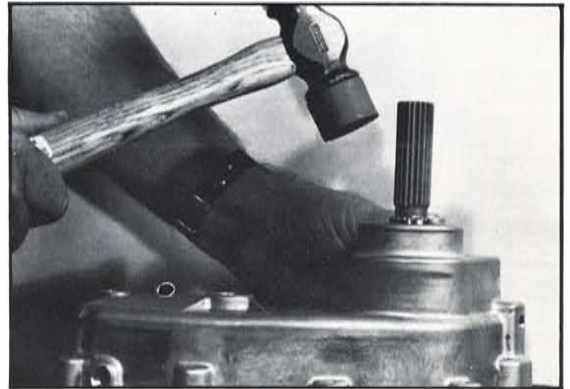


17. The input and output shafts and the shifter shaft must enter their perspective bearing locations at the same time to prevent binding. Apply a light coat of Loctite 515 gasket eliminator to one of the case halves. Install the chain tightener.

Loctite 515 PN 2870587



18. Install the left side cover carefully to ensure proper shaft bearing mating. Once the shafts have entered the bearing bores, light tapping on the outer cover will fully seat or bottom the two halves together. Install cover retaining bolts. Torque to 4 ft./lbs.



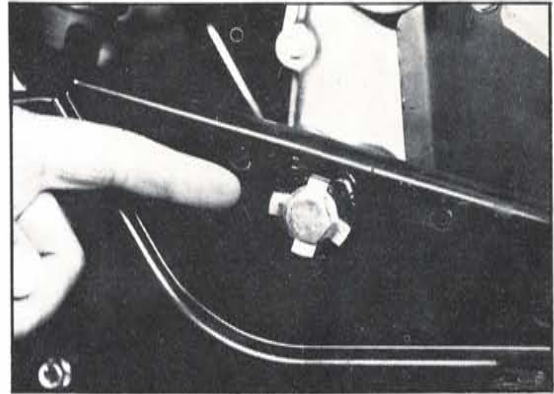
19. Install the detent ball, spring and set screw, where used. Install the reverse switch and shifter lever.



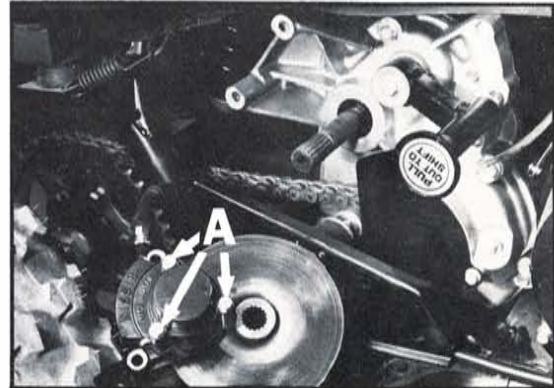
20. Before installing the seals, grease the shaft radius thoroughly to prevent seal damage. Install the seal by hand, over the radius. When the inner seal lip is properly over the radius, seat the seal using the bearing seal driver PN 2870676. Fill the transmission with Polaris chaincase lubricant to the check plug opening. Do not mix or use other type lubricants.



21. Install the transmission into the vehicle using the reverse procedure of removal. Tighten the mounting bolts. Lock the swing arm shoulder bolts with the lock tabs.



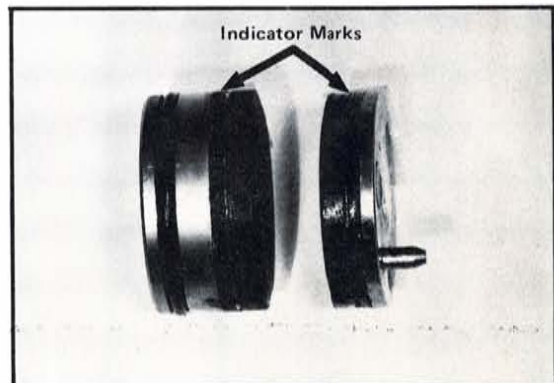
22. To service the rear brake caliper, remove the assembly from the gearcase. Remove the three (3) caliper bolts (A). Disconnect and remove the cable from the ratchet arm assembly.



23. The ratchet adjuster assembly should be cleaned and regreased with a quality low temp grease. If the ratchet adjuster does not pick up the proper breaking capabilities, this adjuster should be cleaned and returned to the least tension position. (Greatest lever arm travel.)



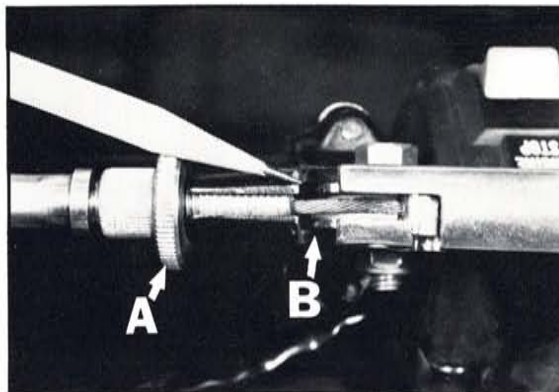
24. When the brake pucks wear down to the indicator marks they should be replaced.





**REAR BRAKE ADJUSTMENT****Procedure:**

1. Loosen the knurled jamnut (A).
2. Rotate the cable adjuster inward so a large amount of lever freeplay exists ( $3/8'' - 1/2''$ ) (B).
3. Pump the brake lever several times (15 - 20 recommended).
4. Rotate the cable adjuster so  $1/4''$  of lever freeplay exists, as shown, then retighten the jamnut.
5. Inspect the rear brake pad for wear occasionally. Contact your dealer for pad replacement when the wear reaches the indicator groove as shown or when brake adjustment does not provide positive braking action.





# PVT System

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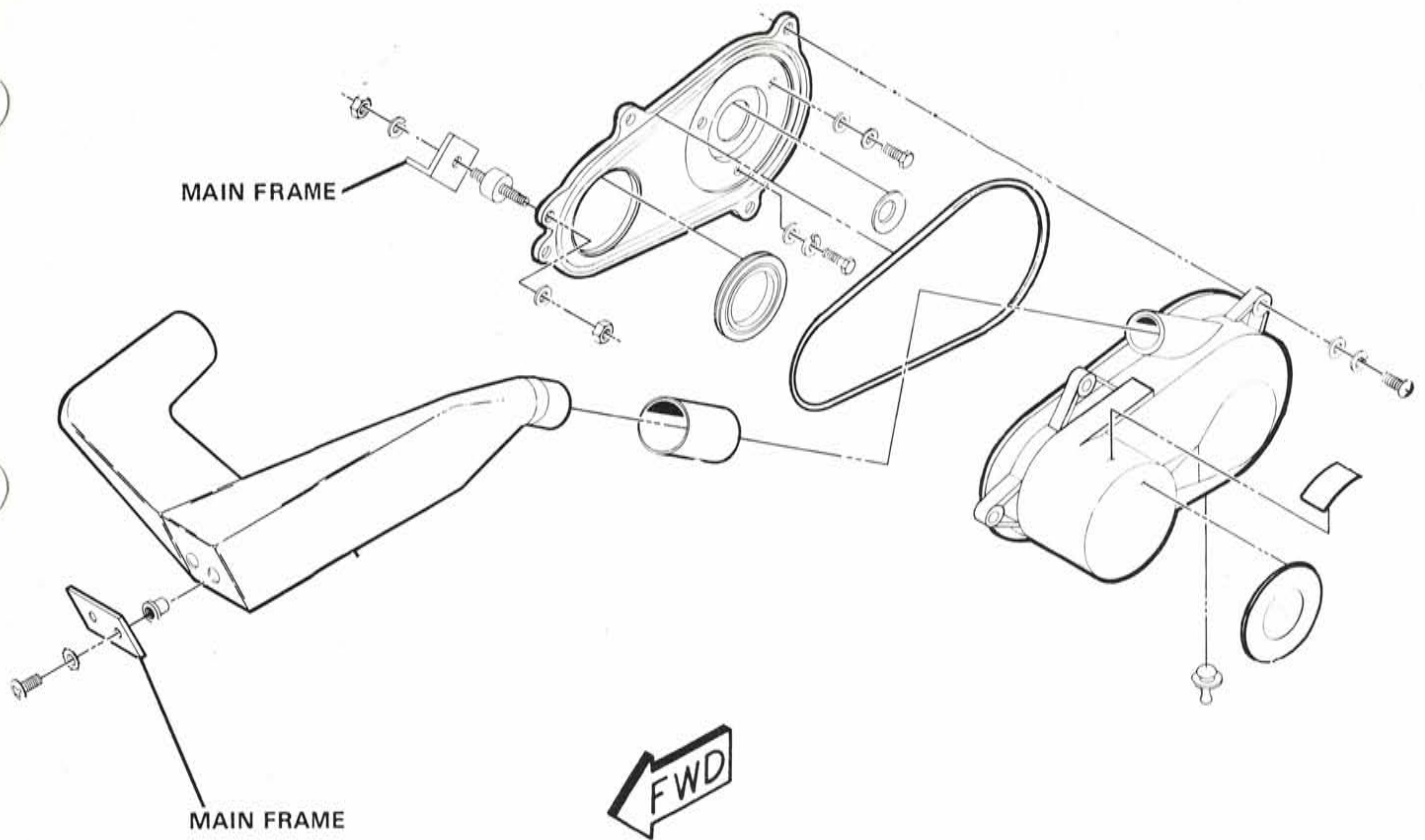
General Information	6-1
Service Tools	6-1
Exploded View	6-2
General Service PVT System	6-2 - 6-8

The Polaris P.V.T. system is a part of the transmission system of the Polaris ATV. It is important to keep the system waterproof or belt slippage can occur.

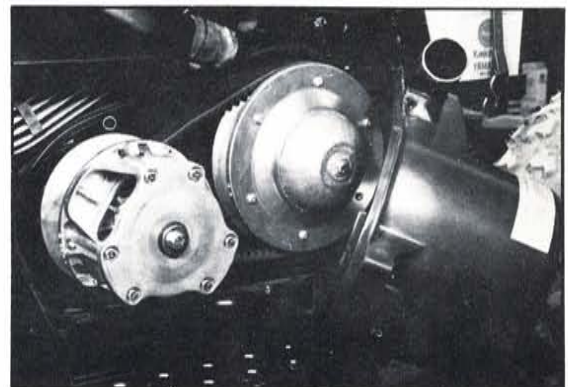
<b>CLUTCH INFORMATION</b>	
<b>Shift Weight</b>	<b>PN 5630279 43.0 Gram</b>
<b>Shift Weight – High Altitude</b>	<b>PN 5630280 40.0 Gram</b>
<b>Drive Belt</b>	<b>3211048</b>
<b>Offset</b>	<b>1/2"</b>
<b>Helix</b>	<b>40°</b>
<b>Center Distance</b>	<b>10"</b>

**SPECIAL SERVICE TOOLS**

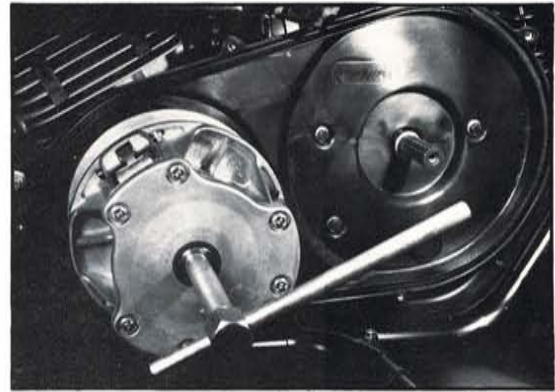
<b>Black Max Sealer</b>	<b>PN 2870660</b>
<b>R.V. Silicone</b>	<b>PN 2870661</b>
<b>Clutch Holding Fixture</b>	<b>PN 2870547</b>
<b>Offset Tool</b>	<b>PN 2870654</b>
<b>"T" Puller</b>	<b>PN 2870506</b>
<b>Spider Tool</b>	<b>PN 2870341</b>



1. If the P.V.T. system is disassembled, it is important that care is taken to not damage the sealing areas of the system. If the drive belt is to be changed, the rear rack and rear cab must first be removed. (Seat, rack and rear cab.) Next, remove the four (4) outer cover bolts. The outer cover should be separated from the air outlet duct at the connector boot.



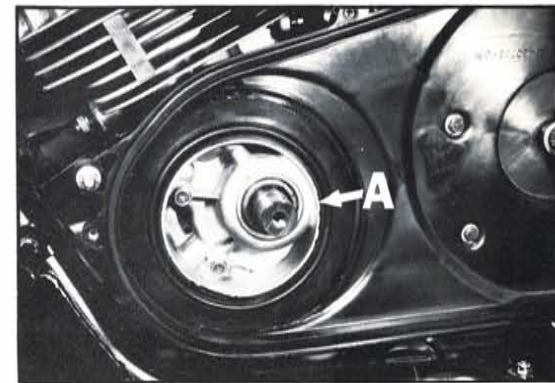
2. If the inner cover is damaged and is replaced, the engine seal to inner cover may also be damaged. To change the inner cover, it is necessary to remove the drive and driven clutches.



3. If the engine seal to inner cover is replaced, the engine area must be thoroughly cleaned (A).



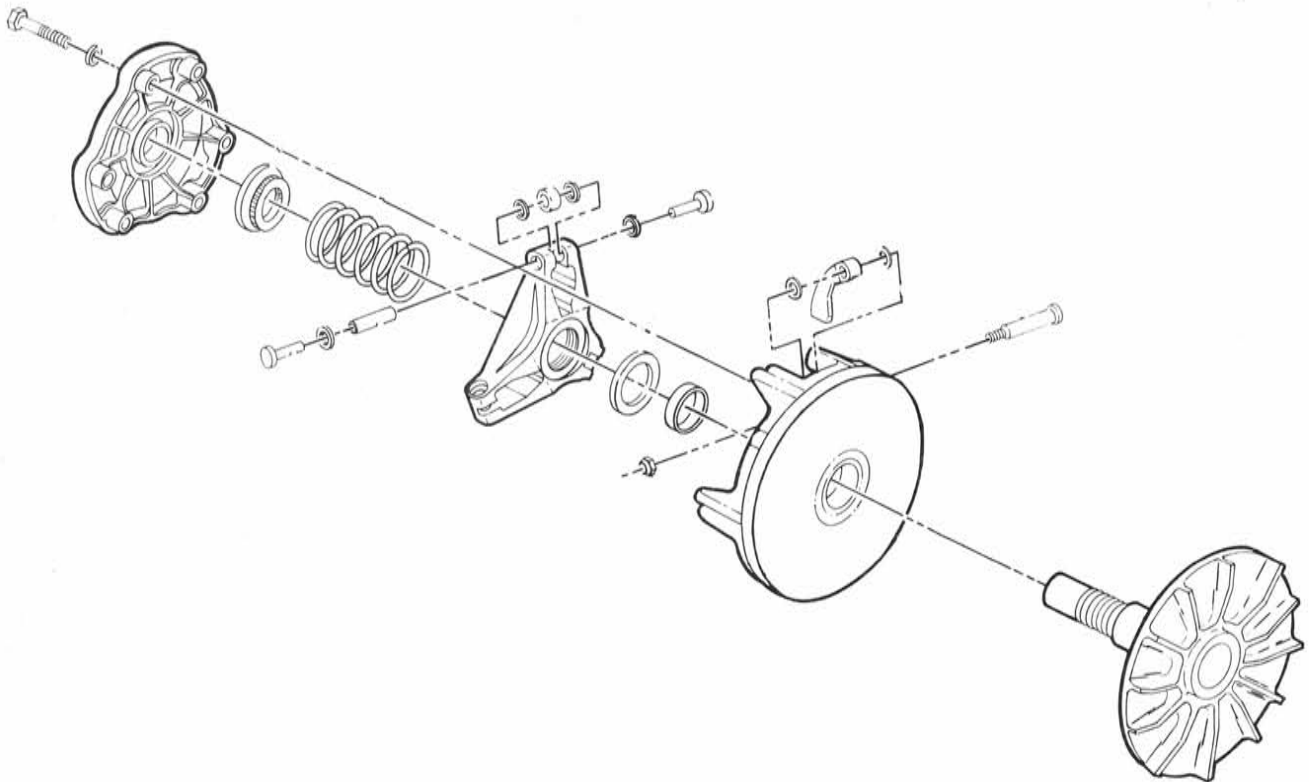
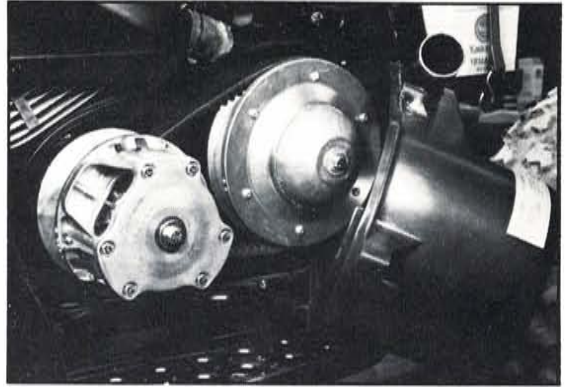
4. Apply a proper sealant between the engine surface and the rubber cover seal (A). (Black Max Loctite PN 2870660)



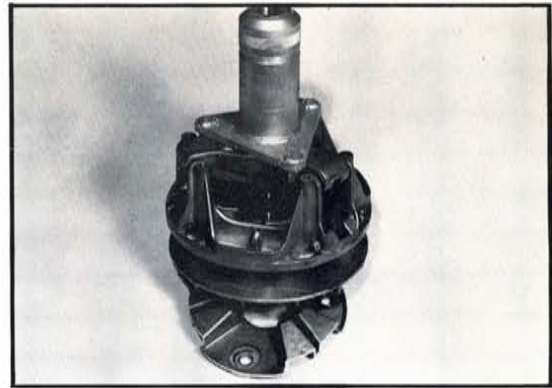
5. Use R.V. type silicone, PN 2870661, to seal the inner cover to the engine seal (B).  
**NOTE:** Sealing surfaces must be extremely clean before sealant is applied.



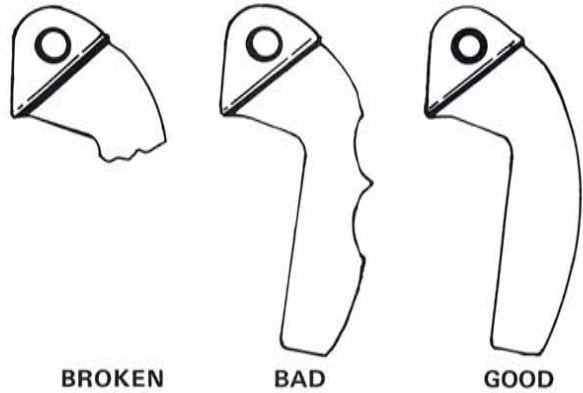
6. Install the cord gasket (rubber) to the inner cover. Before installing the front cover, use R.V. type silicone on the rubber gasket.



- 7. When disassembling the drive clutch, remove the cover bolts. Loosen the spider using clutch holding fixture PN 2870547 and spider tool PN 2870341.

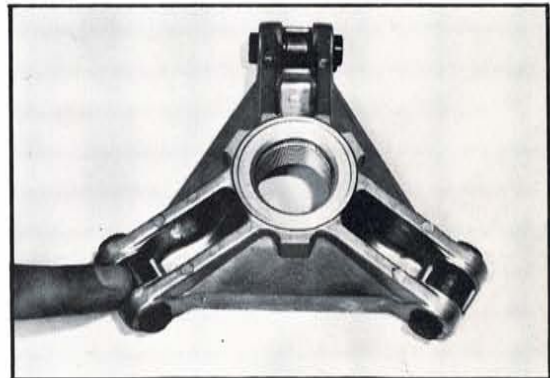


- 8. Remove and replace shift weights if broken or worn out. Shifting surface should be relatively smooth and free of dents or galled marks.



- 9. If a shift weight is damaged, it is usually caused by a damaged or stuck roller in the spider assembly. Check for a stuck roller by simply turning with your finger. If you notice some resistance or galled marks, the rollers should be replaced.

NOTE: Replace roller and pins in sets of three (3).

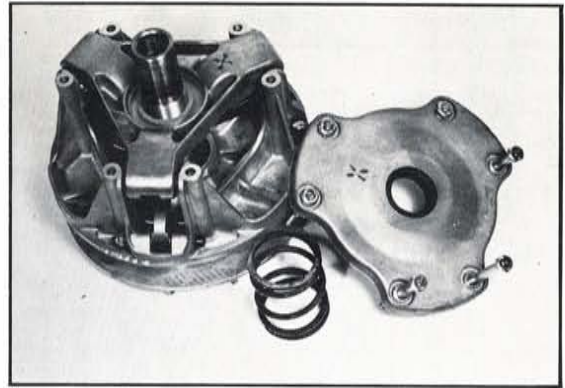


- 10. Use a pin punch to remove the roller pins. Care should be taken not to damage the bearing surface of the new roller when reassembling.

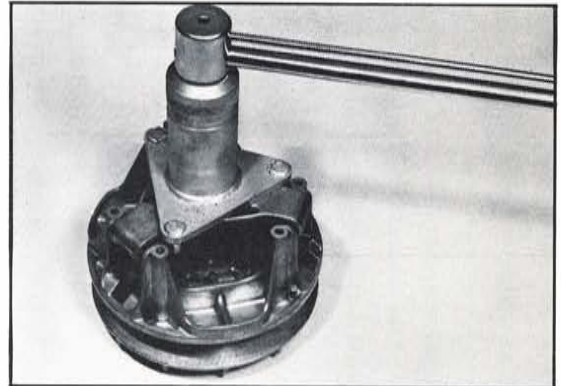




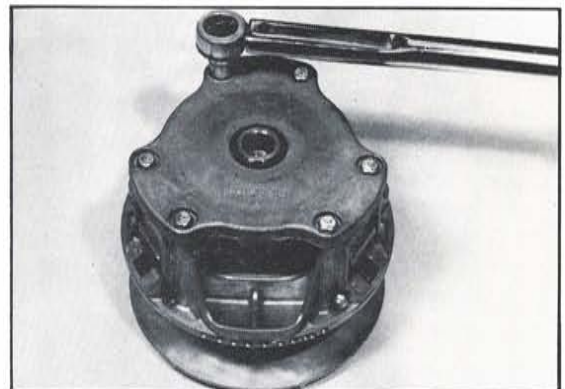
11. Assemble the drive clutch keeping "X" marks in alignment. (Sequence — "X" mark cover, Alcoa spider, "X" mark under weight.)  
NOTE: Spacer washers must be installed under spider.



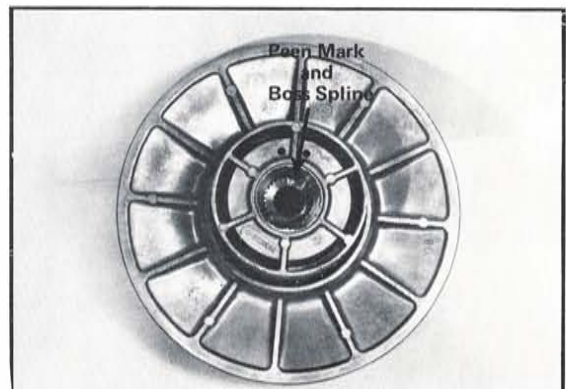
12. Torque the spider to 200 ft./lbs. using the holding fixture and spider tool.

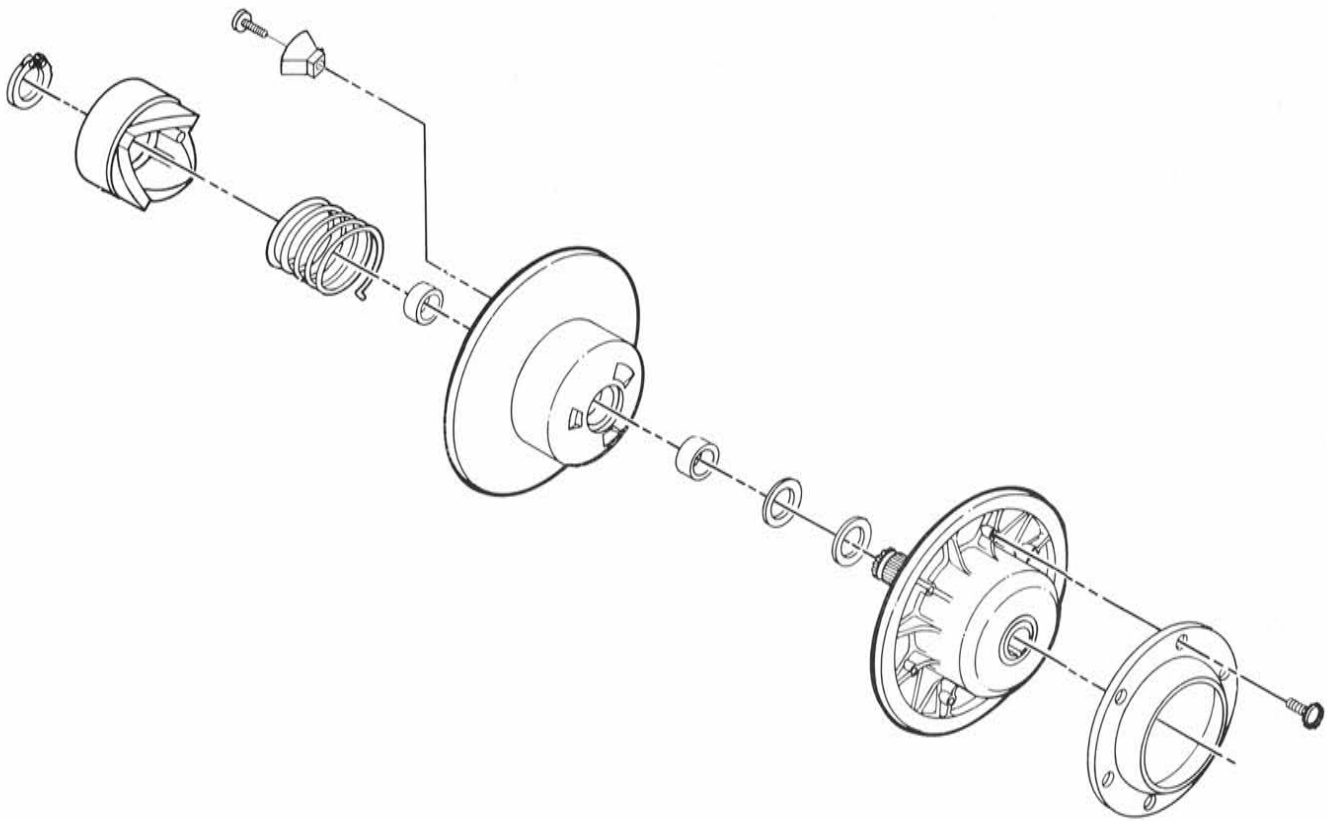


13. Install the clutch spring. Align the cover "X" mark with other marks and torque the cover bolts to 90 in./lbs.



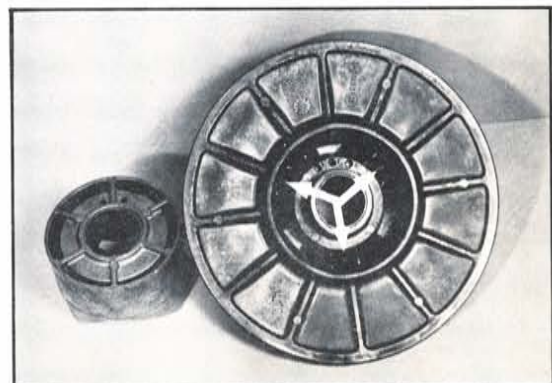
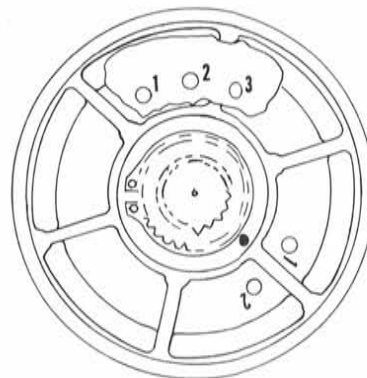
14. When disassembling the driven clutch, notice the peened mark. This is to insure proper alignment during reassembly. Later production will have boss splines to insure correct alignment. Remove the snap ring retainer.





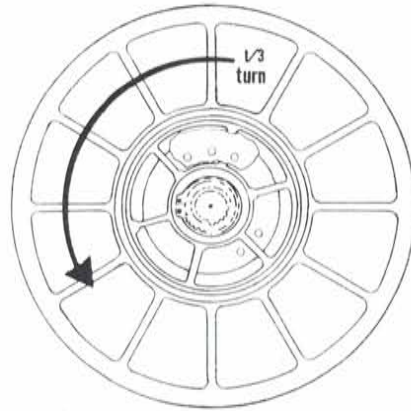
15. The driven clutch, helix/movable assembly has several different spring locations which effect clutch shifting and RPM's. The tightest or most spring tension will usually tend to raise engine RPM's during clutch upshift and allow quicker backshift or downshift when pulling or negotiating a hill, etc. The lesser tension position will tend to have a slower downshift and a harder upshift.

Example:	Helix	Movable Sheave	Spring Tension
Spring/ Position	2	—	1
	2	—	2
	1	—	1
	2	—	3
	1	—	2
	1	—	3
			Heavy
			↕
			Soft

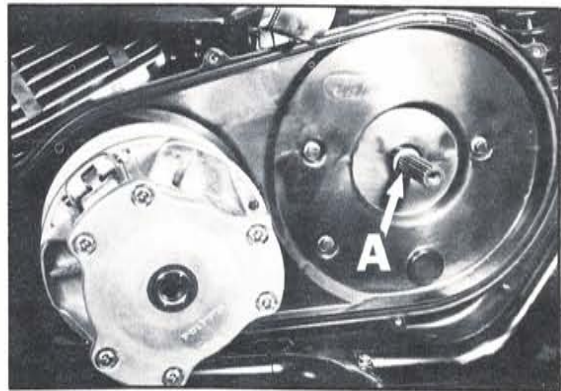


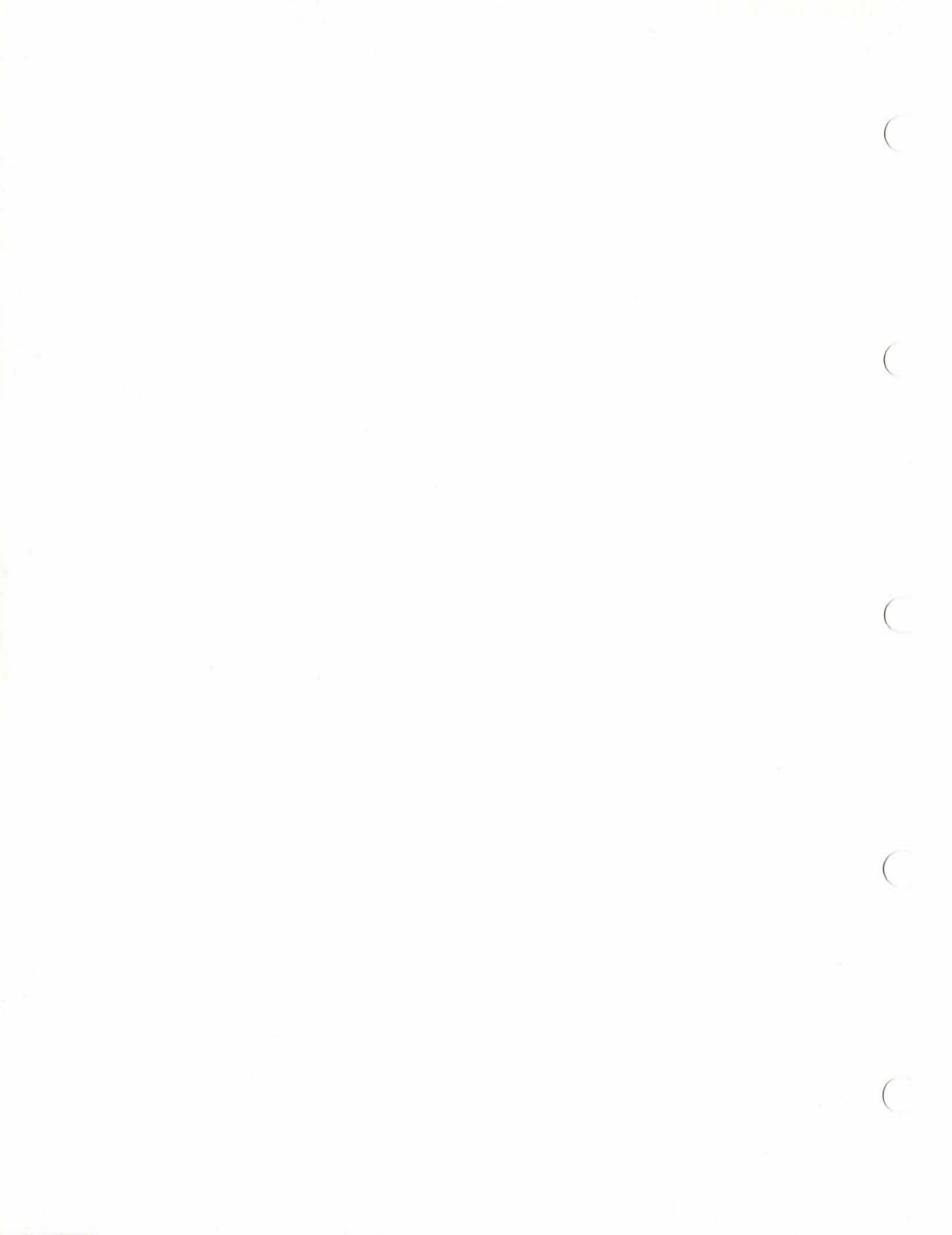
16. The driven clutch ramp buttons are secured by Torx screws. The ramp buttons should be replaced when worn.

17. After rebuilding, the driven clutch can be reassembled.
- NOTE: Preload on the driven spring from any of the various spring positions is  $1/3$  turn, preload tension.



18. Install the clutches. Add spacer washers between the driven clutch and the output bearing to maintain a  $1/2$ " offset (A).





# Engine

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Engine Removal & Service	7-2 - 7-8
Carburetion	7-9 - 7-16
Oil Pump	7-17
Air Cleaner	7-18

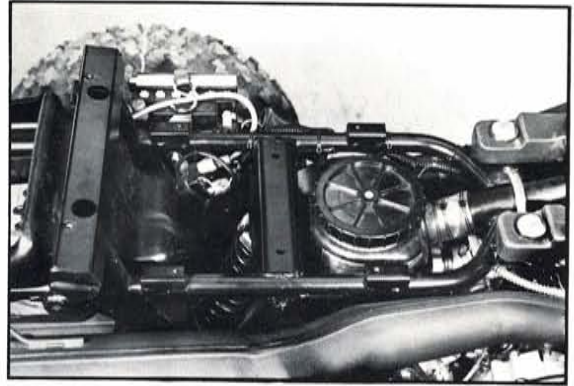
## SPECIAL TOOLS

<u>PART NUMBER</u>	<u>DESCRIPTION</u>
2870303	Cylinder Hone
2870588	Honing Oil
2870306	Oversize Stone/Coarse
2870307	Oversize Stone/Fine
2870386	Piston Pin Puller
2870390	Piston Support Block
2870159	Flywheel Puller
3080706	Puller Bolts
2870587	515 Gasket Eliminator
2870601	Loctite Gasket Chisel

<b>ENGINE SPECIFICATIONS</b>	
<b>Engine</b>	<b>Polaris – Two Cycle</b>
<b>Displacement</b>	<b>244cc Single Cylinder</b>
<b>Bore/Stroke</b>	<b>70 x 60mm</b>
<b>Lubrication</b>	<b>Oil Injection</b>
<b>Cooling</b>	<b>Free Air</b>
<b>Starter</b>	<b>12 Volt Electric w/Manual Recoil</b>
<b>Ignition</b>	<b>C.D.I.</b>
<b>Ignition Timing</b>	<b>23.5° @ 3000 – 18° @ 6000</b>
<b>Spark Plug</b>	<b>RN-4YC</b>
<b>Piston Ring</b>	<b>2 Keystone 1.5mm</b>
<b>End Gap</b>	<b>.008" – .016"</b>
<b>Alternator</b>	<b>100 Watt</b>
<b>Fuel</b>	<b>88 R + <math>\frac{M}{2}</math> Octane Min. Leaded or Unleaded</b>

## ENGINE REMOVAL

1. Remove the rear rack and rear cab assembly. Remove the exhaust system. Remove the air box.



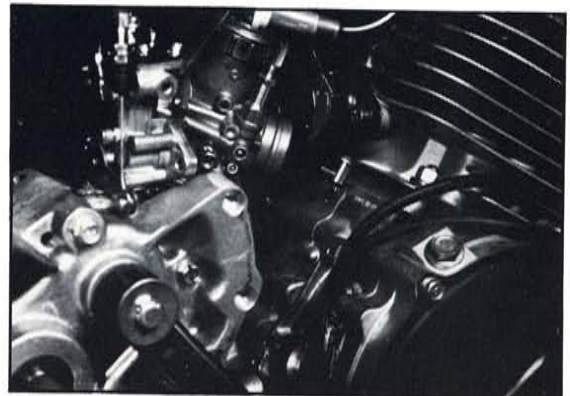
2. Remove the outer cover and drive and driven clutches.



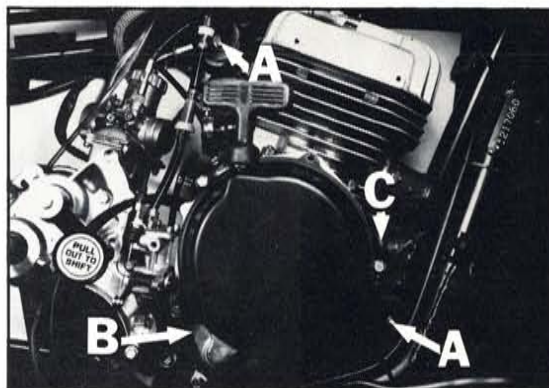
3. Remove inner cover.



4. Remove the carburetor and oil pump assemblies. It is not necessary to disconnect cables on the carburetor or fuel pump.



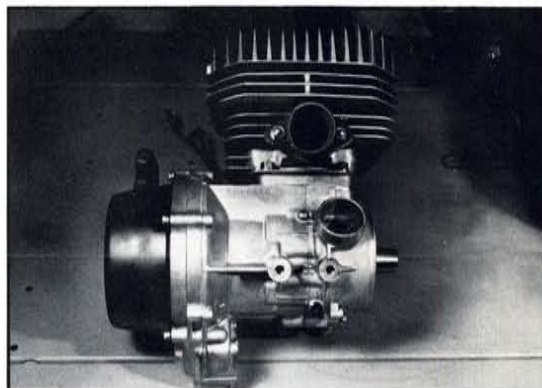
5. Remove the motor mount nuts (A).  
**NOTE:** It is necessary to also loosen the two (2) bracket mount bolts so the mount can swing down (B).  
 For easier removal and installation, slide the P.V.T. sealer boot forward (C).



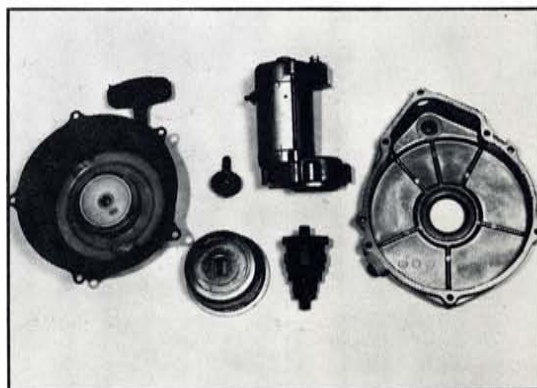
6. Unplug the spark plug wire from the spark plug. Disconnect the negative (-) cable lead from the engine. Disconnect the positive (+) lead from the solenoid. (Solenoid to starting motor)



7. Remove the engine from the frame.

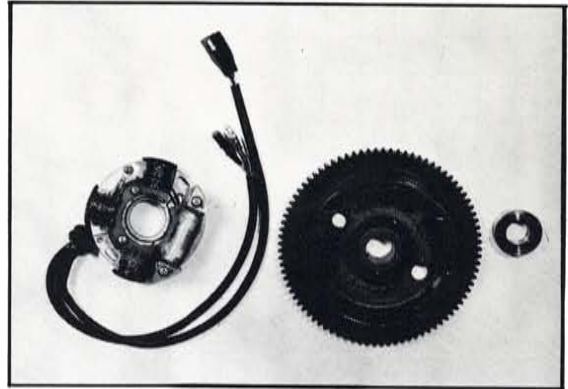


8. Remove the recoil housing, recoil starting pulley and magneto housing. Remove the starter motor from the crankcase.

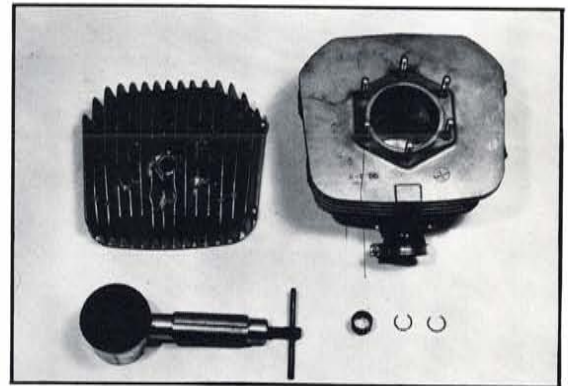




9. Remove the flywheel nut and pull the flywheel with puller PN 2870159. Remove the magneto assembly.



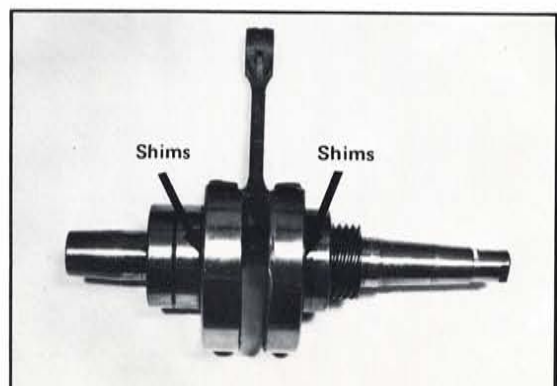
10. Remove the cylinder head and cylinder. Remove the piston pin clips. Use piston pin puller, PN 2870386, to remove the wrist pin from the piston.



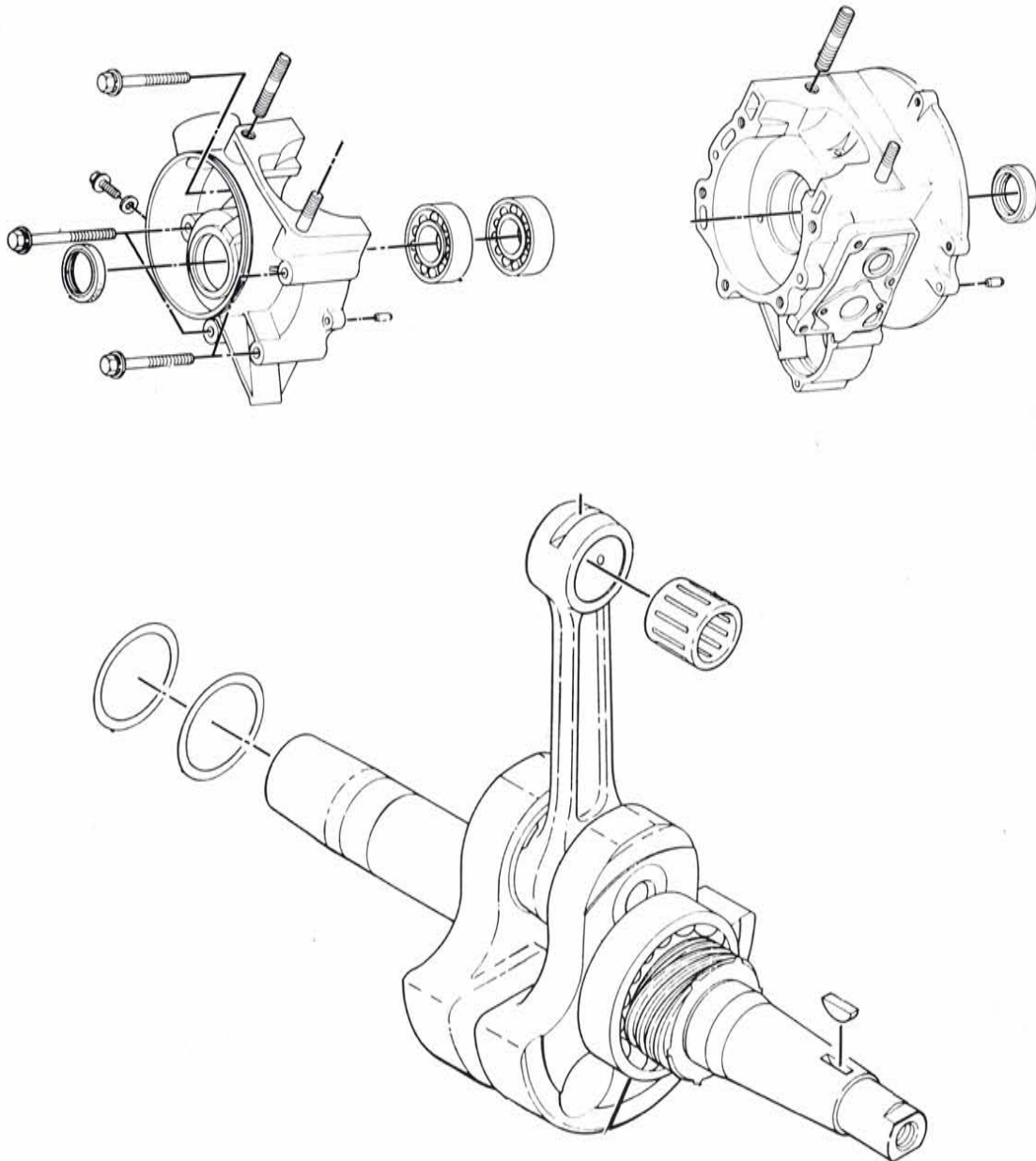
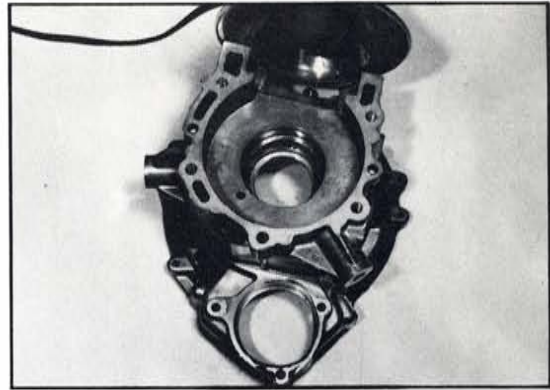
11. Remove the crankcase retaining bolts. Tap the case with a plastic hammer to split the case halves.



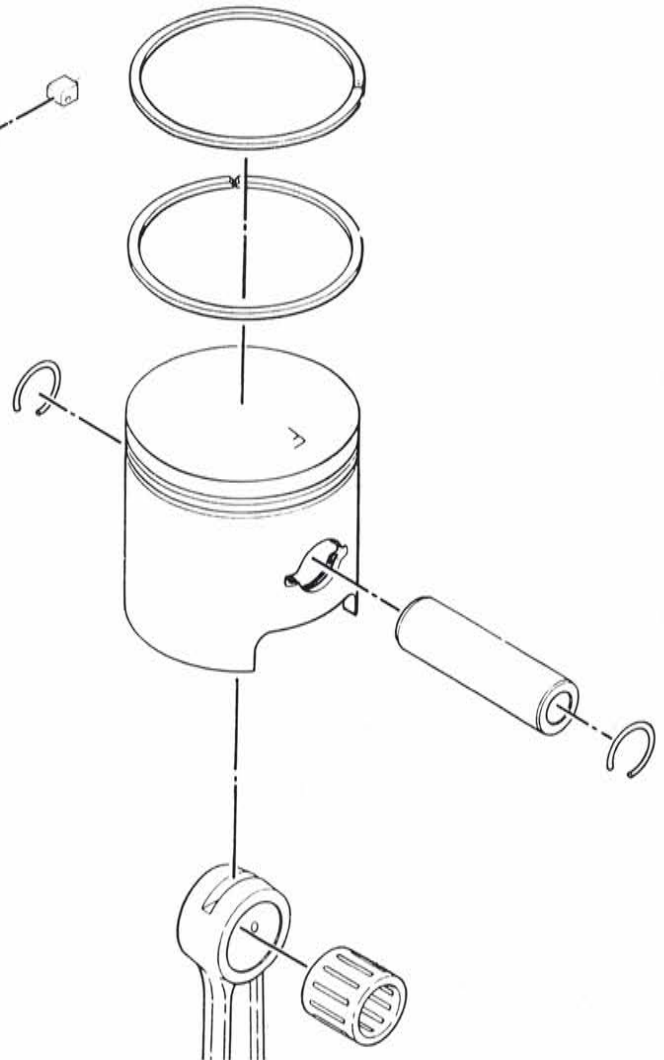
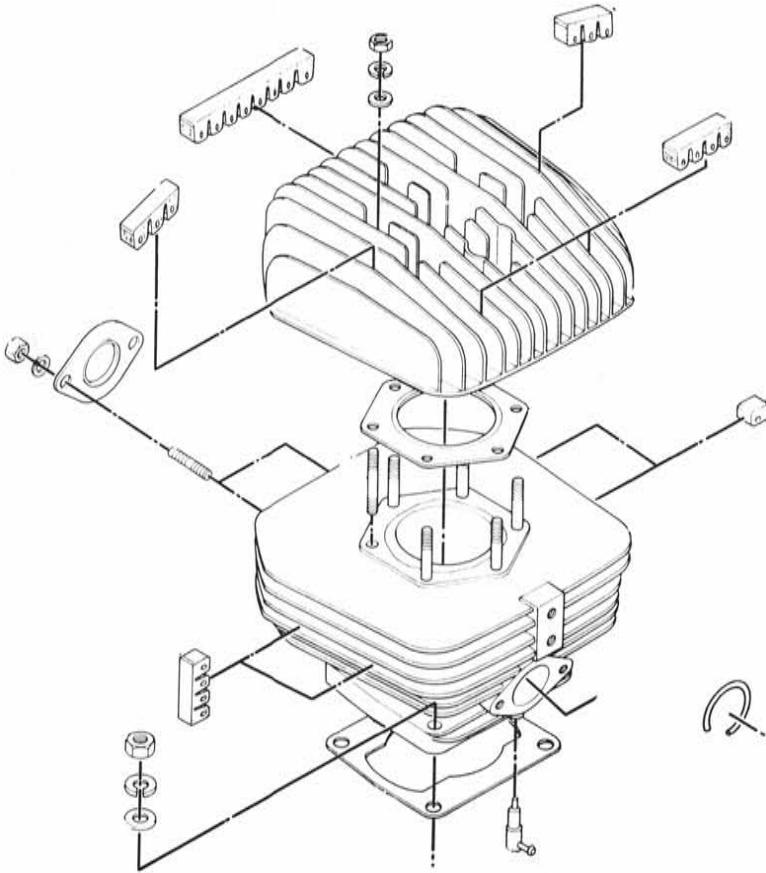
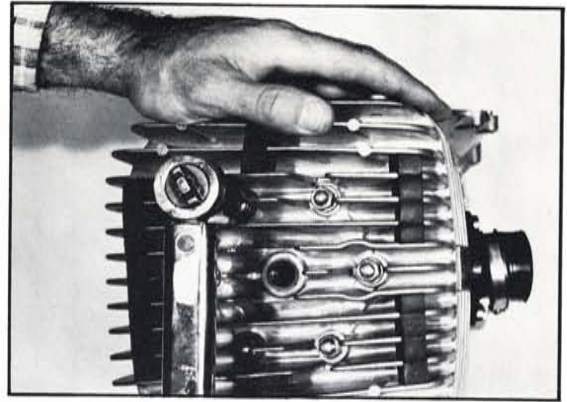
12. There are spacer shims, used to control crankshaft end play between bearings and crankwheel.



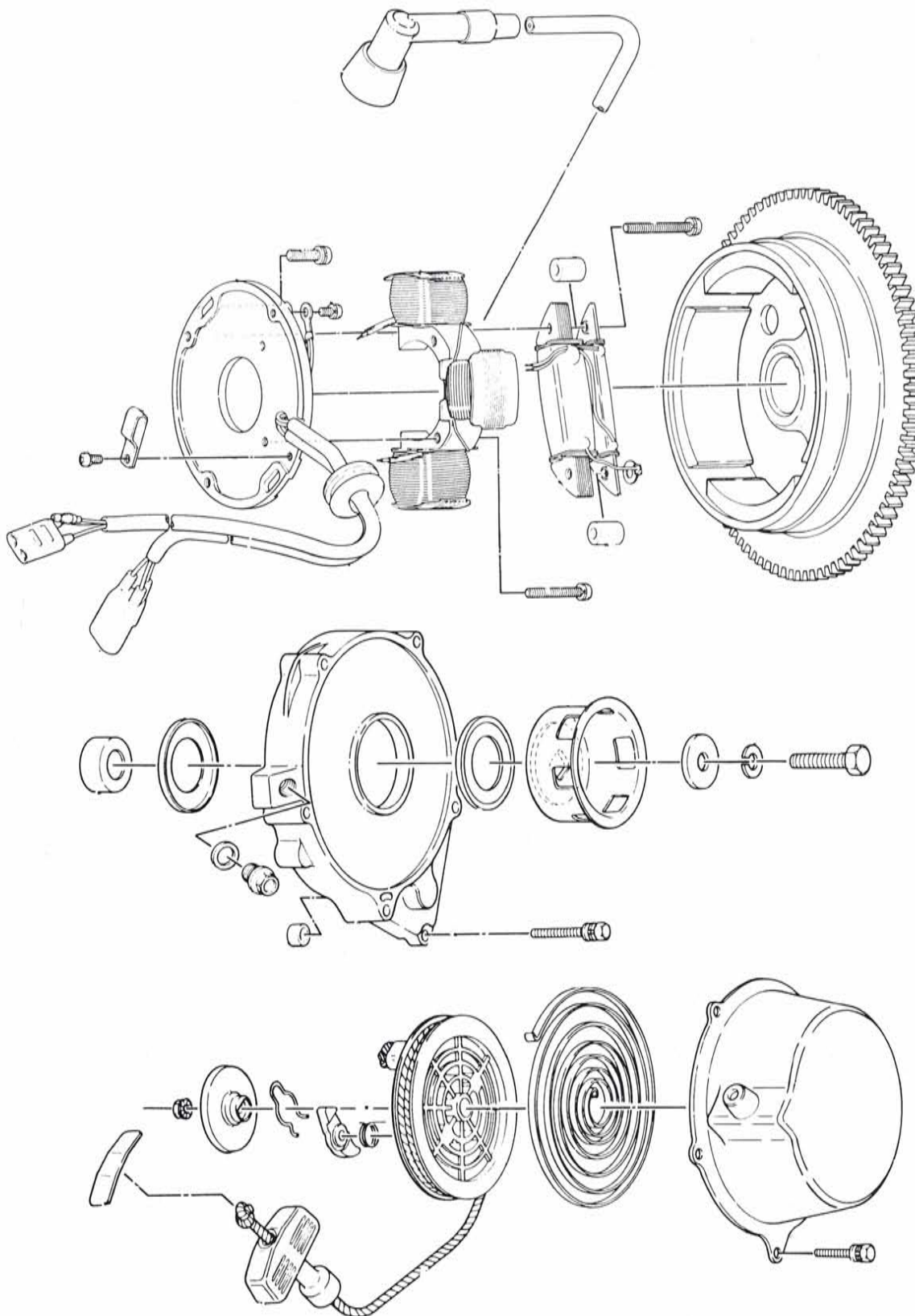
13. When reassembling, heat the case halves. This will allow the crankcase to expand, making assembly much easier. After the crankshaft is installed into one half of the case an appropriate sealer should be applied to the sealing surface. The end seals should be installed after the crankcase is assembled. Torque crankcase bolts to 17 ft./lbs.



14. Install the piston onto the rod with the "F" marking or → to the magneto side of the engine. Install the piston pin clips. Install the cylinder base gasket, cylinder, head gasket and head. Torque the head bolts to 20 ft./lbs.



15. Install the stator plate and flywheel assembly. Install the magneto housing. Torque the flywheel bolt to 38 ft./lbs. Install the recoil starter assembly. Use a waterproof sealer to seal the wire harness on the crankcase. Install the starter motor.



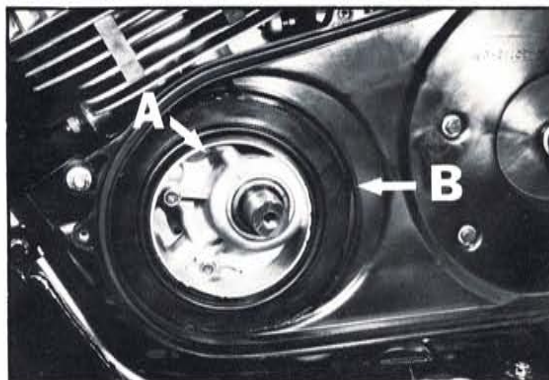
16. The engine can be reinstalled into the frame and secured. The oil pump and carburetor can also be assembled onto the engine. The oil pump should be bled of trapped air by loosening the bleed screw (A) for a few seconds, then retighten. Install the air box and filter element.



17. **NOTE:** Make sure the overflow tube from the carburetor is routed to the upper part of the frame (A).

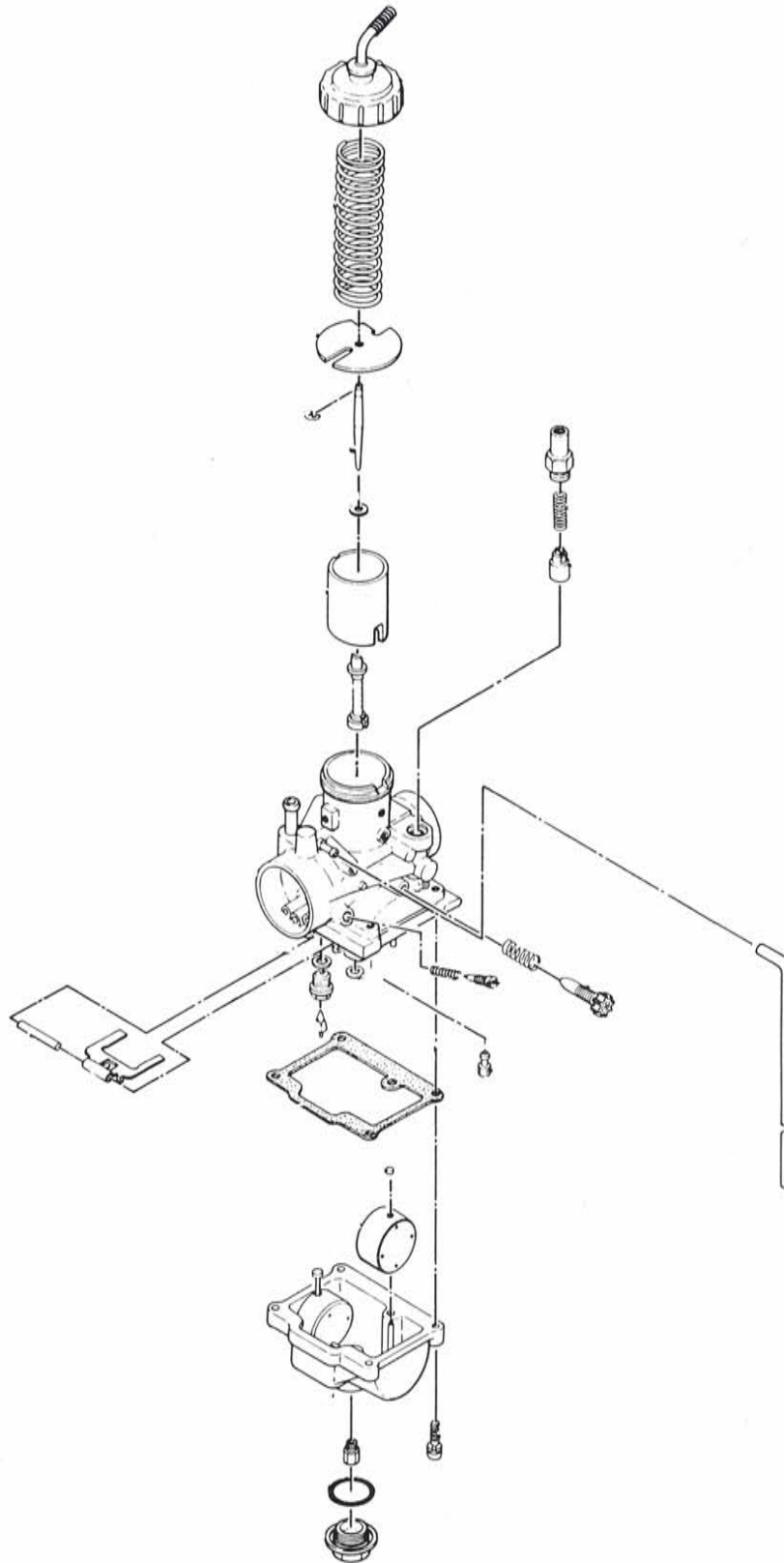


18. Install the rear cover, using Black Max sealer between the engine and the engine seal (A). Use R.V. type silicone between the engine seal and the inner clutch cover (B). Be sure to install the small seal behind the inner clutch cover at the input shaft.



19. Install the drive system. Torque the drive clutch bolt to 40 ft./lbs. Use R.V. silicone on the outer sealing area of the cover mating surfaces. Join the duct outlets with the sealing boot. Panduit the boot to insure proper sealing. See P.V.T. system for proper clutch alignment.





SPECIFICATIONS	
Model	Mikuni VM30SS
Main Jet	155
Pilot Jet	30
Jet Needle	5DP7-3
Needle Jet	O-6 (169)
Throttle Valve	2.5 Cut Away
Air Screw	1 Turn

### FUNCTION OF A CARBURETOR

The function of a carburetor is to produce combustible air-fuel mixture, by breaking fuel into tiny particles (in the form of vapor) and by mixing the fuel with air in a proper ratio, and to deliver the mixture to the engine. A proper ratio (mixture ratio or air-fuel ratio) means an ideal air-fuel mixture that can burn without leaving an excess of fuel or air. Whether the proper mixture ratio is maintained or not holds the key to the efficient engine operation.

### FUNCTIONS AND CONSTRUCTION

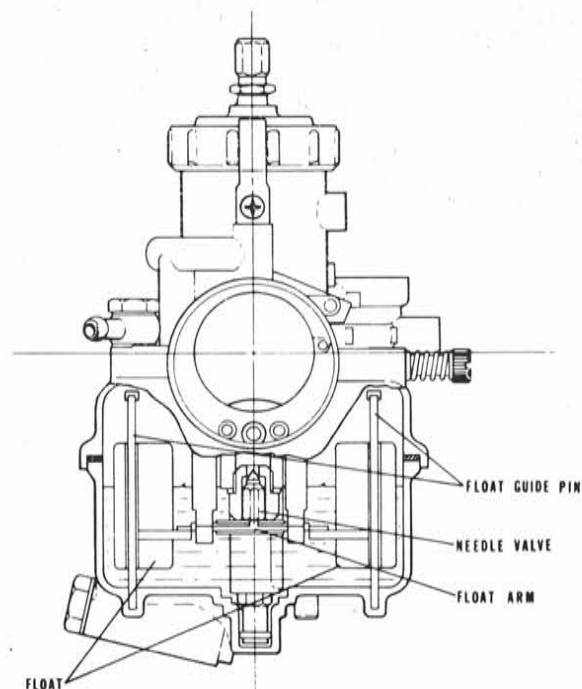
The engine of a vehicle is operated under a wide range of conditions, from idling with the throttle valve remaining almost closed to the full load (the maximum output) with the throttle valve fully opened. In order to meet the requirements for the proper mixture ratio under these varying conditions, a low-speed fuel system (the pilot system) and a main fuel system (the main system) are provided in Mikuni VM-type carburetors.

The Mikuni carburetor has varying operations depending upon varying driving conditions. It is constructed with the float system, the pilot system, the main system, and the starter system (initial starting device).

#### FLOAT SYSTEM – No. 1

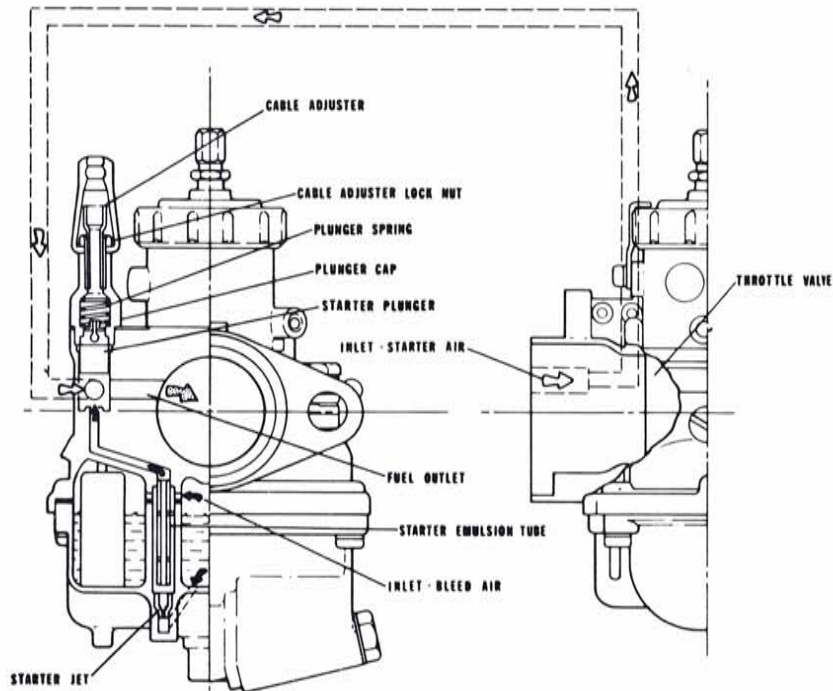
The float system is designed to maintain a constant height of gasoline during operation. When the fuel flowing from the fuel pump into the float chamber through the needle valve reaches the constant fuel level, the floats rise. When the buoyancy of the float and the fuel pressure of the fuel pump balance, the needle valve sticks fast to the needle seat preventing further delivery of gasoline, thereby holding the standard level of gasoline.

The fuel level in the bowl controls the amount of fuel in the fuel mixture. Too high a level allows more fuel than necessary to leave the nozzle, enriching the mixture. Too low a level results in a leaner mixture, as not enough fuel leaves the nozzle. Therefore, the predetermined fuel level should not be changed arbitrarily.



STARTER SYSTEM – No. 2

Starting device (starter system) – In the place of the choke, the starter system is employed for Mikuni carburetors. In the starter type, fuel and air for starting the engine are metered with entirely independent jets. The fuel metered in the starter jet is mixed with air and is broken into tiny particles in the emulsion tube. The mixture then flows into the plunger area, mixes again with air coming from the air intake port for starting and is delivered to the engine in the optimum air-fuel ratio through the fuel discharge nozzle. The starter is opened and closed by means of the starter plunger. Since the starter type is constructed so as to utilize the negative pressure of the inlet pipe, it is important that the throttle valve is closed when starting the engine.



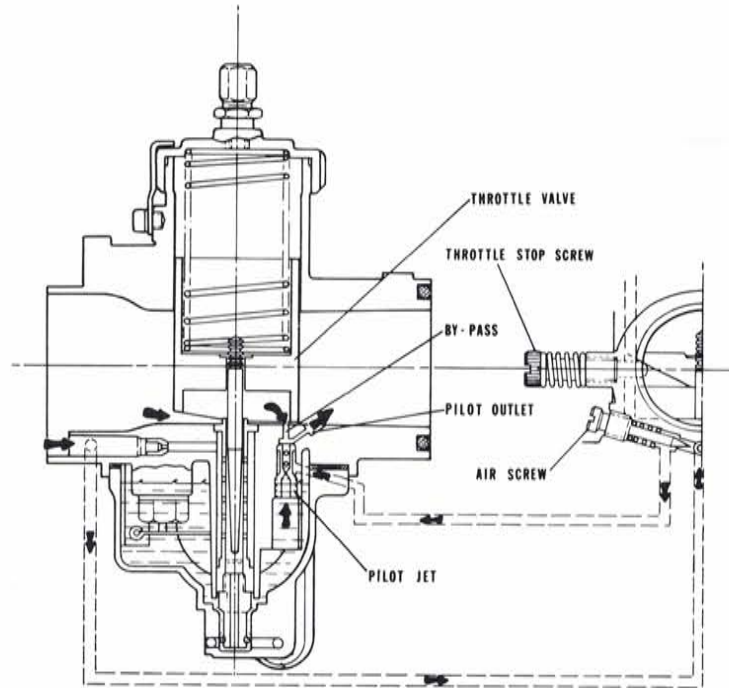


## PILOT SYSTEM – No. 3

The pilot system's main function is that of a low speed jet, to meter fuel at idle and low speed driving. Though its main function is to supply fuel at low speed, it does feed fuel continuously throughout the entire operating range.

Fuel for pilot jet is drawn from the float bowl, mixed with air regulated by the air screw, and delivered to the engine through the pilot outlet.

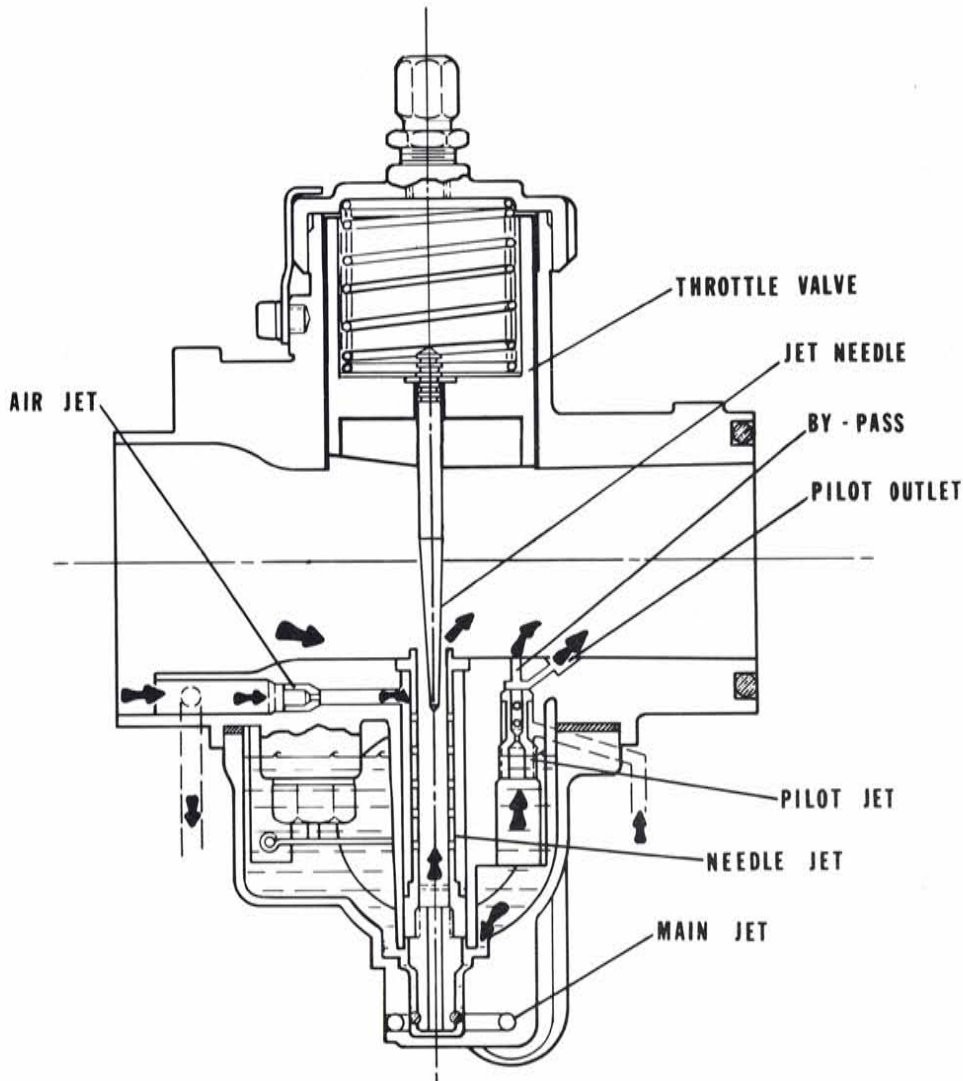
The mixture is regulated to some degree by adjusting the air screw. When the air screw is closed, the fuel mixture is made richer as the amount of air is reduced. When the air screw is opened, the mixture is leaned as the amount of air is increased.

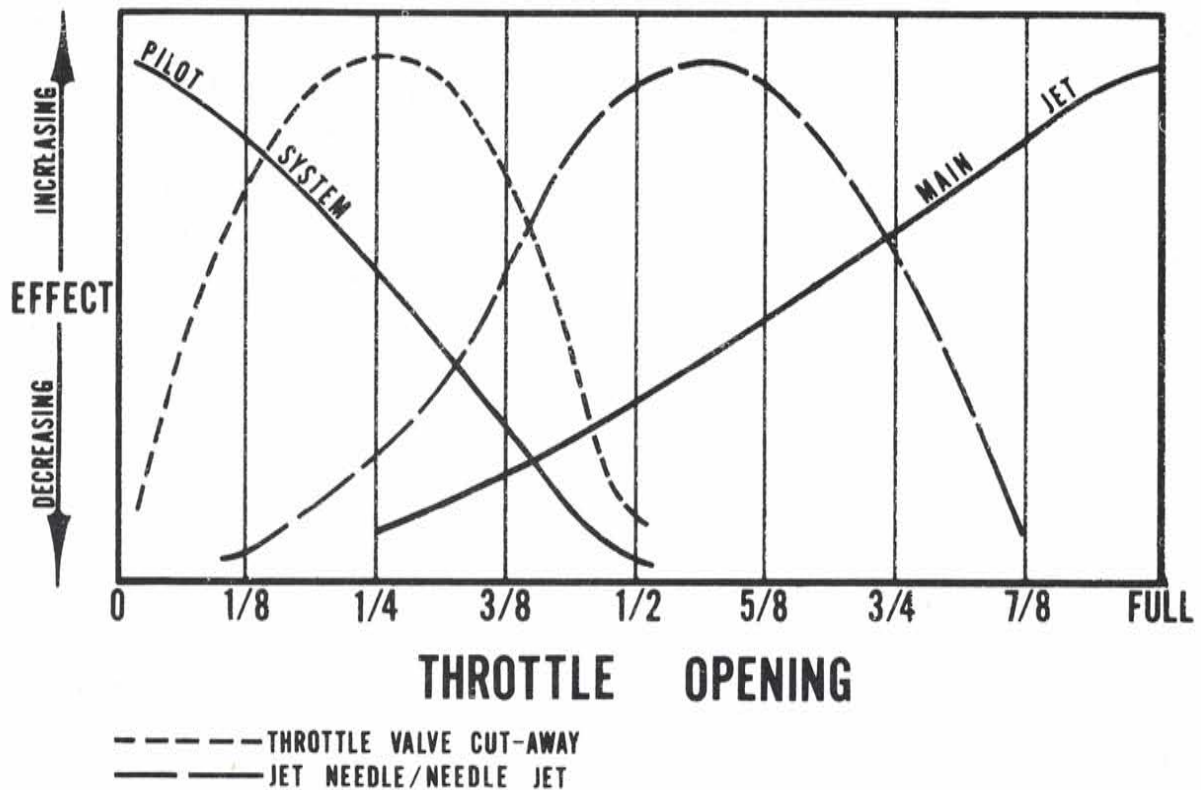


MAIN SYSTEM – No. 4

The main system is designed for delivering fuel between low speed and high speed operation. This system is made up of the jet needle, needle jet, and main jet. The main system begins to take effect as soon as there is enough air flow into the carburetor venturi to draw fuel up through the main jet and needle jet assembly.

During low-speed driving there is very little clearance between the jet needle and the needle jet; therefore, very little fuel from the main jet can pass between the jet needle and the needle jet. As the throttle valve opening is increased, the tapered jet needle is raised farther out of the needle jet, allowing greater fuel flow. Under full throttle opening, the cross-sectioned area of clearance between the jet needle and the needle jet becomes greater than the cross-sectioned area of the main jet. Thus the main jet is now controlling the amount of fuel flow.





The preceding throttle opening chart demonstrates component relationship to fuel flow versus throttle valve opening.

————— Pilot System

The pilot system's main function is that of a low speed jet. Its most effective range of fuel delivery is from idle to approximately 3/8 throttle valve opening.

- - - - - Throttle Valve Cutaway

The throttle valve controls the rate of engine air by its movement up and down in the carburetor venturi. At small throttle openings the air flow is regulated chiefly by the valve cutaway as shown, with its greatest effectiveness at 1/4 throttle opening. Throttle valves are number 1.0, 1.5, 2.0, etc., according to the size of the cutaway. Decreasing the cutaway number will increase the amount of fuel delivered in its effective range.

————— Jet Needle/Needle Jet

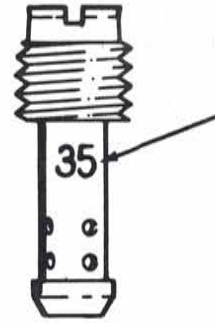
The jet needle and needle jet have an effective operating range from approximately 1/8 to 7/8 throttle opening. The amount of fuel delivered during this range relies upon the jet needle clip position, as well as the needle jet size and other specifications.

————— Main Jet

The main jet affects fuel delivery at 1/4 throttle and consistently increases to full throttle opening.

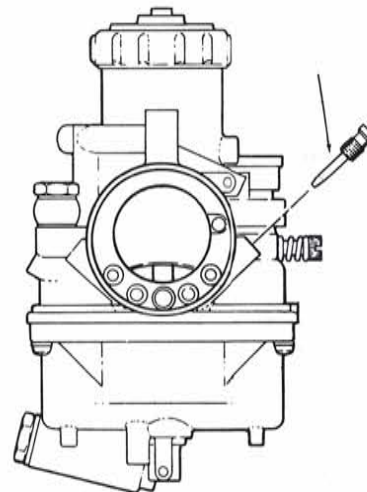
**PILOT JET**

From idling to low speeds, the fuel supply is measured out chiefly by the pilot jet. In the sides of the pilot jet, there are several air bleed openings which serve the same purpose as the air bleed in the needle jet, that is, to reduce the fuel to mist. The number stamped on the jet is an indication of the amount of fuel in cc's which passes through the jet during a one minute interval under a given set of conditions.



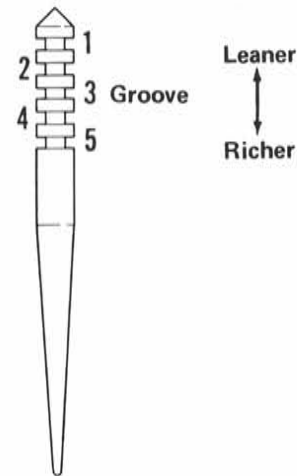
**PILOT AIR SCREW**

This air screw controls the mixture from idling to low speeds. The tapered tip of the air screw projects into the air passage leading to the pilot jet air bleeds, and by turning the screw in or out, the cross-sectional area of the air passage is varied, in turn varying the pilot jet air supply and changing the mixture ratio.



**JET NEEDLE**

The jet needle has 5 grooves for adjustment cut in the upper portion, and is tapered from approximately the middle of the needle to the lower end. The top is fixed to the center of the throttle valve by the needle clip, and the tapered end extends into the needle jet. Fuel flows through the space between the needle jet and jet needle, which space is unvarying until the throttle reaches the 1/4 open point. At this time the tapered portion of the needle begins to move out of the jet and affect fuel flow as the opening enlarges. It follows that taper wear, and the position of the needle clip in the grooves also affect fuel flow rate. If the needle clip is changed from the standard position to a lower groove, the needle taper starts coming out of the jet sooner, resulting in a richer mixture; moving the clip higher produces a leaner mixture.



**NEEDLE JET**

The needle jet works in conjunction with the jet needle to regulate fuel flow rate.

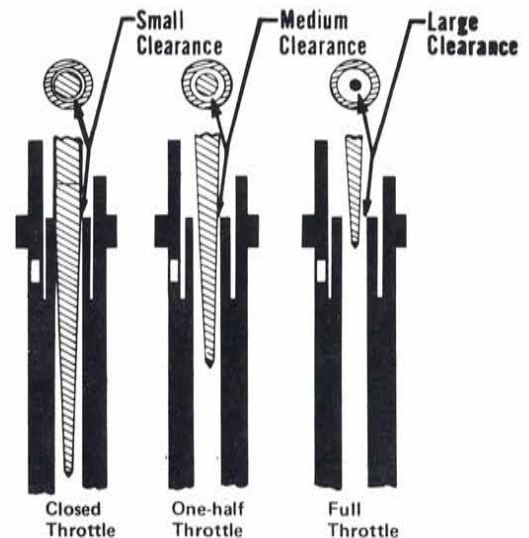
In the side of the needle jet, there is an air bleed opening which brings in air measured by the air jet. This air initiates the mixing and atomizing process inside the needle jet, and mixing is augmented by a projection at the needle jet outlet, called the primary choke.

The letter number code stamped on the jet indicates jet inside diameter.



**THROTTLE OPENING VS FUEL FLOW**

In the full throttle condition, the cross-sectioned area between the jet needle and the needle jet is larger than the cross-sectioned area of the main jet; therefore, the main jet has greater control over fuel flow.



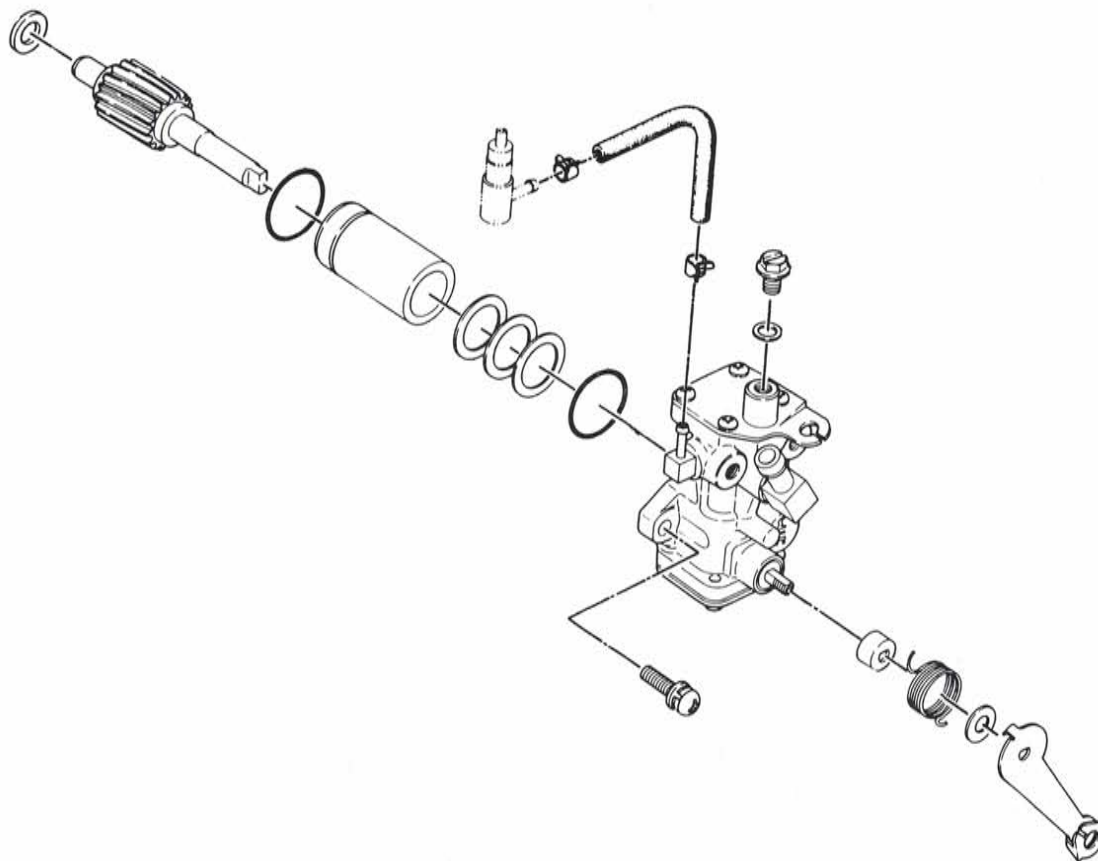
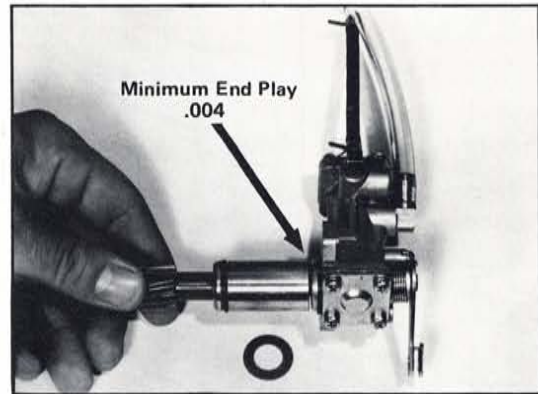
OIL PUMP

The oil pump is a positive displacement type pump. If the oil pump bushing, oil pump, or crankcase are replaced, the end play clearance must be checked. A minimum of .004 is recommended between the oil pump boss and the bushing in the crankcase.

Available spacers:

- Spacer 1. .15mm – .006"
- Spacer 2. .3mm – .012"
- Spacer 3. .6mm – .024"

If pump gear end play is excessive, a noticeable engine noise will occur.



## AIR CLEANER

### Cleaning the Filter

#### Important:

Whenever the air filter is cleaned, observe the following practices.

- A. Never immerse the filter in water as dirt can be transferred to the clean air side of the filter.
- B. If compressed air is used, never exceed a pressure of 40 psi. Always use a dispersion type nozzle to prevent filter damage and clean from the inside of the filter.



### Dust Contamination

1. Tap the filter lightly to remove large particles.
2. Rinse the filter under a faucet directing the water to the **inside** of the filter.
3. Dry the filter thoroughly.

**NOTE:** The filter can also be cleaned using compressed air following the precautions mentioned above.

### Cleaning a Filter with Oil Contamination

If the filter is contaminated with oil it may also be cleaned as follows:

1. Use a mild soap and warm water solution.
2. Wash the outside of the filter only. Take care so dirty water does not contaminate the "clean air" or inside of the filter.
3. Rinse the filter from the inside with warm water.
4. Dry thoroughly.

**NOTE:** Clean the filter every 25 hours of operation and install a new filter every 100 hours. The importance of a clean serviceable air filter cannot be over emphasized. If the filter is not serviced properly, poor performance, shortened engine life and other problems will result!

### Installation

1. Inspect the gasket on the lower end of the filter, replacing if damaged.
2. Install the filter into the air cleaner. Coat the top of the filter with a light film of grease.
3. Install the filter cover, tightening securely by hand.
4. Reinstall the support bracket, taking care to note the correct entry of the bracket into the ribs provided on the air cleaner cover.
5. Reinstall the seat.

**NOTE:** Replace the air filter every 100 hours.

#### **WARNING:**

Never operate the vehicle with the air filter removed as dust will enter the engine.





# Electrical

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General Specifications 8-1

Engine Timing 8-1 – 8-3

Ignition System Test Sequence 8-4 – 8-5

Battery Maintenance & Testing 8-6 – 8-7

Charging System Testing 8-8

Cranking System Testing 8-9 – 8-10

Starter Motor Exploded View 8-11

Wiring Schematic Diagram 8-12

Special Service Tools

Fluke 73 Multitester PN 2870659

## BODY ELECTRICAL

Machine Model	Alternator Output	Headlight Wattage	Taillight Wattage	Battery
Scrambler	100 Watt	45 Watt 45/45 Stanley	5 Watt/GE 168	12 V. 14 Amp Hr.
Trail Boss	100 Watt	45 Watt 45/45 Stanley	5 Watt/GE 168	12 V. 14 Amp Hr.

## ENGINE ELECTRICAL

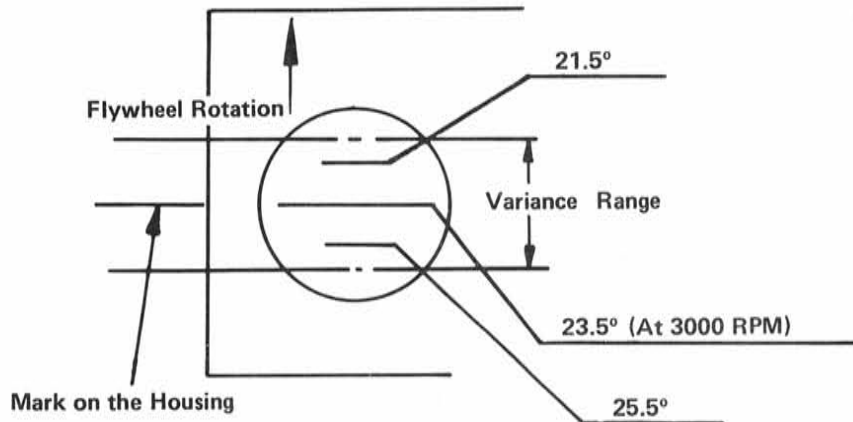
Engine Model EC-25PF	Ign. Coil Primary	Ign. Coil Secondary	Magneto – Stator			Spark Plug	Spark Plug Gap
			Exciter	Pulser	Lighting		
Ohms Res.	0.3 $\Omega$	6.3k $\Omega$	120 $\Omega$	23 $\Omega$	0.47 $\Omega$	Champion RN4YC	.020"
Test Connections	Black/Yellow to Engine Ground	Sec. Cable to Eng. Ground	Brown/White to White	Black/Red to Brown/White	Yellow/Red to Yellow	NGK BPR8ES	.020"

## IGNITION TIMING WITH LIGHTS ON

	Degree	Inches	MM
3000 RPM	23.5° $\pm$ 3°	.1139	3.0871
6000 RPM	18° $\pm$ 3°	.0719	1.8269

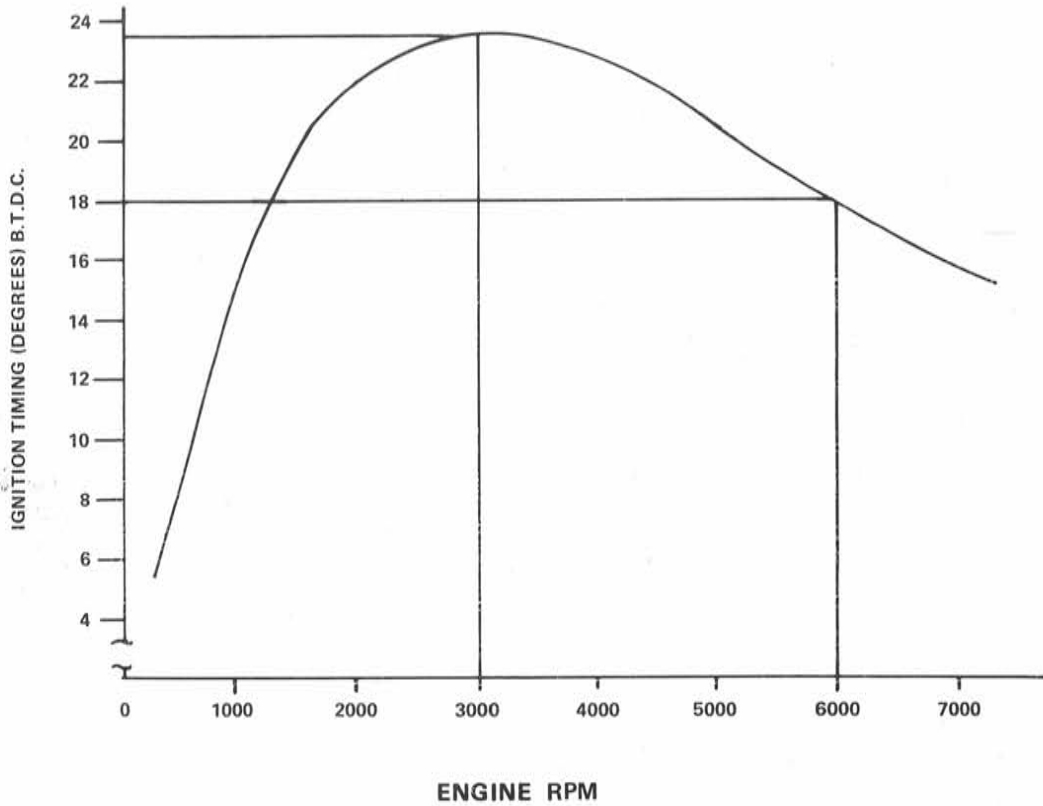
## Timing Check Procedure

- a) The ignition timing check hole is in the magneto housing.
- b) The ignition timing marks are punched on the outside of the flywheel.
  1. Set engine speed to 3000 ( $\pm$  200) rpm. (transmission in neutral)
  2. Run the engine for about 5 minutes, direct the timing light at the ignition timing check hole, and check the ignition timing. (See Fig.)



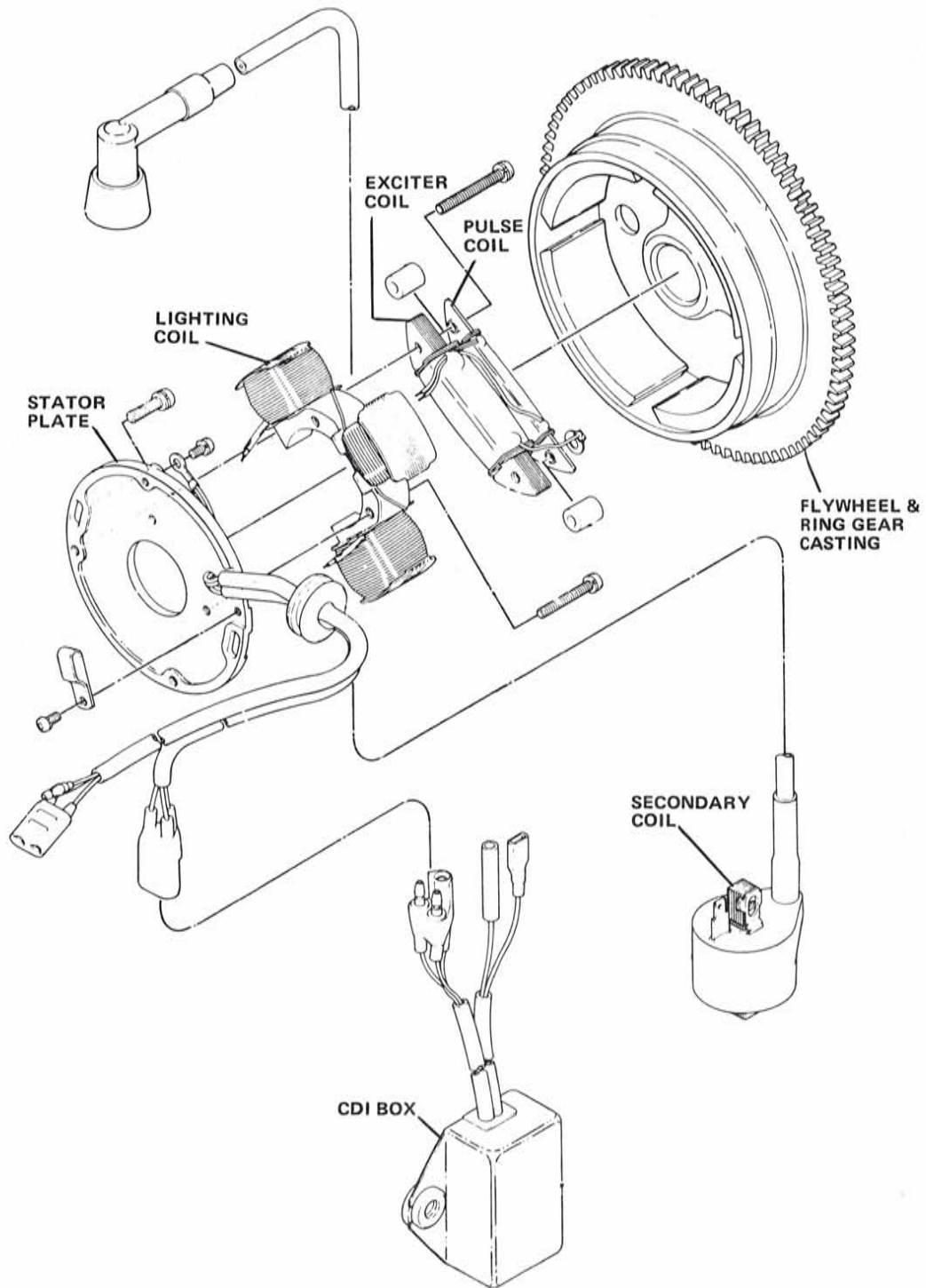
3. If the ignition timing is not within the specified range, adjust the stator plate position as described below.
  - (1) Remove the recoil starter and starter pulley.
  - (2) Remove the magneto housing.
  - (3) Remove the flywheel.
  - (4) Loosen the stator plate screws and adjust the stator plate position. (Moving the stator plate clockwise delays the ignition timing. Moving the plate counterclockwise advances it.)

EC-25PF  
TIMING CURVE



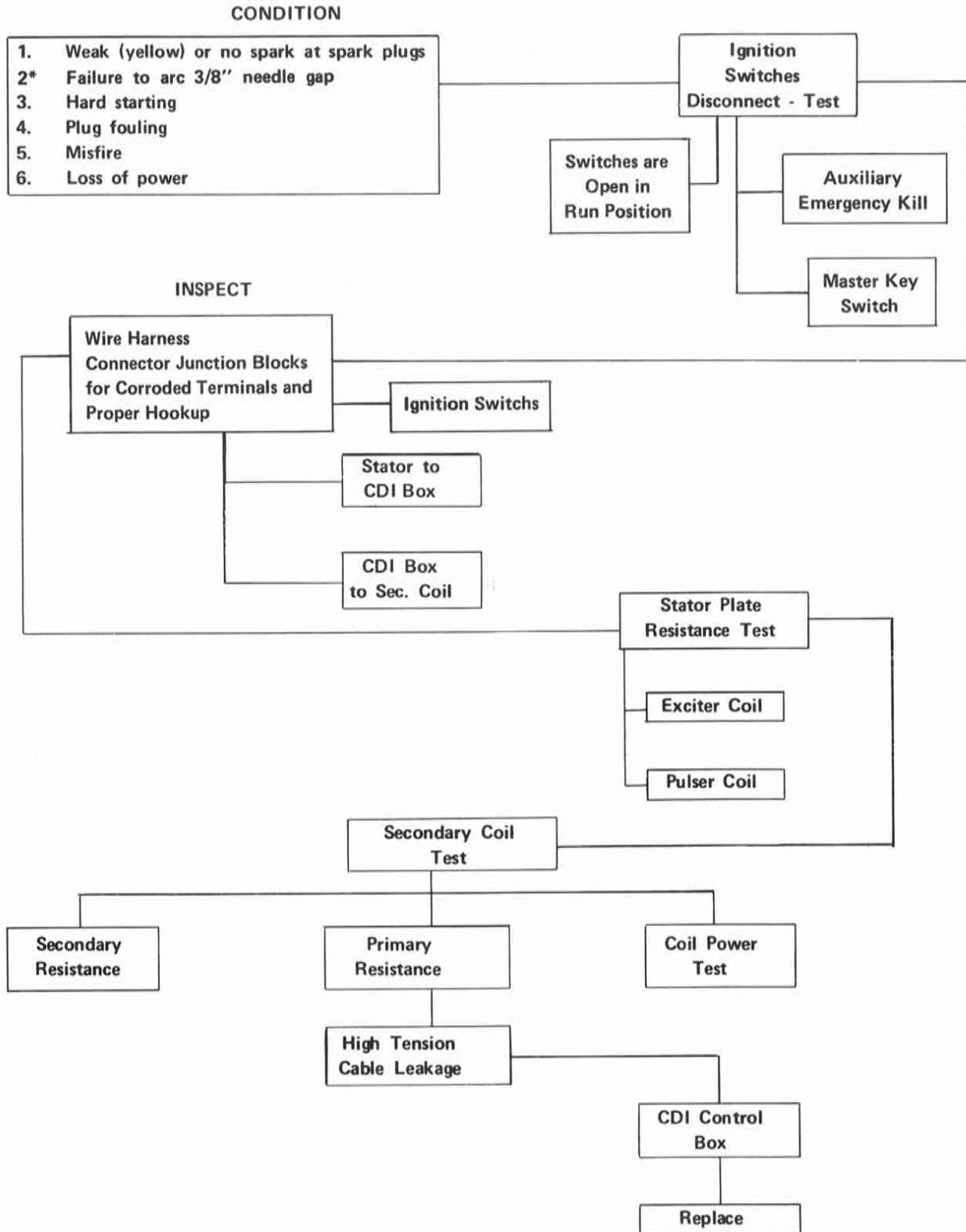
ENGINE EC25-PF		120 MM ROD		60 MM STROKE	
PISTON TRAVEL BTDC					
DEGREES	MM	INCHES	DEGREES	MM	INCHES
1	0.0057	0.0002	17	1.6318	0.0642
2	0.0228	0.0009	18	1.8269	0.0719
3	0.0514	0.0020	19	2.0326	0.0800
4	0.0913	0.0036	20	2.2487	0.0885
5	0.1426	0.0056	21	2.4752	0.0974
6	0.2053	0.0081	22	2.7119	0.1068
7	0.2793	0.0110	23	2.9587	0.1165
8	0.3646	0.0144	24	3.2156	0.1266
9	0.4612	0.0182	25	3.4824	0.1371
10	0.5689	0.0224	26	3.7590	0.1480
11	0.6878	0.0271	27	4.0452	0.1593
12	0.8178	0.0322	28	4.3410	0.1709
13	0.9588	0.0377	29	4.6461	0.1829
14	1.1108	0.0437	30	4.9604	0.1953
15	1.2737	0.0501	31	5.2839	0.2080
16	1.4474	0.0570	32	5.6163	0.2211

TEST SEQUENCE



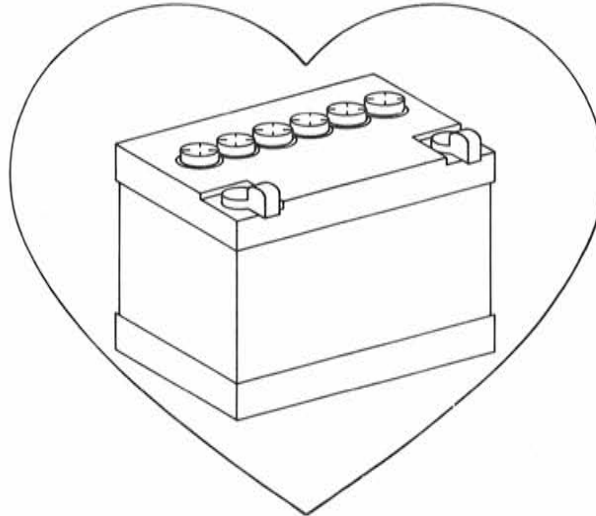
**IGNITION SYSTEM TEST SEQUENCE**

When troubleshooting an electrical problem you should first check all terminal connections to see that they are clean and tight. Also, be sure that the colors agree when the wires are connected. Use the following page as a guide for troubleshooting. The resistance values are given on the specification pages.



**BATTERY MAINTENANCE**

The battery is the heart of any electric-start system; therefore, its condition is critical to all electric-start functions. Long storage periods and high vibrations which are encountered in most ATV applications make periodic battery inspections and service essential.



The following items must be inspected and adjusted on a regular basis, or whenever this type machine enters for preventive maintenance.

**1. Battery Connections:**

**⚠ CAUTION:** Whenever performing any maintenance on the electric-start system or near the battery, always first remove the negative (–) ground cable.

If battery connections and cable ends show any signs of corrosion, they must be separated, cleaned with a soda solution, and shined with a wire brush. This will ensure a resistance-free, good connection. After cleaning and tightening, the cable connection should be coated with a petroleum grease or jelly to help retard corrosion.

**2. General Battery Cleanliness:**

The battery box or holder and battery top should always be kept free from film, dirt, or corrosion. If any of these are evident, the battery should be removed, cleaned with a soda solution, and rinsed with warm water. Keep the battery cell caps tight while washing the battery. If the soda solution should enter the battery cells, it will neutralize the electrolyte causing early battery failure. If the battery box shows signs of corrosion or rust, it should be cleaned and repainted.

**3. Battery Mountings:**

The battery should be positioned to provide adequate clearance on its four sides and top. The battery hold down must be kept tight enough to keep the battery from sliding in its holder. However, they should not be tightened to the point where the battery's plastic case is placed under a severe strain.

**⚠ CAUTION:** Whenever installing the battery cables, always make the negative (–) ground connection last.

**4. Electrolyte Level:**

The battery electrolyte level is visible through the plastic case. When the electrolyte is low, it may be brought to the indicated level with distilled water. Do not overfill the battery. Overfilling will cause a loss of electrolyte, resulting in early battery failure and poor performance. After adding water, always operate the machine or charge the battery for a period of ten minutes at 4 amps. This will mix the water with the electrolyte to keep it from freezing.

**INSPECTION**

Make a visual inspection of the battery. If the battery shows signs of abuse, such as a cracked or badly worn case, it should be replaced.

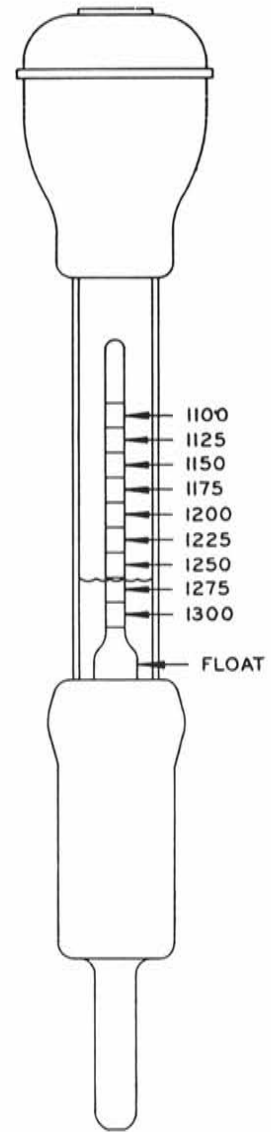
**HYDROMETER TESTS**

The lead-acid storage battery used in ATV application is a device for converting chemical energy into electrical energy.

The hydrometer measures the percentage of acid in the battery electrolyte in terms of specific gravity. As the battery drops from a charged to a discharged condition, the acid leaves the electrolyte and enters the plates which are supported in the battery. This causes a decrease in the specific gravity of the electrolyte. With the hydrometer, a test can be made indicating battery condition or state of charge. Hydrometer readings must never be taken after water has been added. For accurate hydrometer readings, the added water must be mixed with electrolyte by charging at 4 amps for 30 minutes.

Remove the six battery cell caps. With the hydrometer, draw a separate sample from each cell and record readings. The readings should not vary more than .025 specific gravity (referred to as 25 points) between cells. If cells vary 25 points or more, there is likely internal damage to the battery and it should be replaced.

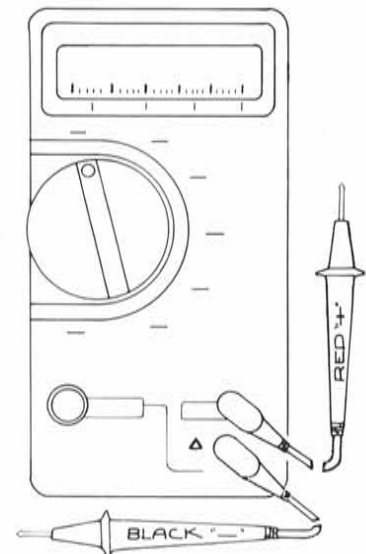
Specific Gravity Readings	State of Charge
1.260 – 1.280	Fully charged
1.220 – 1.240	3/4 charged
1.180 – 1.200	1/2 charged
1.160 – 1.170	1/4 charged
1.110 – 1.120	Discharged



Hydrometer

**VOLTAGE TESTS**

If the hydrometer tests indicate a good, fully charged battery and you feel the battery is still at fault, you can further test the battery with a multimeter. Check to see that the battery caps are in place and tight. Set the multimeter to the DC volt position. Place the red test lead to the positive (+) indicated battery terminal and the black test lead to the negative (-) indicated terminal. Battery voltage should read from 12-13 volts. Crank the engine for 15 seconds, wait 15 seconds and read battery voltage. Reading should remain between 12 and 13 volts or battery is defective and should be replaced. If while cranking the engine the meter needle drops to 9 volts or less, the problem could be in the cranking motor.

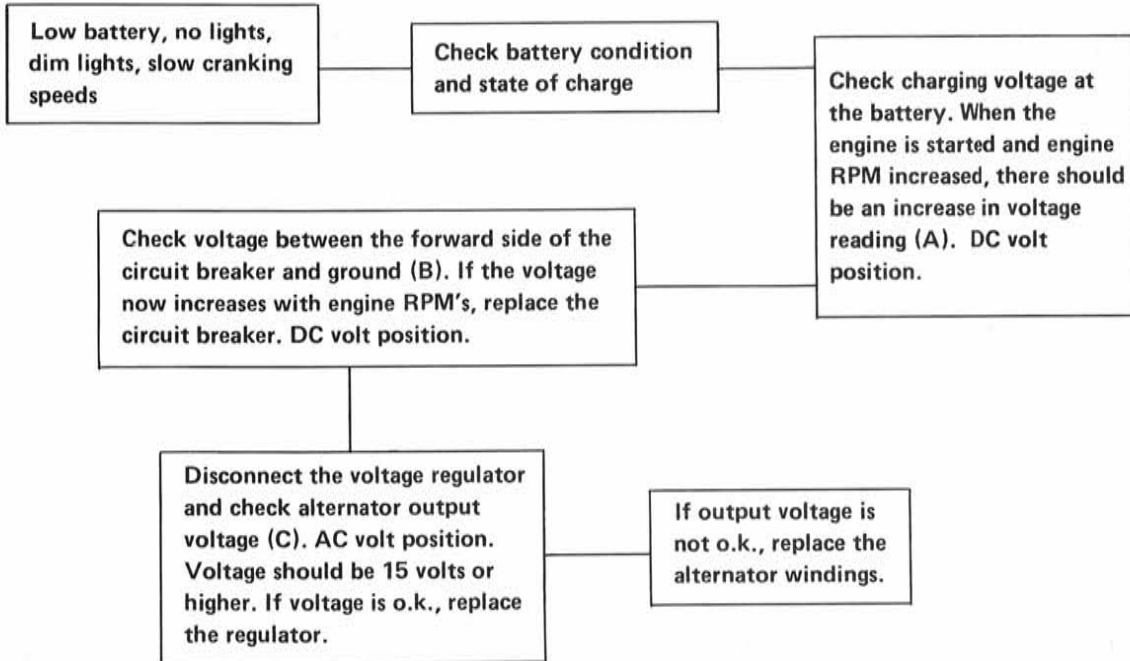


Multimeter

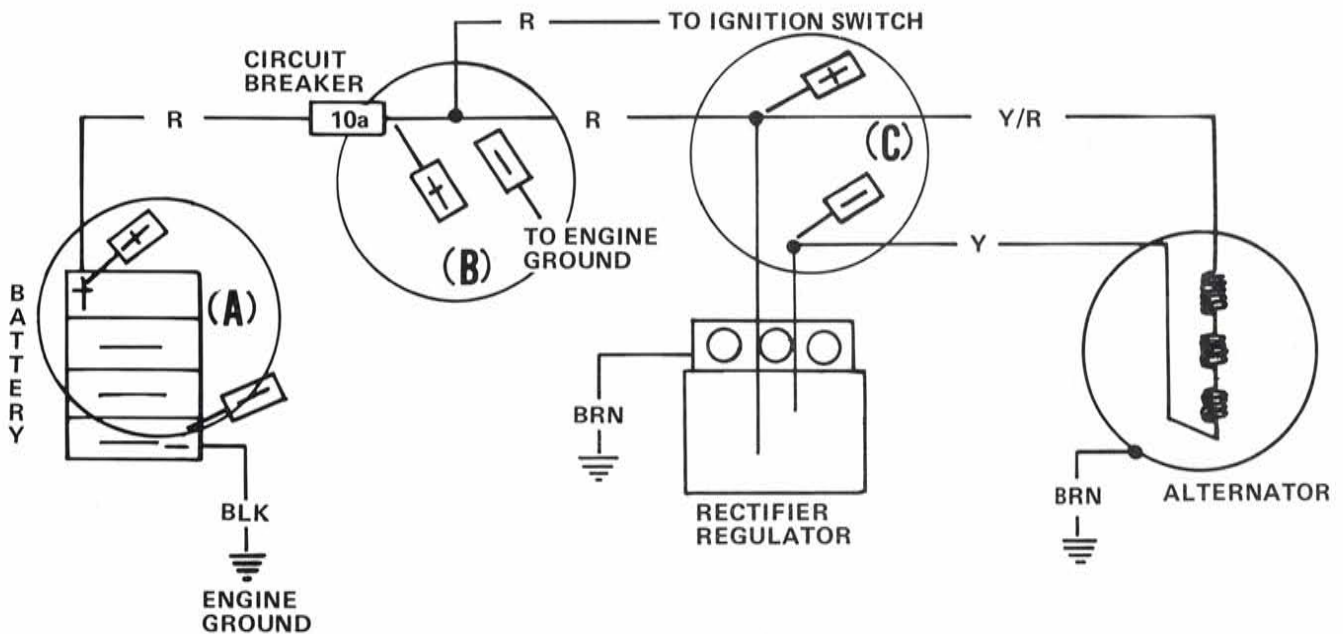


CHARGING SYSTEM TESTING

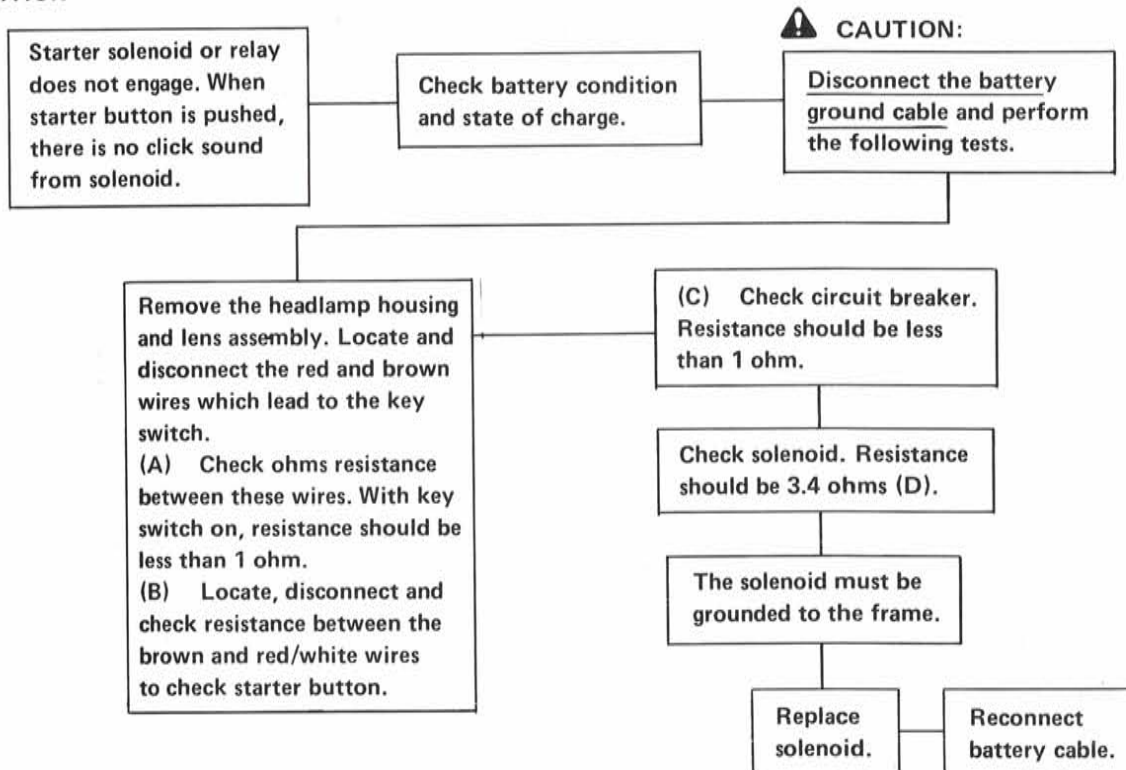
CONDITION



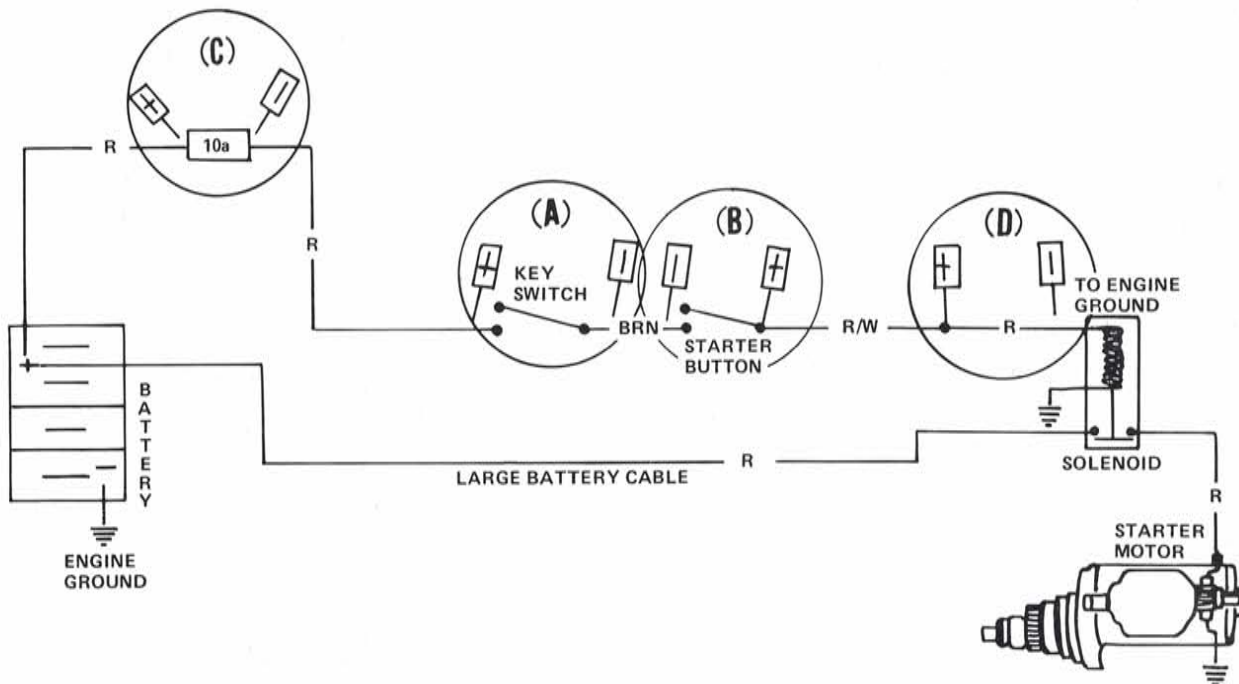
CHARGING SYSTEM CIRCUIT



CRANKING SYSTEM TESTING  
CONDITION

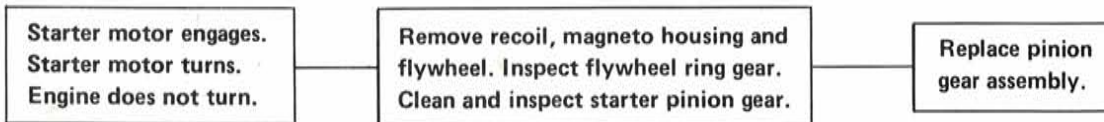


CRANKING SYSTEM CIRCUIT

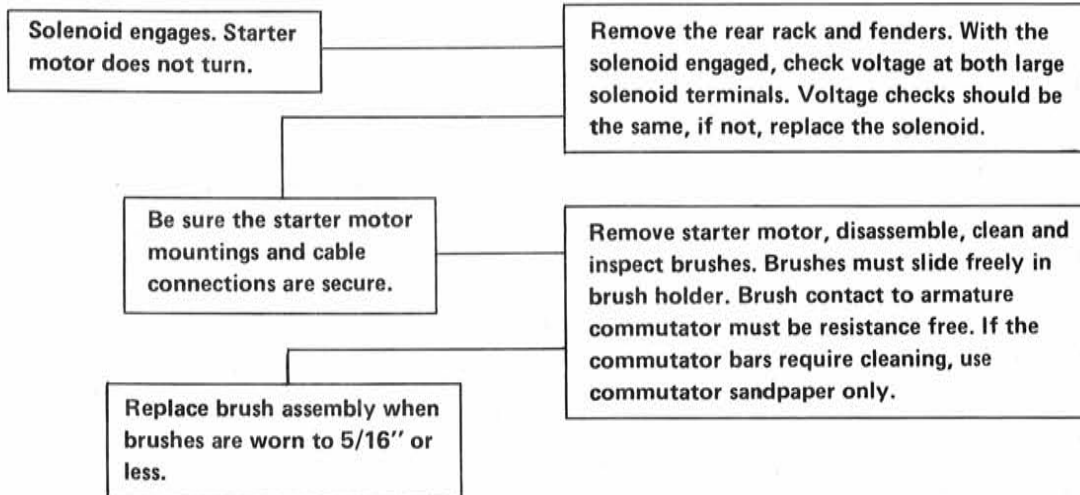


## CRANKING SYSTEM TEST SEQUENCE

## CONDITION



## CONDITION



## Field Coil Tests:

Set Multitester to Ohms x 1 position. Check continuity between the large field coil solenoid wire and the insulated brushes. Readings must be zero ohms resistance. Also, check field coil windings which may be shorted to the case. Place one test lead to large solenoid wire and the other test lead to field coil case; readings must be infinite (open circuit).

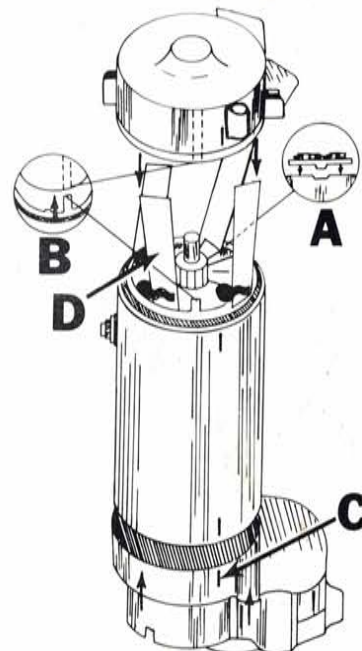
## Armature Short Circuit Tests:

With the armature installed in a growler, place a thin strip of steel on the armature. With the growler on, slowly rotate the armature one full turn. If the steel strip does not vibrate, the armature is not shorted. If the steel strip does vibrate, the armature has a short circuit and must be replaced.

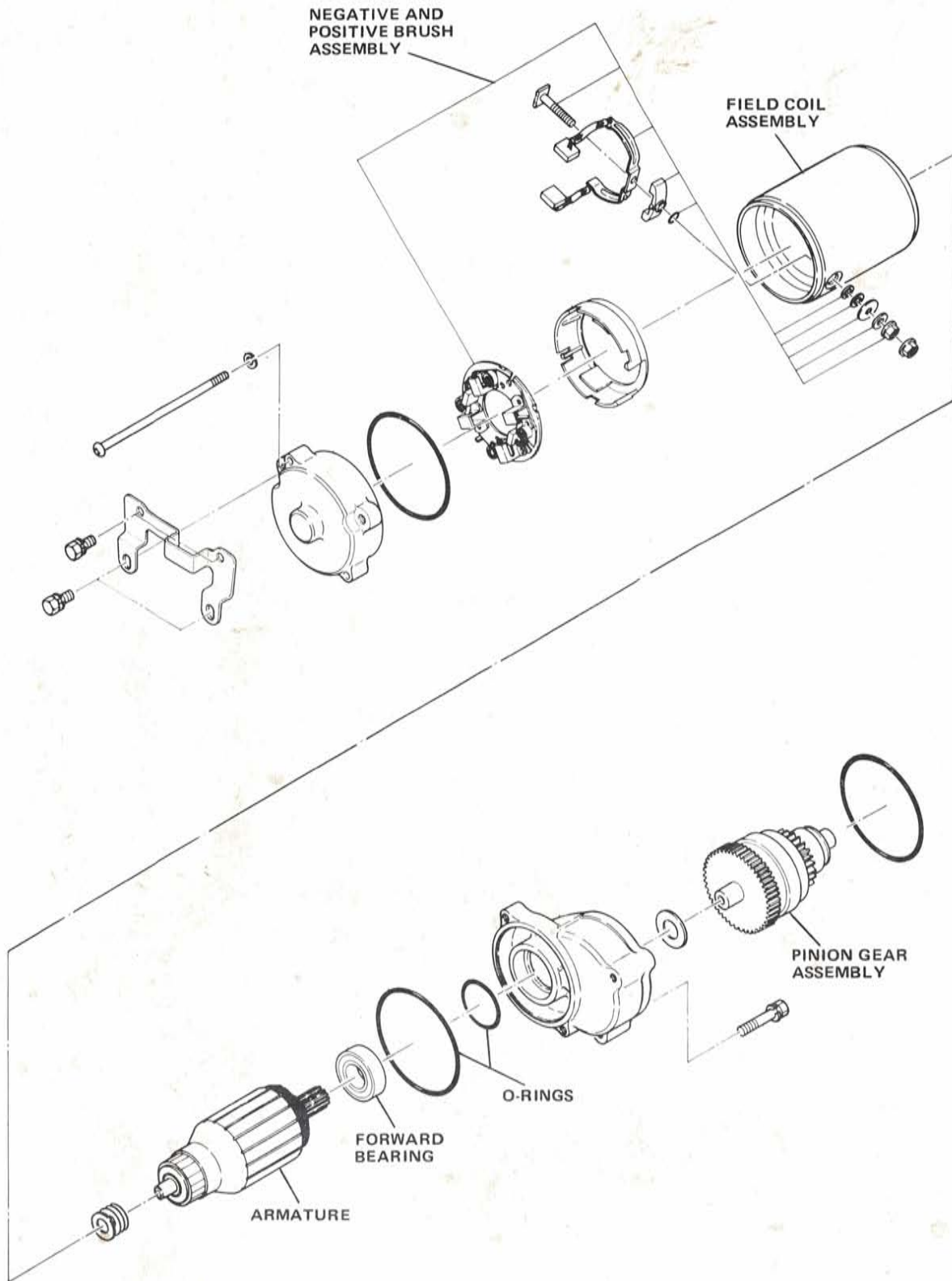
## STARTER MOTOR REASSEMBLY

Alignment of the following components is important.

- A. Brush plate to housing.
- B. End plate to brush plate.
- C. End plates to housing.
- D. Use small metal strips to hold springs away from brushes when installing armature.



STARTER MOTOR EXPLODED VIEW



WIRING SCHEMATIC DIAGRAM

