

CHAPTER 8

BRAKES/FINAL DRIVE

Data

1985-1986	8.1
1987-1988	8.2
1989-1990	8.3
1991-1992	8.4
1993	8.5
1994	8.6
1995	8.7
Hydraulic Brake System Operation	8.8
Type 1 Master Cylinder Overhaul	8.9
Type 2 Master Cylinder Overhaul	8.10-8.11
Type H1 Brake Caliper Removal and Inspection	8.12
Type H1 Brake Caliper Repair and Assembly	8.13
Type H2 Brake Caliper Removal and Repair	8.14-8.15
Type H2 Brake Caliper Assembly	8.16
Type 3 Master Cylinder Overhaul	8.17-8.18
Type H3 Brake Caliper Overhaul	8.19-8.21
Type H4 Brake System Service	8.22-8.24
Type H5 Brake System Service	8.25-8.27
Bleeding Procedures for Polaris Brake Systems	8.28
Type M1 Brake Overhaul and Pad Replacement	8.29-8.30
Type M2 Exploded View	8.31
Type M3 Exploded View	8.32
Jackshaft Speed VS MPH Chart	8.33
Type 1 Drive System Overhaul	8.34-8.35
Type 2 Drive System Overhaul	8.36-8.40
Type 3 Drive System Overhaul	8.41-8.48
Type 4 Drive System Overhaul	8.49-8.52
Drive Shaft Sprocket Installation Tips	8.53-8.54
Series 300 Transmission Overhaul	8.55-8.59
Reverse Kit Service Tips	8.60-8.61



1985

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
SS	M1	1	Direct Drive	3.69	8.93	13.77			
Trail	H2	2	19/35/64	7.06	8.58	13.42			
400	H2	2	19/35/64	7.06	8.58	13.42			
600	H3	2	19/35/64	7.06	8.58	13.42			
Long Track	M2	2	19/35/64	5.03	8.58	13.42			

1986

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
Sprint Sprint ES	M1	1	Direct Drive	3.69	8.93	13.77			
SS	M1	1	Direct Drive	3.69	8.93	13.77			
Trail	H2	2	21/35/64	7.06	8.58	13.42			
400	H2	2	19/35/64	7.06	8.58	13.42			
600 LE	H3	2	21/35/64	7.06	8.58	13.42			
Long Track	M2	2	19/39/64	5.03	8.58	13.42			

BRAKES / FINAL DRIVE
Data

1987

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
StarTrak	M2	2	15/39/64	5.45	8.58	13.42			
Sprint Sprint ES	M1	1	Direct Drive	3.69	8.93	13.77			
Sport	H2	2	17/35/62	7.06	8.58	13.42			
Trails	H2	2	21/35/64	7.06	8.58	13.42			
400	H2	2	19/35/64	7.06	8.58	13.42			
600	H3	2	21/35/64	7.06	8.58	13.42			
Long Track RLR	M2	4	19/39/66	5.03	4.85	9.69			

1988

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
StarTrak	M2	2	15/39/64	5.45	8.58	13.42			
Sprint Sprint ES	M1	1	Direct Drive	3.69	8.93	13.77			
Sport	H2	2	17/35/62	7.06	8.58	13.42			
Trail Trail SKS	H2	2	21/35/64 19/35/64	7.06	8.58	13.42			
400 400 SKS	H2	2	19/35/64 18/35/64	7.06	8.58	13.42			
650 650 SKS	H2	2	21/35/64 19/35/64	7.06	4.58	8.58	13.42	17.42	
Long Track RLR	M2	4	19/39/66	5.03	4.85	9.69			

1989

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
StarTrak	M2	2	15/39/64	5.45	8.58	13.42			
Sprint ES	M1	1	Direct Drive	3.69	8.93	13.77			
Sport Sport GT	H2	2	17/35/62	7.06	8.58	13.42			
Trails	H2	2	21/35/64	7.06	8.58	13.42			
400	H2	2	19/35/64	7.06	8.58	13.42			
500 500 SKS	H2	2	19/35/64 18/35/64	7.06	8.58	13.42			
650 650 SKS	H3	2	21/35/64 19/35/64	7.06	4.58	8.58	13.42	17.42	
Long Track RLR	M2	4	19/39/66	5.03	4.85	9.69			
SuperTrak	M2	4	19/39/66	7.06	4.90	9.74			

1990

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
Star	M1	1	Direct Drive	3.01	8.93	13.77			
StarTrak	M2	2	15/39/64	5.45	8.58	13.42			
Sprint ES	M1	1	Direct Drive	3.69	8.93	13.77			
Sport Sport GT	H2	2	17/35/62	7.015	8.58	13.42			
Trails	H2	2	21/35/64	7.015	8.58	13.42			
400	H2	2	19/35/64	7.015	8.58	13.42			
500 500 SKS	H2	2	19/35/64 18/35/64	7.015	8.58	13.42			
650 650 SKS	H3	2	21/35/64 19/35/64	7.015	4.58	8.58	13.42	17.42	
SuperTrak	H1	4	19/39/66	7.015	4.90	9.74			
WideTrak	H1	4	19/41/66	6.813	.52	4.54	9.32	14.11	17.60

BRAKES / FINAL DRIVE
Data

1991

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
StarLite	M1	1	Direct Drive	3.69	8.70	13.54			
Lite	M1	1	Direct Drive	3.69	8.70	13.54			
Sport Sport GT	H2	2-3	16/35/62 16/39/64	7.015	8.58	13.42			
Trail Trail Deluxe	H2	2-3	21/35/64 21/39/66	7.015	8.58	13.42			
440	H2	2-3	21/39/66	7.015	8.58	13.42			
500 500 SKS	H2	2-3	21/39/66 20/39/66	7.015	8.58	13.42			
650 650 SKS RXL	H3	3	21/35/64 19/35/64 20/35/64	7.015	4.58	8.58	13.42	17.42	
SuperTrak	H1	4	19/39/66	7.015	4.90	9.74			
WideTrak	H1	4	19/41/66	6.813	.52	4.54	9.32	14.11	17.60

1992

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
StarLite	M1	1	Direct Drive	3.69	8.70	13.54			
Lite Lite Deluxe	M1	1	Direct Drive	3.69	8.70	13.54			
Lite GT	M2	3	16/39/64	7.015	8.58	13.42			
Sport Sport GT	H2	3	16/35/62 16/39/64	7.015	8.58	13.42			
Trail Trail Deluxe	H2	3	21/39/66	7.015	8.58	13.42			
440 440 XCR	H2 H3	3	21/39/66	7.015	8.58	13.42			
500 SP Classic 500 SKS	H2	3	21/39/66 20/39/66 21/39/66	7.015	8.58	13.42			
650 RXL 650 RXL SKS	H3	3	20/35/64 20/35/64 21/39/66	7.015	4.58	8.58	13.42	17.42	
SuperTrak	M2	4	19/39/66	7.015	4.90	9.74			
WideTrak	M2	4	19/41/66	6.813	.52	4.54	9.32	14.11	17.60

1993

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
StarLite	M2	2	15/41/66	6.94	7.48	12.32	All 1993 models, except WideTrak, the drive shaft is .250" longer and sprocket positions are measured to sprocket hub and not idler center. Check pages 8.53 and 8.54.		
StarLite GT	M2	2	15/41/66	6.94	7.48	12.32			
Lite	M2	2	16/39/64	6.94	7.48	12.32			
Lite Deluxe	M2	2	16/39/64	6.94	7.48	12.32			
Lite GT	M2	2	16/39/64	6.94	7.48	12.32			
Sport	H4	3	16/35/62	6.94	7.48	12.32			
Trail	H4	3	21/39/64	6.94	7.48	12.32			
Trail Deluxe	H4	3	16/39/64	6.94	7.48	12.32			
440	H4	3	21/39/64	6.94	7.48	12.32			
440 SKS	H4	3	20/39/66	6.94	7.48	12.32			
XCR	H5	3	21/39/66W	6.94	7.48	12.32			
WideTrak	M2	4	19/41/66	6.86	Use 1992 Specs. & Procedures				
Classic	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI SKS	H4	3	20/39/66	6.94	7.48	12.32			
XLT	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SKS	H4	3	20/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SP	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
Classic Touring	H4	3	20/39/66	6.94	7.48	12.32			
RXL	H5	3	20/35/64W	6.94	4.35	7.48	12.32	16.32	
RXL SKS	H5	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
Storm	H5	3	23/37/66W	6.94	4.35	7.48	12.32	16.32	
Storm SKS	H5	3	23/37/66W	6.94	4.35	7.48	12.32	16.32	

"W" denotes a 13 link wide chain and wide sprocket; others are 11 link wide.

BRAKES / FINAL DRIVE Data

1994

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
StarLite	M3	2	15/41/66	6.94	7.48	12.32	All 1994 models, except WideTrak, the drive shaft is .250" longer and sprocket positions are measured to sprocket hub and not idler center. Check pages 8.53 and 8.54.		
StarLite GT	M3	2	15/41/66	6.94	7.48	12.32			
Lite	M3	2	16/39/64	6.94	7.48	12.32			
Lite Deluxe	M3	2	16/39/64	6.94	7.48	12.32			
Lite GT	M3	2	16/39/64	6.94	7.48	12.32			
Sport	H4	3	16/35/62	6.94	7.48	12.32			
Super Sport	H4	3	17/35/62	6.94	7.48	12.32			
Sport SKS (Rental)	H4	3	16/39/62	6.94	7.48	12.32			
Trail	H4	3	21/39/66	6.94	7.48	12.32			
Trail Deluxe	H4	3	22/41/64	6.94	7.48	12.32			
440	H4	3	21/39/66	6.94	7.48	12.32			
440 SKS	H4	3	20/39/66	6.94	7.48	12.32			
XCR	H5	3	21/39/66W	6.94	7.48	12.32			
XCR SP	H5	3	21/39/66	6.94	7.48	12.32			
WideTrak GT*	M2	4	19/41/66	6.86	.52	4.54	9.32	14.11	17.60
WideTrak LX*	M2	4	19/41/66	6.86	.52	4.54	9.32	14.11	17.60
Classic	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI SKS	H4	3	20/39/66	6.94	7.48	12.32			
XLT	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SKS	H4	3	20/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SP	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
Classic Touring	H4	3	20/39/66	6.94	7.48	12.32			
RXL	H5	3	20/35/64W	6.94	4.35	7.48	12.32	16.32	
RXL SKS	H5	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
Storm	H5	3	23/37/66W	6.94	4.35	7.48	12.32	16.32	
Storm SKS	H5	3	21/37/66W	6.94	4.35	7.48	12.32	16.32	
600 XCR	H5	3	21/39/66	6.94	7.48	12.32			
Xtra	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	

"W" denotes a 13 link wide chain and wide sprocket; others are 11 link wide.

* WideTrak sprocket placement as shown on VIII-39 typical 4 drive with center idler.

1995

MODEL	BRAKE TYPE	DRIVE TYPE	GEARS CHAIN	DRIVE SPROCKET DIAMETER	DRIVE SPROCKET POSITION Reference Page 8.53				
					A	B	C	D	E
StarLite	M3	2	15/41/66	6.94	7.48	12.32	All 1995 models, except WideTrak, the drive shaft is .250" longer and sprocket positions are measured to sprocket hub and not idler center. Check pages 8.53 and 8.54.		
Lite	M3	2	16/39/64	6.94	7.48	12.32			
Lite Deluxe	M3	2	16/39/64	6.94	7.48	12.32			
Lite GT	M3	2	16/39/64	6.94	7.48	12.32			
Sport	H4	3	16/35/62	6.94	7.48	12.32			
Super Sport	H4	3	17/35/62	6.94	7.48	12.32			
Sport Touring	H4	3	16/39/62	6.94	7.48	12.32			
Trail	H4	3	21/39/66	6.94	7.48	12.32			
Trail Deluxe	H4	3	22/41/64	6.94	7.48	12.32			
440 L/C	H4	3	21/39/66	6.94	7.48	12.32			
440 SKS	H4	3	20/39/66	6.94	7.48	12.32			
440 XCR	H5	3	21/39/66W	6.94	7.48	12.32			
600 XCR	H5	3	21/39/66	6.94	7.48	12.32			
WideTrak GT*	M2	4	19/41/66	6.86	.52	4.54	9.32	14.11	17.60
WideTrak LX*	M2	4	19/41/66	6.86	.52	4.54	9.32	14.11	17.60
Indy 500	H4	3	21/39/66	6.94	7.48	12.32			
Classic	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI	H4	3	21/39/66	6.94	7.48	12.32			
500 EFI SKS	H4	3	20/39/66	6.94	7.48	12.32			
500 EFI SKS PT	H4	3	20/39/66	6.16**	7.48	12.32			
XLT	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SKS	H4	3	20/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT SKS PT	H4	3	20/39/66W	6.16**	4.35	7.48	12.32	16.32	
XLT SP	H4	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
XLT Touring	H4	3	20/39/66W	6.94	4.35	7.48	12.32	16.32	
RXL	H5	3	20/35/66W	6.94	4.35	7.48	12.32	16.32	
RXL Touring	H5	3	21/39/66W	6.94	4.35	7.48	12.32	16.32	
Storm	H5	3	23/37/66W	6.94	4.35	7.48	12.32	16.32	
Storm SKS	H5	3	20/35/66W	6.94	4.35	7.48	12.32	16.32	
Storm SKS PT	H5	3	20/35/66W	6.16**	4.35	7.48	12.32	16.32	

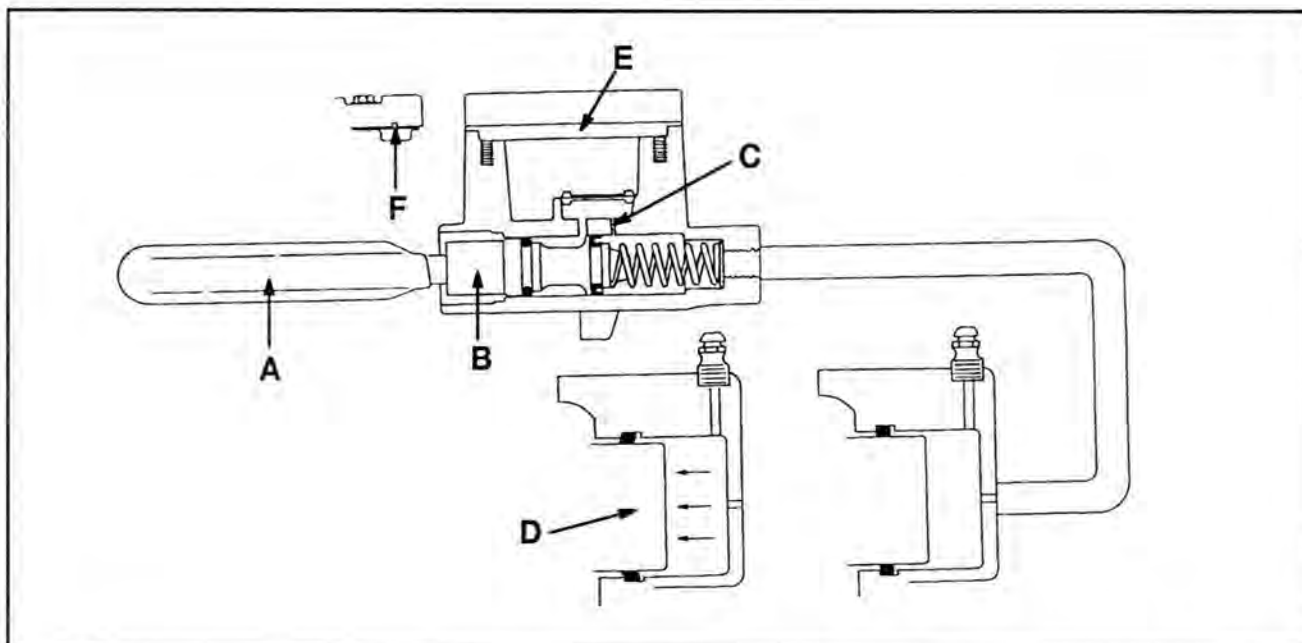
"W" denotes a 13 link wide chain and wide sprocket; others are 11 link wide.

* WideTrak sprocket placement as shown on VIII-39 typical 4 drive with center idler.

**8 Tooth drive sprocket

BRAKES / FINAL DRIVE

Hydraulic Brake System Operation



The Polaris snowmobile hydraulic brake system consists of the following components or assemblies: brake lever, master cylinder, hydraulic hose, brake caliper (slave cylinder), brake pads, and a brake disc which is secured to the drive line.

When the hand activated brake lever (A) is applied, it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening called a port within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the moveable brake pad. This pad contacts the brake disc, moves the caliper in its floating bracket and pulls the stationary side pad into the brake disc. This action reduces brake disc speed and vehicle speed. As the lever pressure is increased, the braking effect is increased.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper self-adjusts and moves further outward.

Brake fluid level is critical to proper system operation. A low fluid level allows air to enter the system causing the brakes to feel spongy. A high fluid level does not allow enough room for fluid expansion. Both conditions will result in loss of brakes.

Located within the master cylinder is a small port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the brake lever is released and the piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion caused by heat, or contraction caused by cooling. During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for the brake fluid to expand. Master cylinder reservoirs should be filled to the top of the fluid level mark on the inside of the reservoir:

- Type 1 Master Cylinder 1/8" (.3 cm) below lip of reservoir opening;
- Type 2 Master Cylinder 1/4" (.6 cm) below lip of reservoir opening;
- Type 3 Master Cylinder 1/4" – 5/16" (.6 – .8 cm) below lip of reservoir opening.

WARNING: Never overfill the reservoir. This could cause brakes to lock, resulting in severe injury or death.

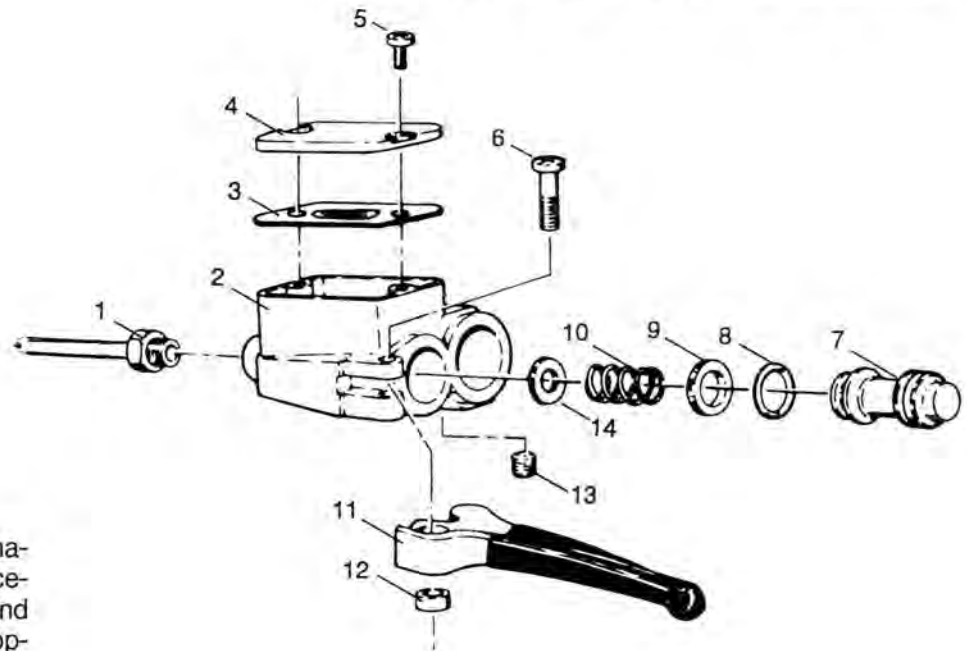
This system also incorporates a diaphragm (E) as part of the cover gasket and a vent port (F) located between the gasket and the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Be sure the vent is open and allowed to function. If the reservoir is overfilled or the diaphragm vent is plugged, the expanding fluid may build pressure in the brake system and lead to brake failure.

BRAKES / FINAL DRIVE

Type 1 Master Cylinder Overhaul

Removal

1. Brake Hose
2. Housing (cylinder)
3. Cover Gasket
4. Cover
5. Cover Screw
6. Pivot Bolt
7. Piston
8. O-Ring
9. Seal U-Pack
10. Compression Spring
11. Brake Lever
12. Pivot Bushing
13. Set Screw
14. Washer

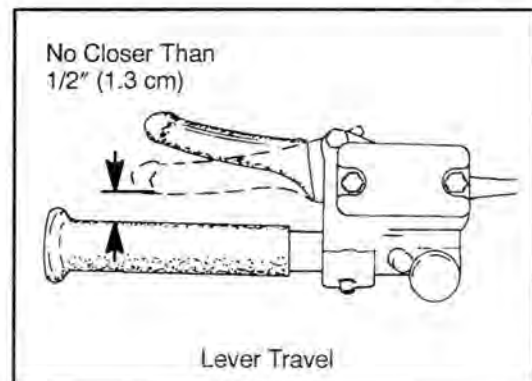


CAUTION: Due to the critical nature of these parts and procedures, be sure you have read and understand hydraulic brake operation on page 8.8.

1. Remove handlebar grip. To assist in grip removal, plug one end of the handlebar and apply air pressure to the opposite end.
2. Remove brake line. Be prepared to catch all fluid in a shop cloth. **NOTE:** Special care must be used to see that brake fluid does not come in contact with any finished surfaces.
3. Loosen brake cylinder set screw and remove cylinder.
4. Remove brake lever. Note position of brake lever pivot bushing.
5. Remove piston assembly, return spring, and washer (item 14).

Inspection and Reassembly

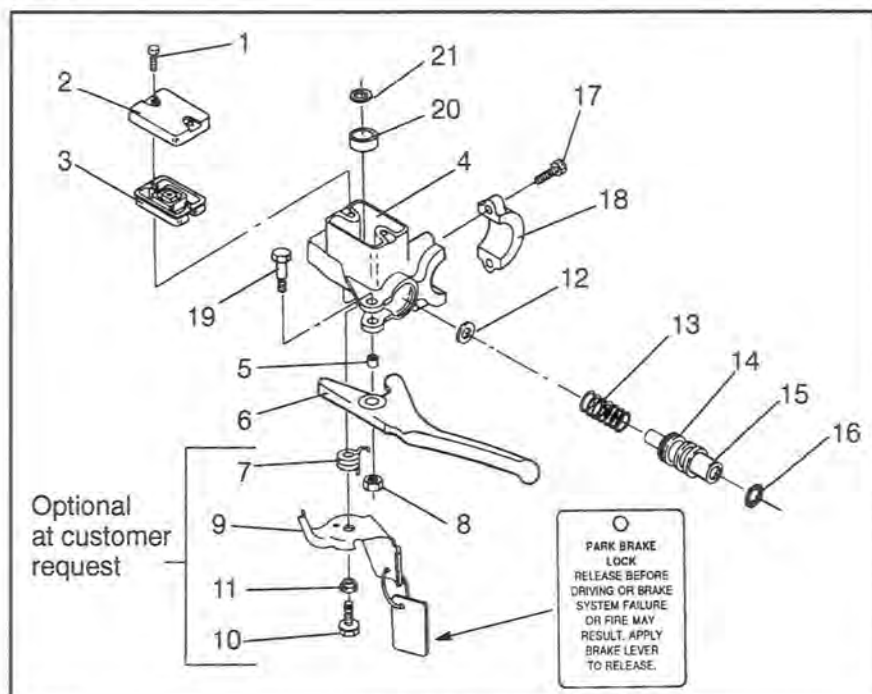
1. Always replace O-Ring seals, U-pack seals, and cover gasket.
2. Apply clean brake fluid onto piston, piston seals and cylinder bore.
3. Install U-pack seal with lip towards bore, and O-Ring seal.
4. Install spring seat washer (item 14) into cylinder.
5. Place spring into piston end and install piston assembly. **CAUTION:** Use care not to damage the U-pack seal when installing into the cylinder.
6. Reinstall brake lever with bushing, bolt and nut.
7. Prior to installing the master cylinder, it is possible to bench bleed by attaching a short, flexible hose to the outlet fitting and back into the reservoir. Fill the reservoir and slowly squeeze and release the lever until air bubbles no longer appear.
8. Reinstall master cylinder onto handlebar and reconnect brake line.
9. Adjust master cylinder to a level position centered on the handlebar and tighten the set screw. **NOTE:** The set screw should be adjusted to allow the cylinder to rotate on the handlebar if it should ever be hit hard.
10. After final bleeding, make sure fluid level is 1/8" (.3 cm) below the top of the reservoir.
11. Field test machine, checking for proper braking action and lever reserve. Lever reserve should be no less than 1/2" (1.3 cm) from the handlebar with the lever firmly applied.
12. Recheck unit for any possible fluid leaks.



BRAKES / FINAL DRIVE

Type 2 Master Cylinder Overhaul

1. Cover Screw
2. Cover
3. Cover Gasket
4. Cylinder Housing
5. Brake Lever Bushing
6. Brake Lever
7. Park Lever Return Spring
8. Pivot Bolt Nut
9. Park Lever
10. Park Lever Pivot Bolt
11. Park Lever Pivot Bushing
12. Spring Seat Washer
13. Compression Spring
14. U-Pack Seal
15. Piston
16. O-Ring Seal
17. Clamp Bolt
18. Attaching Clamp
19. Lever Pivot Bolt
20. Baffle
21. Baffle Washer



Park Brake Lever Lock

WARNING: Release park brake lock before driving or brake system failure or fire may result. Apply brake lever to release.

Type 2 – Removal

1. Position clean shop cloths to catch spilled fluid and remove brake hose. **CAUTION:** Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.
2. Remove brake clamp attaching bolts (Item 17).
3. Remove park brake lever (Item 9) and brake master cylinder lever (Item 6), noting position of bushing, spring, etc., for proper reassembly.
4. Using special service tool PN 2870962, position push rod through small hole in spring seat washer (Item 12) as shown. Remove piston assembly, spring and washer.



Type 2 – Inspections

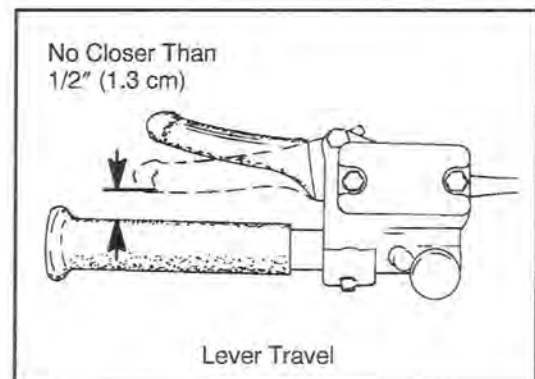
NOTE: Due to the critical nature of these parts and procedures, be sure you have thoroughly read and understand Hydraulic Brake Operation, page 8.8.

1. Thoroughly clean all brake parts with hot soapy water. Rinse with isopropyl alcohol. Inspect piston for wear or scratches and replace if any are noticed. Check master cylinder bore for scratches or score marks and replace if any are noticed.

CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

Reassembly

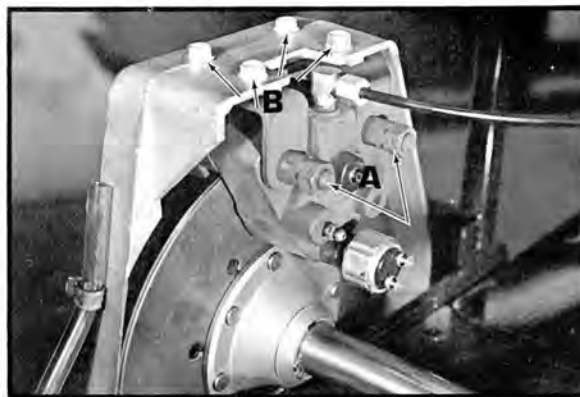
1. Always replace O-Ring seal, U-pack seal, and cover gasket.
2. Apply clean brake fluid onto piston, piston seals and cylinder bore.
3. Install seals onto piston with the U-pack lip towards the bore.
4. Insert piston assembly into special tool PN 2870962.
5. Position special tool as shown. This tool is used to guide the lip seal into the cylinder bore without damage.
6. Install spring seat washer into bore and place spring into piston.
7. Install piston (tool installed) into bore.
8. On models with dust seal, install this seal using special tool PN 2870962. **NOTE:** Use stepped end of tool for piston installation and opposite end for dust seal installation.
9. Reinstall brake lever with bushing bolt and nut.
10. Prior to installing the master cylinder, it is possible to bench bleed by attaching a short, flexible hose to the outlet fitting and back into the reservoir. Fill the reservoir and slowly squeeze and release the lever until air bubbles no longer appear.
11. Reinstall master cylinder onto handlebar and reconnect brake line.
12. Adjust master cylinder to a level position centered on the handlebar and tighten the set screw. **NOTE:** The set screw should be adjusted to allow the cylinder to rotate on the handlebar if it should ever be hit hard.
13. After final bleeding, make sure fluid level is 1/4" (.6 cm) below the top of the reservoir.
14. Field test machine, checking for proper braking action and lever reserve. Lever reserve should be no less than 1/2" (1.3 cm) from the handlebar with the lever firmly applied.
15. Recheck unit for any possible fluid leaks.



BRAKES / FINAL DRIVE

Type H1 Brake Caliper Removal and Inspection

1. Remove hydraulic line. Be prepared to catch fluid in a shop cloth. Do not allow fluid to come in contact with painted surfaces.
2. Remove two bolts (A) holding caliper halves together and four bracket mounting screws (B).



3. Remove friction pads, noting difference between stationary side and piston side pads. **NOTE:** When replacing friction pads only, it is important to make room for new pads. The piston must be pushed back into the slave cylinder bore. Apply Loctite to the two friction pad attaching screws when reinstalling.



4. Remove piston by using compressed air at the inlet fitting. **CAUTION:** Wear eye protection to avoid getting brake fluid in eyes. Cover assembly as shown.
5. Inspect cylinder and piston for scoring. Evidence of severe scoring in the caliper bore will mean replacing the housing and piston to obtain a proper piston seal.



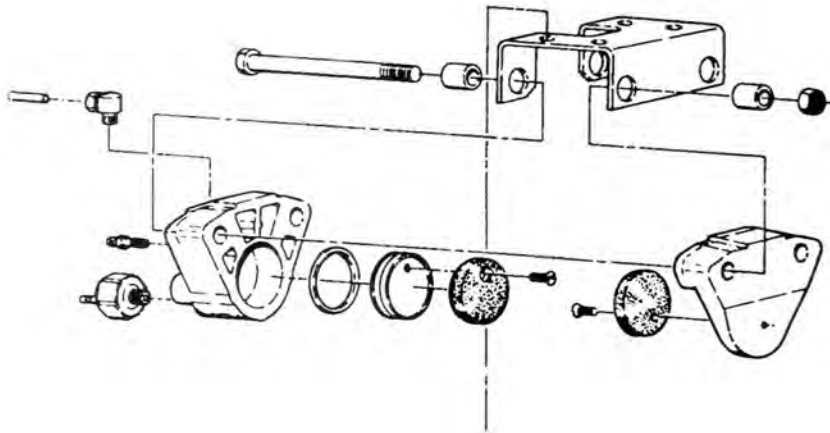
BRAKES / FINAL DRIVE

Type H1 Brake Caliper Repair and Assembly

6. Dip piston assembly and O-Ring seal in brake fluid. Assemble seal to piston.
7. Press piston into caliper bore, keeping it square to avoid scoring the bore. Push it firmly all the way in.
8. Reassemble unit by reversing disassembly procedures. Be sure all components are clean and serviceable before reassembling.



9. Apply Loctite (PN 2870326) on the two caliper carrier bolts and four bracket attaching cap screws.
10. Purge system of all trapped air.
11. Inspect system for leaks.
12. Check caliper unit mount for free floating action. Caliper must float freely from end to end on carrier bolts.



BRAKES / FINAL DRIVE

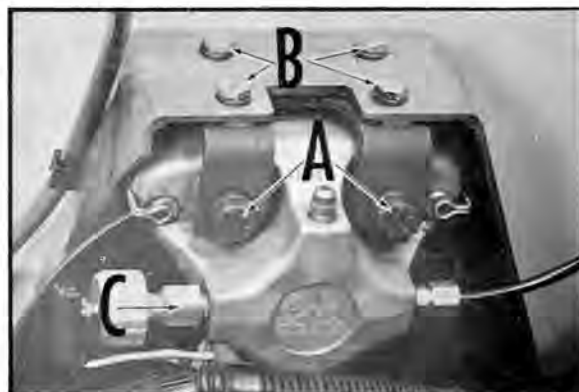
Type H2 Brake Caliper Removal and Repair

1. Remove hydraulic line. Be prepared to catch fluid in a shop cloth. Do not allow fluid to come in contact with painted surfaces.
2. Remove spring clips holding pad retaining pins.
3. Remove two bridge bolts (A) holding caliper halves together and four bracket mounting screws (B).

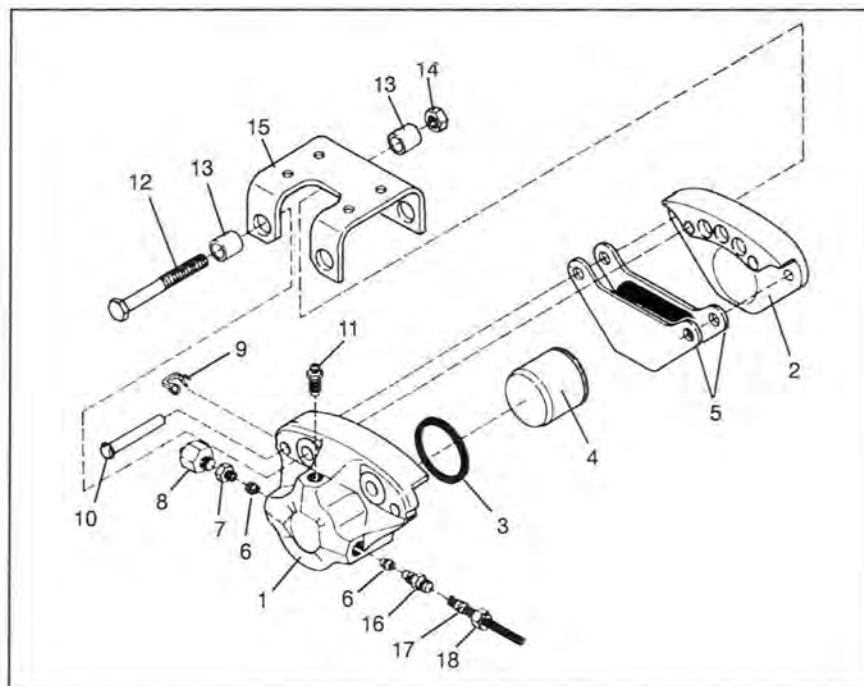
Replacing Friction Pads

The pad is attached to a pad holder and is replaced as a set.

1. To make room for new pads, the piston must be pushed back into the caliper bore. Loosen bleeder screw and work piston back into bore.
2. Take out pad retaining pins and remove worn friction pads.
3. Install new pad holders. Brake pads should be replaced only as a set.
4. With unit reassembled, apply brakes lightly several times to seat the new pads against the disc.



1. Piston Casting
2. Carrier Casting
3. Piston Seal
4. Piston
5. Pad Assembly (2)
6. Seat Insert (2)
7. Brass Adaptor
8. Stop Light Switch
9. Spring Clip (2)
10. Pad Retainer Pin (2)
11. Bleeder Screw
12. Bridge Bolt (2)
13. Spacer Bushing (4)
14. Nut (2)
15. Bracket
16. Male Adaptor
17. Ferrule Fitting
18. Female Connector



BRAKES / FINAL DRIVE

Type H2 Brake Caliper Removal and Repair

Disassembly

Refer to the exploded view while performing steps below. Numbers in parenthesis correspond to callouts on exploded view. **NOTE:** Do not disassemble and further than necessary to make repairs.

CAUTION: Protect eyes from fluid.

1. Disconnect hydraulic lines.
2. Disassemble on a clean bench.
3. Open bleed screw (11) and drain brake fluid from caliper assembly.
4. Remove spring clips (9) holding pad retainer pins (10) and remove pins.
5. Remove two bridge bolts (12).
6. Separate castings (1) and (2).
7. Place caliper with piston down and remove piston (4) from piston casting (1) by applying compressed air to the hydraulic inlet port. **CAUTION:** Do not apply too much air pressure as damage may result to the piston or piston bore.
8. Using a small wooden or plastic stick, work out piston seal (3) from its groove in the piston bore. Discard old seal. **CAUTION:** To avoid scratching piston or burring edge of seal groove, do not use a metal tool such as a screwdriver when removing seal.

Cleaning and Inspecting

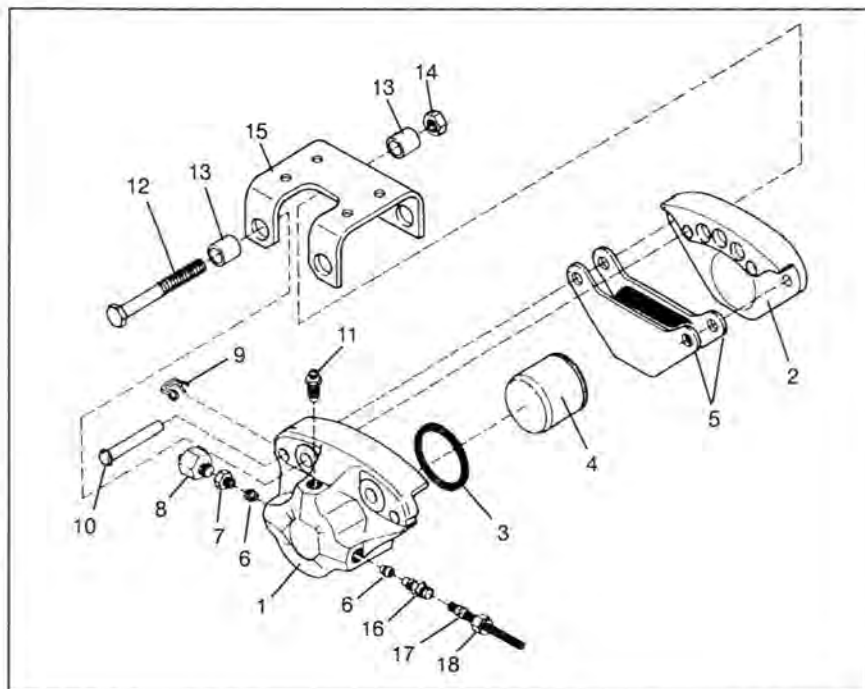
Check all parts for wear or damage and replace as necessary.

1. Clean all parts with denatured alcohol and wipe dry with a clean, lint-free cloth.
2. Using an air hose, blow out the drilled passages and bores.
3. Inspect casting cylinder bore for scoring, pitting, or corrosion. A corroded or deeply scored casting should be replaced; light scores and stains may be removed.
4. Polish any discolored or stained area with *crocus cloth only*. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not slide the cloth in and out of the bore under pressure. Do not use any other kind of abrasive or abrasive cloth. Black stains on the bore walls are caused by the piston seals and are not harmful.
5. Check piston to see if it is pitted, scored, or worn. If so, discard and replace the piston. Do not attempt to polish or sand piston.
6. Clean piston with denatured alcohol and wipe dry with a clean, lint-free cloth. Blow dry with compressed air.
7. Check inlet and bleeder hole threads for damage.
8. Inspect seat inset (6) for damage and replace if necessary.

BRAKES / FINAL DRIVE

Type H2 Brake Caliper Assembly

1. Piston Casting
2. Carrier Casting
3. Piston Seal
4. Piston
5. Pad Assembly (2)
6. Seat Insert (2)
7. Brass Adaptor
8. Stop Light Switch
9. Spring Clip (2)
10. Pad Retainer Pin (2)
11. Bleeder Screw
12. Bridge Bolt (2)
13. Spacer Bushing (4)
14. Nut (2)
15. Bracket
16. Male Adaptor
17. Ferrule Fitting
18. Female Connector

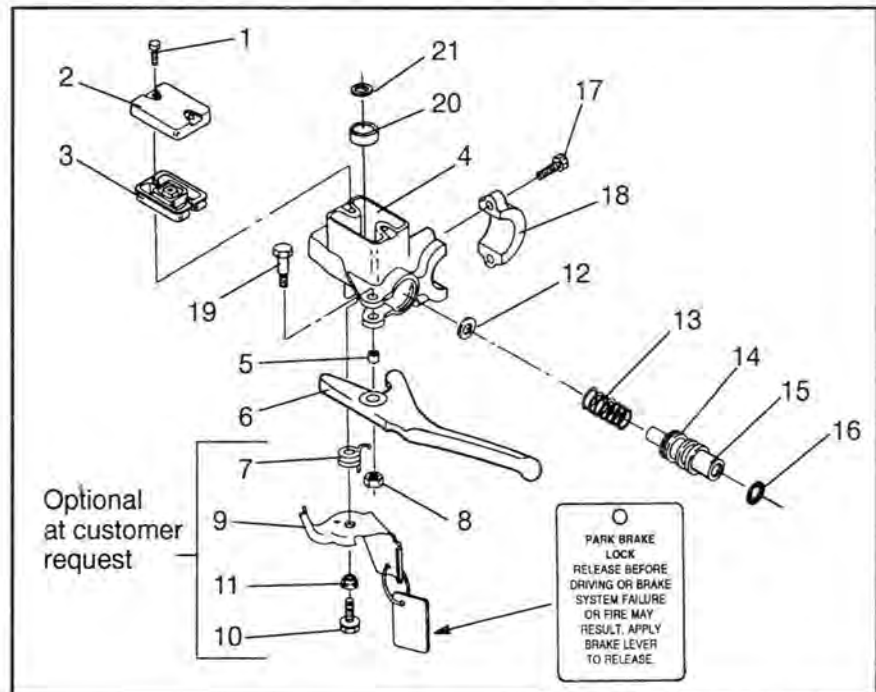


1. Reassemble unit by reversing disassembly procedures. Be sure all components are clean and serviceable before reassembling.
2. Dip a new piston seal (3) into clean brake fluid and place in groove in cylinder bore. Seal should be positioned at one point in groove and then gently worked around groove by hand until properly seated. Never use an old seal.
3. Coat piston thoroughly with brake fluid and carefully work piston down the bore until bottomed. **CAUTION:** Apply even force to avoid cocking piston in bore.
4. Examine pads for wear or damage. If pads are worn to less than half the original thickness, install new pad holder assemblies. If pads are not worn or damaged they may be reused. Be sure to reinstall pads in their original positions. If pads are replaced, they must be replaced in sets.
5. Replace pad retainer pin (10) and spring clips (9).
6. Make sure nuts and bolts are clean and dry. Apply Loctite (PN 2870326) to the two caliper carrier bolts and four bracket attaching cap screws. Torque caliper carrier bolts to 30 ft. lbs. (4.14 kg/m). Torque caliper attaching bracket cap screws to 8 ft. lbs. (1.10 kg/m).
7. Purge system of all trapped air.
8. Inspect system for leaks.
9. Check caliper unit mount for free floating action.

BRAKES / FINAL DRIVE

Type 3 Master Cylinder Overhaul

1. Cover Screw
2. Cover
3. Cover Gasket
4. Cylinder Housing
5. Brake Lever Bushing
6. Brake Lever
7. Park Lever Return Spring
8. Pivot Bolt Nut
9. Park Lever
10. Park Lever Pivot Bolt
11. Park Lever Pivot Bushing
12. Spring Seat Washer
13. Compression Spring
14. U-Pack Seal
15. Piston
16. O-Ring Seal
17. Clamp Bolt
18. Attaching Clamp
19. Lever Pivot Bolt
20. Baffle
21. Baffle Washer



Park Brake Lever Lock

WARNING: Release park brake lock before driving or brake system failure or fire may result. Apply brake lever to release.

Type 3 - Removal

1. Position clean shop cloths to catch spilled fluid and remove brake hose. **CAUTION:** Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.
2. Remove brake clamp attaching bolts (Item 17).
3. Remove park brake lever (Item 9) and brake master cylinder lever (Item 6), noting position of bushing, spring, etc., for proper reassembly.
4. Using special service tool PN 2870962, position push rod through small hole in spring seat washer (Item 12) as shown. Remove piston assembly, spring and washer.

CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

Type 3 - Inspection

NOTE: Due to the critical nature of these parts and procedures, be sure you have thoroughly read and understand Hydraulic Brake Operation, page 8.8.

1. Thoroughly clean all brake parts with hot soapy water. Rinse with isopropyl alcohol. Inspect piston for wear or scratches and replace if any are noticed. Check master cylinder bore for scratches or score marks and replace if any are noticed.



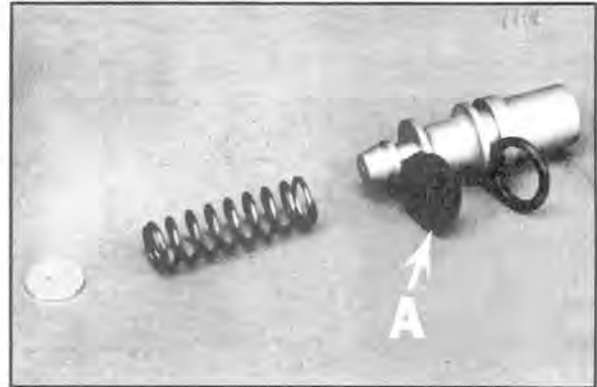
BRAKES / FINAL DRIVE

Type 3 Master Cylinder Overhaul

Type 3 - Reassembly

1. Always replace O-Ring seal, U-pack seal and cover gasket.
2. Apply clean brake fluid onto piston, piston seals and cylinder bore. Install seals onto piston positioning U-pack lip (A) towards spring. Snap spring into place on piston.
3. Install piston assembly into special service tool PN 2870962 until U-pack seal is covered by tool as shown. **NOTE:** This tool is used to guide the lip seal into the cylinder bore without damage.
4. Install spring seat washer into bore. Insert piston, still installed in tool, into bore. Push piston through special tool. Remove tool.
5. Reinstall brake lever with bushing, bolt and nut.
6. It is possible to bench bleed master cylinder before installing it on machine. Attach a short, flexible hose from outlet fitting back into reservoir. Fill reservoir. Slowly squeeze and release lever until air bubbles no longer appear in reservoir.
7. Reinstall master cylinder onto handlebar and reconnect brake line. Adjust master cylinder to a level position centered on handlebar. Torque clamp screws to 45-55 in. lbs.
8. Re-bleed brake system. Check fluid level in reservoir. The Type 3 Master Cylinder should be 1/4" - 5/16" (.6 - .8 cm) below lip of reservoir opening.
9. Field test machine before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 1/2" (1.3 cm) from handlebar.
10. Check brake system for any possible fluid leaks.

WARNING: Although snowmobile and ATV master cylinder pistons are very similar, they are not interchangeable. Piston (A) is a snowmobile piston. Piston (B) is an ATV piston. Notice the difference on the lever end of the piston. Using the wrong piston will cause a build up of pressure in the brake system and could result in a fire.



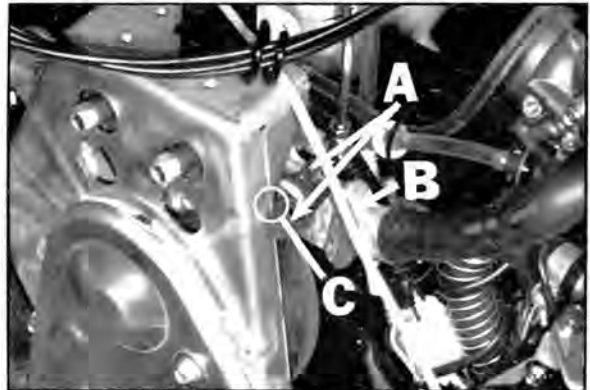
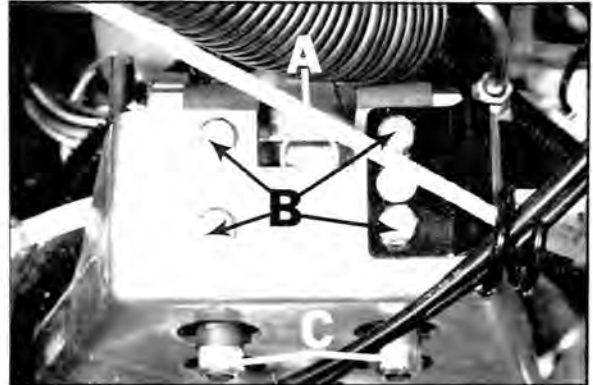
BRAKES / FINAL DRIVE

Type H3 Brake Caliper Overhaul

H3 brake caliper overhaul is primarily the same as H2. However, this unit incorporates a coolant manifold for insulating or cooling the caliper piston. Due to this design, pad replacement and caliper overhaul require slightly different procedures. Listed below are those differences. Refer to Type H2 Brake Caliper Overhaul for other service procedures, cleaning, inspection, etc.

Brake Pad Replacement

1. Remove master cylinder cover and gasket. Prepare to catch spilled brake fluid.
2. Force caliper piston inward (A).
3. Remove four caliper carrier bracket attaching bolts (B).
4. Loosen, but do not remove, the two caliper carrier bolts (C).
5. Remove brake pad pin spring clips and remove pins. Note these pins hold the pads (A) and coolant manifold (B).
6. Remove brake pads. On some units, area (C) on the chaincase may require additional clearance.
7. Replace pads which are worn to more than 1/2 their original thickness. New pad material thickness is .190" (4.8 mm).
8. Reinstall pads, pins, and spring clips using the following sequence. Install one brake pad pin through forward end of caliper, brake cooler and inner brake pad (piston side). Install outer brake pad, align forward end and install pin and pin spring clip. Install rear pin through caliper, cooler, inner and outer brake pad. Install pin spring clip. Carefully inspect pads and coolant manifold to ensure proper pin installation and positioning.



BRAKES / FINAL DRIVE

Type H3 Brake Caliper Overhaul

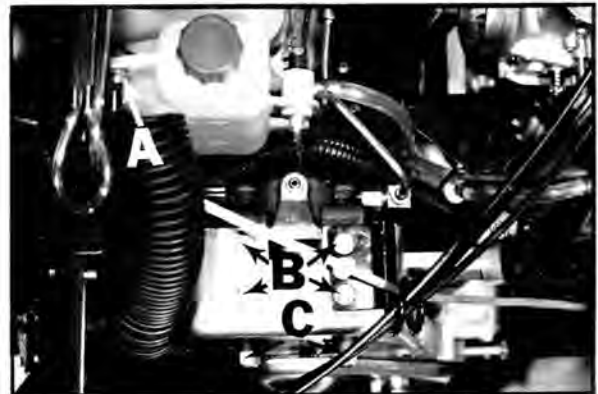
The following procedure should be followed to ensure proper alignment between caliper and brake disc.

1. Install and finger tighten four caliper bracket attaching bolts (photo 1, B)
2. Pump up brake system. While holding a small amount of pressure in the system, evenly tighten the two caliper carrier bridge bolts (photo 1, C). Torque bridge bolts to 30 ft. lbs. (4.14 kg/m). **NOTE:** While tightening these bolts, the brake lever will move outward.
3. Again, pump up the brake system and evenly tighten and torque the four caliper carrier bracket attaching bolts to 8 ft. lbs. (1.1 kg/m).
4. With brake lever released, re-torque the four caliper bracket attaching bolts (photo 1, B) to 8 ft. lbs. (1.1 kg/m) and the bridge bolts (photo 1, C) to 30 ft. lbs. (4.14 kg/m).
5. To ensure proper positioning of the piston seal it is important to move the piston back into its bore at least 1/4" (.6 cm). Then pump brakes and adjust master cylinder fluid level to 1/4" (.6 cm) from the top of the cylinder.
6. Test machine for proper braking performance.

Brake Caliper Removal

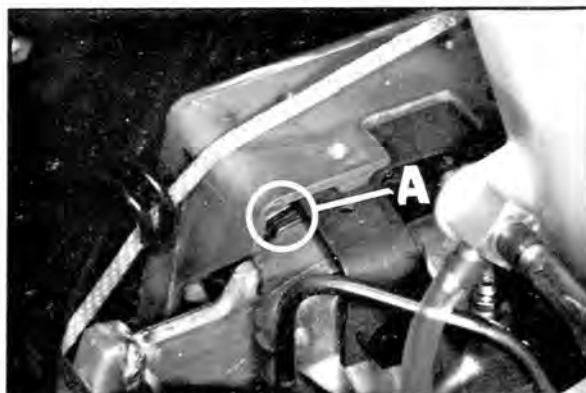
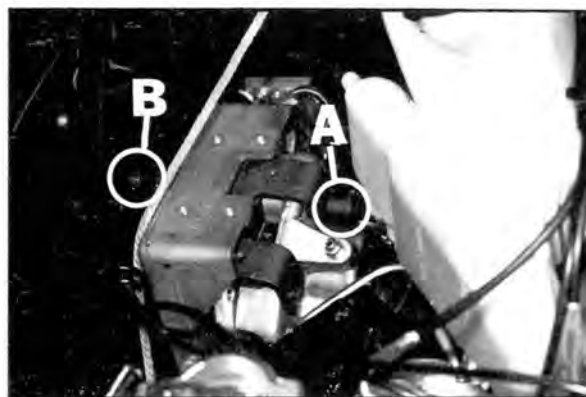
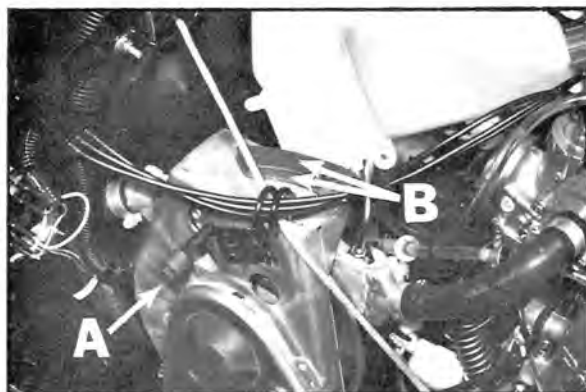
The piston side caliper casting can be removed and service as outlined in the following procedure. However, if the stationary side carrier casting should need service, the chaincase will have to be removed.

1. Remove coolant recovery tank attaching bolt (A), four caliper bracket attaching bolts (B), and two caliper bridge bolts (C).
2. Note that the caliper halves are separated by two steel spacers (A). As the bridge bolts are removed, these spacers will fall out.
3. Remove brake pads.
4. Remove piston side caliper casting (A). Refer to H2 procedures for cleaning and inspection.



Brake Caliper Casting Reinstallation

1. Temporarily install a bridge bolt (A) as shown to align the carrier bracket, stationary side casting, and two spacers (B).
2. Position piston side caliper casting and install the remaining bridge bolt as shown (A). **NOTE:** The bridge bolt installed in step 1. is used to pilot bridge bolt (A) through the spacers, casting and bracket. Push bridge bolt (A) through while holding slight tension on bolt (B).
3. Install the forward bridge bolt through bracket, piston side casting, spacers, stationary casting, and bracket. **NOTE:** It is extremely important that spacers (A) are positioned properly.
4. Replace brake pads.
5. Reinstall coolant recovery tank and tank retaining bolt.



BRAKES / FINAL DRIVE

Type H4 Brake System Service

Maintenance

The routine maintenance procedures below are suggested as a means of keeping the brake system in good working order.

1. Clean any dirt from master cylinder cover and remove cover.
2. Check fluid level in reservoir. Add new DOT 3 fluid to within 1/4" (.6 cm) of the top of the reservoir. Do not overfill.
3. Make sure floating parts move freely and all other parts are mounted securely. Tighten hardware as required.
4. Inspect for hydraulic leaks and repair any found.
5. Inspect disc surface condition. If warped or badly pitted, replace.
6. Check to see if friction pads are worn to less than 1/32" (.08 cm) thick. Replace if they are.
7. Check brake lever travel. Brake lever should not feel spongy. Replace pads. Bleed or add fluid as needed.

Replacing Friction Pads

1. Carrier Bracket Attaching Bolts
2. Carrier Bracket
3. Piston
4. Piston Seal
5. Spring Clip
6. Stop Light Switch
7. Brake Pads
8. Brake Line
9. Bleeder Screw
10. Caliper
11. Rope Guide

WARNING: The rider's safety depends on correct installation. Follow the procedures carefully.

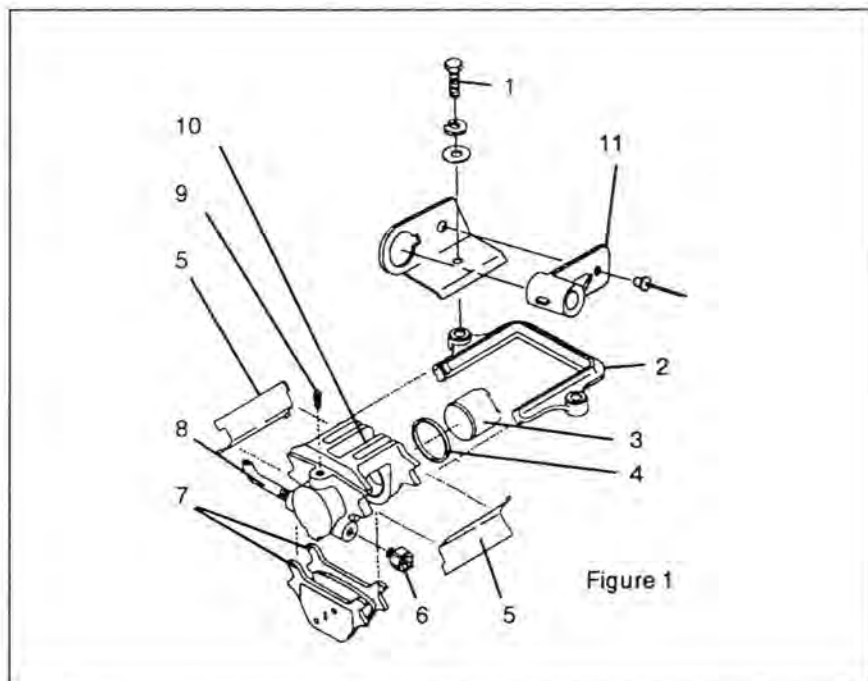


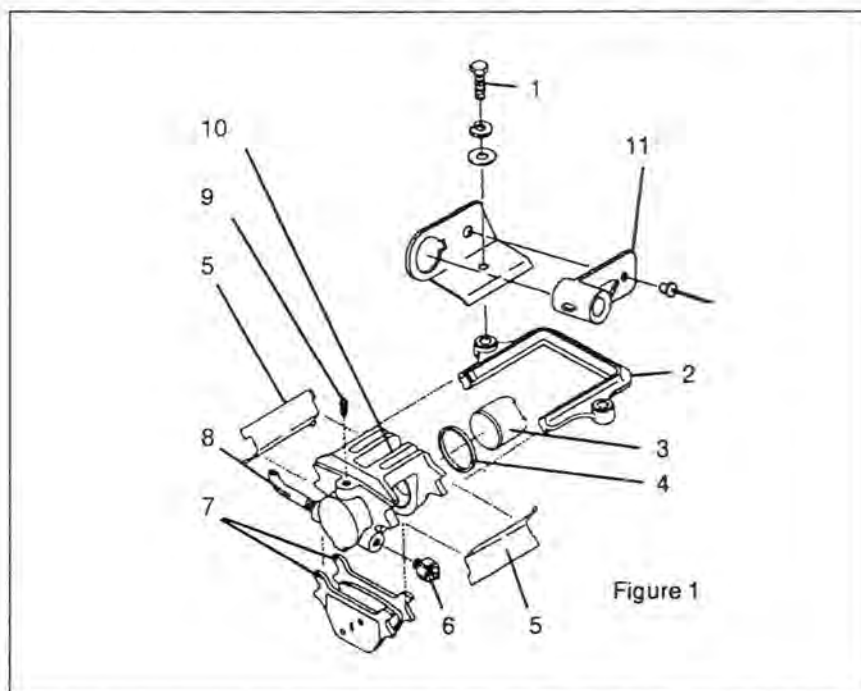
Figure 1

1. Clean any dirt from mount bracket and bolts.
 2. With a 9/16 socket, remove two 3/8 hex bolts and washers from bracket. Remove rope guide. **NOTE:** Do not disconnect brake line.
 3. Lift bracket and brake assembly off vehicle.
 4. Slide brake assembly out of bracket. Discard old pads and clips. **NOTE:** Pad and holders must be replaced as a pair.
 5. Clean dirt from end of piston and nearby area with a clean shop cloth.
- CAUTION:** Protect eyes from brake fluid.
6. Remove reservoir cover. Using a hardwood dowel or the flat of a large screwdriver, work piston back into bore by carefully prying between parts.

BRAKES / FINAL DRIVE Type H4 Brake System Service

1. Carrier Bracket Attaching Bolts
2. Carrier Bracket
3. Piston
4. Piston Seal
5. Spring Clip
6. Stop Light Switch
7. Brake Pads
8. Brake Line
9. Bleeder Screw
10. Caliper
11. Rope Guide

NOTE: Pushing the piston back into the bore will cause the fluid level to rise in the reservoir and possible to overflow. Remove this excess fluid and discard.



1. Place new pads with friction material facing each other into housing. Hole in place using clips. See illustration.
2. Slide brake assembly into bracket until both clips snap into grooves in bracket.
3. Clean top of chaincase where brake mounts.
4. Separate pads for installation over disc. If brake assembly does not slide easily over the disc with loose pads, work piston back into bore by carefully prying between parts using a hardwood dowel or the flat of a large screwdriver.
5. Place brake assembly over disc and push bracket into chaincase.
6. Replace 3/8 bolts, washers, and rope guide. Torque to 25-30 ft. lbs. (3.45-4.14 kg/m).
7. Actuate brake several times to set brake pads to proper operating position.
8. Check for proper fluid level in master cylinder and replace cover.
9. Field test at low speeds before putting into regular service.

Disassembly

Refer to the exploded view while performing the following steps.

1. Remove bracket bolts.
2. Disconnect hydraulic line.
3. Disassemble on a clean bench.
4. Open bleed screw and drain operating fluid from caliper assembly. **CAUTION:** Protect eyes from fluid.
5. Slide brake assembly out of bracket and remove old pads and clips.
6. Place caliper on bench with piston down.
7. Place a shop cloth in front of the piston and remove piston from casting by applying compressed air to the hydraulic inlet port. **CAUTION:** Use only enough air to remove piston. Too much pressure may damage piston or bore.
8. Using a small wooden or plastic stick, work piston seal out from its groove in the piston bore. **CAUTION:** To avoid scratching bore or burring edge of seal groove, do not use a metal tool such as a screwdriver.
9. Discard old seal.

BRAKES / FINAL DRIVE

Type H4 Brake System Service

Cleaning and Inspection

Check all parts for wear or damage and replace any found to be defective.

1. Clean all parts with denatured alcohol and wipe dry with a clean, lint free cloth.
2. Using compressed air, blow out the drilled passages and bores.
3. Inspect casting cylinder bore for scoring, pitting or corrosion. A corroded or deeply scored casting should be replaced. Light scores and stains may be removed by polishing with a *crocus cloth only*. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not slide the cloth in and out of the bore under pressure. Do not use any other kind of abrasive cloth. Black stains on the piston are caused by the seal and do no harm.
4. Check piston to see if it is pitted, scored or worn. If so, discard and replace the piston. **CAUTION:** Do not attempt to polish or sand piston.
5. Clean piston with denatured alcohol and wipe dry with a clean, lint free cloth. Using compressed air, blow dry.
6. Check inlet and bleeder hole threads for damage.
7. Inspect seat insert for damage and replace if necessary.

Assembly

1. Reassemble by reversing disassembly process. Be sure all parts are clean and serviceable before reassembling the unit.
2. Coat a new piston seal in clean DOT 3 brake fluid and place in groove in the cylinder bore. Seal should be positioned at one point in groove and then gently worked around the groove by hand until properly seated. **CAUTION:** Never reuse an old seal.
3. Coat piston thoroughly with brake fluid and work down into bore by hand carefully until bottomed. **CAUTION:** Apply even pressure to avoid cocking the piston in the bore.
4. Examine pads for wear or damage. If pad thickness is less than 1/32" (.08 cm) install new pad holder assemblies. If pads are not worn or damaged, they may be reused. Be sure pads are reinstalled in their original positions. If pads are replaced, replace in sets and make sure the new pads have the same friction material type code number as the old set.
5. Connect hose or line to caliper.
6. Place new pads with friction material facing each other into housing. Hold in place using clips.
7. Slide brake assembly into bracket until both clips snap into grooves in bracket.
8. Separate pads for installation over disc.
9. Place brake assembly over disc and push bracket into chaincase.
10. Replace 3/8" bolts, rope guide, and washers. Torque to 25-30 ft. lbs. (3.45-4.14 kg/m).
11. Actuate brake several times to set brake pads to proper operating position.
12. Make sure master cylinder reservoir brake fluid level is 1/4" (.6 cm) from the top of the reservoir.

Bleeding

Each hydraulic brake is fitted with a bleeder valve. This is a special valve which seals when turned in tight, but which allows air or fluid to pass out through a hole in the valve nipple when the valve is loosened one turn.

1. Clean any dirt from master cylinder cover and remove cover.
2. Attach a flexible tube to nipple of bleeder screw on caliper.
3. Place other end of flexible tube into a jar containing a small amount of clean brake fluid. See that end of tube is below fluid surface to prevent air from getting back into the system.
4. Loosen bleeder screw.
5. Slowly operate brake and check for air bubbles rising in fluid, indicating air is being forced out of the system.
6. Tighten bleeder screw as master cylinder is being depressed and reaching end of stroke.
7. Repeat steps 4 through 6 until air bubbles stop, adding new fluid to reservoir as needed.
8. Add new DOT 3 brake fluid to reservoir to bring level back up to within 1/4" (.6 cm) of top. Replace diaphragm and cap.
9. Re-check system for proper operation and for leaks.
10. Discard fluid in jar. This fluid contains air and should not be reused.
11. **WARNING:** Upon completion of brake service, test vehicle at low speeds before putting vehicle in regular service.

A thorough brake check should be made every ten days under normal conditions. This check should be made more often as the pads wear down. Under hard usage, check the fluid level often. As the brake pads wear, fluid fills the area behind the piston, lowering the fluid level in the reservoir.

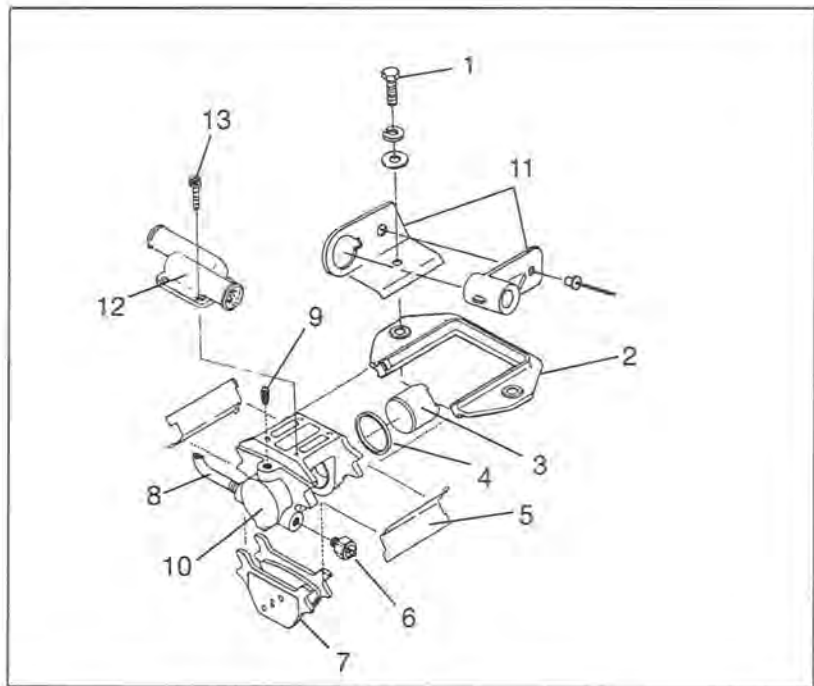
Maintenance

The routine maintenance procedures below are suggested as a means of keeping the brake system in good working order.

1. Clean any dirt from master cylinder cover and remove cover.
2. Check fluid level in reservoir. Add new DOT 3 fluid to within 1/4" (.6 cm) of the top of the reservoir. Do not overfill.
3. Make sure floating parts move freely and all other parts are mounted securely. Tighten hardware as required.
4. Inspect for hydraulic leaks and repair any found.
5. Inspect disc surface condition. If warped or badly pitted, replace.
6. Check to see if friction pads are worn to less than 1/32" (.08 cm) thick. Replace if they are.
7. Check brake lever travel. Brake lever should not feel spongy. Replace pads. Bleed or add fluid as needed.
8. Check cooler hose connections for leaks and replace hoses as required.

Replacing Friction Pads

1. Carrier Bracket Attaching Bolts
2. Carrier Bracket
3. Piston
4. Piston Seal
5. Spring Clip
6. Stop Light Switch
7. Brake Pads
8. Brake Line
9. Bleeder Screw
10. Caliper (Liquid Cooled)
11. Rope Guide
12. Water Cooler Manifold
13. Screws (Cooler Manifold)



WARNING: The rider's safety depends on correct installation. Follow the procedures carefully.

1. Clean any dirt from mount bracket and bolts.
2. With a 9/16 socket, remove two 3/8 hex bolts and washers from bracket. Remove rope guide. **NOTE:** Do not disconnect brake line.
3. Remove hose clamp from engine side of cooler. Twist and remove hose from cooler, catching and disposing of antifreeze properly.
4. Lift bracket and brake assembly off vehicle. Raise open end of cooler and pad assembly to trap antifreeze in cooler.
5. Slide brake assembly out of bracket. Discard old pads and clips. **NOTE:** Pad and spring clip must be replaced as a pair.
6. Clean dirt from end of piston and nearby area with a clean shop cloth.

CAUTION: Protect eyes from brake fluid.

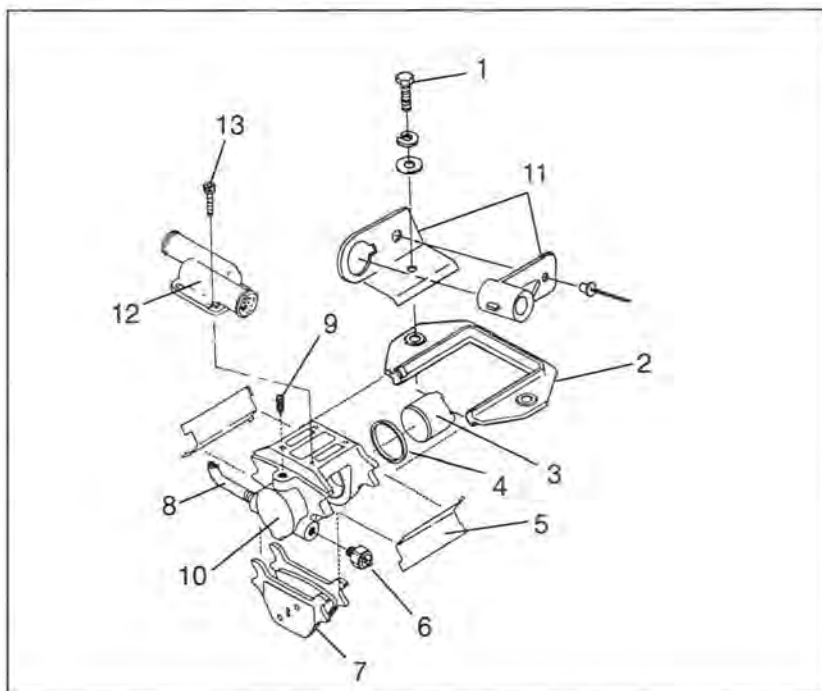
7. Remove reservoir cover. Using a hardwood dowel or the flat of a large screwdriver, work piston back into bore by carefully prying between parts.

BRAKES / FINAL DRIVE

Type H5 Brake System Service

1. Carrier Bracket Attaching Bolts
2. Carrier Bracket
3. Piston
4. Piston Seal
5. Spring Clip
6. Stop Light Switch
7. Brake Pads
8. Brake Line
9. Bleeder Screw
10. Caliper (Liquid Cooled)
11. Rope Guide
12. Water Cooler Manifold
13. Screws (Cooler Manifold)

NOTE: Pushing the piston back into the bore will cause the fluid level to rise in the reservoir and possible to overflow. Remove this excess fluid and discard.



1. Place new pads with friction material facing each other into housing. Hold in place using clips. See illustration.
2. Slide brake assembly into bracket until both clips snap into grooves in bracket.
3. Clean top of chaincase where brake mounts.
4. Separate pads for installation over disc. If brake assembly does not slide easily over the disc with loose pads, work piston back into bore by carefully prying between parts using a hardwood dowel or the flat of a large screwdriver.
5. Install coolant hose and clamp on cooler assembly.
6. Place brake assembly over disc and push bracket into chaincase.
7. Replace 3/8 bolts, washers, and rope guide. Torque to 25-30 ft. lbs. (3.45-4.14 kg/m).
8. Actuate brake several times to set brake pads to proper operating position.
9. Check for proper fluid level in master cylinder and replace cover.
10. Be sure to bleed coolant system by opening cap lever and running unit until all air in system has been displaced. Fill reservoir and close cap lever.
11. Field test at low speeds before putting into regular service.

Disassembly (For Caliper or Piston Replacement)

Refer to the exploded view while performing the following steps.

1. Remove bracket bolts.
2. Disconnect hydraulic line.
3. Disconnect and plug coolant lines, catching and disposing of antifreeze properly.
4. Disassemble on a clean bench.
5. Open bleed screw and drain operating fluid from caliper assembly. **CAUTION:** Protect eyes from fluid.
6. Slide brake assembly out of bracket and remove old pads and clips.
7. Place caliper on bench with piston down.
8. Place a shop cloth in front of the piston and remove piston from casting by applying compressed air to the hydraulic inlet port. **CAUTION:** Use only enough air to remove piston. Too much pressure may damage piston or bore.
9. Using a small wooden or plastic stick, work piston seal out from its groove in the piston bore. **CAUTION:** To avoid scratching bore or burring edge of seal groove, do not use a metal tool such as a screwdriver.
10. Discard old seal.

Cleaning and Inspection

Check all parts for wear or damage and replace any found to be defective.

1. Clean all parts with denatured alcohol and wipe dry with a clean, lint free cloth.
2. Using compressed air, blow out the drilled passages and bores.
3. Inspect casting cylinder bore for scoring, pitting or corrosion. A corroded or deeply scored casting should be replaced. Light scores and stains may be removed by polishing with a *crocus cloth only*. Use finger pressure and rotate the crocus cloth in the cylinder bore. Do not slide the cloth in and out of the bore under pressure. Do not use any other kind of abrasive cloth. Black stains on the piston are caused by the seal and do no harm.
4. Check piston to see if it is pitted, scored or worn. If so, discard and replace the piston. **CAUTION:** Do not attempt to polish or sand piston.
5. Clean piston with denatured alcohol and wipe dry with a clean, lint free cloth. Using compressed air, blow dry.
6. Check inlet and bleeder hole threads for damage.
7. Inspect seat insert for damage and replace if necessary.

Assembly

1. Reassemble by reversing disassembly process. Be sure all parts are clean and serviceable before reassembling the unit.
2. Coat a new piston seal in clean DOT 3 brake fluid and place in groove in the cylinder bore. Seal should be positioned at one point in groove and then gently worked around the groove by hand until properly seated. **CAUTION:** Never reuse an old seal.
3. Coat piston thoroughly with brake fluid and work down into bore by hand carefully until bottomed. **CAUTION:** Apply even pressure to avoid cocking the piston in the bore.
4. Examine pads for wear or damage. If pad thickness is less than 1/32" (.08 cm) install new pad holder assemblies. If pads are not worn or damaged, they may be reused. Be sure pads are reinstalled in their original positions. If pads are replaced, replace in sets and make sure the new pads have the same friction material type code number as the old set.
5. Connect hose or line to caliper.
6. Place new pads with friction material facing each other into housing. Hold in place using clips.
7. Slide brake assembly into bracket until both clips snap into grooves in bracket.
8. Separate pads for installation over disc.
9. Place brake assembly over disc and push bracket into chaincase.
10. Install coolant lines and hose clamps and tighten securely.
11. Replace 3/8" bolts, rope guide, and washers. Torque to 25-30 ft. lbs. (3.45-4.14 kg/m).
12. Actuate brake several times to set brake pads to proper operating position.
13. Make sure master cylinder reservoir brake fluid level is 1/4" (.6 cm) from the top of the reservoir.

Bleeding

Each hydraulic brake is fitted with a bleeder valve. This is a special valve which seals when turned in tight, but which allows air or fluid to pass out through a hole in the valve nipple when the valve is loosened one turn.

1. Clean any dirt from master cylinder cover and remove cover.
2. Attach a flexible tube to nipple of bleeder screw on caliper.
3. Place other end of flexible tube into a jar containing a small amount of clean brake fluid. See that end of tube is below fluid surface to prevent air from getting back into the system.
4. Loosen bleeder screw.
5. Slowly operate brake and check for air bubbles rising in fluid, indicating air is being forced out of the system.
6. Tighten bleeder screw as master cylinder is being depressed and reaching end of stroke.
7. Repeat steps 4 through 6 until air bubbles stop, adding new fluid to reservoir as needed.
8. Add new DOT 3 brake fluid to reservoir to bring level back up to within 1/4" (.6 cm) of top. Replace diaphragm and cap.
9. Re-check system for proper operation and for leaks.
10. Discard fluid in jar. This fluid contains air and should not be reused.
11. Be sure to bleed coolant system by opening cap lever and running unit until all air in system has been displaced. Fill reservoir and close cap lever.
12. **WARNING:** Upon completion of brake service, test vehicle at low speeds before putting vehicle in regular service.

A thorough brake check should be made every ten days under normal conditions. This check should be made more often as the pads wear down. Under hard usage, check the fluid level often. As the brake pads wear, fluid fills the area behind the piston, lowering the fluid level in the reservoir.

BRAKES / FINAL DRIVE

Bleeding Procedures for Polaris Brake Systems

The Polaris hydraulic brake mechanism consists of the following components or assemblies: handlebar mounted master cylinder, hydraulically operated plunger assembly (slave cylinder) integrally mounted in chaincase rear cover, adjustable brake pad, and self-aligning brake disc mounted in chaincase.

The master cylinder contains a fluid reservoir and a cylindrical pressure chamber. Force applied to the brake lever is transmitted to the fluid, which actuates the plunger assembly in the chaincase rear cover. A coil spring located in the master cylinder holds the piston assembly against the actuating force of the brake lever. The piston assembly consists of a piston, U-seal and rubber O-Ring.

SERVICE

Air in the hydraulic system will cause a springy or spongy action of the brake lever. Follow directions below for bleeding.

1. Fill master cylinder reservoir to recommended level with DOT 3 brake fluid PN 2870990: Type 1 Master Cylinder 1/8" (.3 cm) below lip of reservoir opening; Type 2 Master Cylinder 1/4" (.6 cm) below lip of reservoir opening; Type 3 Master Cylinder 1/4"- 5/16" (.6 - .8 cm) below lip of reservoir opening.



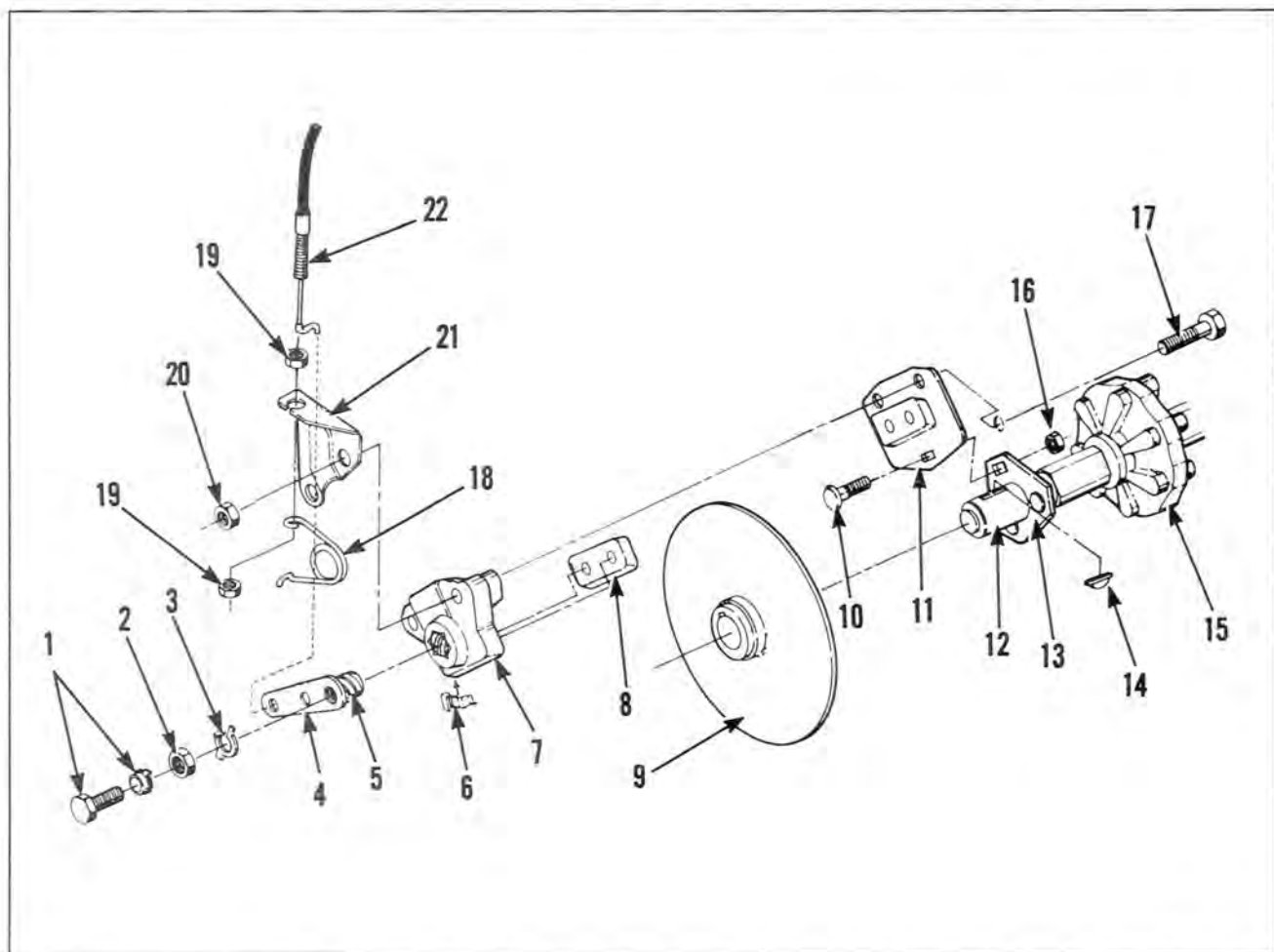
2. Slip a flexible rubber tube over ball of bleeder valve and direct fluid away from painted areas. **CAUTION:** Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.



3. Slowly squeeze brake lever a full stroke and hold. Unscrew bleeder valve 3/4 turn to release air. Close bleeder valve. Release brake lever. Repeat this procedure until fluid flows from bleeder valve in a solid stream, free of air. Re-check fluid level in reservoir.



BRAKES / FINAL DRIVE **Type M1 Brake Overhaul and Pad Replacement**



1. Adjuster Bolt and Stop
2. Jam Nut
3. Jam Nut Locking Tab
4. Actuating Lever
5. Helix Shaft
6. Brake Pad Retainer
7. Caliper Casting
8. Moveable Brake Pad
9. Brake Disc
10. Carriage Bolt
11. Stationary Pad Assembly

12. Front Drive Shaft
13. Drive Shaft Bearing Flangette
14. Brake Disc Key
15. Front Drive Sprocket
16. Nut, 5/16"
17. Caliper Attaching Bolt (2)
18. Return Spring
19. Cable Sleeve Jam Nut (2)
20. Caliper Attaching Nut (2)
21. Brake Cable Bracket
22. Brake Cable

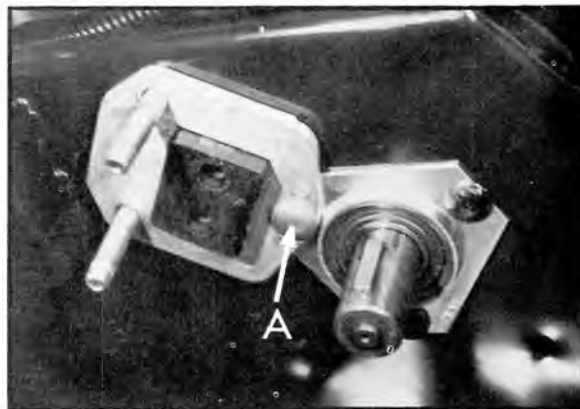
1. Open adjuster bolt jam nut locking tab (A).
2. Loosen jam nut and remove adjuster bolt (B).
3. Remove actuating lever (C) and return spring.
4. Remove two brake caliper attaching nuts (D).
5. Remove cable bracket and caliper assembly. Check cable condition at both ends. Frayed or binding brake cables must be replaced.



BRAKES / FINAL DRIVE

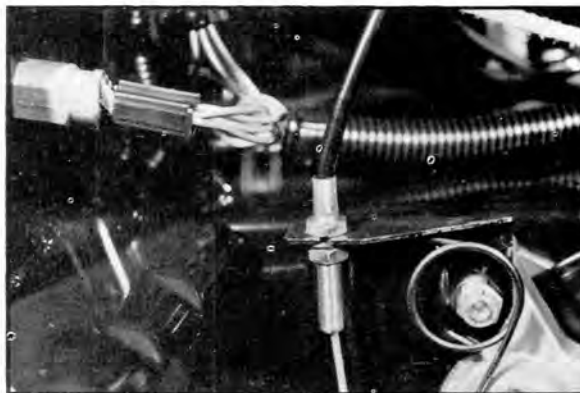
Type M1 Brake Overhaul and Pad Replacement

6. Slide brake disc off front drive shaft. Check disc condition and mounting. Replace if necessary.
7. Clean drive shaft in brake disc area. Lightly lubricate with anti-seize.
8. Remove carriage bolt (A). Remove pad assembly and replace with new assembly.
9. Install brake disc. The disc must float or slide freely on the front drive shaft.



10. Replace moveable pad assembly and install caliper onto attaching bolts.
11. Install brake cable bracket and torque attaching nuts to 30 ft. lbs. (4.14 kg/m).
12. Loosen cable sleeve jam nuts and adjust brake cable sleeve to its shortest position.

CAUTION: The following step is critical for proper positioning of the actuating arm to the caliper helix shaft.



13. With brake lever bottomed on handlebar, and helix shaft (A) bottomed in caliper, install actuating arm, jam nut locking tab, jam nut, and adjuster bolt.

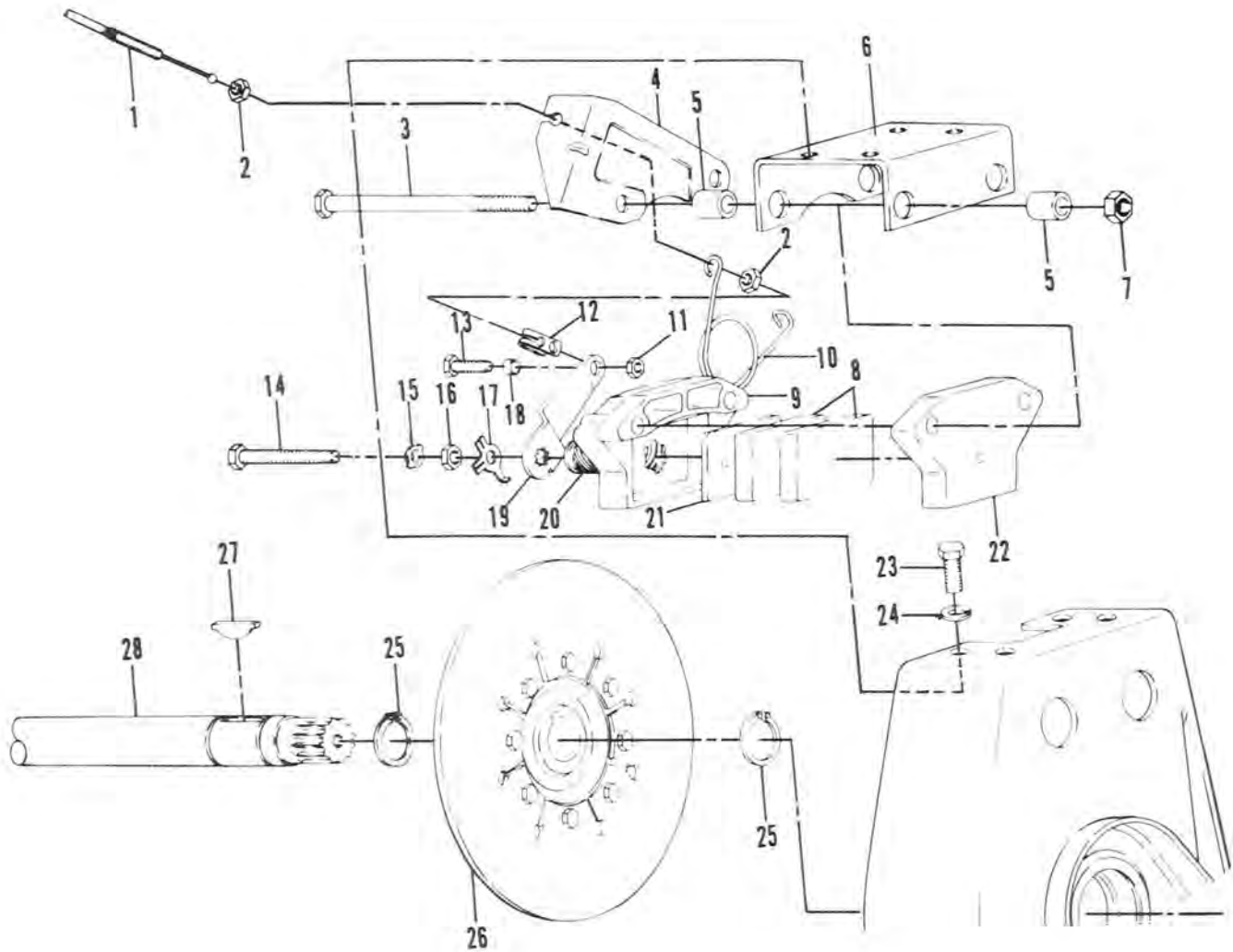


14. Insert a .015" feeler gauge between the brake disc and moveable brake pad. Release brake lever. Install return spring and finger tighten bolt. Set adjuster bolt jam nut, bend locking tab, and remove feeler gauge.

15. Field test unit for proper braking action.



BRAKES / FINAL DRIVE **Type M2 Exploded View**

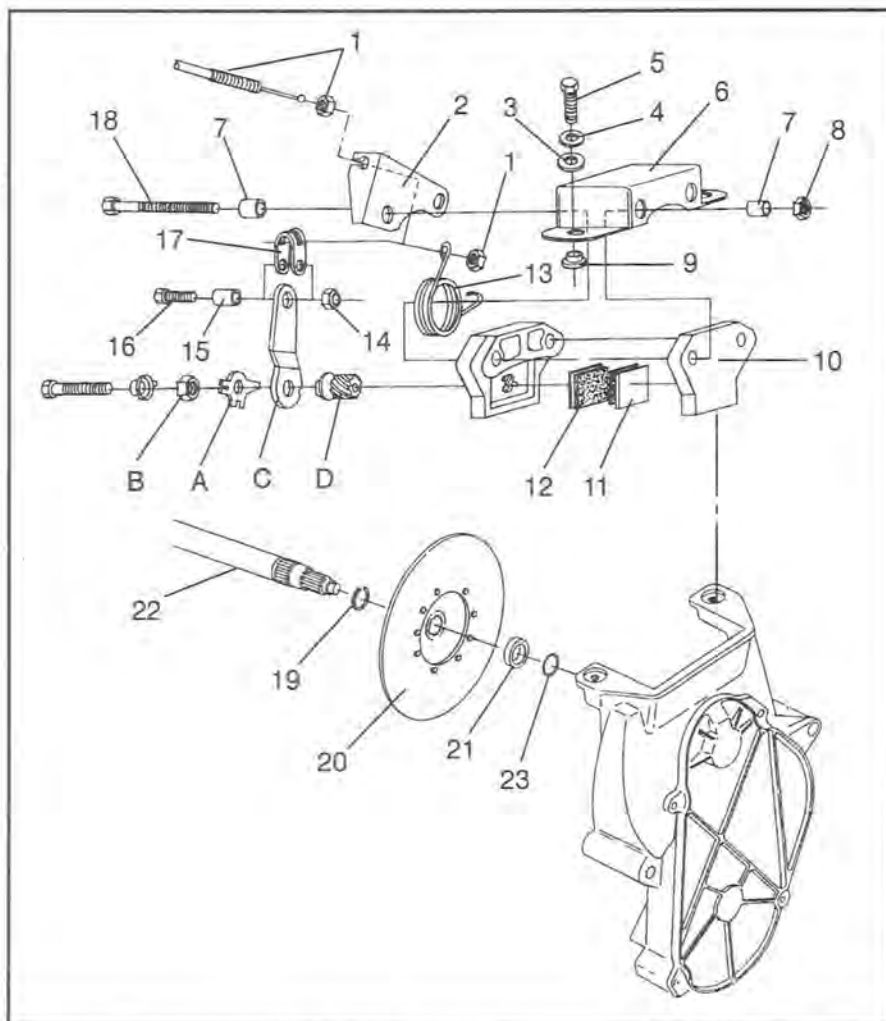


1. Brake Cable
2. Cable Sleeve Jam Nut (2)
3. Bridge Bolt (2)
4. Brake Cable Bracket
5. Spacer Bushing (4)
6. Carrier Bracket
7. Nut (2)
8. Brake Pad (2)
9. Caliper Casting
10. Return Spring
11. Nut
12. Cable Clevis
13. Clevis Bolt
14. Adjuster Bolt

15. Adjuster Bolt Stop
16. Jam Nut
17. Jam Nut Locking Tab
18. Bushing
19. Actuating Lever
20. Helix Shaft
21. Pad Backing Plate
22. Caliper Casting
23. Bracket Cap Screw (4)
24. Lock Washer (4)
25. Snap Ring (2)
26. Brake Disc
27. Key
28. Jackshaft

BRAKES / FINAL DRIVE Type M3 Exploded View

1. Cable, Brake
2. Bracket, Brake
3. Washer
4. Washer, Spring Lock
5. Bolt
6. Bracket, Brake Top Mounting
7. Bushing
8. Nut, Bi-Lock
9. Spacer, Alignment
10. Caliper, Stationary, Cast
11. Pad, Brake
12. Puck, Moveable Brake
13. Spring, Brake Return
14. Nut
15. Bushing, Brake Arm
16. Bolt
17. Clevis, LT
18. Bolt
19. Retaining Ring
20. Brake Disc
21. Seal
22. Jackshaft
23. O-Ring



Adjusting Procedure

CAUTION: Whenever inspection reveals worn, damaged or defective parts, replacement is necessary in order to avoid serious damage to the machine or injury to the operator.

1. Open adjuster bolt jam nut locking tab (A). Loosen jam nut and remove adjuster bolt (B).
2. Remove actuating lever (C) and return spring.
3. Remove top mount bracket and brake assembly mounting bolts (Item 5). Remove washers (Items 3 and 4) and alignment spacers (Item 9). Remove brake assembly. **NOTE:** Be prepared to catch brake pads as assembly is lifted out.
4. Remove brake pads and inspect for wear and damage. Replace if necessary.
5. Inspect rotor disc and replace if necessary.

NOTE: Reassembly is made easier by clipping moveable brake pad into position under holder clip. Stationary pad can be held in place by use of a rubber band while placing assembly over rotor disc and mounting to chaincase.

6. Install alignment spacers (Item 9), washers (Items 3 and 4) and bolts (Item 5). Torque assembly to 25-30 ft. lbs.

7. Loosen cable sleeve jam nuts and adjust brake cable sleeve to its shortest position.

WARNING: The following step is critical for proper positioning of the actuating arm to the caliper helix shaft. Improper positioning will result in minimal resistance and ineffective brakes.

8. With brake lever bottomed on handlebar and helix shaft (D) bottomed in caliper, install actuating arm, jam nut locking tab, jam nut and adjuster bolt.
9. Insert a .015" (.04 cm) feeler gauge between brake disc and moveable brake pad. Release brake lever. Install return spring and finger tighten bolt. Set adjuster bolt jam nut, bend locking tab and remove feeler gauge.
10. Field test machine for proper braking action before putting into service.

INDY JACKSHAFT SPEED VS. MILES PER HOUR SPROCKET COMBINATION/GEAR RATIO/CHAIN PITCH

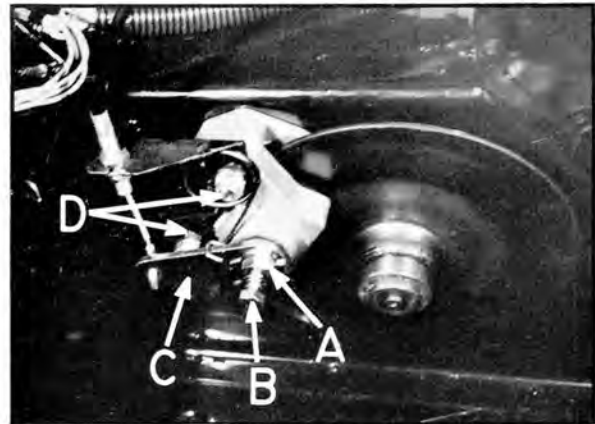
The following chart should be used to select optimum gearing for special applications. The chart is calculated for models with the P85 drive clutch at a 1 to 1 ratio between drive clutch and driven clutch front drive sprocket diameter is 7.06 inches. To use the chart, select the jackshaft rpms (equal to engine rpm). MPH is shown to the right of jackshaft rpm. Shown on top is optimum gearing for mph and engine rpms.

[illegible]

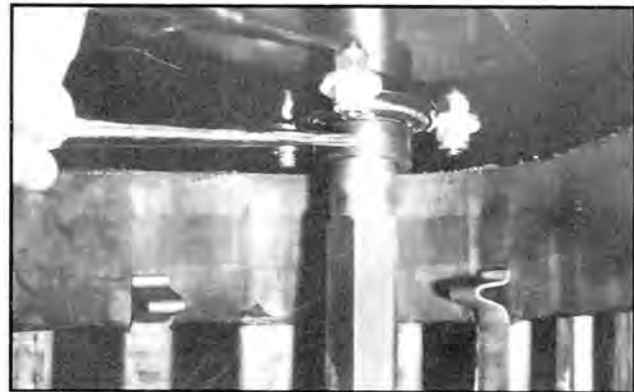
BRAKES / FINAL DRIVE

Type 1 Drive System Overhaul

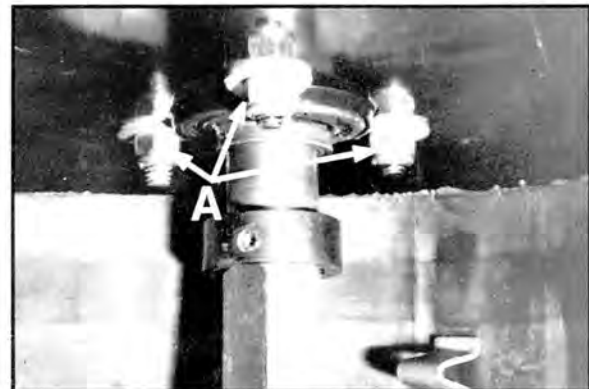
1. Remove drive belt, driven clutch and driven clutch spacer washers.
2. Open adjuster bolt jam nut locking tab (A). Loosen jam nut and remove adjuster bolt (B).
3. Remove actuating lever (C) and return spring.
4. Remove two brake caliper attaching nuts (D).
5. Remove cable bracket and caliper assembly. Check cable condition at both ends. Frayed or binding brake cables must be replaced.



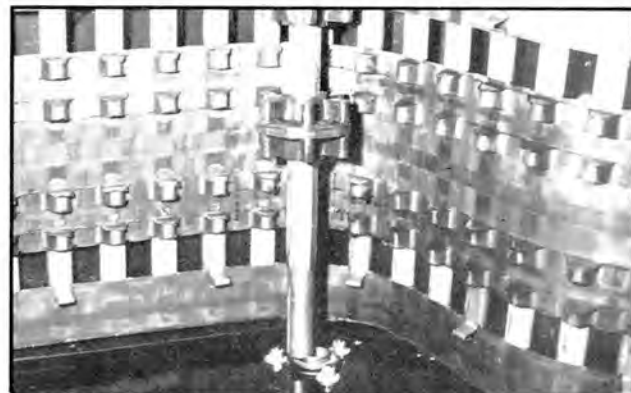
6. Slide brake disc off front drive shaft and remove half moon key.
7. Remove four suspension mounting bolts and suspension. Note placement of two rear torque arm idler wheel thrust spacers for reassembly.
8. Loosen lock collar Allen head set screw. With a punch and hammer, loosen bearing lock collar located on brake end of drive shaft.



9. Remove three flange attaching bolts (A).
NOTE: The longest of these bolts attaches the stationary brake pad.



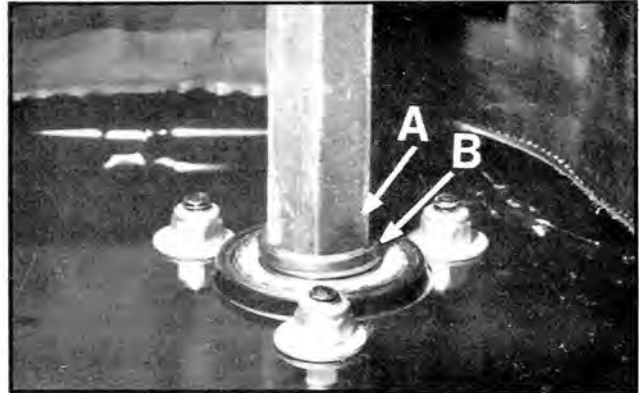
10. Slide drive shaft toward brake side of chassis until driven clutch end is free. Tilt shaft and remove it from brake end bearing.
11. Remove track.



BRAKES / FINAL DRIVE

Type 1 Drive System Overhaul

12. Before reassembly check drive shaft, drive shaft sprocket, and drive shaft bearings. Replace if necessary.
13. Reverse disassembly procedures to reassemble. Sprocket or drive shaft centering is controlled by the hex portion of drive shaft (A) being bottomed on driven clutch side bearing (B). **NOTE:** Driven clutch must be installed and torqued before lock collar is tightened.
14. Refer to brake adjustment procedures in this chapter.

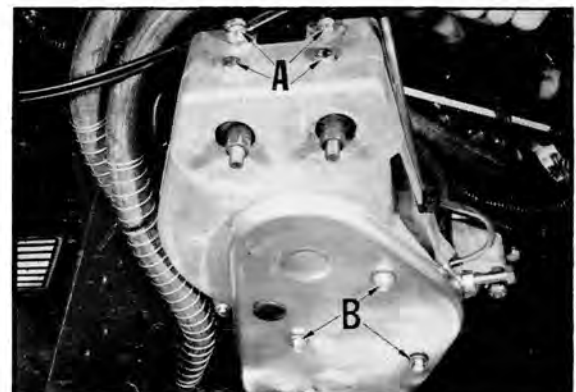
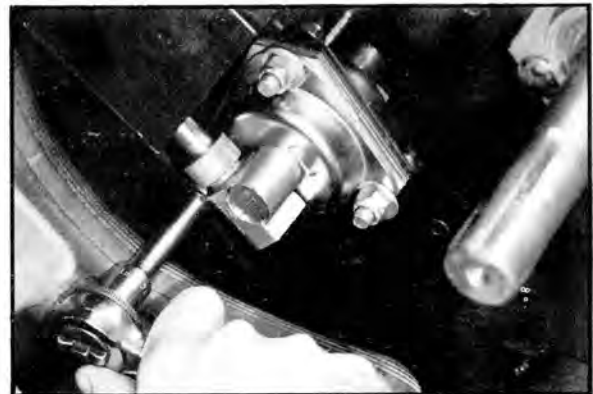
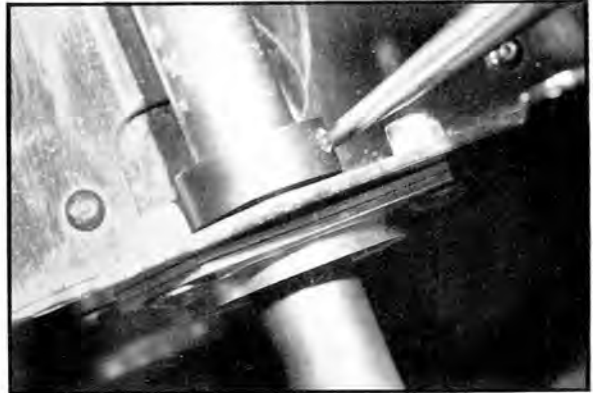


BRAKES / FINAL DRIVE

Type 2 Drive System Overhaul

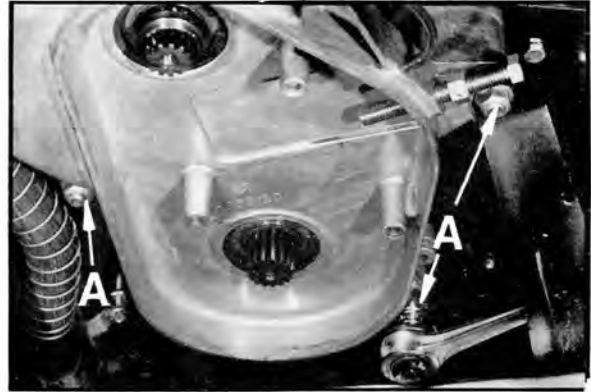
Disassembly

1. Remove hood.
2. Remove air silencer and exhaust system. **NOTE:** Exhaust silencer and expansion chamber can be removed as a unit.
3. Remove drive belt and driven clutch, noting position of clutch offset washers.
4. Loosen jackshaft bearing locking collar and slide it away from bearing.
5. Remove three flange attaching nuts and washers located on left side of front drive shaft.
6. If unit is equipped with a battery, remove the battery.
7. Drain or siphon fuel tank.
8. Remove four suspension mounting bolts.
9. Place a protective mat on the floor and tip the machine on its left side.
10. Remove suspension.
11. Loosen front drive shaft locking collar set screw. Rotate bearing lock collar and slide it away from bearing.
12. Remove four caliper attaching bracket capscrews (A) and three chaincase cover bolts (B).



BRAKES / FINAL DRIVE Type 2 Drive System Overhaul

13. Loosen chain adjuster bolt jam nut and remove adjuster.
14. Remove chain, and top and bottom gears. Note position of gear spacer and shims for proper gear alignment upon reassembly.
15. Remove three chaincase attaching nuts and carriage bolts (A).



16. Install a 5/16 x 3/4" bolt into the jackshaft and drive the shaft out through the upper case bearing.
17. Remove front drive shaft and track.



18. Remove stop light switch wires and lift brake caliper assembly from brake disc. **CAUTION:** Do not squeeze brake lever with caliper removed.



19. Remove three flangette attaching bolts from left side of jackshaft. **NOTE:** The bottom flangette is accessible from the *underside* of the tunnel as shown in the photo at right.
20. Remove jackshaft.



BRAKES / FINAL DRIVE

Type 2 Drive System Overhaul

Inspection

21. Inspect jackshaft bearing in support area as shown. If any wear is noted, the shaft must be replaced.
22. Remove brake disc and inspect brake disc key and keyways. If the key or keyways show signs of wear, the brake disc and jackshaft should be replaced. If the brake disc is glazed, it should also be replaced.
23. Lubricate jackshaft between snap rings with anti-seize and reinstall brake disc.



Reassembly

Be sure all parts are clean and serviceable before proceeding with reassembly. It is important that the following reassembly steps be performed in sequence to prevent misalignment and possible component failures.

1. Remove and replace upper and lower chaincase bearings.
2. Replace chaincase cover gasket. Use a small amount of silicone sealer at the ends of the cover gasket.
3. Install jackshaft as shown and place caliper assembly onto brake disc.
4. Place chaincase into position on bulkhead and onto jackshaft. Do not bolt chaincase to bulkhead at this time.
5. Install jackshaft alignment tool with bolt and washer as shown. Tighten alignment tool bolt until jackshaft is seated into upper chaincase bearing.

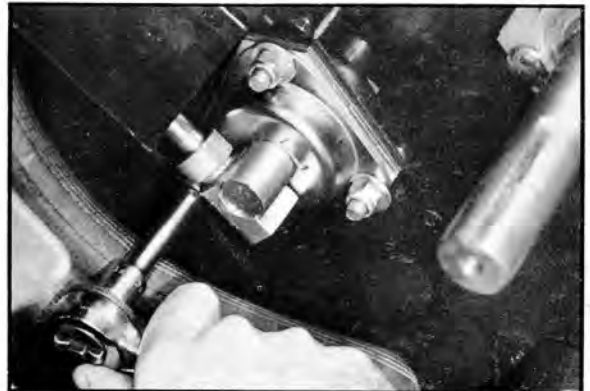
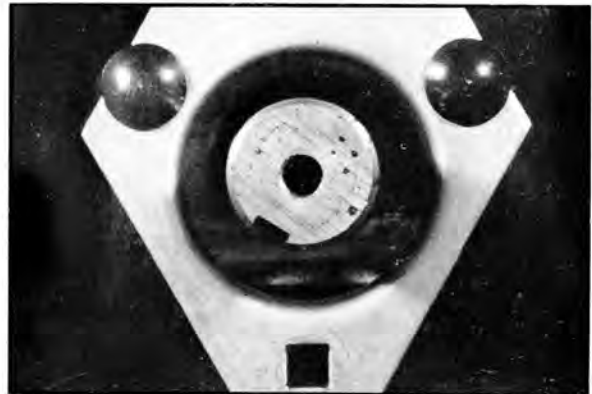


BRAKES / FINAL DRIVE Type 2 Drive System Overhaul

6. Install and tighten three chaincase attaching carriage bolts and locking nuts.
7. Apply Loctite to four caliper attaching bracket capscrews and finger tighten into carrier bracket. With brake applied, torque capscrews (A) to 8 ft. lbs. (1.1 kg/m).
8. Reinstall stop light switch wires.
9. Install a flangette into left bearing support hole.



10. With alignment tool torqued to 6 ft. lbs. (.83 kg/m), the shaft should be centered as shown. If not, the chaincase will have to be shimmed between the bulkhead and case. Using Shim Kit PN 2200126, install shims as needed to position shaft on center.
11. Install track and front drive shaft assembly.
12. Remove jackshaft alignment tool and install top and bottom gear shims, chain and gears.
13. Tighten gear retainer bolts. Check gear alignment and chain tension.
14. Install bearing assembly onto left side drive shaft and tighten three carriage bolts.



15. Lightly rotate bearing locking collars on jackshaft and drive shaft. Tighten Allen head set screws.



BRAKES / FINAL DRIVE

Type 2 Drive System Overhaul

16. Add three ounces of Polaris chaincase oil into the chaincase and reinstall chaincase cover.
NOTE: One full stroke on the pump equals one ounce of oil. Polaris highly recommends the use of this oil for extended gear and chain life.

17. Install cover and fill to check plug opening.

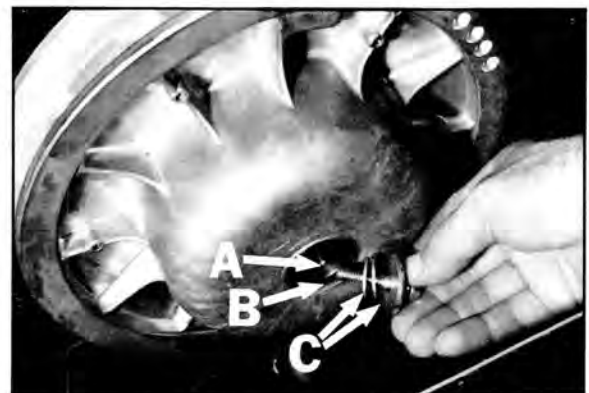
18. Reinstall suspension. Torque suspension mounting bolts to 35-40 ft. lbs. (4.83-5.52 kg/m).



19. Reinstall air silencer, exhaust system and driven clutch. Check and adjust clutch offset. Refer to Chapter 7 for correct offset specifications and tool. **CAUTION:** If this step is not performed, bearing side loading and clutch misalignment during driven clutch bolt tightening may occur.

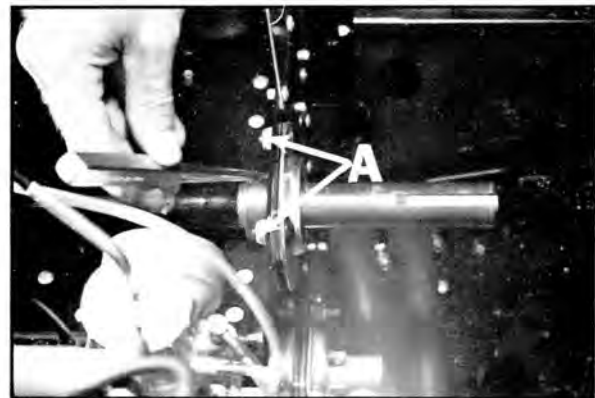
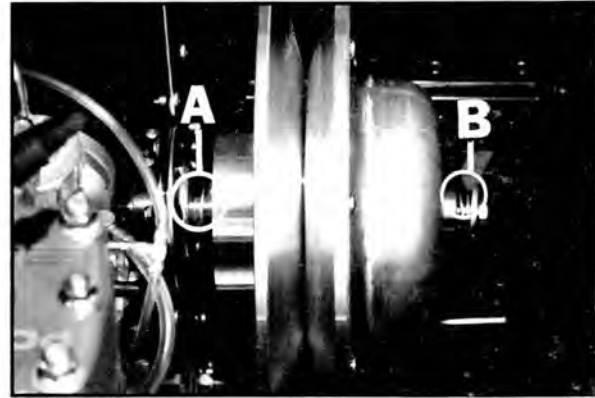


20. With driven clutch properly positioned, measure distance between alignment spacer (A) and outer edge of driven clutch hub (B). This distance must be taken up by using washer(s) PN 7555734 (C).
21. Reinstall clutch retaining bolt and torque to 12 ft. lbs. (1.66 kg/m).
22. Reinstall drive belt.
23. Reinstall hood and field test unit for proper front drive operation.



BRAKES / FINAL DRIVE Type 3 Drive System Overhaul

1. Remove hood, air silencer, exhaust system and battery, if so equipped.
2. Turn fuel valve off.
3. Remove drive belt and driven clutch. Note position of washers for controlling drive to driven offset (A) and washers to control clutch free floating (B).
4. Loosen jackshaft bearing lock collar set screw. Loosen lock collar by rotating in opposite direction of rotation.
5. Remove two upper flangette attaching bolts (A).
6. Remove three bolts securing angle drive and bearing flangettes.
7. Remove four suspension mounting bolts.
8. Place a protective mat on floor and tip machine onto left side.
9. Remove rear suspension.
10. Position track as shown and remove third jackshaft flangette attaching bolt (A).
11. Loosen drive shaft lock collar set screw and rotate lock collar.



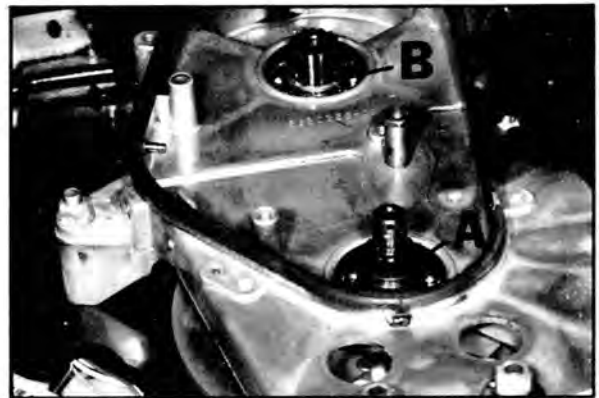
BRAKES / FINAL DRIVE

Type 3 Drive System Overhaul

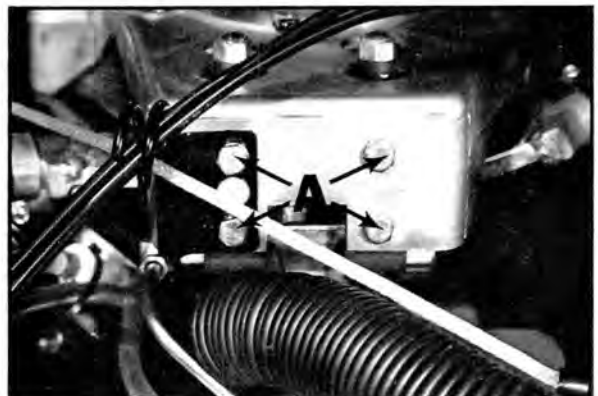
12. Remove chaincase cover attaching bolts and remove cover.
13. Remove castle nut cotter pin and castle nut.
14. Remove chain adjustment bolt and chain tensioner assembly.
15. Remove bottom gear attaching bolt, chain and sprockets.



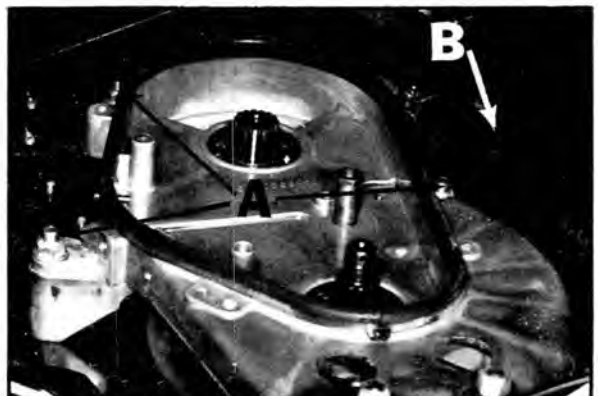
16. Note position of top gear spacer (A) and gear alignment washers (B). Remove spacer and washers.



17. Remove four bolts securing caliper carrier bracket to chaincase (A).



18. Remove three chaincase to bulkhead attaching nuts and bolts. **NOTE:** On some machines it may be necessary to remove the rear exhaust bracket (B) prior to lifting chaincase or removing drive shaft assembly.



BRAKES / FINAL DRIVE Type 3 Drive System Overhaul

19. Remove chaincase and slide brake caliper assembly (A) outward from brake disc as shown.

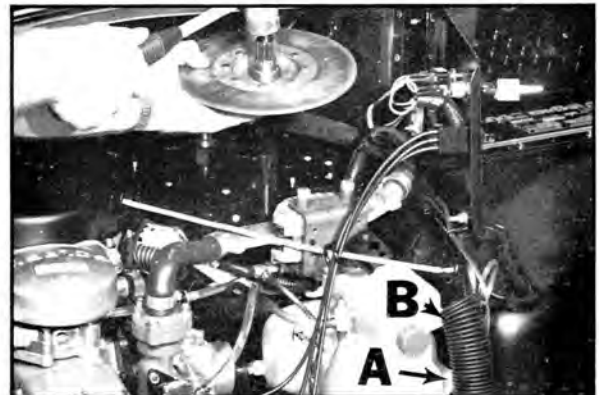


20. Remove oil tank attaching bolt (A). On liquid cooled models, remove coolant recovery tank bolt (B).

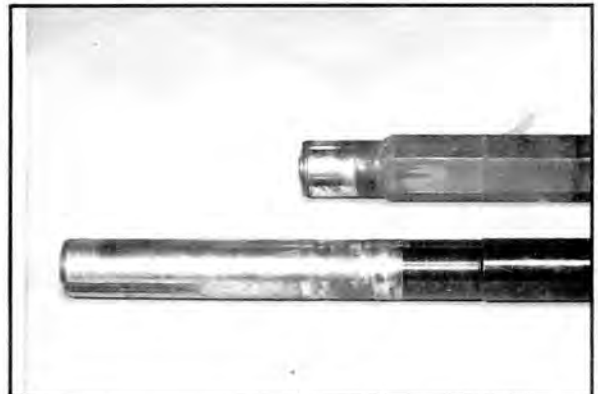
21. Raise jackshaft assembly as shown.

22. Remove O-Ring, seal sleeve and brake disc by tapping on jackshaft end with a soft face hammer as shown.

23. Remove jackshaft and drive shaft.



24. Inspect drive shaft and jackshaft in bearing contact area. If diameter is .001" (.025 mm) less than non-contact area, shafts should be replaced.



25. Remove bearing retaining snap rings.



BRAKES / FINAL DRIVE

Type 3 Drive System Overhaul

26. Pry out old seal.
27. Press out old bearing from side shown. **NOTE:** If bearing appears tight, use heat to expand chaincase bore.



28. Apply Loctite 680 (PN 2870584) to outer race of bearing and press into position.
29. Reinstall snap rings.
30. Press new seals in until outer edge is flush with chaincase shoulder.



31. Install drive shaft and jackshaft as shown with new seal sleeves (A) and O-Rings. **NOTE:** Recessed area on seal sleeve is positioned outward and O-Ring rests in this recess.
32. Grease seal sleeves and O-Rings.

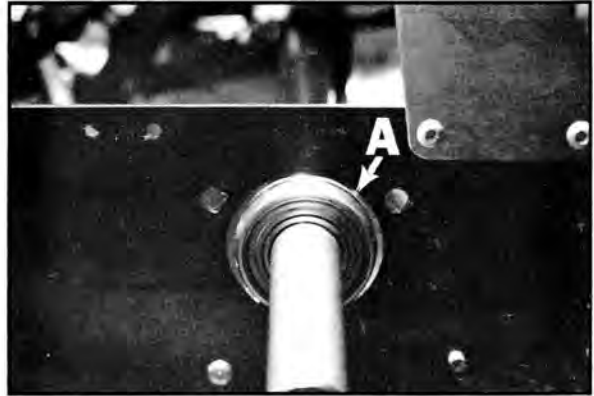


33. Reinstall brake caliper onto brake disc and install chaincase. **NOTE:** On some models, prior to installing the drive shaft it will be necessary to install the chaincase to bulkhead attaching bolts (A).
34. Install jackshaft alignment tool (PN 2870399) and secure with castle nut as shown.



BRAKES / FINAL DRIVE Type 3 Drive System Overhaul

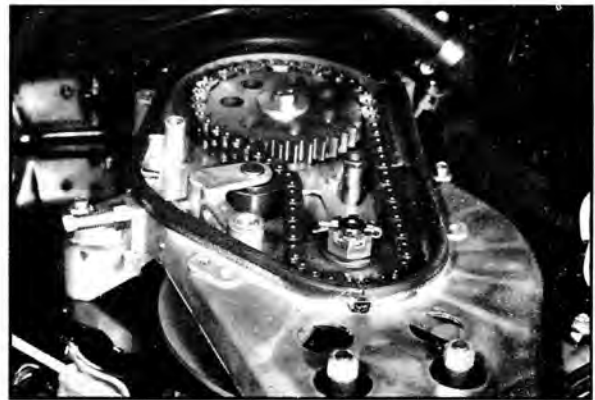
35. Slide a bearing onto driven clutch end and check shaft alignment to bulkhead opening (A).



36. If alignment is not correct, shims may be added between any of the chaincase to bulkhead attaching points. Use Shim Kit PN 2200126.



37. Reassemble by reversing disassembly procedures.
38. Torque castle nut to 50 ft. lbs. (6.9 kg/m).. If cotter pin does not align, tighten nut until cotter pin aligns.
39. Finger tighten four carrier bracket attaching bolts.
40. Apply parking brake to align caliper to brake disc. Torque bolts with brake applied. Release brake and retorque bolts to 8 ft. lbs. (1.1 kg/m).

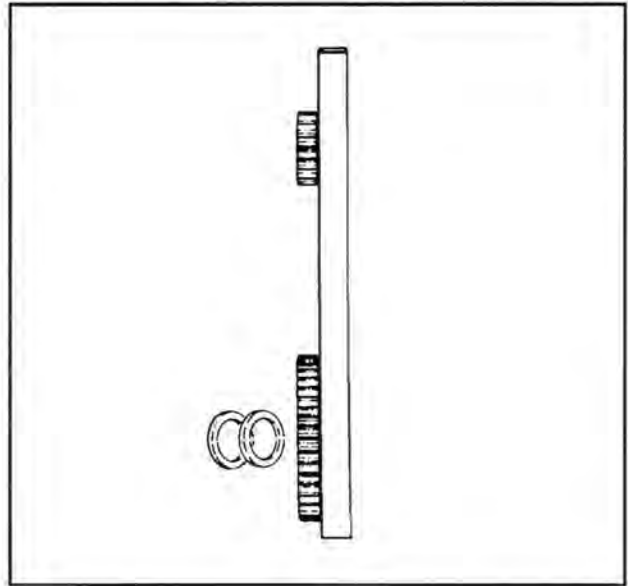


BRAKES / FINAL DRIVE

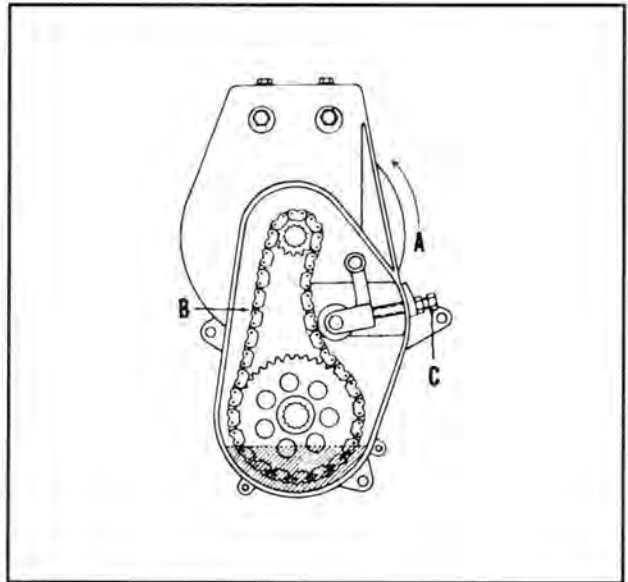
Type 3 Drive System Overhaul

Maximum sprocket and chain life are directly related to proper sprocket alignment and chain tension.

41. Before installing drive chain, place a straight edge against upper and lower installed sprockets. The edge should contact equally on both sprockets.
42. If misalignment is evident, the addition or subtraction of washers (PN 7556509) behind the bottom sprocket will be necessary.

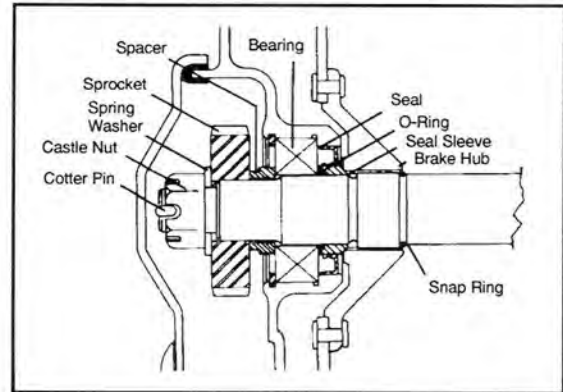


43. To obtain correct chain tension, place a slight reverse tension on the chain as indicated in the illustration at right (A).
44. There should be approximately 1/4-3/8" (.6-.95 cm) deflection on the chain at point (B). Loosen adjuster bolt locknut and turn adjuster bolt (C) until correct chain deflection is obtained.
45. Lock adjuster bolt locknut while holding a wrench on the adjuster bolt.
46. Install chaincase cover and add Polaris chaincase lubricant (PN 2870337) through cover upper plug hole until lubricant trickles from check plug hole.
47. Reinstall plugs.



BRAKES / FINAL DRIVE Type 3 Drive System Overhaul

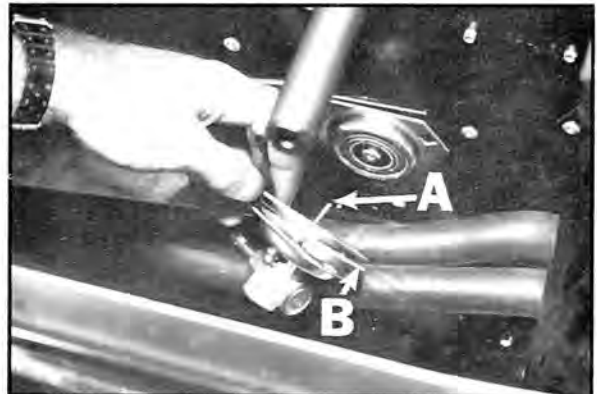
48. The illustration at right shows a cross section view of the upper chaincase. Always replace seals and O-Rings. Check seal sleeve for wear and/or nicks. Replace if any are noticed.
49. Castle nut is torqued to 50 ft. lbs. (6.9 kg/m). Cotter pin must be installed and fixed so it will not hit chaincase cover. **NOTE:** If cotter pin does not align, tighten nut until alignment is achieved.



50. When install caliper assembly, tighten four bracket attaching bolts (A) finger tight.
51. Apply brakes and torque to 8 ft. lbs. (1.1 kg/m). Release brakes and retorque to 8 ft. lbs. (1.1 kg/m). This procedure allows better alignment of brake caliper to brake disc.



52. When reinstall drive shaft flangettes and speedometer angle drive, always replace drive key (A) and install a new gasket (B).
53. Check cable routing and lubricate with Polaris clutch and cable lube PN 2870510.
54. Grease angle drive and bearing with Polaris low temp grease.



55. When reinstalling jackshaft flangette and bearing be sure to align bearing outer race hole (A) with flangette hole (B). This will allow a more positive grease entry into the bearing.



BRAKES / FINAL DRIVE

Type 3 Drive System Overhaul

56. Lubricate top bearing using a needle point adaptor and Polaris low temp grease.



57. Jackshaft and drive shaft locking collars are tightened only after chaincase top and bottom gears have been torqued. Lightly rotate collars in the same direction as the shaft rotates and tighten set screw.



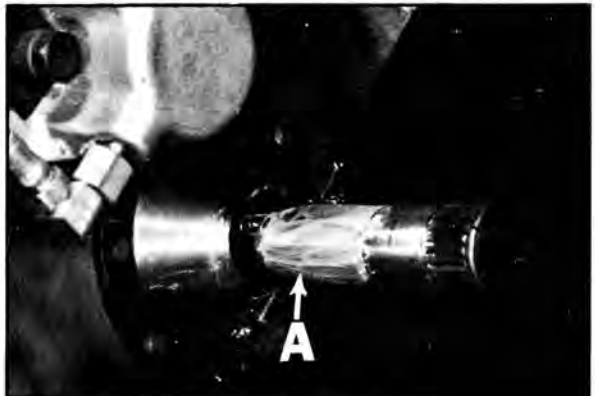
58. When driven clutch offset is properly adjusted, the washers (A) PN 7555734 are used to adjust for free float on driven. Without a slight free float, the jackshaft bearings could be side loaded and cause premature bearing failure.

59. If only the jackshaft needs service, loosen left rear nosepan to foot rest mounting bolts and slide shaft out left side without removing chaincase.



60. For reassembly, use jackshaft installation tool (A) PN 2870974. Grease tool and guide jackshaft through brake disc hub, seal sleeve, O-Ring and bearing. **NOTE:** Jackshaft with tool installed must slide freely. If not, reposition O-Ring.

61. Field test machine and check for proper braking action and drive train efficiency.



BRAKES / FINAL DRIVE Type 4 Drive System Overhaul

Jackshaft and Drive Shaft Disassembly

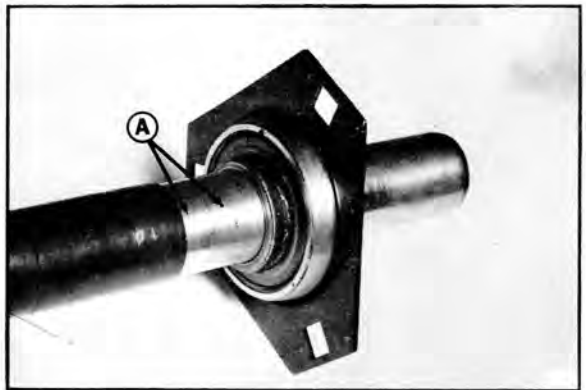
1. Remove rear suspension.
2. Clean, lubricate and inspect.
3. Loosen drive shaft lock collar set screw (A) and rotate collar.
4. Remove clutch guard, drive belt, driven clutch, driven clutch offset washers and air silencer.,



5. Remove jackshaft and drive shaft bearing flangette attaching bolts.
6. Remove drive shaft and jackshaft.



7. Remove bearing from each shaft and inspect bearing support area (A). If this area shows any sign of wear the shaft must be replaced.



BRAKES / FINAL DRIVE

Type 4 Drive System Overhaul

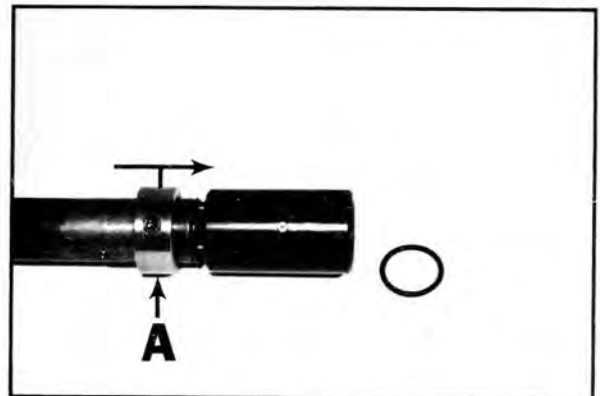
8. Check shafts at the splined coupling ends. If excessive wear or play is noted here and inside the coupler, the shafts and couplings should be replaced. **NOTE:** If this wear is premature, it is very important to check jackshaft alignment.
9. If the transmission is to be removed, refer to transmission overhaul procedures at the end of this chapter.



10. Move collar (A) tight against coupler and set.



11. Lubricate drive shaft coupling and shaft splines with grease. **NOTE:** On 1992 to current models, the coupler is greasable.
12. Install coupler with O-Rings, positioning coupler shallow recessed end towards transmission.



13. Install drive shaft through bulkhead and onto transmission output shaft.



BRAKES / FINAL DRIVE Type 4 Drive System Overhaul

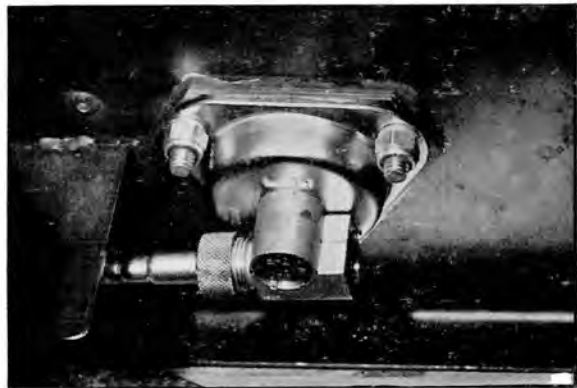
14. Lubricate flangette and outer race of bearing.



15. Install bearing lock collar, inner flangette, new bearing and outer flangette onto drive shaft.



16. Install speedometer drive key, angle drive and attaching bolts, washers, and nuts. Tighten.



17. Tightly position bearing lock collar against bearing inner race. Tighten Allen head set screw while pulling up on drive shaft in direction shown.



BRAKES / FINAL DRIVE

Type 4 Drive System Overhaul

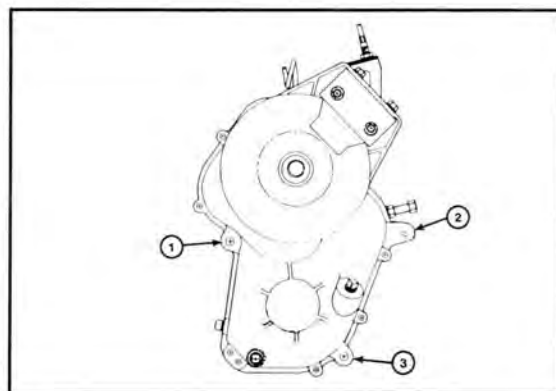
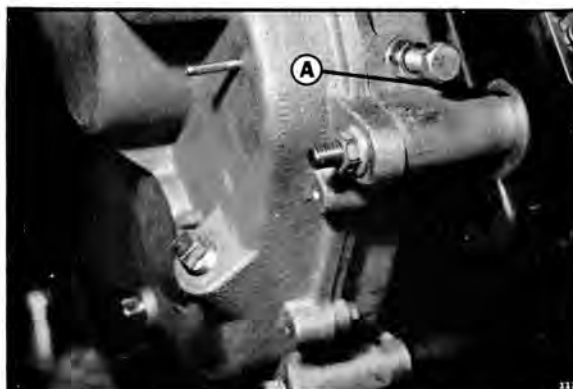
Jackshaft Alignment

18. Lubricate jackshaft coupling and splines with multi-purpose automotive chassis grease.
19. Install jackshaft through bulkhead and onto transmission input shaft.

20. Orbit shaft in bulkhead bearing support opening.
NOTE: There should be an equal distance between shaft and bulkhead bearing support during this orbit.



21. To correct any jackshaft misalignment, shim transmission between bulkhead and transmission (A). Use Shim Kit PN 2200126. See illustration at right for possible shim locations.



22. Clean bearing support area with Loctite Primer T. Install a stud and bearing mount on shaft in bearing area.
23. Install new bearing, outer flangette and flangette attaching bolts.
24. Install driven clutch and check driven clutch offset.
25. Torque driven clutch bolt to 12 ft. lbs. (1.66 kg/m).
26. Reinstall rear suspension, drive belt, air silencer, and clutch guard.
27. Field test for proper operation.



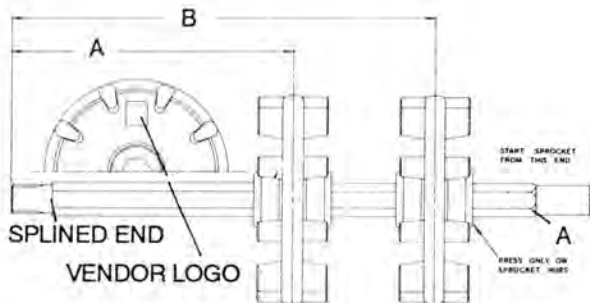
BRAKES / FINAL DRIVE

Drive Shaft Sprocket Installation Tips

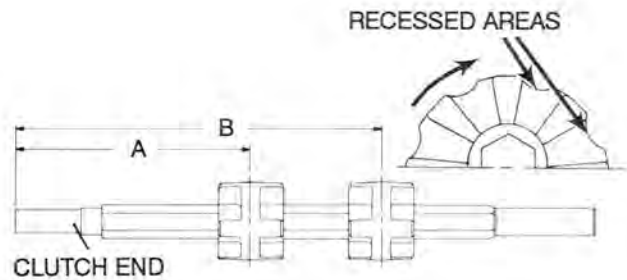
Refer to brake and drive data pages at the beginning of this chapter for specific distance from shaft end to sprocket idler center.

- Direct drive units are measure from clutch end while all others are measure from splined end of shaft.
- Prior to pressing sprockets, clean shafts with sandpaper to remove rust. Replace shaft if nicked or damaged.
- When pressing new sprocket onto shaft, press in hub or center of sprocket.
- Sprockets must be started from the end that has a smooth entry onto the hex portion of the shaft (A).
- To ensure proper sprocket tooth alignment, be sure the vendor logos are oriented in the same position on all sprockets.

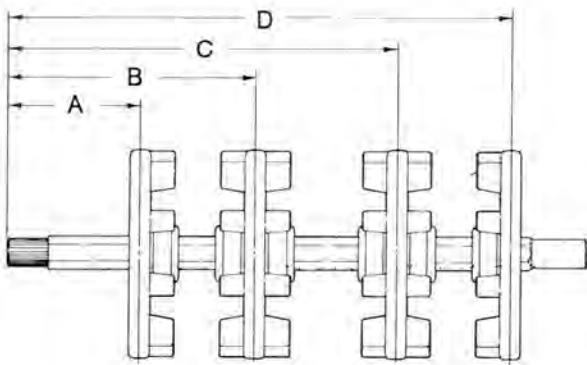
NOTE: Some direct drive sprockets require the recessed area on the sprocket idler be positioned towards the driving side of the sprocket tooth.



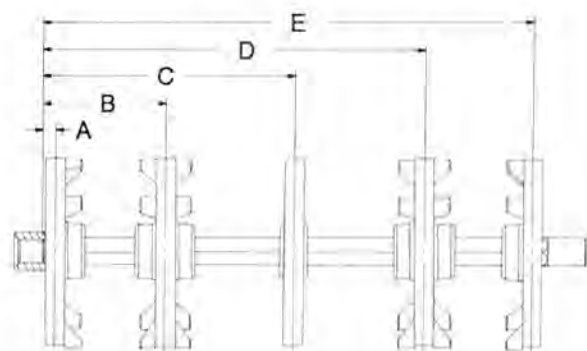
Typical 2 Drive Sprocket



Typical Direct Drive Shaft



Typical 4 Drive Sprocket



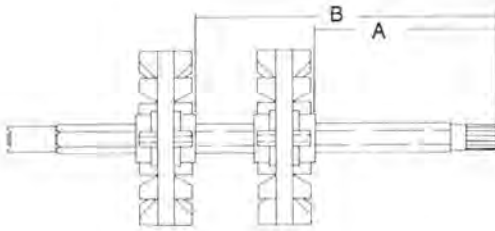
Typical 4 Drive with Center Idler

BRAKES / FINAL DRIVE

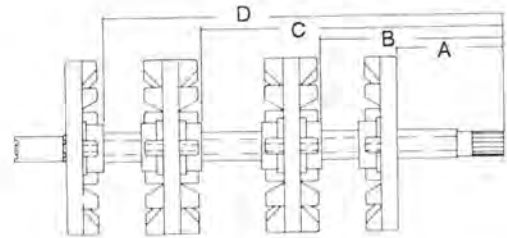
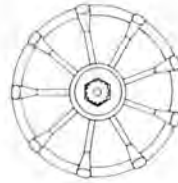
Drive Shaft Sprocket Installation Tips

Driveshaft Sprocket Installation Tips, 1993 to Current

- 1993 to current models, except Wide-Traks, have a longer spline on the chaincase end of the jackshaft and drive shaft.
- Drive shaft sprocket positions are measured to sprocket hub edge instead of sprocket idler center.



1993 to Current 2 Drive Sprocket

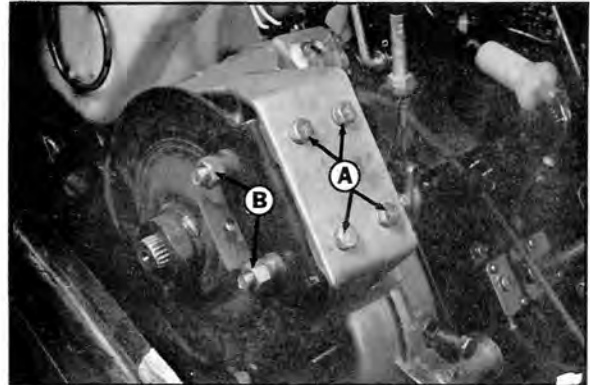


1993 to Current 4 Drive Sprocket

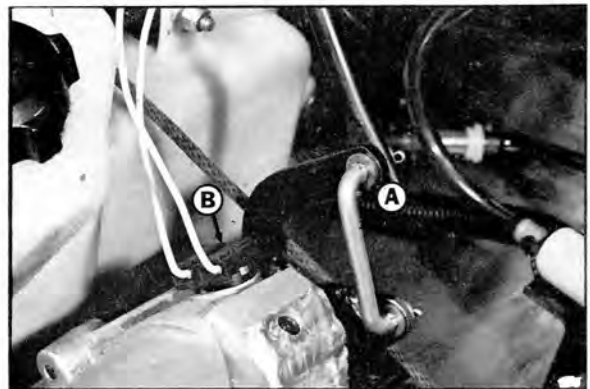
BRAKES / FINAL DRIVE Series 300 Transmission Overhaul

Transmission overhaul should also include drive system overhaul. After removing drive shaft and jackshaft, proceed as indicated below.

1. Remove four caliper carrier attaching bolts (A).
2. Remove two caliper bridge bolts (B).
3. Remove brake caliper and brake disc.



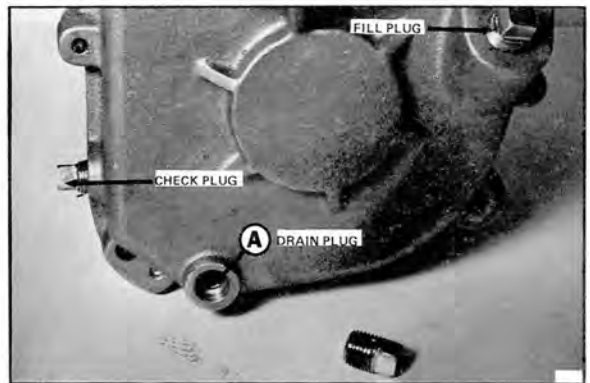
4. Remove shift linkage (A) and stop light switch wires (B).
5. Remove exhaust system.



6. Remove three nuts securing transmission to front bulkhead. Remove transmission. **NOTE:** Note position of transmission shims for reassembly (A). these shims control jackshaft alignment.



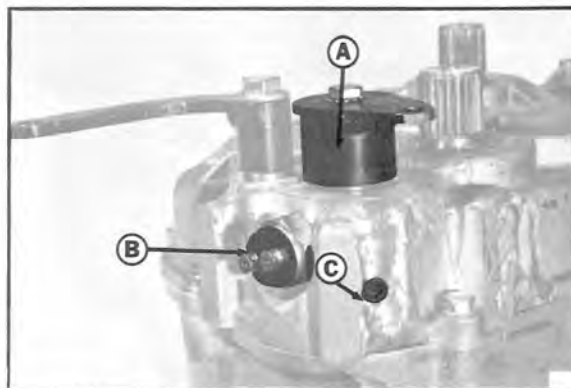
7. Remove transmission drain plug (A) and drain oil.



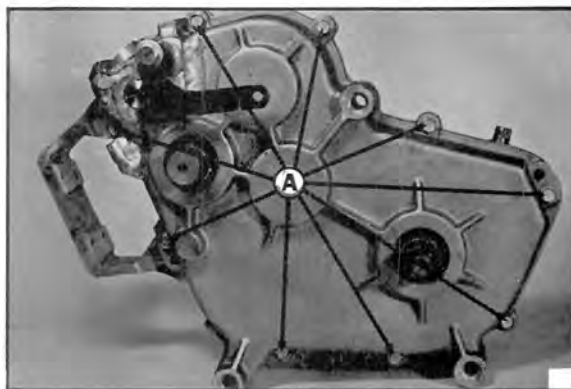
BRAKES / FINAL DRIVE

Series 300 Transmission Overhaul

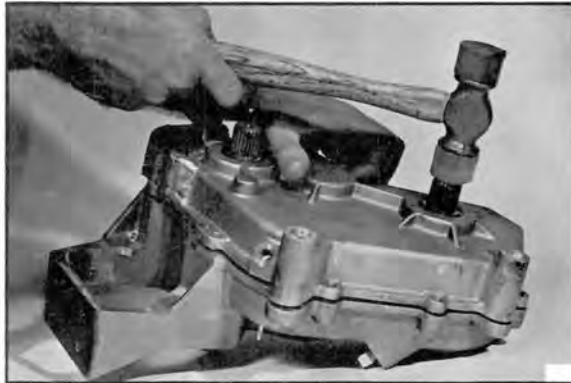
8. Place transmission as shown and remove shift lever and key (A), neutral light switch (B), detent set screw, spring, and ball (C).
9. Loosen chain tensioner jam nut and remove tensioner bolt.



10. Remove transmission housing attaching bolts (A).



11. Lift upwards on inner housing and tap with a soft face hammer on input shaft, output shaft, and shift shaft.

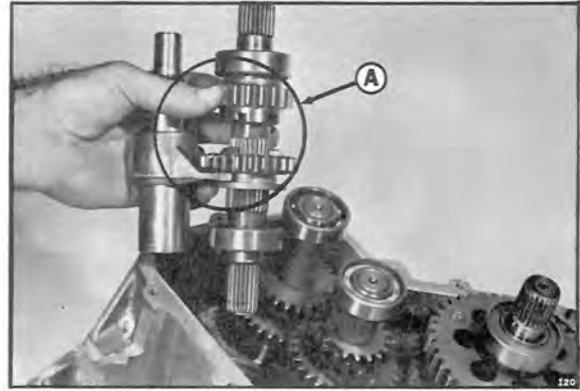


12. Remove high range long silent chain (A).

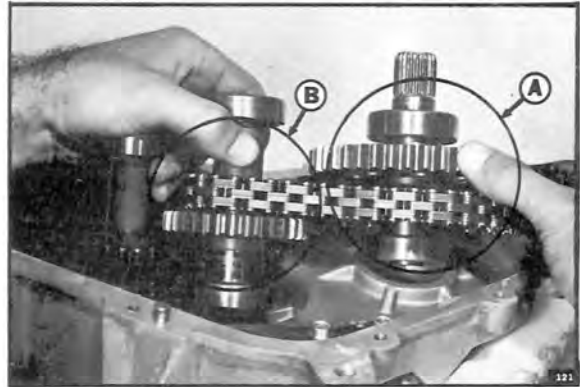


BRAKES / FINAL DRIVE Series 300 Transmission Overhaul

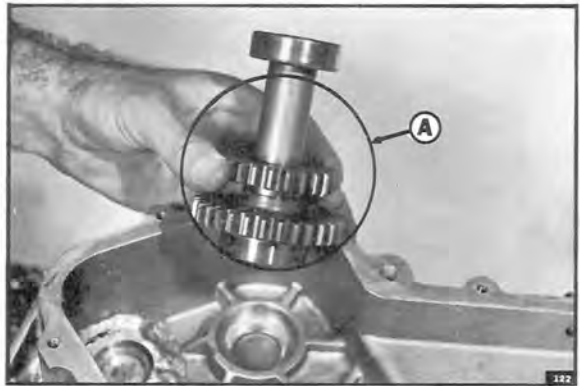
13. Remove input cluster and shift cluster as an assembly (A).



14. Remove output cluster (A), reverse cluster (B) and silent chain as an assembly.



15. Remove low range cluster (A).
16. Thoroughly clean and inspect all parts. Refer to correct parts book for replacement parts.
17. Reverse disassembly procedures for reassembly.



Transmission Service Tips

- Before reassembly, remove all oil seals, and chain tensioner bolt. After transmission is assembled, install tape around shaft splines and shaft sealing area. Grease seal inner and outer diameters. Grease shift shaft O-Ring. These precautions will protect the seals and O-Ring from damage.

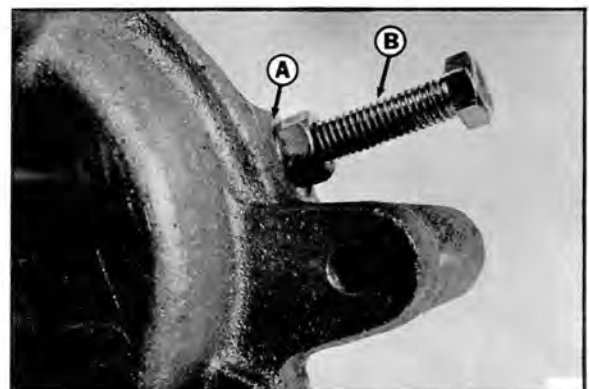
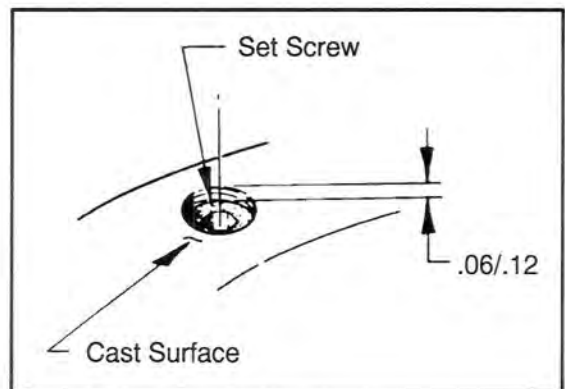
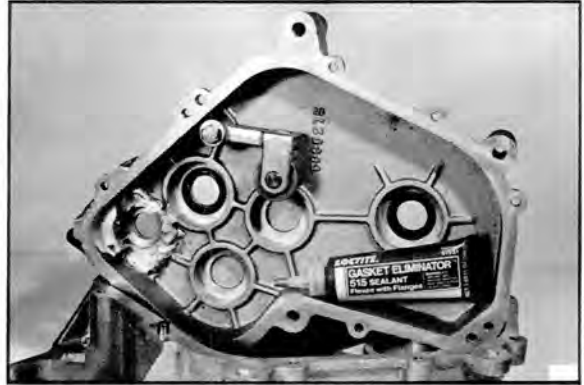


BRAKES / FINAL DRIVE

Series 300 Transmission Overhaul

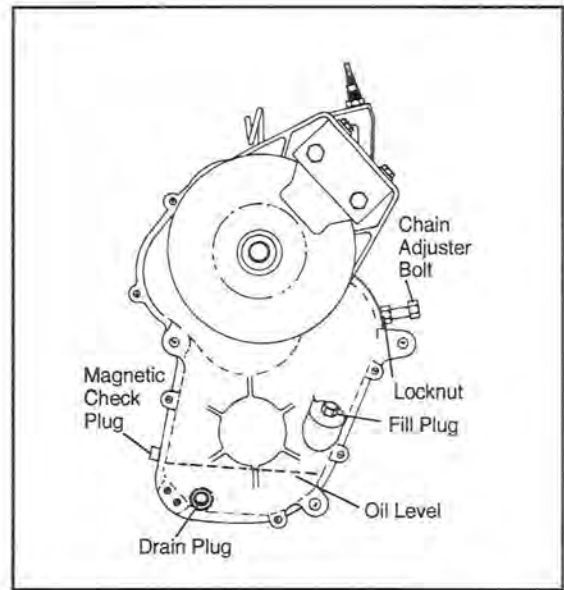
Transmission Service Tips

- Be sure the case half mating surfaces are clean and free of any nicks or scratches. Place a small amount of Loctite 515 Gasket Eliminator (PN 2870587) on one of the case halves.
- Install bearings and seals using service tool PN 2870676. Bearings, gears, etc., are assembled until they bottom onto each other or onto snap rings or shoulders.
- Install detent ball and spring. Apply a medium strength thread locking compound to the Allen head set screw and install it to a depth of .060-.120" (1.5-3 mm) below the casting surface. During field testing, check the detent preload. If the detent is adjusted too tightly, the unit will become hard to shift. If the detent is too loose, it will affect the operator's perception of the shift position.
- To adjust chain on Hi/Lo range transmissions, loosen lock nut on adjuster bolt (A). Place slight reverse tension on chain by turning brake disc, then tighten adjuster bolt (B) to 20 inch. lbs. Back bolt off 1 1/4 to 1 1/2 turns and tighten jam nut while holding adjuster bolt.



Transmission Service Tips

- After transmission is installed onto bulkhead, be sure to align jackshaft as described in drive system overhaul in this chapter.
- With transmission installed on unit, fill transmission to correct level. Use only Polaris chaincase oil.



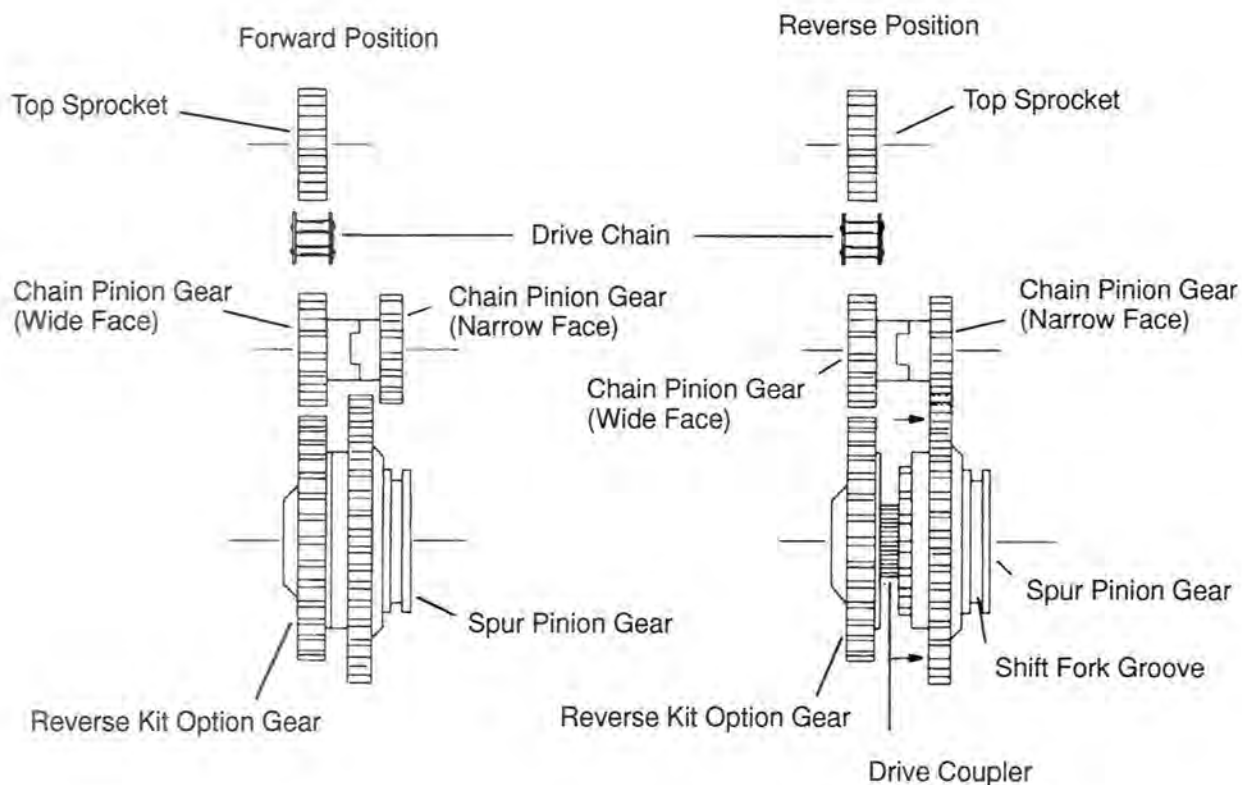
BRAKES / FINAL DRIVE

Reverse Kit Service Tips

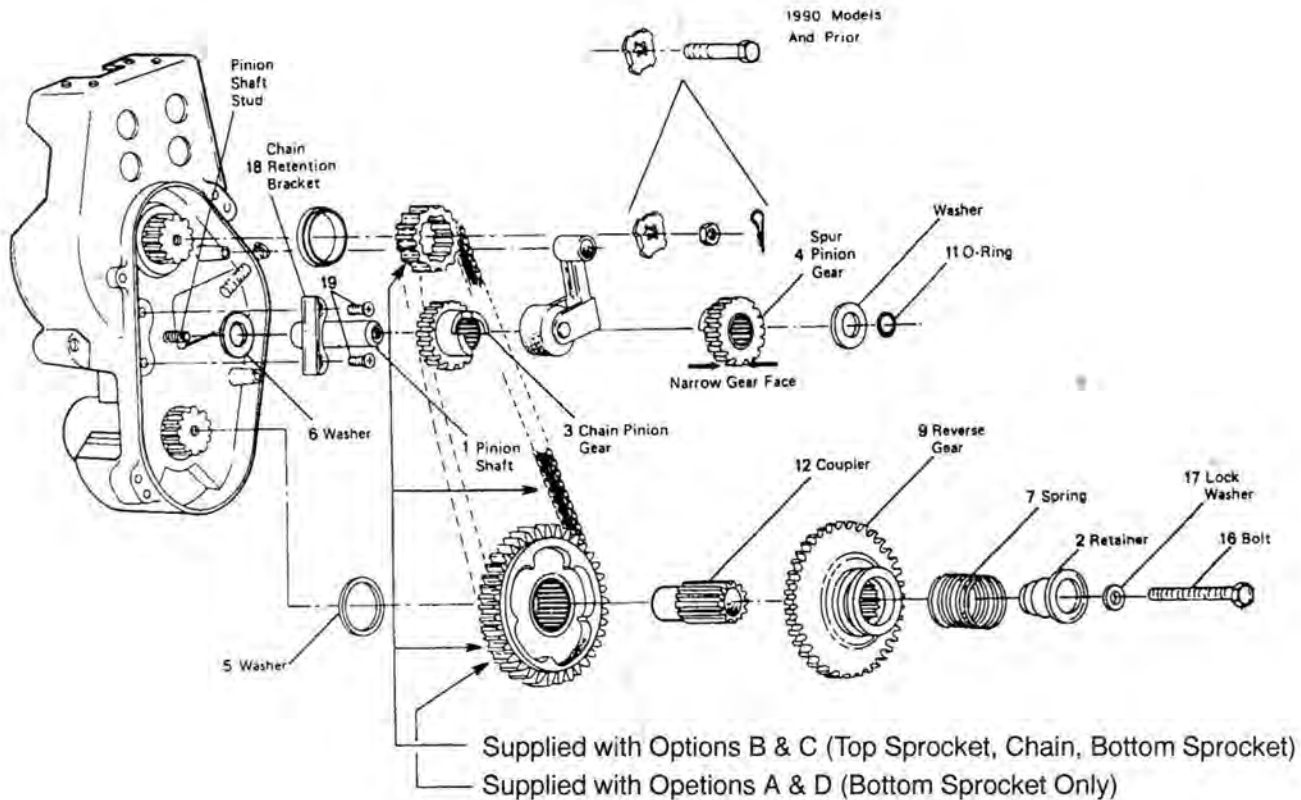
The following illustration indicates gear position with the Polaris Reverse Kit in the forward and reverse selection.

Installation Tips (Refer to Illustration on page 8.61)

- When installing pinion shaft, be sure the chamfered end of pinion shaft is toward case cover.
- Install chain, top sprocket, bottom option sprocket and wide face pinion gear into case at the same time.
- When installing case cover, be sure that shift fork has slipped into fork groove of reverse gear.



BRAKES / FINAL DRIVE Reverse Kit Maintenance



Chain Tension:

1. Maintain proper chain tension by loosening lock nut and applying 20 inch lbs. of torque on adjuster bolt.
2. Loosen adjuster bolt 1/2 turn.
3. Hold adjuster bolt in position and tighten locknut.

Oil Level:

1. Using Polaris chaincase lubricant, maintain proper oil level. Proper level is checked by removing magnetic check plug.
2. Wipe off any metal particles from the magnetic plug. Small amounts of particles will be common on this plug.
3. Add lubricant until a small amount of oil flows from the check plug hole. Do not mix or use other types of lubricant.

Oil Change:

1. Change annually, prior to off season storage.

Adjustment:

1. Due to break in of components and cable stretch, the shifter may need readjustment. Readjust with the shifter in the forward position.
2. Adjust nuts on lower cable end so the endplay movement of the cable housing in the holder on the handlebar is 1/32" (.08 cm). Do not adjust beyond this point.

