Bombardier Recreational Products Inc.

ski-doo®
2005

Racing Handbook

484 200 063

2005 RACING HANDBOOK

TABLE OF CONTENTS

⚠ WARNING

This information relates to the preparation and use of snowmobiles in competitive events. Bombardier Inc. disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that these modifications be carried out and/or verified by a highly-skilled professional racing mechanic. It is understood that racing or modifications of any Bombardier-made snowmobile voids the vehicle warranty and that such modifications may render use of the vehicle illegal in other than sanctioned racing events under existing federal, provincial and state regulations.

KEEPING YOUR MACHINE LEGAL IS YOUR RESPONSIBILITY

Read the rule book and/or contact organization you will be competing in.

RACE DEPARTMENT CONTACTS

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- Race Program
- Race Resumes
- Race Sleds Allocation
- Media Relations
- Press Events
- Dealer Programs

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- Technical Support
- Race Schools
- Race Manual
- MPEM Programming

Website: www.ski-doo.com/racingzone

- Race Schedule and Results

NOTE: E-mail is the preferred method of communications throughout the year.

CDN RACERS (FRENCH SPEAKING RACERS ONLY)

Marcel Imbeault
Race Manager

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- Race Program
- Race Resumes
- Race Sleds Allocation

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- T.I.P. Sheet Distribution (See T.I.P. Sheet Application on Page 1-3)

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- Technical Support

Website: www.ski-doo.com/racingzone

- Race Schedule and Results

NOTE: E-mail is the preferred method of communications throughout the year.

T.I.P. SHEET APPLICATION

TECHNICAL INFORMATION POSTING

This form only will be accepted
Last year applications are not valid anymore

Dear Ski-Doo X-Team

Please add my name to your list of recipients for the T.I.P. sheets to be distributed during the 2004-05 race season.

Name: ______________________________ City: ______________

To receive the T.I.P. sheets by e-mail, send an e-mail to the following:

helene.despaties@brp.com

and mention to add your address on the tip sheet distribution list

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To receive the T.I.P. sheets by fax, send a fax to the following:

Fax to: Hélène Despaties at (450) 532-6175

Fax: ______________________________ (your complete fax number)

and mention to add your name on the tip sheet distribution list

ORDER FORM

Valcourt Race Dept.

DATE: Page 1 of

Race Dept. Parts Order Desk — Fax (450) 532-5076

SHIP TO: *(name & complete address)*

If you are a dealer:

DEALER #:

FED. ID # *(US dealer only)*

If you are a racer:

SOCIAL SECURITY #:

(US Racer only) Need your SS # for custom regulations

PHONE #: FAX #:

PAYMENT: VISA ___ MASTER CARD ___ # ___________________________ Exp. Date ________

SHIPPING CONDITIONS: RED: _______ BLUE: ________ GROUND: _______

(shippin g fees will be char ged to you)

ALL B/O PARTS WILL BE CANCELLED, REORDER AT A LATER DATE

DESCRIPTION	PART # OR CLOTHING PART #	QTY	B/O

Please, read the following important notices

(1) 15% fee will be char ged on returned parts - Written Return Authorization Required

(2) Phone call orders or shippin g requests will not be accepted

(3) ONLY FAXED ORDERS WILL BE ACCEPTED (COMPLETELY FILLED)

eric.arsenault@brp.com

ORDER FORM

Race Support Truck DATE: Page 1 of____

Phone : 320-251-2882 Fax: 320-251-3733

SHIP TO: *(name & complete address)*	*If you are a dealer:*
	Name:
	Number:
	Signature:
PHONE #:	FAX #:

PAYMENT: VISA ___ MASTER CARD ___ # ____________________________ Exp. Date ________

SHIPPING CONDITIONS: RED: _______ BLUE: ________ GROUND: _______

(shipping fees will be charged to you)

ALL B/O PARTS WILL BE CANCELLED, REORDER AT A LATER DATE

DESCRIPTION	PART # OR CLOTHING PART #	QTY	B/O

Please, read the following important notice

15% fee will be charged on returned parts - Written Return Authorization Required

TABLE OF CONTENTS

MX Z X 440 RACING

		MODEL	MX Z X 440 Racing
ENGINE			
Engine type			453
Number of cylinders			2
Bore		mm (in)	65.0 (2.56)
Stroke		mm (in)	65.8 (2.59)
Displacement		cm^3 (in^3)	436.7 (26.6)
Maximum power engine speed [1]		±100 RPM	8400
Piston ring type		1st/	Semi-trapezoidal
		2nd	—
Ring end gap	New	mm (in)	0.4 (.0157)
	Wear Limit	mm (in)	1.0 (.040)
Ring/piston groove clearance	New	mm (in)	0.04 (.0016)
	Wear Limit	mm (in)	0.2 (.0079)
Piston/cylinder wall clearance	New	mm (in)	0.10 ±0.016 (.0039±0.0006)
	Wear Limit	mm (in)	0.2 (.0079)
Connecting rod big end axial play	New	mm (in)	0.39 (.0154)
	Wear Limit	mm (in)	1.2 (.0472)
Maximum crankshaft end-play [2]		mm (in)	0.3 (.0118)
Maximum crankshaft deflection at PTO		mm (in)	0.06 (.0024)
Reed Valve		P/N	420 924 810
FUEL SYSTEM			
Carburetor type		PTO/MAG	TMX 34-29/(Europe) TMX 34-33
Main jet		PTO/MAG	400/(Europe) 350
Needle jet			Q-6
Pilot jet			25
Needle identification — clip position			6EN29-61 — 3
Slide cut-away			4.0
Float adjustment		± 1 mm (± .040 in)	—
Air screw adjustment		± 1/16 Turn	1.0
Idle speed RPM		± 200 RPM	1600
Gas/oil ratio mixing oil			Premix 33: 1 / XP-S Synthetic oil
Vehicle with valid warranty (standard compression insert)			
Gas grade/pump octane number	Inside North America	(R + M)/2	91 or higher
	Outsine North America	RON	95
Vehicle without warranty			
Gas grade/pump octane number		(R + M)/2	108 or higher

			MODEL	MX Z X 440 Racing
ELECTRICAL				
Magneto generator output			W	290
Ignition type				CDI
Spark plug make and type				[6] NGK BR9ECS
Spark plug gap			± 0.05 mm (± 0.002 in)	0.45 (.018)
Ignition timing BTDC [3]			mm (in)	3.00 (.1181)
Trigger coil [4]			Ω	190 – 300
Generating coil [4]			Ω	17.5 – 42.5
Lighting coil [4]			Ω	0.1 – 0.4
High tension coil [4]	Primary		Ω	0.3 – 0.7
	Secondary		kΩ	8 - 16
Headlight			W	H4 60/55
Taillight and stoplight			W	8/27
Tachometer bulb			W	2 x 3
DRIVE				
Gear ratio			Teeth	21/45
Chain	Pitch		mm (in)	9.525 (.375)
	Type/Links Qty/Plates Qty			Silent 74 - 15
Type of drive pulley				TRA 3 Light
Ramp identification				435 [10]
Spring color				White/White
Spring length			± 1.5 mm (± 0.060 in)	137.44 (5.41)
Engagement speed			± 200 RPM	5400
Drive pulley calibration screw position or calibration disc quantity [10]				5
Pulley distance	Z			16.5 (0.650)
Offset	X		± 0.5 mm (± .020 in)	40.0 (1.575)
	Y		± 0.75 mm (± .030 in)	Dimension Y must exceed X of 0.86 mm (0.034 in)
Driven pulley spring preload cam angle			± 0.7 kg (± 1.5 lbf)	0.0
			Degree	44°/48°
Drive belt part number			P/N	417 300 288
Drive belt width (new) [12]			mm (in)	37.7 (1.484)
Drive belt adjustment	Deflection		± 5 mm (± 13/64 in)	32 (1-1/4)
	Force [8]		kg (lbf)	11.3 (25)
Track width			cm (in)	38.1 (15.0)
Track length			cm (in)	307 (121)
Track adjustment	Deflection		mm (in)	30 to 35 (1-3/16 to 1-3/8)
	Force [9]		kg (lbf)	7.3 (16)
Suspension type	Track			SC 4
	Ski			R.A.S. A-Arm

MODEL		MX Z X 440 Racing
GENERAL SPECIFICATIONS		
Length	mm (in)	2882 (113)
Width	mm (in)	1217 (47.9)
Height	mm (in)	1022 (40)
Ski stance	mm (in)	1080 (42.5)
Mass (dry)	kg (lb)	199 (438)
Ground contact area	cm^2 (in^2)	6670 (1034)
Ground contact pressure	kPa (PSI)	2.93 (0.425)
Frame material		Aluminum
Bottom pan material		Impact Copolymer
Cab material/side panels		Surlyn/Polypropylene
LIQUID SPECIFICATIONS		
Fuel tank	L (U.S. gal)	21 (5.5)
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)
Cooling system	L (U.S. oz)	3.7 (125.1)

MX Z 600 HO/800HO

MODEL			MX Z 600 HO	MX Z 800 HO
ENGINE				
Engine type			593 HO	793 HO
Number of cylinder			2	
Bore	Standard	mm (in)	72 (2.835)	82 (3.228)
Stroke		mm (in)	73 (2.874)	75.70 (2.980)
Displacement		cm^3 (in^3)	594.40 (36.273)	799.50 (48.789)
Compression ratio			12.25 ± 0.5	12.00 ± 0.5
Maximum power engine speed (1)		± 100 RPM	8000	7850 Power TEK: 7950
Piston ring type		1st	Semi-trapezoidal	
		2nd	—	
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)	
	Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance	New	mm (in)	0.05 to 0.1 (.0020 to .0039)	
	Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance	New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	0.125 ± 0.022 (.0049 ± .0009)
	Wear limit	mm (in)	0.18 (.0071)	0.20 (.0079)
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
	Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL				
Magneto generator output			360 W	
Ignition type			CDI	
Spark plug	Make and type		NGK BR9ECS (6)	
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3) (12)		mm (in)	2.79 (.110)	2.370 (.0933)
Trigger coil (4)		Ω	190 to 300	
Generating coil (4)	Low speed	Ω	—	
	High speed	Ω	—	
Lighting coil (4)		Ω	0.1 to 1.0	
High tension coil (4)	Primary		—	
	Secondary		—	
Battery			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	

		MODEL	MX Z	
			600 HO	800 HO
Fuse	Starter solenoid	A	30	
	Fuel level sensor	A	—	
FUEL SYSTEM				
Carburetor/throttle body type			TM40 – B316	TM40–B319 Power TEK: TM40–B322
Main jet			380	400 Power TEK: 440
Needle jet			P-0M	
Pilot jet			17.5	17.5
Needle identification			9DHI14–58	9DGI16–58 Power TEK: 9EGI04–58
Clip position			1	1 Power TEK: —
Slide cut-away			2.0	
Float adjustment		mm (in)	—	
Air or pilot screw adjustment		± 1/16 turn	1.5	
Idle speed		± 200 RPM	1600	1500
Gas type			Unleaded	
Pump octane number	Inside North America	(R+M)/2	87 or higher	
	Outside North America	RON	91 or higher	
Gas/oil ratio			Injection	
Injection oil			XP-S mineral injection oil	
COOLING SYSTEM				
Type			Liquid	
Coolant		Mixture	Ethyl glycol/water mix (50% coolant, 50% distilled water). Use coolant specifically designed for aluminum engines.	
		Premix	P/N 219 700 362 — 12 x 1 L	
Axial fan belt adjustment	Deflection	mm (in)	N.A.	
	Force	kg (lbf)	N.A.	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
DRIVE				
Chaincase oil			XP-S Synthetic chaincase oil	
Chain drive ratio		Adrenaline	22/43	25/45
		Renegade	21/43	23/43
		Trail	22/43	—
Chain	Pitch	in	3/8	
	Type/links qty/plate qty		Silent 74/13	Silent 76/13 Renegade: Silent 74/13
Drive pulley type			TRA III	

			MX Z	
		MODEL	600 HO	800 HO
Drive pulley calibration	Clutch engagement	± 100 RPM	3800	
	Spring color		Purple/Blue	Violet/Green
	Spring length	mm (in)	114.6 (4.5)	133.5 (5.256)
	Weight		—	
	Block		—	
	Cap		—	
	Pin		Solid (P/N 417 004 308)	Solid (P/N 417 222 594)
	Ramp		410	414 Power TEK: 415
	Screw position		3	
Driven pulley type	Type		HPV VSA	
	Spring preload		0	
	Cam angle	Adrenaline	47/44°	50/40°
		Renegade	44°	47/40°
		Trail	47/44°	—
Pulley distance	Z	mm (in)	20.0 (.787)	
Offset	X	mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X	mm (in)	0.82 (.0032)	
Drive belt part number		P/N	417 300 197	417 300 166
Drive belt	Width	mm (in)	37.3 (1.327)	37.7 (1.484)
	Wear limit	mm (in)	34.9 (1.374)	35.3 (1.390)
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
	Force (8)	kg (lbf)	11.30 (24.91)	
Track	Width	Adrenaline	381 mm (15 in)	
		Renegade	406 mm (16 in)	
		Trail	381 mm (15 in)	—
	Length	Adrenaline	3074 mm (121 in)	
		Renegade	3456 mm (136 in)	
		Trail	3074 mm (121 in)	—
	Profile height	Adrenaline	25.4 mm (1.0 in)	
			31.8 mm (1.25 in)	
		Renegade	31.8 mm (1.25 in)	
			—	44.5 mm (1.75 in)
		Trail	25.4 mm (1.0 in)	—
		Trail Europe	31.8 mm (1.25 in)	—
Track adjustment	Adjustment Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
	Force (9)	kg (lbf)	7.3 (16)	

		MODEL	MX Z	
			600 HO	800 HO
Suspension type	Track	Adrenaline	SC 3 121″	
		Renegade	SC 3 136″	
		Trail	SC 3 121″	—
	Ski		R.A.S. A-arm	
BRAKE				
Brake fluid reservoir		mL (U.S. oz)	60 (2.0)	
Brake fluid (P/N)			GTLMA (DOT 4) (P/N 293 600 062) Racing brake fluid SRF (DOT 4) (P/N 293 600 063)	
VEHICLE INFORMATIONS				
Mass (dry)	Adrenaline	Manual start	211 kg (464 lb)	
		Electric start	223 kg (491 lb)	
	Renegade	Manual start	218 kg (480 lb)	
		Electric start	230 kg (506 lb)	
	Trail	Manual start	211 kg (464 lb)	—
		Electric start	223 kg (491 lb)	—
Length	Adrenaline	mm (in)	2882 (113.464)	
	Renegade	mm (in)	3055 (120.276)	
	Trail	mm (in)	2882 (113.464)	—
Width		mm (in)	1217 (48)	
Height		mm (in)	1105 (43.5)	1105 (43.5) Renegade X: 1022 (40.2)
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out		mm (in)	0.00	
Camber			0°	
Ground contact area	Adrenaline	cm^2 (in^2)	6910.2 (1071)	
	Renegade	cm^2 (in^2)	7931.3 (1229)	7926 (1229) X: 7931.3 (1229)
	Trail	cm^2 (in^2)	6910.2 (1071)	—
Ground contact pressure	Adrenaline	kPa (PSI)	3.17 (.460)	3.00 (.435)
	Renegade	Manual start	2.70 kPa (.392 PSI)	
		Electric start	2.84 kPa (.412 PSI)	
	Trail	kPa (PSI)	3.00 (.435)	—
Frame material			Aluminum	
Bottom pan material			Impact resistant copolymer	
Hood material			Surlyn	

MODEL			MX Z	
			600 HO	800 HO
CAPACITIES				
Fuel tank		L (U.S. gal)	40 (10.6)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system	Adrenaline	L (U.S. oz)	4.9 (165.7)	
	Renegade	L (U.S. oz)	5.17 (174.8)	
	Trail	L (U.S. oz)	4.9 (165.7)	—
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(5)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•in)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MX Z 380F/550F

MODEL			MX Z 380 F	MX Z 550 F
ENGINE				
Engine type			377	552
Number of cylinder			2	
Bore	Standard	mm (in)	62 (2.441)	76 (2.992)
Stroke		mm (in)	61.00 (2.402)	
Displacement		cm^3 (in^3)	368.30 (22.475 in)	553.40 (33.771)
Compression ratio			11.2 ± 0.5	9.6 ± 0.5
Maximum power engine speed (1)		± 100 RPM	7000	7000
Piston ring type		1st	Semi-trapezoidal	
		2nd	Rectangular	
Ring end gap	New	mm (in)	0.02 to 0.35 (.008 to .0138)	0.40 to 0.55 (.016 to .022)
	Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance	New	mm (in)	0.040 to 0.110 (.0016 to .0043)	0.04 to 0.08 (.0016 to .0030)
	Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance	New	mm (in)	0.070 ± 0.016 (.0028 ± .0006)	0.147 ± 0.026 (.0058 ± .0010)
	Wear limit	mm (in)	0.2 (.0079)	
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial paly	New	mm (in)	0.200 to 0.527 (.0079 to .0207)	
	Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL				
Magneto generator output			340 W	
Ignition type			CDI	
Spark plug	Make and type		NGK BR9ES	
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3)		mm (in)	2.79 (.110)	2.77 (.109)
Trigger coil (4)		Ω	160 to 180	
Generating coil (4)	Low speed	Ω	6.3	
	High speed	Ω	7.7	
Lighting coil (4)		Ω	0.145 to 0.175	
High tension coil (4)	Primary		N.A.	
	Secondary		N.A.	
Battery			N.A.	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	N.A.	

		MODEL	MX Z	
			380 F	550 F
Fuse	Starter solenoid	A	N.A.	
	Fuel level sensor	A	N.A.	
FUEL SYSTEM				
Carburetor type			VM30–213	VM34–617
Main jet			195	260
Needle jet			Q-2	P-7
Pilot jet			35	45
Needle identification			6DEY13-3	6BCY40-4
Slide cut-away			2.0	2.5
Float adjustment		mm (in)	23.90 ± 1 (.941 ± .040)	
Air or pilot screw adjustment		± 1/16 turn	N.A.	
Idle speed		± 200 RPM	1650	
Gas type			Unleaded	
Pump octane number	Inside North America	(R+M)/2	87 or higher	
	Outside North America	RON	91 or higher	
Gas/oil ratio			Injection	
Injection oil			XP-S mineral injection oil	
COOLING SYSTEM				
Type			Fan	
Axial fan belt adjustment	Deflection	mm (in)	9.5 ± 0.5 (.374 ± .020)	
	Force	kg (lbf)	5.0 (11.0)	
Thermostat opening temperature			N.A.	
Radiator cap opening pressure			N.A.	
DRIVE SYSTEM				
Chaincase Oil			XP-S synthetic chaincase oil	
Chain drive ratio			19/45	19/43
Chain	Pitch	in	3/8	
	Type/links qty/plate qty		Silent 74/13	Silent 72/13
Drive pulley Type			Bombardier Lite	
Drive Pulley Calibration	Clutch engagement	± 100 RPM	3300	3500
	Spring color		Blue/Pink	Purple/Yellow
	Spring length		—	
	Weight	417 120 400 = 21 g 417 114 400 = 3.4 g	1 x 417 120 400 + 1 x 417 114 400	1 x 417 120 400 + 2 x 417 114 400
	Block		3 x 417 128 605	3 x 417 128 932
	Cap		1 x 417 114 500	
	Pin		—	
	Ramp		—	
	Screw position		—	

		MODEL	MX Z	
			380 F	550 F
Driven pulley	Type		Formula RER	
	Spring preload		N.A.	
	Cam angle		44°	
Pulley distance	Z	mm (in)	17.5 (0.689)	
Offset	X	mm (in)	33.4 ± 0.5 (1.315 ± 0.2)	
	Y – X	mm (in)	0.46 (.0.181)	
Drive belt part number		P/N	415 060 600	
Drive belt	Width	mm (in)	34.70 (1.366)	
	Wear limit	mm (in)	32.30 (1.272)	
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
	Force (8)	kg (lbf)	11.34 (25)	
Track	Width	mm (in)	381 (15)	
	Length	mm (in)	3074 (121)	
	Profile height	mm (in)	18.4 (.724) Europe: 25.4 (1.0)	22.3 (.878) Europe: 31.8 (1.25).
Track Adjustment	Deflection	mm (in)	30 to 35 (1-3/16 to 1-3/8)	
	Force (9)	kg (lbf)	7.3 (16)	
Suspension type	Track		SC 3 121″	
	Ski		R.A.S. A-Arm	
BRAKE				
Brake fluid reservoir		mL (U.S. oz)	60 (2.0)	
Brake fluid (P/N)			GTLMA (DOT 4) (P/N 293 600 062) Racing brake fluid SRF (DOT 4) (P/N 293 600 063)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	186 (409)	195 (429)
Length		mm (in)	2830 (111)	
Width		mm (in)	1150 (45)	
Height		mm (in)	1105 (43.5)	
Ski stance (carbide to carbide)		mm (in)	1080 (42.5)	
Toe-out		mm (in)	0.00	
Camber			0°	
Ground contact area		cm^2 (in^2)	6947 (1077)	
Ground contact pressure		kPa (PSI)	2.63 (.381)	2.75 (.399)
Frame material			Aluminum	
Bottom pan material			Impact Copolymer	
Hood material			Surlyn	
Side Panels			Polypropylene	

MODEL		MX Z	
		380 F	550 F
CAPACITIES			
Fuel tank	L (U.S. gal)	40 (10.6)	
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)	
Cooling system	L (U.S. oz)	N.A.	
Injection oil reservoir	L (U.S. oz)	3.5 (118.4)	
TIGHTENING TORQUE (engine cold)			
Drive pulley retaining screw		(5)	
Exhaust manifold nuts or bolts		22 N•m (16 lbf•ft)	
Magneto ring nut		105 N•m (77 lbf•ft)	
Crankcase nuts or screws	M6	N.A.	
	M8	22 N•m (16 lbf•ft)	
Crankcase/engine support nuts or screws		40 N•m (30 lbf•ft)	
Cylinder head screws		22 N•m (16 lbf•ft)	
Crankcase/cylinder nuts or screws		N.A.	
Axial fan shaft nut		48 N•m (35 lbf•ft)	

SUMMIT 600 HO/800HO

			SUMMIT	
		MODEL	600 HO	800 HO
ENGINE				
Engine type			593 HO	793 HO
Number of cylinder			2	
Bore	Standard	mm (in)	72 (2.835)	82 (3.228)
Stroke		mm (in)	73 (2.874)	75.70 (2.980)
Displacement		cm^3 (in^3)	594.40 (36.273)	799.50 (48.789)
Compression ratio			12.25 ± 0.5	13.25 ± 0.5
Maximum power engine speed (1)		± 100 RPM	8000	7850
Piston ring type		1st	Semi-trapezoidal	
		2nd	—	
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)	
	Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance	New	mm (in)	0.05 to 0.1 (.0020 to .0039)	
	Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance	New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	0.125 ± 0.022 (.0049 ± .0009)
	Wear limit	mm (in)	0.18 (.0071)	0.20 (.0079)
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
	Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL				
Magneto generator output			360 W	
Ignition type			CDI	
Spark plug	Make and type		NGK BR9ECS (6)	
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3) (12)		mm (in)	2.79 (.110)	2.37 (.0933)
Trigger coil (4)		Ω	190 to 300	
Generating coil (4)	Low speed	Ω	—	
	High speed	Ω	—	
Lighting coil (4)		Ω	0.1 to 1.0	
High tension coil (4)	Primary		—	
	Secondary		—	
Battery			—	12V, 18 A•h
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	

MODEL			SUMMIT 600 HO	SUMMIT 800 HO
Fuse	Starter solenoid	A	—	30
Fuse	Fuel level sensor	A	—	
FUEL SYSTEM				
Carburetor/throttle body type			TM40 – B325	TM40 – B328
Main jet			380	400
Needle jet			P-0M	
Pilot jet			17.5	
Needle identification			9DGK11–58	9EGY2–58
Clip position			3	
Slide cut-away			2.0	
Float adjustment		mm (in)	—	
Air or pilot screw adjustment		± 1/16 turn	1.5	
Idle speed		± 200 RPM	1600	1500
Gas type			Unleaded	Premium unleaded
Pump octane number	Inside North America	(R+M)/2	87 or higher	91
Pump octane number	Outside North America	RON	91 or higher	95
Gas/oil ratio			Injection	
Injection oil			XP-S mineral injection oil	
COOLING SYSTEM				
Type			Liquid	
Coolant		Mixture	Ethyl glycol/water mix (50% coolant, 50% distilled water). Use coolant specifically designed for aluminum engines.	
Coolant		Premixed	P/N 219 700 362 — 12 x 1 L	
Axial fan belt adjustment	Deflection	mm (in)	N.A.	
Axial fan belt adjustment	Force	kg (lbf)	N.A.	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
DRIVE				
Chaincase oil			XP-S Synthetic chaincase oil	
Chain drive ratio		Adrenaline	19/45	19/45 EUR: 21/45
Chain	Pitch	in	3/8	
Chain	Type/links qty/plate qty		Silent 74/13	
Drive pulley type			TRA III	

			SUMMIT 600 HO	SUMMIT 800 HO
MODEL			600 HO	800 HO
Drive pulley calibration	Clutch engagement	± 100 RPM	3600	3800
	Spring color		Purple/White	Violet/Yellow
	Spring length	mm (in)	98.5 (3.878)	157.9 (6.217)
	Weight		—	
	Block		—	
	Cap		—	
	Pin (with roller (P/N 417 003 900))		Solid (P/N 417 222 478)	Solid (P/N 417 222 707)
			EUR: Solid (P/N 417 004 308)	
	Ramp		417 EUR: 410	415
	Screw position		1/EUR: 3	
Driven pulley type	Type		HPV VSA	
	Spring preload		0	
	Cam angle	Adrenaline	47°/44°/EUR: 44°	44°
		Adrenaline 144”	47°/44°	
		X	—	44°
		X 144”	—	44°/40°
Pulley distance	Z	mm (in)	20.0 (.787)	
Offset	X	mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X	mm (in)	0.82 (.0032)	
Drive belt part number		P/N	417 300 197	417 300 166
Drive belt	Width	mm (in)	37.3 (1.327)	37.7 (1.484)
	Wear limit	mm (in)	34.9 (1.374)	35.3 (1.390)
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
	Force (8)	kg (lbf)	11.30 (24.91)	
Track	Width		406 mm (16 in)	
	Length	Adrenaline	3648 mm (144 in)	
			—	3840 mm (151 in)
		X	—	3648 mm (144 in)
			—	3840 mm (151 in)
		X 159”	—	4038 mm (159 in)
	Profile height	Adrenaline	50.8 mm (2.0 in)	
		X	—	50.8 mm (2.0 in)
		X 159”	—	57.2 mm (2.25 in)
Track adjustment	Adjustment Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
	Force (9)	kg (lbf)	7.3 (16)	

			SUMMIT	
		MODEL	**600 HO**	**800 HO**
Suspension type	Track	Adrenaline	SC 144″	
			—	SC 151″
		X	—	SC 144″
			—	SC 151″
			—	SC 159″
	Ski		R.A.S. A-arm	
BRAKE				
Brake fluid reservoir		mL (U.S. oz)	60 (2.0)	
Brake fluid (P/N)			GTLMA (DOT 4) (P/N 293 600 062) Racing brake fluid SRF (DOT 4) (P/N 293 600 063)	
VEHICLE INFORMATIONS				
Mass (dry)	Adrenaline	144″	222 kg (488 lb)	
		151″	—	224 kg (493 lb)
	X	144″ Manual start	—	222 kg (488 lb)
		144″ Electric start	—	234 kg (515 lb)
		151″ Manual start	—	224 kg (493 lb)
		151″ Electric start	—	236 kg (519 lb)
		159″ Manual start	—	226 kg (497 lb)
		159″ Electric start	—	238 kg (524 lb)
Length	Adrenaline	144″	3125 mm (123.031 in)	
		151″	—	3216 mm (126.614 in)
	X	144″	—	3125 mm (123.031 in)
		151″	—	3216 mm (126.614 in)
		159″	—	3825 mm (150.591 in)
Width		mm (in)	1139 (44.843)	
Height		mm (in)	1122 (44.173)	
Ski stance (carbide to carbide)		mm (in)	1080 (42.520)	
Toe-out		mm (in)	0.00	
Camber			0°	
Ground contact area	Adrenaline	144″	9049.86 cm^2 (1402.731 in^2)	
		151″	—	9537.54 cm^2 (1478.322 in^2)
	X	144″	—	9049.86 cm^2 (1402.731 in^2)
		151″	—	9537.54 cm^2 (1478.322 in^2)
		159″	—	10025.22 cm^2 (1553.912 in^2)

		MODEL	SUMMIT 600 HO	SUMMIT 800 HO
Ground contact pressure	Adrenaline	144″	2.41 kPa (.349 PSI)	
		151″	—	2.30 kPa (.334 PSI)
	X	144″ Manual start	—	2.41 kPa (.349 PSI)
		144″ Electric start	—	2.54 kPa (.368 PSI)
		151″ Manual start	—	2.30 kPa (.334 PSI)
		151″ Electric start	—	2.43 kPa (.352 PSI)
		159″ Manual start	—	2.21 kPa (.320 PSI)
		159″ Electric start	—	2.33 kPa (.338 PSI)
Frame material			Aluminum	
Bottom pan material			Impact resistant copolymer	
Hood material			Surlyn	
CAPACITIES				
Fuel tank		L (U.S. gal)	40 (10.6)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system	Adrenaline	144″	4.59 L (152.2 U.S. oz)	
		151″	—	4.9 L (165.7 U.S. oz)
		X	—	4.59 L (152.2 U.S. oz)
		X 159″	—	4.69 L (158.6 U.S. oz)
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(5)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•in)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			N.A.	

MACH Z 1000 SDI/SUMMIT 1000 SDI

MODEL			MACH Z 1000 SDI	SUMMIT 1000 SDI
ENGINE				
Engine type			995 SDI	
Number of cylinder			2	
Bore	Standard	mm (in)	88 (3.465)	
Stroke		mm (in)	82 (3.228)	
Displacement		cm^3 (in^3)	997.47 (60.869)	
Compression ratio			12.0 ± 0.5	
Maximum power engine speed (1)		± 100 RPM	7900	
Piston ring type		1st	Semi-trapezoidal	
		2nd	Semi-trapezoidal	
Ring end gap	New	mm (in)	?	
	Wear limit	mm (in)	?	
Ring/piston groove clearance	New	mm (in)	?	
	Wear limit	mm (in)	?	
Piston/cylinder wall clearance	New	mm (in)	?	
	Wear limit	mm (in)	?	
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play	New	mm (in)	0.23 to 0.62 (.0091 to .0244)	
	Wear limit	mm (in)	N.A.	
ELECTRICAL				
Magneto generator output			480 W	
Ignition type			Inductive	
Spark plug	Make and type		NGK BR9ECS (6)	NGK BR8ECS
	Gap	mm (in)	0.8 mm (.0315)	
Ignition timing BTDC (3) (12)		mm (in)	7.87 (0.3098)	
Trigger coil (4)		Ω	190 to 300	
Generating coil (4)	Low speed	Ω	—	
	High speed	Ω	—	
Lighting coil (4)		Ω	0.145 to 0.185	
High tension coil (4)	Primary		—	
	Secondary		—	
Battery			12 V, 18A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	N.A.	
Fuel and temperature gauge bulbs		W	2 x 2.6	N.A.

			MACH Z	SUMMIT
		MODEL	1000 SDI	1000 SDI
Fuse	Starter solenoid	A	30	
	Fuel level sensor	A	0.25	N.A.
FUEL SYSTEM				
Throttle body type			Dell'Orto	
Idle speed		± 200 RPM	1600	
Gas type			Premium unleaded	
Pump octane number	Inside North America	(R+M)/2	91	
	Outside North America	RON	95	
Gas/oil ratio			Injection	
Injection oil			XP-S 2-stroke synthetic blend	
COOLING SYSTEM				
Type			Liquid	
Coolant		Mixture	Ethyl glycol/water mix (50% coolant, 50% distilled water). Use coolant specifically designed for aluminum engines.	
		Premixed	P/N 219 700 362 — 12 x 1 L	
Thermostat opening temperature		°C (°F)	N.A.	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
DRIVE				
Chaincase oil			XP-S Synthetic chaincase oil	
Chain drive ratio			29/49	21/49 EUR: 23/49
Chain	Pitch	in	3/8	
	Type/links qty/plate qty		Silent 82/13	Silent 86/13
Drive pulley type			TRA V	
Drive pulley calibration	Clutch engagement	± 100 RPM	3400	3500 EUR: 3400
	Spring color		Green/Violet	Pink/White EUR: Green/White
	Spring length	mm (in)	133.7 (5.26)	124.5 (4.90) EUR: 110.7 (4.36)
	Weight		—	
	Block		—	
	Cap		—	
	Pin (with roller (P/N 417 222 762))		Steel lever (P/N 417 004 309)	
	Ramp		434	433 EUR: 600
	Screw position		6	4 EUR: 3

		MODEL	MACH Z 1000 SDI	SUMMIT 1000 SDI
Driven pulley type	Type		HPV Roller	HPV VSA
	Spring preload		0.0	
	Cam angle		44°/33°	44°/30°
Pulley distance	Z	mm (in)	27.5 (1.083)	
Offset	X	mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X	mm (in)	1.23 (.0484)	
Drive belt part number		P/N	417 300 189	
Drive belt	Width	mm (in)	38.3 (1.51)	
	Wear limit	mm (in)	35.9 (1.41)	
Drive belt adjustment	Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
	Force (8)	kg (lbf)	11.30 (24.91)	
Track	Width	mm (in)	381 (15)	406 (16)
	Length	mm (in)	3074 (121)	4115 (162)
	Profile height	mm (in)	25.4 (1.0) 31.8 (1.25)	58.8 (2.313)
Track adjustment	Adjustment Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
	Force (9)	kg (lbf)	7.3 (16)	
Suspension type	Track		SC 4	SC 162
	Ski		R.A.S. A-arm	
BRAKE				
Brake fluid reservoir		mL (U.S. oz)	60 (2.0)	
Brake fluid (P/N)			GTLMA (DOT 4) (P/N 293 600 062) Racing brake fluid SRF (DOT 4) (P/N 293 600 063)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	236 (519)	240 (529)
Length		mm (in)	2930 (115.4)	3435 (135.2)
Width		mm (in)	1217 (47.9)	1139 (44.8)
Height		mm (in)	1046 (41.2)	1125 (44.3)
Ski stance (carbide to carbide)		mm (in)	1195 (47.0)	1025 to 1080 (40.35 to 42.52)
Toe-out		mm (in)	0.00	
Camber			0°	
Ground contact area		cm^2 (in^2)	?	
Ground contact pressure		kPa (PSI)	?	?
Frame material			Aluminum	
Bottom pan material			Impact resistant copolymer	
Hood material			Surlyn	

MODEL		MACH Z 1000 SDI	SUMMIT 1000 SDI
CAPACITIES			
Fuel tank	L (U.S. gal)	40 (10.6)	
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)	
Cooling system	L (U.S. oz)	6.4 (216.4)	7.4 (250.2)
Injection oil reservoir	L (U.S. oz)	3.7 (125.112)	
TIGHTENING TORQUE (engine cold)			
Drive pulley retaining screw		120 N•m (89 lbf•ft)	
Exhaust manifold nuts or bolts		11 N•m (97 lbf•**in**)	
Magneto ring nut		130 N•m (96 lbf•ft)	
Crankcase nuts or screws	M6	9 N•m (80 lbf•**in**)	
	M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws		24 N•m (18 lbf•ft)	
Cylinder head screws		40 N•m (30 lbf•ft)	
Crankcase/cylinder nuts or screws		55 N•m (41 lbf•ft)	
Axial fan shaft nut		N.A.	

TECHNICAL DATA LEGEND

BTDC:	Before Top Dead Center
CDI:	Capacitor Discharge Ignition
MAG:	Magneto
N.A.:	Not Applicable
P/N:	Part Number
PTO:	Power Take Off
R.A.S.:	Response Angle Suspension
RER:	Rotax Electronic Reverse
RPM:	Revolution Per Minute
TRA:	Total Range Adjustable
VSA:	Variable Sheave Angle
W:	Watt

(1) The maximum horsepower RPM applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER reserves the right to modify it without obligation.

(2) Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

(3) At 3500 RPM with headlamp turned on.

(4) All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

(5) Drive pulley retaining screw: torque to 80 to 100 N•m (59 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Retorque screw to 90 to 100 N•m (66 to 74 lbf•ft).

(6) **CAUTION:** Do not attempt to adjust gap on spark plug BR 9 ECS. The specification is given for verification purpose only. If found out of specification, replace with a new one.

(7) 793 HO Power TEK: with TPS (Throttle positioning Sensor) disconnected.
995 SDI: with APS (Air pressure Sensor) disconnected.

(8) Force applied midway between pulleys to obtain specified tension deflection.

(9) Force or downward pull applied to track to obtain specified tension deflection.

(10) Lever with roller pin (P/N 417 003 900).

(11) Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.

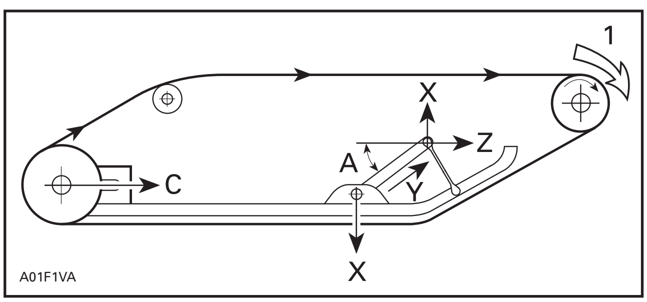
TABLE OF CONTENTS

SUSPENSION OPERATION/ WEIGHT TRANSFER

The purpose of any suspension system is to isolate the rider from the terrain while still allowing for complete control of the vehicle. A snowmobile rear suspension has the added requirements of providing weight transfer and maintaining correct track tension.

Weight transfer is essentially the shifting of weight to the track for better traction during acceleration, and to the skis for positive handling during cornering.

The physics that apply to all rear suspensions are basically the same. As we apply torque from the engine to the drive axle, the torque is transferred to the track and pulls it for forward. That energy enters the suspension system at the rear axle and tries to pull it forward (force "C" in following illustration). The rear arm is a pivoting or sliding linkage that only provides vertical forces at the rear of the chassis, therefore, none of force "C" enters the chassis at the rear arm.



1. *Drive axel torque*

The front arm is mounted with a pivot to both the runners and the chassis. It is through this arm that the major reaction to the engine torque is applied. As the front arm begins to swivel from the load of force "C", it pushes down on the front of the track (force "X" in illustration). This reduces weight on the skis and applies more weight on the track for better traction. The rest of the force "C" enters the chassis through the front arm and accelerates the vehicle (force "Z").

If we keep force "C" constant, we can then vary the size of the vertical and horizontal forces at the front arm by varying angle "A". As angle "A" is made smaller, force "X" decreases, and force "Z" increases. This reduces the amount of torque reaction and more weight stays on the skis. As angle "A" is increased, force "X" increases. The skis then tend to lift more during acceleration and more weight is placed on the track.

We can vary angle "A", within limits, by adjusting the length of the limiter strap. The limiter strap is just that, a strap to limit the extension of the front of the suspension. Shortening the strap decreases angle "A" and is what we would do to set up a machine for more ski pressure. For more track pressure we would want to lengthen the strap to increase angle "A". The limiter adjustment has the largest affect on controlling the amount of weight transfer.

NOTE: Track tension must be checked whenever a major change is made to the limiter length.

Front arm spring pressure will also affect weight transfer. A stiffer spring and/or more preload will transfer more weight to the track. A softer spring and/or less preload will keep more weight on the skis. Springs must also be selected to provide absorption to the intended size of bumps to be encountered. A soft spring will increase ski pressure but may bottom out on large bumps, while a stiff spring will provide more track pressure but may produce a harsh ride.

NOTE: In this and other Ski-Doo texts, we refer to the front arm of the rear suspension and it's spring and shock absorber, as the center of the vehicle. The ski suspension is considered the front of the vehicle and the rear arm of the rear suspension and it's spring(s) and shock(s) are indicated as the rear of the vehicle.

Also, think of the center arm as a pivot point. During acceleration the rear arm will want to compress and the front suspension will want to extend (possibly raising the skis off the ground). Because of this pivoting affect, the rear spring and preload will also affect weight transfer (to a lesser amount than center arm changes). A softer rear spring and/or less preload will allow more weight transfer to the track and less ski pressure, while stiffer rear springs and/or more preload will allow less weight transfer to the track and more ski pressure.

Contrary to popular belief, it is not necessary to have the skis 2 feet off the ground to achieve good weight transfer. In fact, the energy used to lift the front of the vehicle is not available to push the vehicle forward.

The main function of the rear arm is to support the weight of the vehicle and rider, yet provide usable travel to absorb bumps and jumps. The springs are chosen depending on the linkage design of the rear arm and the intended load to be applied. Stiffer springs will be used on vehicles intended to carry heavier loads and on vehicles that plan to encounter large bumps, while vehicles used for lighter loads and on smaller bumps will use softer springs.

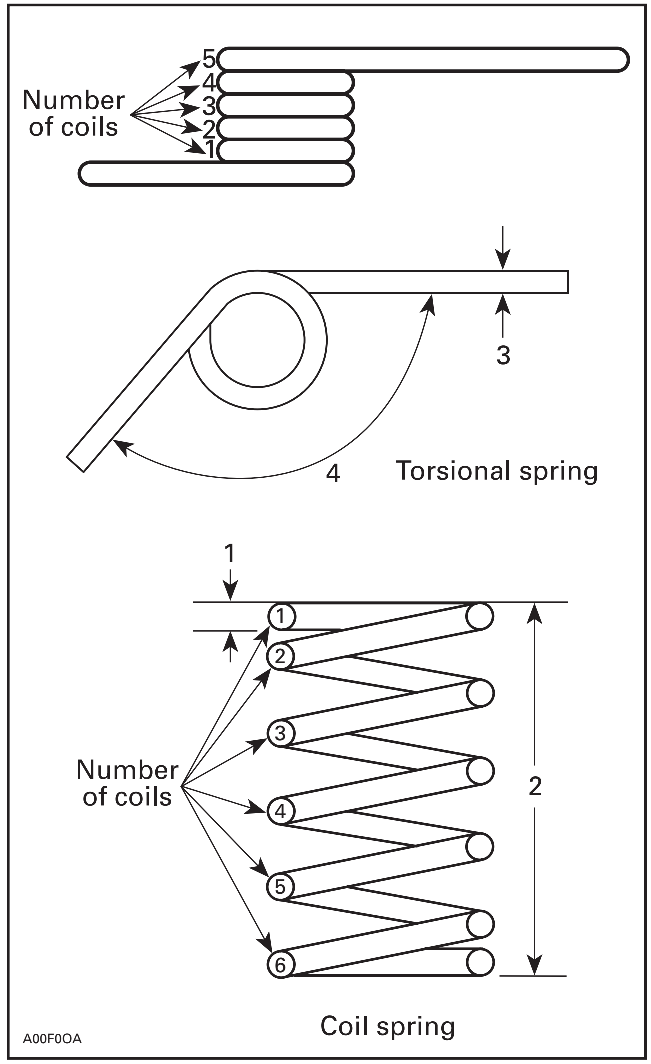
Springs for the front suspension are chosen in a similar fashion. A softer spring will provide less ski pressure and will be used on lighter vehicles while stiffer springs will provide more ski pressure and be used on heavier vehicles.

NOTE: Shock absorber valving and the type of shock used will also affect weight transfer. Refer to the shock absorber section for details.

SPRINGS

General

Generally, 2 types of springs are used on our suspensions. Coil springs and torsional springs. Refer to following illustration.



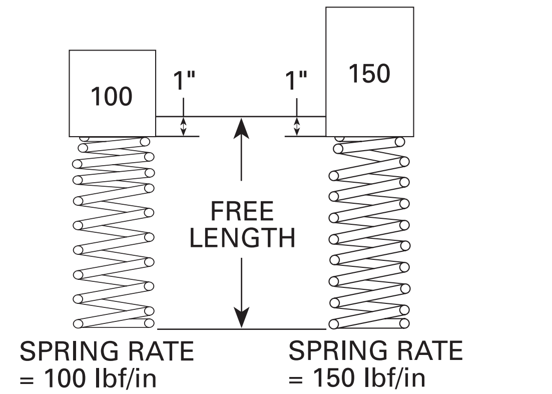
1. *Wire diameter*
2. *Free length*
3. *Wire diameter*
4. *Opening angle*

Several factors are used to determine the characteristics of a spring and they are similar for both the coil and torsional spring types. Wire diameter, material type, the number of coils and the physical shape of a spring all determine how a spring will act. Once these characteristics are built into a spring, they determine the spring rate and the free length in a coil spring or the opening angle and spring rate in a torsional spring.

Coil Springs

The free length of a coil spring is the length with no load applied to the spring.

The spring rate of a coil spring is defined as the amount of force required to compress the spring one inch. If a 100 pound force compresses a spring 1 inch it is referred to as having a rate of 100 lbf/in (pounds per inch). If 150 pounds of force is required to compress a spring 1 inch then it would have a rate of 150 lbf/in (see following illustration).



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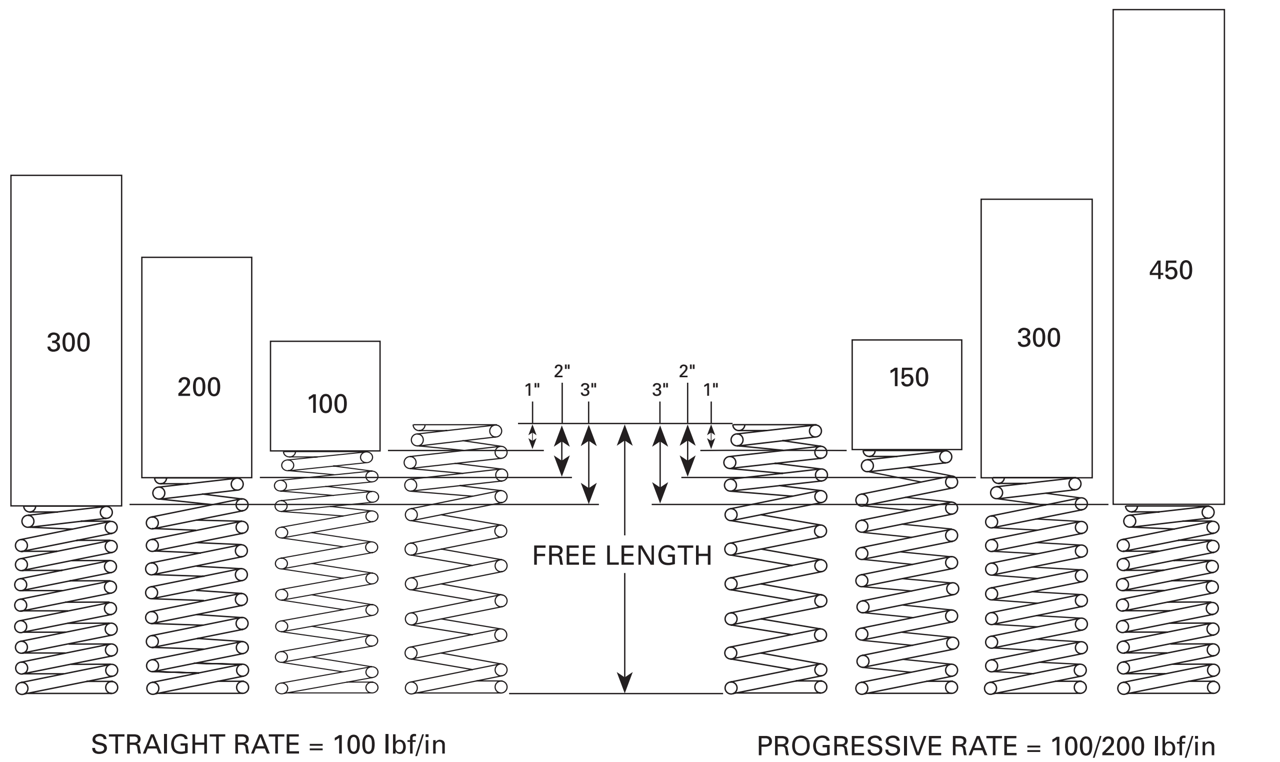

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An easy way to measure coil springs is to put a bathroom scale in a press with the spring resting on the scale. Measure the free length and then apply a load until the spring compresses 1 inch. The reading on the scale will approximate the rate of the spring. Now compress the spring another 1 inch. If the spring is a straight rate, the scale reading should be doubled. If the reading is more than doubled, then you have a progressive spring. If you can compress the spring another 1 inch (3 inches total) (do not exceed maximum scale rating or damage may occur) the reading should be 3 times your first reading. In order to maintain a reasonable cost on springs, the manufacturing tolerances are quite large. A 100 lbf/in rated spring may test anywhere from 80 to 120 lbf/in.

Now, so far we have assumed that the 2 springs in our examples have the same free length and that they are not preloaded at all. In the case of our suspensions, we mount the coil springs on a shock absorber. The shock will have a certain length between the spring retainers which is called the installed length of the spring. If the installed length is less than the free length (as is the case in most applications), then there will be some preloading of the spring.

Dual Rate Spring Formula

$$\frac{\text{Spring 1} \times \text{Spring 2}}{\text{Spring 1} + \text{Spring 2}}$$

A Dual Rate Spring will assume the rate of the heavier rate spring when the lighter spring bottoms or coil binds.

Example:

Spring 1 100# Rate

Spring 2 150# Rate

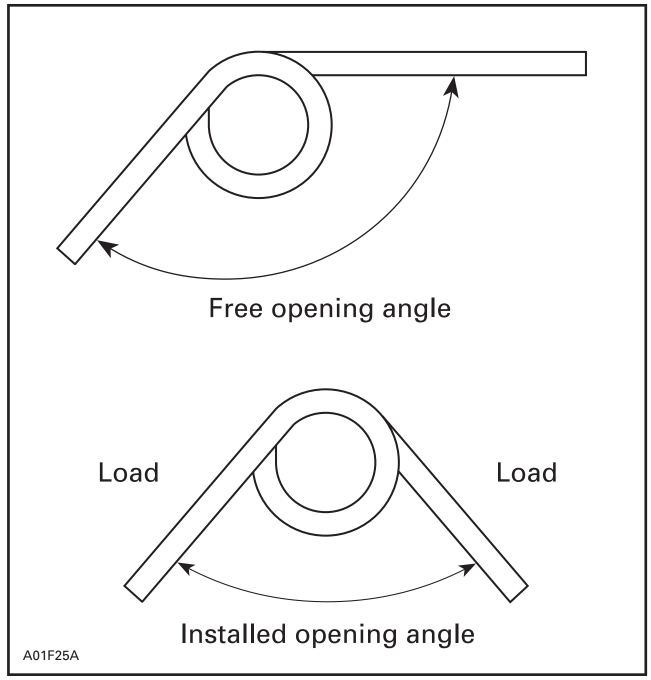
$$\frac{100 \times 150}{100 + 150} = \frac{1500}{250} = 60$$

Spring 1 was a 100# Rate separately, but when stacked on the 150# spring (spring 2), it now has a 60# rate. As the spring bottoms or coil binds, it will assume the 150# rate of spring 2.

Torsional Springs

A torsional spring acts just like a coil spring but it is shaped differently. It is much more difficult to measure the rate of a torsional spring because of the lengths of the legs and where the load will be applied. The rear torsional springs on the S chassis are rated in lb-ft/degree (pounds-feet per degree of rotation). Suffice it to say that there are stiffer and softer springs for most applications.

The preload on a torsional spring is controlled by the free opening angle and the installed opening angle. If a torsional spring must be **twisted** more to be installed, then it will have more preload (following illustration).



Spring Identification

Our springs will have one, 2 or 3 stripes of color painted on the spring. This is the color code used for identification. Refer to the applicable chart to find a cross reference between the part number, model application, color code, spring rate, free length and spring type. The spring type denotes physical characteristics of the spring like the inside diameter of the ends which will determine the type of retainer used to hold the spring. All spring types are not interchangeable.

CHECK THE SPRING TYPE AND FIT OF THE SPRING RETAINER BEFORE INSTALLING DIFFERENT SPRINGS!

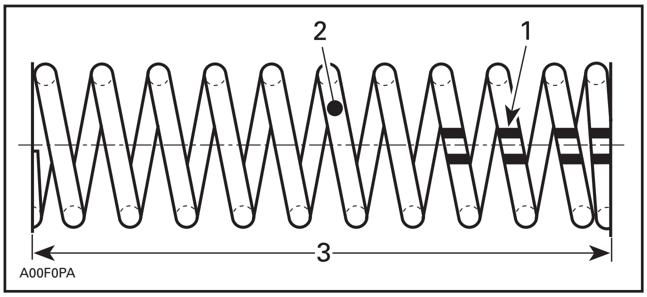
SPRING DESCRIPTION

COIL SPRINGS (compression)

NOTE: Read color when spring is upright and stripes are down.

Type R
(straight on both ends)

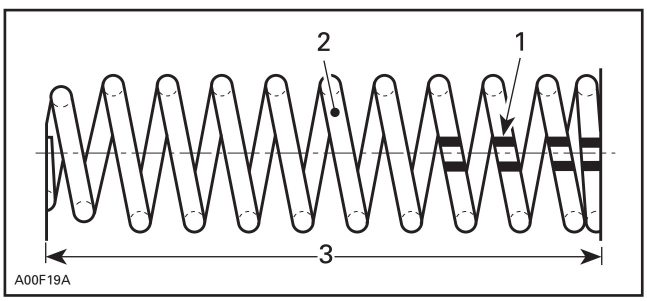
(Single Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*

Type S
(barrel shape on one end)

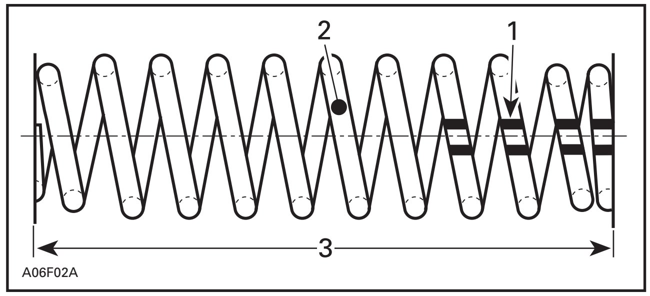
(Single Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*

Type T
(barrel shape on both ends)

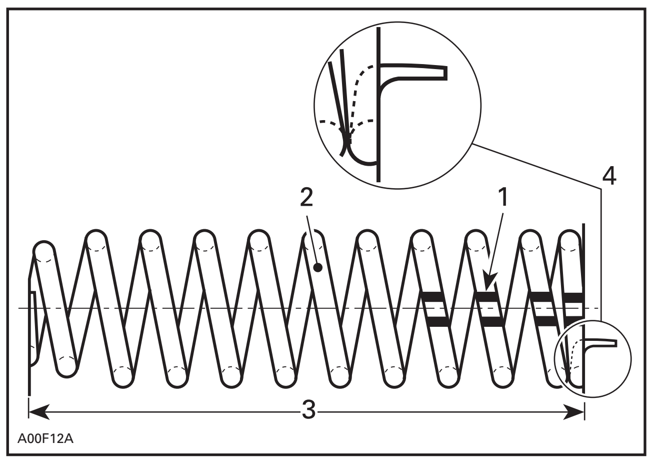
(Single Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*

Type U
(barrel shape on one end with positioning tab at the other end)

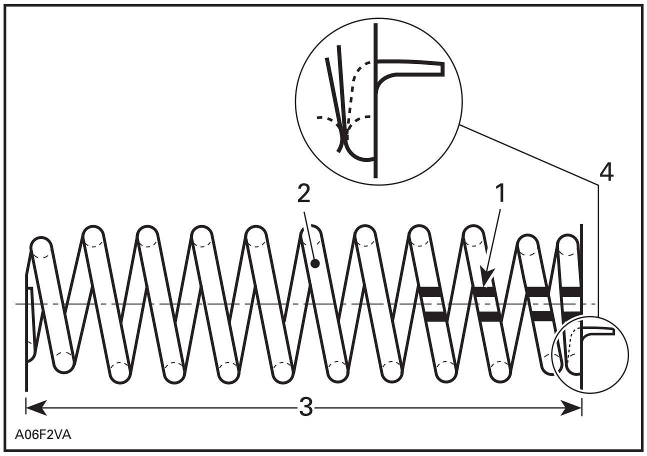
(Single Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*
4. *Positioning tab*

Type Y
(barrel shape on both ends with positioning tab at the color code coils end)

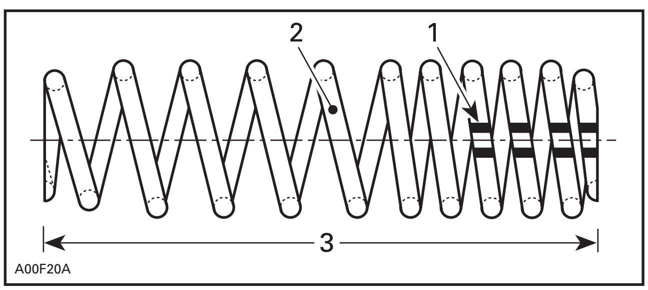
(Single Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*
4. *Positioning tab*

Type 2
(barrel shape on both ends)

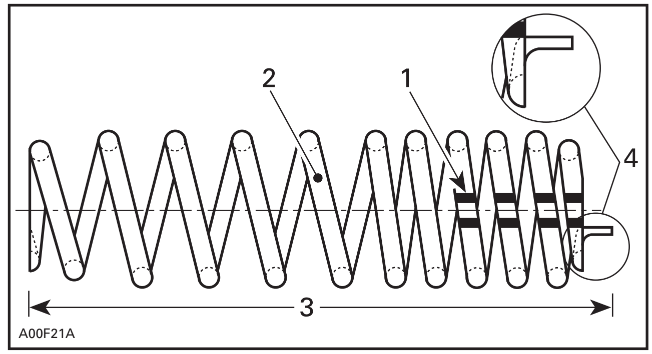
(Dual Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*

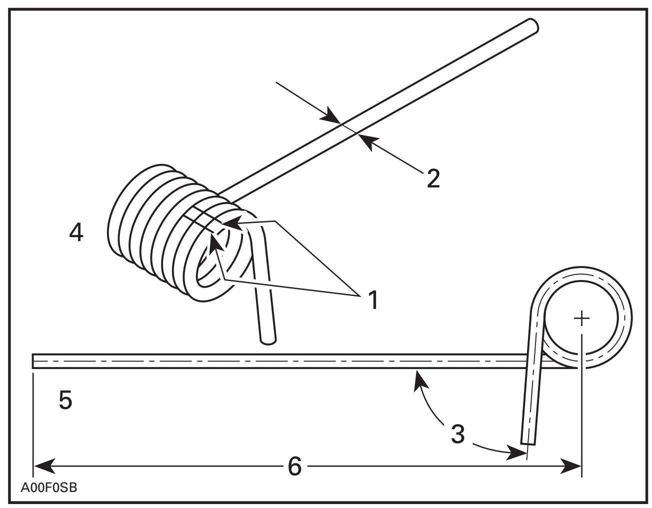
Type 4
(barrel shape on both ends with positioning tab at the color code coils end)

(Dual Rate Spring)



1. *Color code stripes*
2. *Wire diameter*
3. *Free length*
4. *Positioning tab*

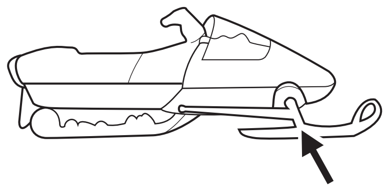
TORSION SPRINGS



1. *Color code stripes*
2. *Wire diameter*
3. *Opening angle (°)*
4. *Left hand (LH)*
5. *Right hand (RH)*
6. *Length*

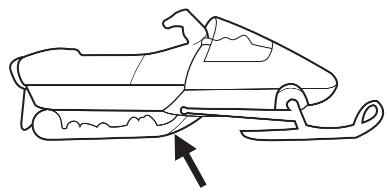
SPRING APPLICATIONS

2005 FRONT SPRINGS 2005



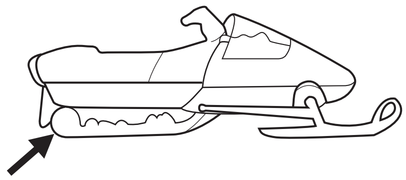
MODEL	(P/N) SOFTER SPRING	(P/N) STANDARD	(P/N) HARDER SPRING
MACH Z	505 071 492	**505 071 447**	505 070 536
MX Z ADRENALINE	505 071 129	**505 071 257**	505 070 762
MX Z TRAIL	505 071 129	**505 071 257**	505 070 762
MX Zx	505 071 129	**505 071 388**	505 070 762
MX Zx RENEGADE	505 071 129	**505 071 388**	505 070 762
MX Z RENEGADE	505 071 129	**505 071 257**	505 070 762
MX Z FAN	505 071 129	**505 071 257**	505 070 762
SUMMIT ADRENALINE	Not Applicable	**505 071 461**	505 071 492
SUMMIT X	Not Applicable	**505 071 642**	505 071 492
SUMMIT HM	505 071 461	**505 071 492**	505 071 447
SUMMIT HM X	505 071 461	**505 071 647**	505 071 447

2005	CENTER SPRINGS		2005



MODEL	(P/N) SOFTER SPRING	(P/N) STANDARD	(P/N) HARDER SPRING
MACH Z	503 189 325	503 189 659	503 189 686
MX Z ADRENALINE	503 189 812	503 190 476 503 190 478	503 190 476 503 190 480
MX Z TRAIL	503 189 659	503 189 686	503 190 283
MX Zx	415 070 500	503 189 325	503 189 659
MX Zx RENEGADE	503 189 812	503 190 476 503 190 478	503 190 476 503 190 480
MX Z RENEGADE	503 189 812	503 190 476 503 190 478	503 190 476 503 190 480
MX Z FAN	503 189 659	503 189 686	503 190 283
SUMMIT ADRENALINE	503 190 476 503 190 478	503 190 471 503 189 990	503 190 471 503 189 999
SUMMIT X	503 190 476 503 190 478	503 190 471 503 189 990	503 190 471 503 189 999
SUMMIT HM	503 190 471 503 189 999	503 190 982 503 190 854	503 189 659
SUMMIT HM X	503 190 471 503 189 999	503 190 982 503 190 854	503 189 659

2005	REAR SPRINGS		2005



MODEL	(P/N) SOFTER SPRING	(P/N) STANDARD	(P/N) HARDER SPRING
MACH Z	503 190 718LH 503 190 716 RH	503 190 775 LH 503 190 773 RH	503 191 000 LH 503 190 999 RH
MX Z ADRENALINE	503 190 714 LH 503 190 712 RH	503 190 718 LH 503 190 716 RH	503 190 775 LH 503 190 773 RH
MX Z TRAIL	503 189 594 LH 503 189 592 RH	503 190 335 LH 503 190 334 RH	503 190 718 LH 503 190 716 RH
MX Zx	503 190 718 LH 503 190 716 RH	503 190 779 LH 503 190 777 RH	503 190 775 LH 503 190 773 RH
MX Zx RENEGADE	503 190 714 LH 503 190 712 RH	503 190 494 LH 503 190 492 RH	503 190 775 LH 503 190 773 RH
MX Z RENEGADE	503 190 714 LH 503 190 712 RH	503 190 494 LH 503 190 492 RH	503 190 775 LH 503 190 773 RH
MX Z FAN	Not Applicable	503 189 594 LH 503 189 592 RH	503 190 714 LH 503 190 712 RH
SUMMIT ADRENALINE	503 190 718 LH 503 190 716 RH	503 190 775 LH 503 190 773 RH	Not Applicable
SUMMIT X	503 190 718 LH 503 190 716 RH	503 190 775 LH 503 190 773 RH	Not Applicable
SUMMIT HM	503 190 718 LH 503 190 716 RH	503 190 775 LH 503 190 773 RH	Not Applicable
SUMMIT HM X	503 190 718 LH 503 190 716 RH	503 190 775 LH 503 190 773 RH	Not Applicable

LH = Left Hand RH = Right Hand

SPRING SPECIFICATIONS

Coil Springs Specifications-Steel

P/N	TYPE	SPRING RATE (lb/in) ± 10	FREE LENGTH (mm) ± 3	WIRE DIAMETER (mm) ± .05	COLOR CODE STRIPES	COLOR OF SPRING
415 070 100	T	115	242	7,82	GD/YL/YL	BLACK
415 070 500	T	135	242	8,41	BL/YL/YL	BLACK
486 130 023	Y	90	295	8,25	BK/BK/BK/BK	YELLOW
486 130 024	Y	120	315	9,19	GR/GR/GR/GR	YELLOW
486 130 025	S	240	145	8,71	PI/PI/PI/PI	BLACK
486 500 029	T	115	295	8,41	WH/RN/GN/GN	N/A
486 500 030	T	95	280	7,77	WH/BK/BK/BK	N/A
486 500 031	S	135	205	7,77	WH/PI/PI/PI	N/A
486 500 032	S	175	205	8,25	WH/SI/SI/SI	N/A
503 189 090	S	220	200	9,19	YL/WH/YL	BLACK
503 189 325	T	150	242	8,25	YL/SI/YL	BLACK
503 189 659	T	180	242	8,71	BL/RD/YL	BLACK
503 189 686	T	200	242	8,71	RD/SI/YL	BLACK
503 189 812	2	125-200	250	8,41	BL/GR/YL	BLACK
503 189 988	U	215	64	6,35	GD/GD/YL	BLACK
503 189 990	R	275	189	9,19	GD/WH/YL	BLACK
503 189 999	R	325	189	9,52	GD/SI/YL	BLACK
503 190 296	U	210	65	6,65	WH/BL/YL	BLACK
503 190 299	S	275	150	9,19	SI/GR/YL	BLACK
503 191 019	S	155	205	7,77	WH/RD/BL	N/A
505 070 034	4	60-90	325	7,77	BL/GR/BK	YELLOW
505 070 089	R	125	260	7,92	GR/BK/BK	GOLD
505 070 090	R	125	235	7,49	BL/BL/BK	COPPER
505 070 091	2	65-95	340	8,25	BK/BL/BK	GOLD
505 070 092	2	65-95	340	8,25	BK/YL/BK	RED
505 070 093	T	85	290	7,77	BK/GR/BK	RED
505 070 130	R	75	410	6,17	YL/PI/YL	BLACK
505 070 144	T	100	390	8,25	RD/BK/RD	YELLOW
505 070 146	T	100	315	8,71	RD/RD/RD	YELLOW
505 070 153	2	65-95	340	8,25	GR/GR/BK	YELLOW
505 070 233	U	125	260	7,92	PI/BL/BK	YELLOW
505 070 240	T	90	265	7,49	RD/PI/BK	YELLOW
505 070 300	U	150	260	8,71	GR/PI/BK	YELLOW
505 070 302	U	100	265	7,14	OR/PI/BK	YELLOW
505 070 391	2	65-95	340	8,25	YL/BK/BK	SILVER

P/N	TYPE	SPRING RATE (lb/in) ± 10	FREE LENGTH (mm) ± 3	WIRE DIAMETER (mm) ± .05	COLOR CODE STRIPES	COLOR OF SPRING
505 070 392	2	55-85	320	7,77	RD/GD/YL	BLACK
505 070 393	2	55-85	320	7,77	RD/BL/RD	YELLOW
505 070 394	R	125	235	7,49	RD/WH/YL	BLACK
505 070 446	R	100	242	7,14	RD/YL/BK	BLUE
505 070 473	R	125	260	7,92	BK/YL/RD	SILVER
505 070 474	4	55-85	320	7,77	BK/YL/BL	SILVER
505 070 534	U	290	45	6,17	BL/WH/YL	BLACK
505 070 536	T	150	300	9,19	GR/WH/YL	BLACK
505 070 572	2	55-85	320	7,77	RD/BL/BL	SILVER
505 070 575	U	290	45	6,17	RD/BL/GD	YELLOW
505 070 576	T	150	300	9,19	RD/BL/WH	YELLOW
505 070 758	2	45-85	320	7,49	RD/GD/BK	YELLOW
505 070 760	Y	95	280	8,25	BL/GD/BK	YELLOW
505 070 762	T	105	300	8,71	GR/GD/BK	YELLOW
505 070 852	4	40-85	340	7,49	RD/GR/RD	YELLOW
505 070 941	T	150	315	9,52	RD/SI/BK	YELLOW
505 071 162	2	55	320	7,77	WH/GN/BK	YELLOW
505 071 179	2	62-85	320	7,77	WH/BL/BK	YELLOW
505 071 200	T	105	300	8,71	SI/GR/BK	YELLOW
505 071 678	T	105	295	8,25	WH/RD/BL	N/A
706 000 068	R	68	355	7,77	GR/WH/BK	YELLOW
706 000 130	R	45	360	6,91	WH/RD/BK	YELLOW
706 000 172	R	45	345	6,91	GR/BKRD	YELLOW
706 200 006	V	140	270	8,25	OR/BK/BK	YELLOW

Coil Springs Specifications-Titanium

P/N	TYPE	SPRING RATE (lb/in) ± 10	FREE LENGTH (mm) ± 3	WIRE DIAMETER (mm) ± .05	COLOR CODE STRIPES	COLOR OF SPRING
486 130 029	T	125	300	N/A	RD/RD/RD/RD	UNPAINTED
486 130 030	T	110	300	N/A	BL/BL/BL/BL	UNPAINTED
486 130 031	T	95	300	N/A	GD/GD/GD/GD	UNPAINTED

SPRING COLOR CODES				
BK = BLACK	BL = BLUE	GD = GOLD	GN = GREEN	OR = ORANGE
PI = PINK	RD = RED	SI = SILVER	WH = WHITE	YL = YELLOW

Part numbers with a 486 prefix must be ordered from the Valcourt Race Dept. or the Race Support Truck. All other part numbers must be ordered from your local dealer.

Torsion Spring Specification-Steel-Round Wire

P/N	WIRE DIAMETER (MM)	OPENING ANGLE + - 7	LENGTH (MM)	SPRING RATE FT. LBS/DEG	COLOR CODE
486 071 100 RH 486 071 200 LH	10,3	135	400	0,82	YL/YL
486 071 300 RH 486 071 400 LH	10,3	150	400	0,81	WH/WH
486 078 500 RH 486 078 600 LH	10.0	115	400	1,00	YL/RD
486 093 200 RH 486 093 300 LH	11.5	80	400	1,25	GN/YL
486 099 100 RH 486 099 300 LH	11.89	140	385	1,46	YL/RD/YL
503 188 100 RH 503 188 200 LH	11.11	100	400	1,18	BL/YL
503 189 080 RH 503 189 083 LH	11.5	100	385	1,36	GD
503 189 241 RH 503 189 242 LH	11.11	105	400	1,12	OR/YL
503 189 327 RH 503 189 329 LH	11.89	100	385	1,51	SI
503 189 334 RH 503 189 335 LH	11.11	105	400	1,12	YL/GD
503 189 338 RH 503 189 339 LH	11.11	90	400	1,13	GN/GN
503 189 342 RH 503 189 343 LH	10.6	80	400	0,94	RD/RD/RD
503 189 346 RH 503 189 347 LH	10.3	85	400	0,83	YL/YL/YL
503 189 350 RH 503 189 351 LH	11.5	100	385	1,36	GD/GD
503 189 354 RH 503 189 355 LH	10.6	90	400	0,94	WH/WH/WH
503 189 358 RH 503 189 359 LH	11.11	80	400	1,13	BL/BL
503 189 443 RH 503 189 445 LH	11.11	95	385	1,13	GN/GN/GN
503 189 522 RH 503 189 524 LH	11.11	90	385	1,13	GN/GN/YL
503 189 592 RH 503 189 594 LH	10.3	85	385	0,83	GD/RD
503 189 615 RH 503 189 616 LH	11.11	100	385	1,18	RD/YL
503 189 627 RH 503 189 629 LH	10.6	90	385	0,94	YL/WH
503 189 674 RH 503 189 675 LH	11.11	80	385	1,13	GD/YL/YL
503 189 681 RH 503 189 683 LH	11.89	80	385	1,51	SI/SI

P/N	WIRE DIAMETER (MM)	OPENING ANGLE + - 7	LENGTH (MM)	SPRING RATE FT. LBS/DEG	COLOR CODE
503 189 881 RH 503 189 883 LH	11.11	75	385	1,05	YL/BL
503 189 898 RH 503 189 900 LH	11.5	90	385	1,36	GD/GD/GD
503 189 902 RH 503 189 904 LH	10.6	80	385	0,94	RD/RD/YL
503 189 947 RH 503 189 948 LH	10.3	75	385	0,83	GN/YL/YL
503 189 992 RH 503 189 994 LH	11.11	73	385	1,13	GN/RD/YL
503 191 026 RH 503 191 024 LH	11.89	90	385	1,51	SI/SI/SI

LH = Left Hand RH = Right Hand

Torsion Spring Specification-Steel-Square Wire

P/N	WIRE DIAMETER (mm)	OPENING ANGLE ± 7°	LENGTH (mm)	SPRING RATE FT. LBS/DEG	COLOR CODE
486 400 021 RH 486 400 022 LH	9.14	75	390	1,00	RD/YL/YL
486 400 023 RH 486 400 024 LH	9.53	90	390	1,22	GD/SI/YL
503 190 329 RH 503 190 331 LH	9.14	90	385	1,11	RD/SI/YL
503 190 334 RH 503 190 335 LH	8.59	75	385	0,83	YL/RD/RD
503 190 483 RH 503 190 485 LH	8.59	85	385	0,94	YL/BL/YL
503 190 492 RH 503 190 494 LH	8.85	80	385	0,94	BL/BL/BL
503 190 708 RH 503 190 710 LH	9.14	85	390	0,96	BL/YL
503 190 712 RH 503 190 714 LH	8.85	75	390	0,83	BL/BL
503 190 716 RH 503 190 718 LH	9.14	80	390	0,94	RD/RD
503 190 773 RH 503 190 775 LH	9.53	90	390	1,11	GN/GN
503 190 777 RH 503 190 779 LH	9.53	80	390	1,06	GN/YL
503 190 999 RH 503 191 000 LH	9.14	85	390	1,08	GN/RD

SPRING COLOR CODES				
BK = BLACK PI = PINK	BL = BLUE RD = RED	GD = GOLD SI = SILVER	GN = GREEN WH = WHITE	OR = ORANGE YL = YELLOW

Part numbers with a 486 prefix must be ordered from the Valcourt Race Dept. or the Race Support Truck. All other part numbers must be ordered from your local dealer.

CORNERING DYNAMICS

The ideal situation, while going through a turn, is to keep the snowmobile as flat as possible without the skis or track losing contact with the driving surface.

As you enter a corner and turn the skis, the rest of the vehicle will want to continue straight ahead. If the skis do not bite the surface, they will start slipping and the vehicle will not turn as tight as the skis are turned. This is called understeering or pushing. If the skis bite very well and the track starts sliding out, then the vehicle is oversteering or is said to be loose. If the ski and track traction is balanced, then the vehicle will maintain a good line though the corner. Because the center of gravity of the vehicle wants to continue straight ahead and because the center of gravity is above ground level, weight will be transferred to the outside of the vehicle. This causes the machine to roll to the outside. As the radius of the corner gets tighter and/or speeds increase, the machine rolls more, and more weight is transferred to the outside of the vehicle until the front or back loses traction or the vehicle tips over.

Roll can be reduced by installing stiff springs on the front suspension and/or a lot of preload, but this will cause a harsher ride than necessary. Lowering the center of gravity will also reduce roll but there are practical limits as to how low the center of gravity can go. Most vehicles are equipped with an antiroll bar or stabilizer bar. Common terminology will refer to it as a sway bar. (It is inaffect an anti-sway bar) The bar is mounted to and pivots on the chassis. The ends of the bar have lever arms from 3" to 7" in length. The ends of the levers are connected to the front suspension. As the outside suspension is compressed during a corner, the bar is twisted and forces the inside spring to compress also. The bar is "borrowing" spring pressure from the inside spring and adding it to the outside spring. The suspension can now resist more chassis roll (see following illustration).

By having a sway bar in the suspension, softer springs can be used to achieve a good ride because the bar will help control roll in a corner. The bar has no affect on ride when traveling straight ahead over bumps that are even from side to side. However, if only one ski encounters a bump, then the bar will transfer energy between the springs. This leads to another design decision. The diameter of the sway bar determines how much spring pressure will be borrowed from the opposite spring. A smaller bar will twist more and not transfer as much energy. A larger diameter bar will transfer more energy which will reduce chassis roll, but will produce a harsher ride on uneven, bumpy terrain. A smaller diameter bar will give a more compliant ride on the nasty bumps but it will allow the chassis to roll more in corners. A cross country sled will use small to medium diameter bars while oval and lemans racers will use large diameter bars.

The length of the lever arm also affects the stiffness of the sway bar. A shorter lever will stiffen the bar and a longer lever will soften the bar. Many lever arms will have 2 holes to mount the connector linkage. The hole closest to the bar will act stiffer.

When changing the sway bar diameter you must also change the ball joint blocks and bushings.

For snowcross racing some racers prefer to disconnect the sway bar. This will let the front suspension act more independently, as the suspension is no longer coupled.

Another little known fact that has a large affect on roll is the limiter strap length. As mentioned earlier, if the limiter is lengthened, the front suspension will extend during acceleration, which reduces ski pressure. If this vehicle was in a corner when power was applied, it would have quite a bit of chassis roll and the inside ski will start to lift off of the ground. Shortening the limiter will have a very large affect on controlling roll. A general guideline for initially setting limiter length for good ski pressure and reducing roll is to have the front and back of the track touch the ground at the same time when you set the back of the vehicle down. If the front of the track touches much sooner than the rear, there will be quite a lot of weight transfer and chassis roll during hard cornering.

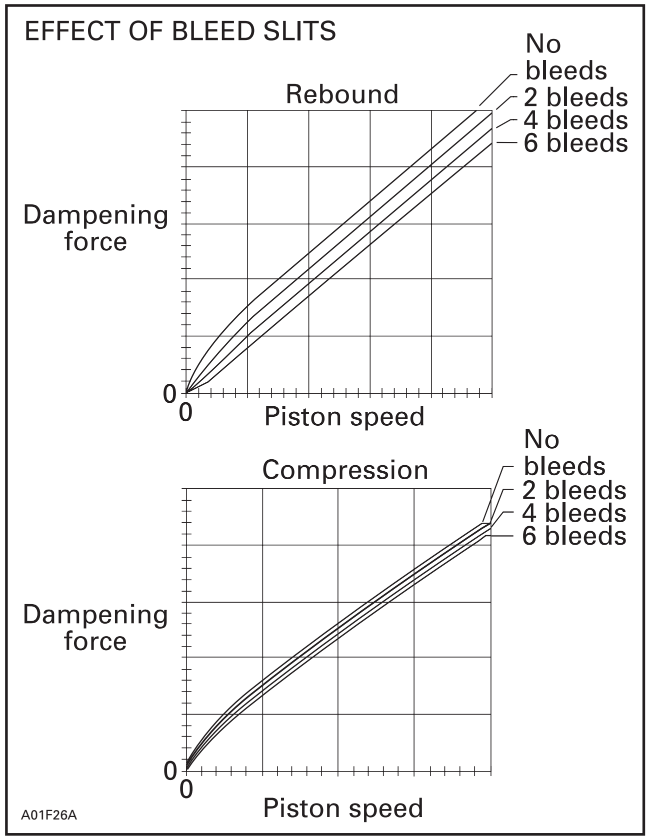
SHOCKS

Valving and Dampening

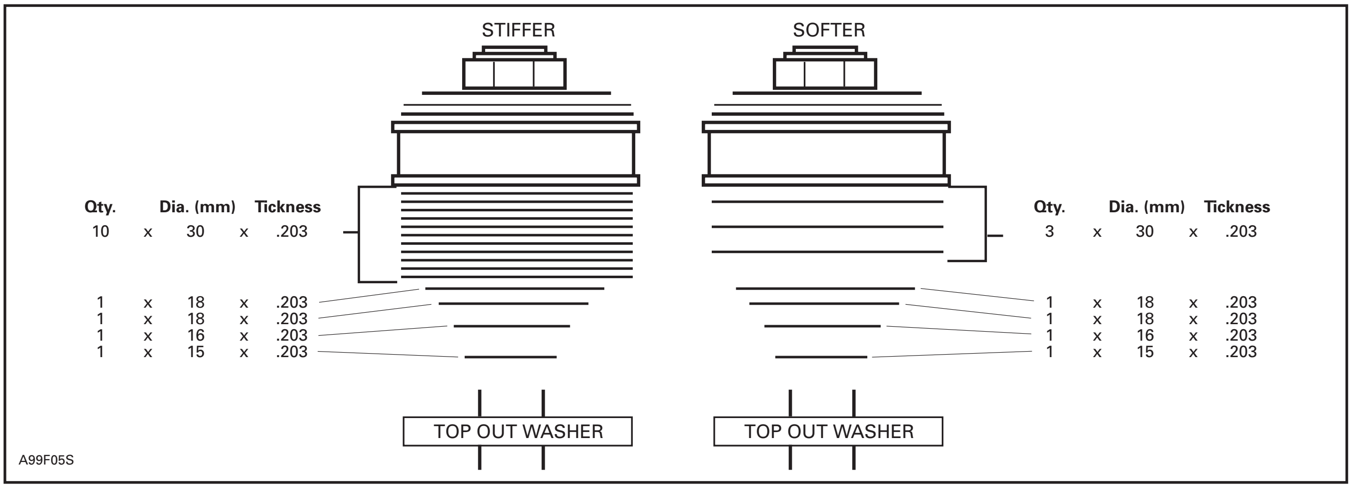
In the HPG shock, the piston passages are covered by a stack of thin metal shims of various thicknesses and diameters. The shims provide dampening by acting as spring loaded valves offering resistance to the oil traveling through the piston. There is a stack of shims on both sides of the piston. One side controls compression dampening and the other side controls rebound dampening. By varying the number and thickness of shims the dampening characteristics can be very accurately obtained. There may also be orifices or slits in the piston that are not covered by the shims. These are referred to as bleed slits. The size and number of these slits will also affect dampening. The external adjustment on the MVA, HPG shocks is a variable bleed hole.

Rebound dampening will usually be much stiffer than compression dampening. This is because rebound dampening must resist the force of the spring and because piston speeds are much slower during rebound.

At low piston speeds, the number of bleed slits will have a fairly large effect on dampening, but as piston speeds increase most of the dampening is controlled by the shim stack. This is because the flow area of the slits is much smaller than the flow area under the shims. Since only a small amount of oil can flow through the bleed slits (compared to the amount that flows under the shim stack), the slits have only a very small effect on dampening at high piston speeds. Because of this characteristic, bleed slits are most effective on rebound dampening. They will have only a very slight effect on compression damping because the typical piston speeds on compression strokes are several times faster than on rebound strokes. There really is no such thing as **high speed** rebound dampening.



As mentioned earlier, the configuration of the shim stack will control most of the dampening of the shock. There are several methods to tuning shim stacks. The first and most commonly used is to increase or decrease the overall stiffness of the stack. This can be done by changing the number of large shims or by increasing or decreasing their thickness.



The overall stiffness of the stack has been increased by adding 7-30 mm × .203 mm shims. This will result in firmer dampening at both low and high piston speeds. Thicker shims will also result in firmer dampening but it is better to use more thin shims than fewer thick shims. More thin shims will provide better, smoother dampening than a few thick shims. There is an equivalency between thick and thin shims, though. The following chart indicates how many thin shims are required to equal the stiffness of one thick shim.

(mm)

1 × .152 = 2.4 × .114
1 × .203 = 2.3 × .152
1 × .254 = 2.0 × .203

This means it will take 2.4 × .114 mm shims to have the same dampening as 1 × .152 mm shim. Obviously you can't use a fraction of a shim so you must find the lowest common denominator. For 2.4 it will be 5. For 2.3 it will be 10. The following chart shows the most common possibilities.

(mm)

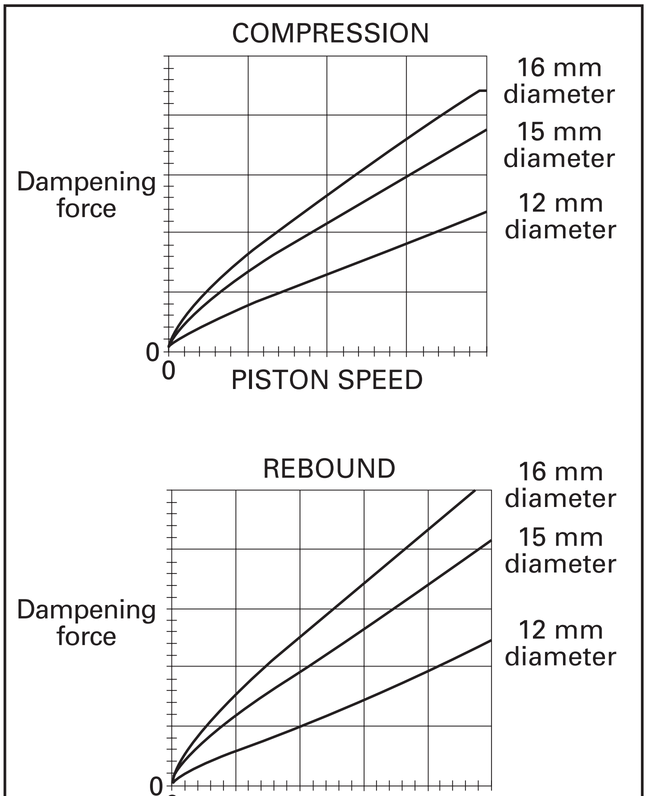
5 × .152 = 12 × .114
10 × .152 = 24 × .114
10 × .203 = 23 × .152
1 × .254 = 2 × .203
2 × .254 = 4 × .203
3 × .254 = 6 × .203
4 × .254 = 8 × .203
5 × .254 = 10 × .203
6 × .254 = 12 × .203
7 × .254 = 14 × .203
8 × .254 = 16 × .203
9 × .254 = 18 × .203
1 x .305 = 2 x .254
2 x .305 = 3 x .254
3 x .305 = 5 x .254
4 x .305 = 7 x .254
5 x .305 = 9 x .254
6 x .305 = 10 x .254

The diameter of the smaller shims that support the large shims will also affect the dampening. A larger support shim gives more support to the large shim thus making it act stiffer. Conversely, a smaller diameter support shim will allow the large shim to bend more easily thus softening the dampening. The following graph shows the effect of different diameter support washers.

Shim Comparator Formula

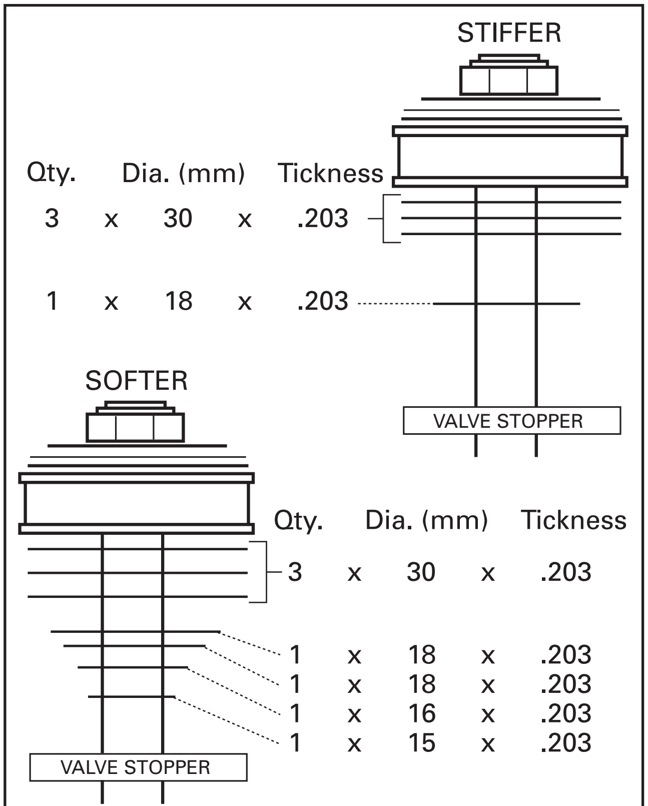
Thickness³ or cubed.

Example: .152 x .152 x .152



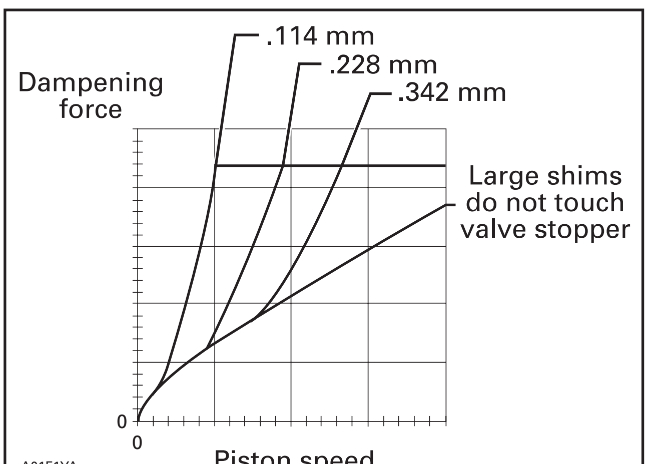
A01F27A

Another method of changing dampening is by controlling the amount of space the stack has to open. This is done by reducing the amount of smaller shims which support the larger shims. The larger shims act the same until they bottom out against the valve stopper.



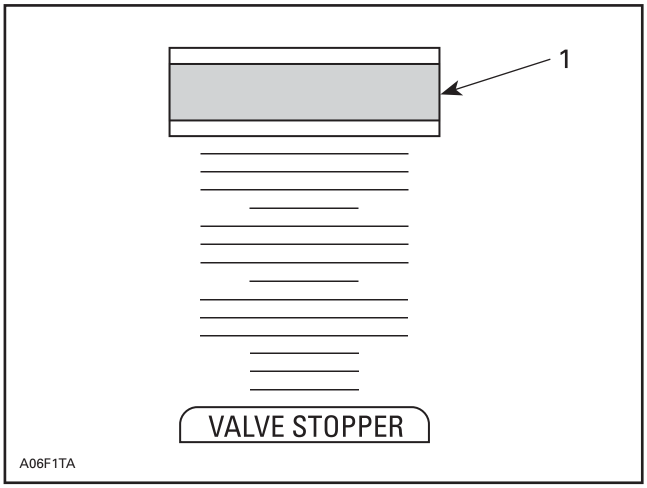
A99F06A

The large shims are only able to deflect .203 mm instead of .610 mm thus reducing the flow area of the piston. This will result in the same low speed dampening, but the medium and high speed damping will be increased. The following graph represents the effect of changing the total thickness of small shims which determine the amount of large shim deflection.



A01F1YA

As you can see, low speed dampening remains the same until the shim stack bottoms out against the valve stopper. Then the dampening becomes significantly stiffer. This is sometimes referred to as progressive dampening. Another similar way to achieve this type of dampening is to use multiple stacks of large and small shims.



1. Piston

The first stack of large shims will deflect very easily thus giving soft low speed dampening. The number of small shims will determine when the first stack hits the second stack of large shims. Now both stacks are acting together thus stiffening the dampening. This can be repeated several times until the complete stack of large shims bottoms out against the valve stopper.

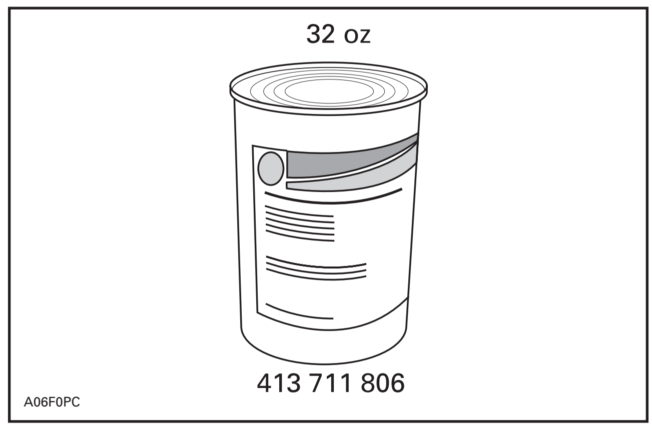
As you can see, there are an unlimited number of valving combinations and many different versions will achieve very similar results. The following general guidelines should help reduce your tuning time.

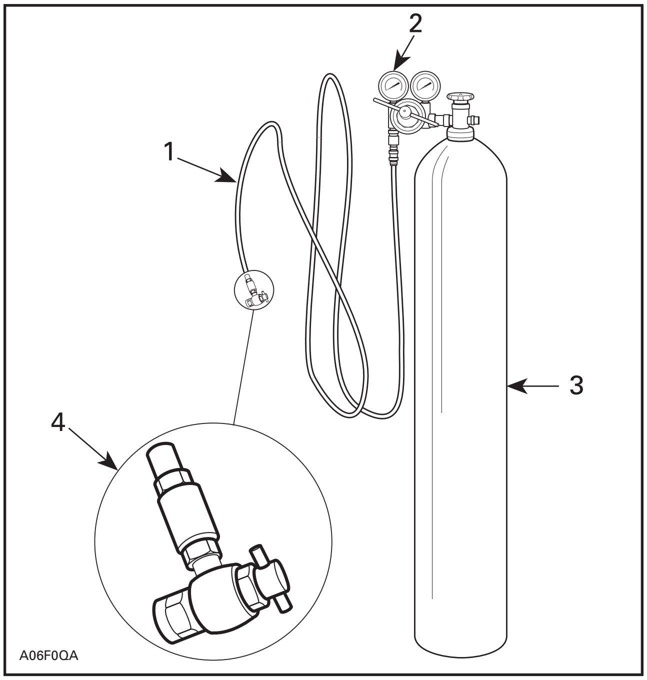
– If the dampening is close to what you want, just add or remove 1 or 2 large shims, from the appropriate side, to fine tune the overall stiffness.

NOTE: Always use 30 mm diameter shims against the piston for compression dampening and 26 mm diameter shims against the piston for rebound dampening. Excludes C-46 shock.

– Generally, rebound dampening should not be changed unless a large change in spring rate is made.
– Bleed slit quantity will affect low speed dampening.
– Under dampening may be due to an aerated shock due to low gas pressure and/or old, used oil. Change the oil and recharge the gas pressure to 300 PSI before altering the shock valving.
– If the vehicle bounces or pogos a lot, the problem may be too little compression dampening NOT too little rebound dampening. Do not use too much rebound dampening! Excessive rebound dampening is a common error. Overdampening will not allow the suspension to recycle to full extension after an obstacle compresses the suspension. This situation (called packing) will eventually bottom the suspension and not allow it to cycle properly.
– For faster weight transfer under acceleration and deceleration, use a piston with more bleed slits.

Shock Oil and Nitrogen





1. *Automotive type air pressure hose*
2. *2 stage regulator, delivery pressure range 2070 kPa (300 PSI)*
3. *High pressure cylinder filled with industrial grade nitrogen*
4. *Valve tip (P/N 529 035 570)*

NOTE: Commercially available through compressed gas dealers.

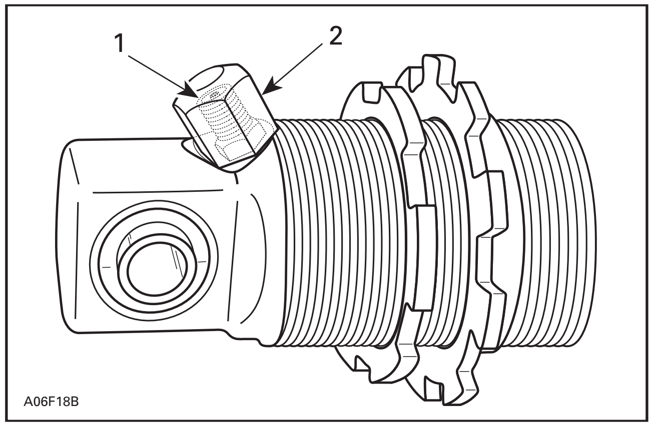
Disassembly and Assembly

Release N_2 (nitrogen) pressure from the damper Schrader valve on any HPG T/A with IFP.

NOTE: When rebuilding a gas emulsion shock, mount the shock vertically in a vice with the schrader valve up and let it sit for 5 minutes before releasing the gas. This 5 minute period will allow most of the gas to separate from the oil and minimize oil spray.

⚠ WARNING

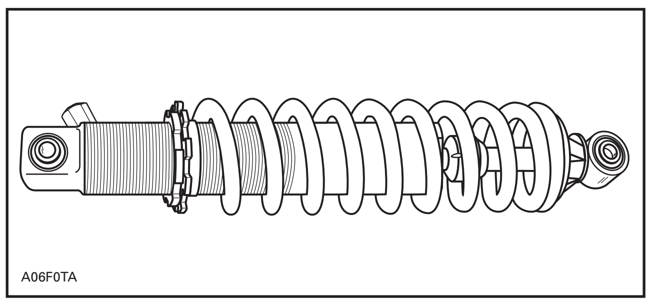
Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.



1. *Schrader valve 1.5-2 N•m (13-17 lbf•**in**)*
2. *Schrader cap 5-6.5 N•m (44-57 lbf•**in**)*

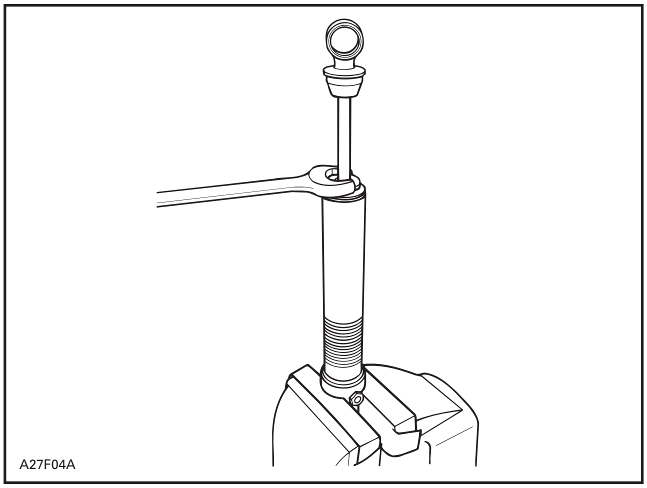
NOTE: Before unscrewing pre-load rings, measure the compressed length of the installed spring and mark position for reinstallation. For factory adjustment refer to the end of this section.

Use tools (P/N 861 743 900) to remove damper spring by unthreading spring pre-load rings, then removing spring retainer or use the spring removal tool (P/N 529 035 504).



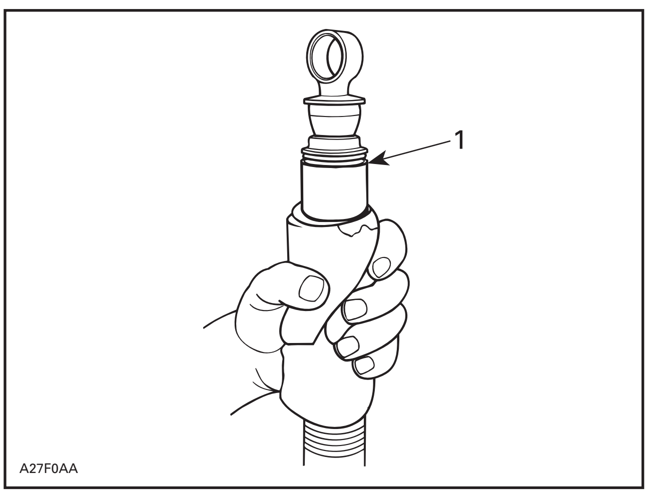
TYPICAL

Holding damper assembly in bench vise with aluminum jaw protectors, unthread seal assembly from damper body using a 32 mm (1.25 in) spanner wrench. This assembly uses a right hand thread.



With the seal assembly removed, slowly lift and remove damper rod assembly from the damper body.

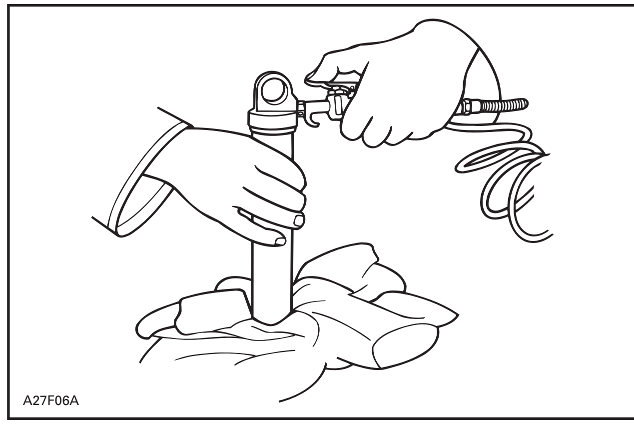
NOTE: Remove damper rod assembly slowly to reduce oil spillage and prevent piston seal damage by damper body threads. Wrap the damper body with a shop cloth to capture possible overflow oil while removing the damper piston.



1. *Oil flows*

Discard old oil into storage container. Never reuse damper oil during shock rebuild.

Remove Schrader valve core. Using compressed air pressure, carefully remove floating piston from damper body. Hold shop cloth over damper body opening to catch released floating piston. Allow room for floating piston to leave damper body.



TYPICAL

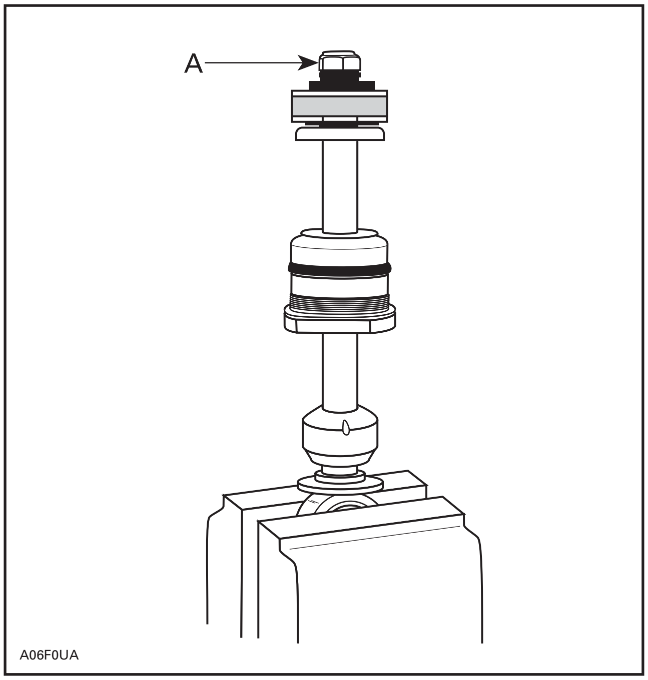
⚠ WARNING

Whenever using compressed air, use an O.S.H.A. approved air gun and wear protective eye wear.

Thoroughly clean, with a typical cleaning solution, and blow dry using low pressure air. Carefully inspect the damper body for any imperfections or signs of wear in the damper bore.

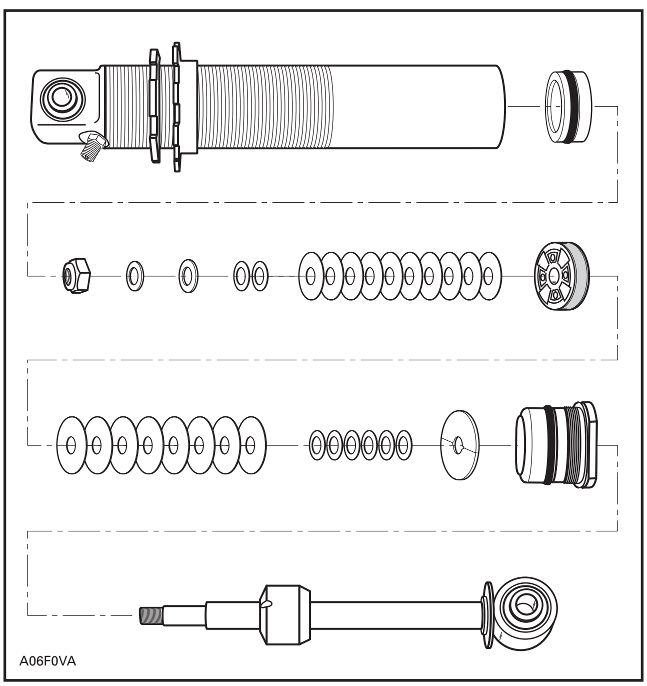
Replace damper body if wear is identified.

Holding the damper rod assembly in a bench vise, begin piston and valve removal.



A. Remove damper nut

Always arrange parts removed in the sequence of disassembly.



NOTE: As a general rule we suggest replacing the damper rod lock-nut after 4 rebuilds to ensure good locking friction and use Loctite 271 each time.

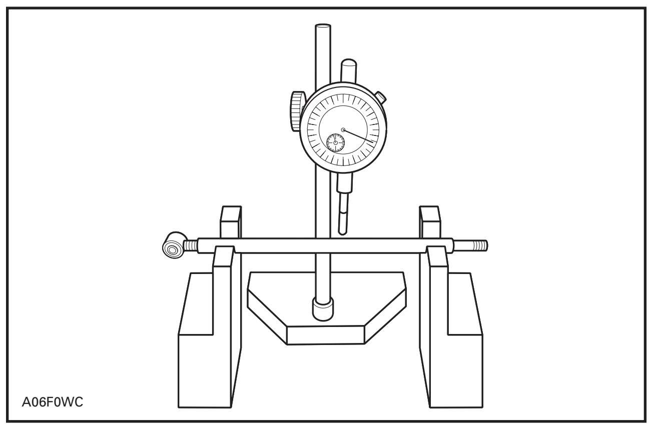
NOTE: If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). The seal carrier need not be removed if only revalving is to be done.

Shims can be measured by using a vernier caliper or a micrometer.

NOTE: All shims should be carefully inspected and any bent or broken shims must be replaced for the shock to function properly.

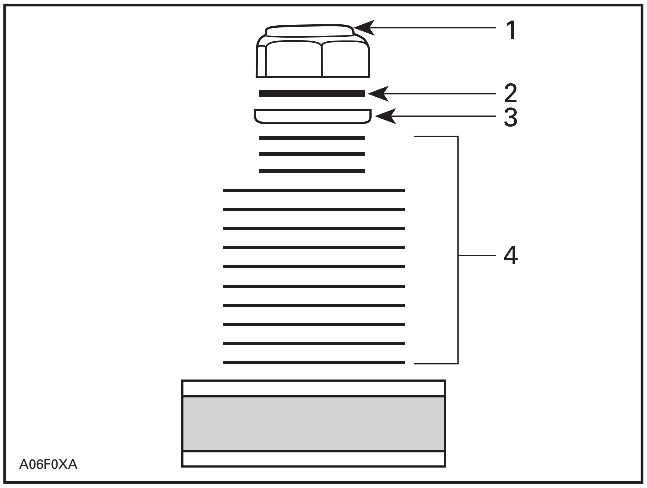
The damper rod is constructed of a plated shaft design. This damper shaft must be inspected for any visible wear on the surface of the damper rod.

Another check that must be completed if damper seal leakage has been noticed, is damper rod run-out. This damper rod run out must not exceed 0.025 mm (.001 in).



MAXIMUM DEFLECTION 0.025 mm (.001 in)

After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly. Torque piston nut 11-13 N•m (97-115 lbf•**in**). Use 271 Loctite.



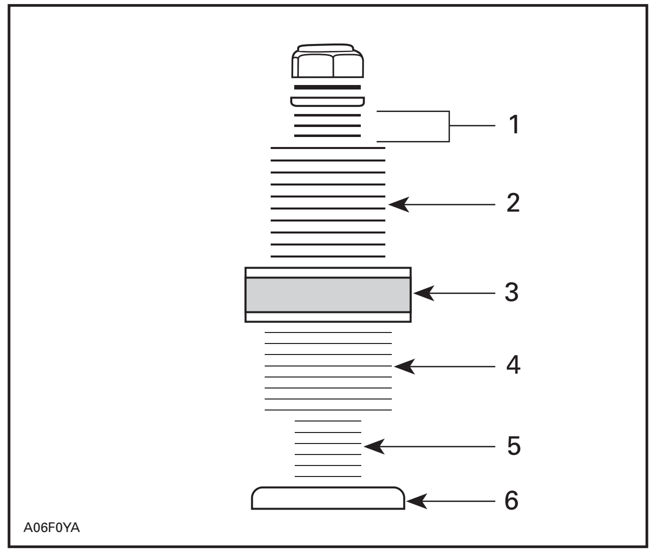
1. *Damper nut*
2. *Spacer*
3. *Washer*
4. *Shim pack*

CAUTION: The damper rod nut can only be re-used 4 times, then, must be replaced. Do not substitute this part for non – O.E.M. use Loctite 271 on nut each time.

This spacer washer(s) (P/N 414 888 309) must be used as shown to ensure damper rod nut does not bottom out or contact shaft threads.

Rebound valve stopper with round edge facing shim stack.

NOTE: Rebound shim stack must not reach into threads of damper shaft. Washer under damper shaft nut is used to prevent damper shaft nut from bottoming on threads.



1. *Rebound dampening shim pack*
2. *Rebound dampening shim pack*
3. *Piston*
4. *Compression dampening shim*
5. *Compression dampening shim pack*
6. *Stopper*

Rebound

A minimum of 0.203 mm (.008 in) clearance must be allowed between shim stack and rebound valve stopper. Use at least one shim of 12 × .203 mm.

Whenever tuning for more rebound damping always use 26 mm (1.02 in) shims against piston to properly close piston orifice holes. More thin shims will offer more control than a few thick shims of the same overall thickness.

NOTE: When tuning for less dampening it is important to remember, never use less than 3-26 mm (1.02 in) shims against piston. This will guard against fatigue breakage.

Piston options include 5 pistons; 0, 1, 2, 4 and 6 slits for rebound dampening bleeds.

Compression

Whenever tuning for more compression dampening always use 30 mm (1.18 in) shims against piston to properly close piston orifice holes. Two thin shims will offer more control than one thick shim of the equal thickness.

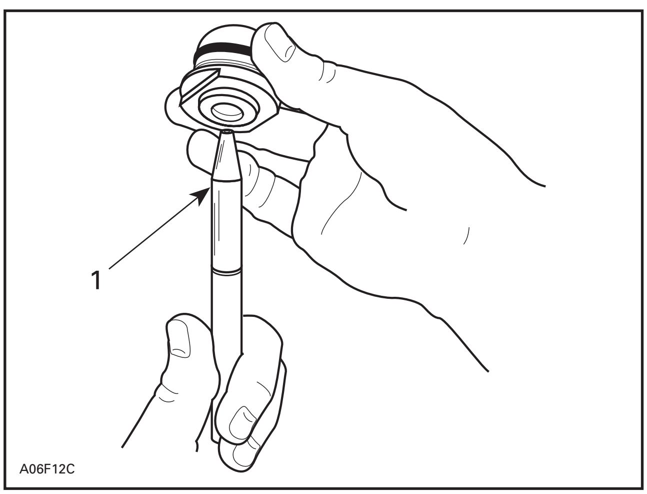
NOTE: When tuning for less dampening it is important to remember, never use less than 3 shims against piston. This will guard against fatigue breakage.

Fewer spacer shims will result in more high speed dampening. A minimum of 0-114 mm (.0045 in) clearance should be allowed between shim stack and compression valve stopper. Use at least one shim of 12 × .114.

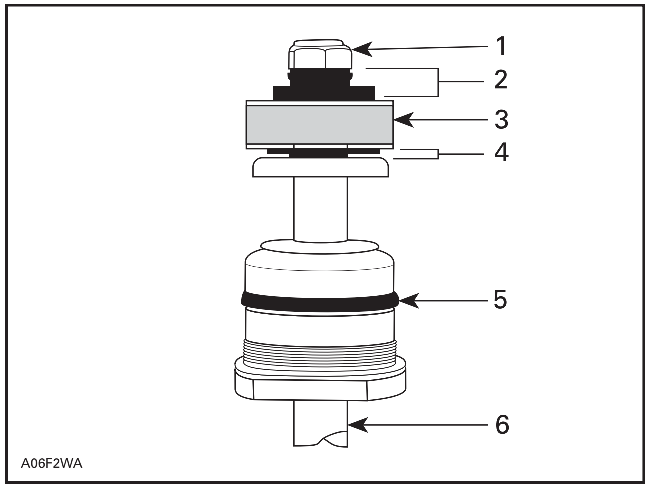
If the seal carrier assembly is replaced, use seal pilot to guide seal over damper shaft. Lubricate seal carrier guide pilot before use.

CAUTION: Failure to use seal pilot will result in seal damage.

Reassemble damper rod assembly, taking care to properly assemble shim packs as required for your dampening needs Ensure that the shaft piston is installed with the slits/larger intake holes facing the rebound shim stack.



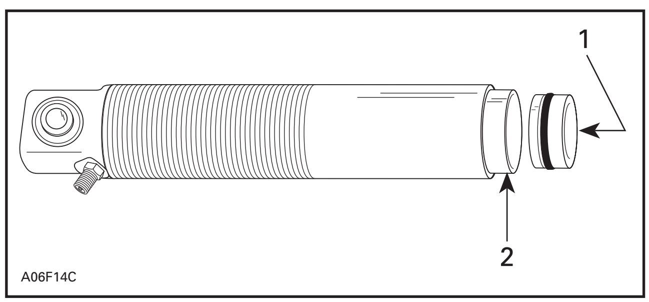
1. *Pilot (P/N 529 026 900)*



1. *Damper nut torque 11-13 N•m (97-115 lbf•**in**) use Loctite 271*
2. *Rebound shim pack*
3. *Piston*
4. *Compression shim pack*
5. *O-ring visual inspection seal carrier assembly*
6. *Damper rod*

Reinstall floating piston into damper body (ensure that Schrader valve core has been removed). Use molybdenum disulfide grease (example: molykote paste (P/N 413 703 700) or silicone grease Dow Corning MS4 (P/N 420 897 061) to ease O-ring past damper body threads with floating piston pilot (P/N 529 026 600).

CAUTION: Failure to install IFP correctly could result in shock damage.

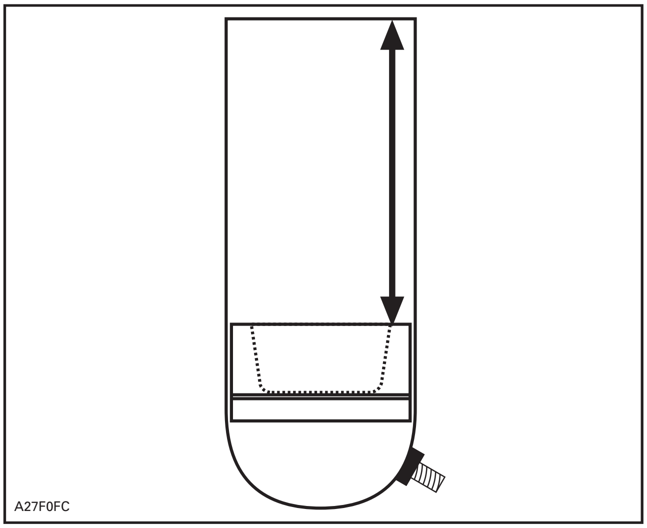


1. *Push (slowly) by hand*
2. *Floating piston guide (P/N 529 026 600)*

NOTE: Lubricate inside of piston guide with molykote GN paste (P/N 413 703 700) or MS4 silicone grease (P/N 420 897 061).

Install floating piston to the proper depth.

On all HPG take apart shocks from 1996 on. The floating piston is installed hollow side up.



Required distance for floating piston installation.

NOTE: If the floating piston is installed too far into the damper body, light air pressure through Schrader valve (with core removed) will move piston outward.

NOTE: Reinstall Schrader valve core after IFP has been installed at correct height and before adding oil.

⚠ WARNING

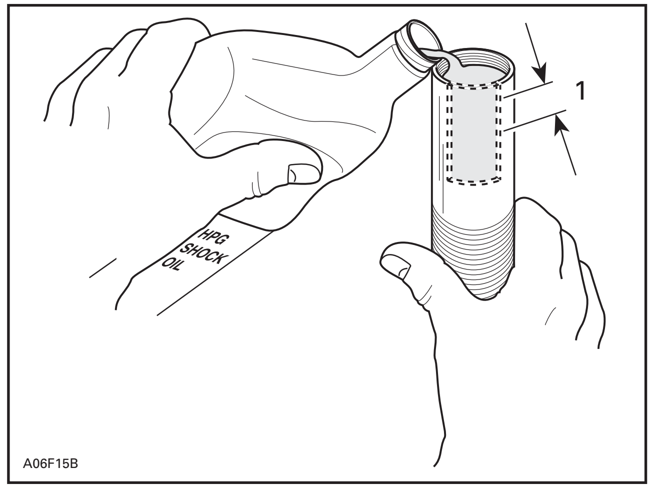
Whenever using compressed air exercise extreme caution, cover damper opening with shop cloth to reduce chance of possible injury.

CAUTION: Moisture laden compressed air will contaminate the gas chamber and rust floating piston.

⚠ WARNING

Always wear protective eye wear whenever using compressed air.

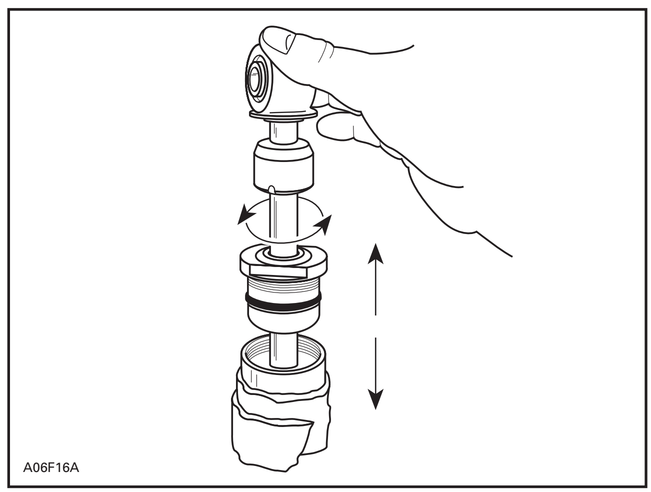
Fill the shock with Bombardier HPG shock oil (P/N 413 711 806) to approximately 10 mm (.393 in), from the base of seal carrier threads.



1. Fill to 10 mm (.393 in)

NOTE: Although we do not measure the exact amount of oil added to the damper, approximately 106 mL (3.58 oz U.S.) will be used.

Carefully insert damper rod into the damper body. Install damper rod assembly into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.



NOTE: Some shock oil will overflow when installing damper. Wrap damper with shop cloth to catch possible overflow oil.

CAUTION: Use care when passing piston into damper body at damper body threads.

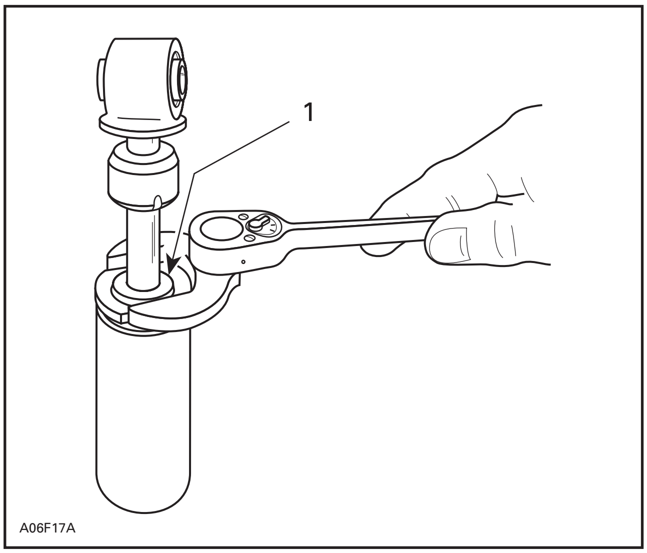
Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required to allow all air to pass through piston assembly. The gentle tapping of a small wrench, on the shock eye, may help dislodge air trapped in the submersed piston. Be careful not to drive the shaft any deeper into the oil than is necessary to just cover the shim stack.

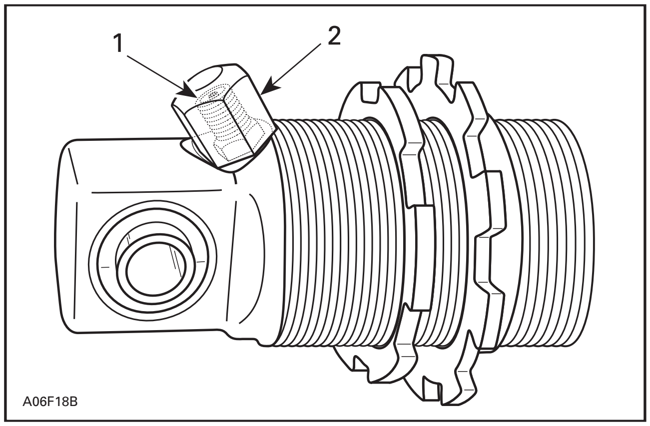
NOTE: Fast installation of the damper rod may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.

With damper rod piston into-oil, TOP OFF damper oil volume. Oil level should be to damper body thread base.

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weapage of oil and to minimize IFP displacement. After the seal carrier is fully in place avoid pushing the shaft into the body until the nitrogen charge is added.



1. Torque seal carrier to 88-89 N•m (65-66 lbf•ft)



*1. Schrader valve 1.5-2 N•m (13-17 lbf•**in**)*
*2. Schrader cap 5-6.5 N•m (44-57 lbf•**in**)*

Adding Gas Pressure

Nitrogen (N_2) can now be added to damper body.

NOTE: Never substitute another gas for nitrogen. Nitrogen has been selected for its inert qualities and will not contaminate the gas chamber of the shock.

Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N_2), this gas pressure will restore the correct pressure for your damper.

CAUTION: Do not exceed the recommended pressure values.

When removing and retightening the Schrader valve acorn nut use minimal torque. When the cap is over tightened and subsequently removed it may prematurely break the seal of the Schrader valve to the shock body and cause a loss of nitrogen charge without being noticed. If you suspect this has happened then recharge the shock as a precaution. Inspect the acorn cap before installation to ensure that the internal rubber gasket is in its proper position.

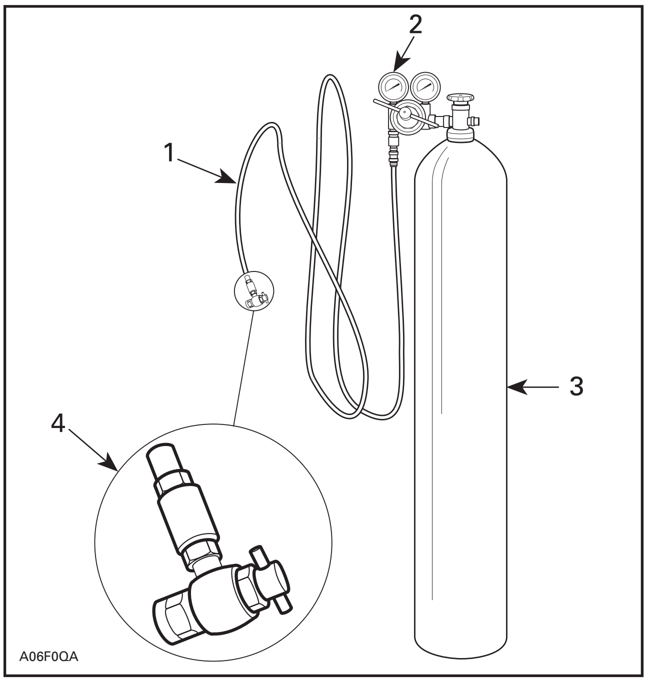
⚠ WARNING

Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

NOTE: Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing.

Damper gas pressure cannot be confirmed by using a pressure gauge. The volume of gas in the shock is very small, and the amount lost during gauge installation will lower the pressure too much and require refilling.

After recharging is complete and before installing the spring the rebuilt shock should be bench-tested. Stroke the shock to ensure full travel and smooth compression and rebound action. If the shaft moves in or out erratically this could indicate too much air is trapped inside. If the shaft will not move or has partial travel then it may be hydraulically locked. In either event the shock must be rebuilt again. Pay particular attention to the placement of the IFP, quantity of oil and shim stack/piston assembly.



1. Automotive type air pressure hose
2. 2 stage regulator, delivery pressure range 2070 kPa (300 PSI)
3. High pressure cylinder filled with industrial grade nitrogen
4. Valve tip (P/N 529 035 570)

Reinstall damper spring retainer, then your spring. Next, thread the spring pre-load rings up to the spring. Set pre-load according to recommended spring length specifications. Your damper is now ready for reinstallation to your snowmobile.

CHASSIS SET-UP

General

Reducing rolling resistance of a snowmobile is also an important area to explore when you are searching for the ultimate top speed. The horsepower required to overcome rolling resistance or drag increases approximately with the square of velocity so small reductions here can provide measurable improvements in top speed.

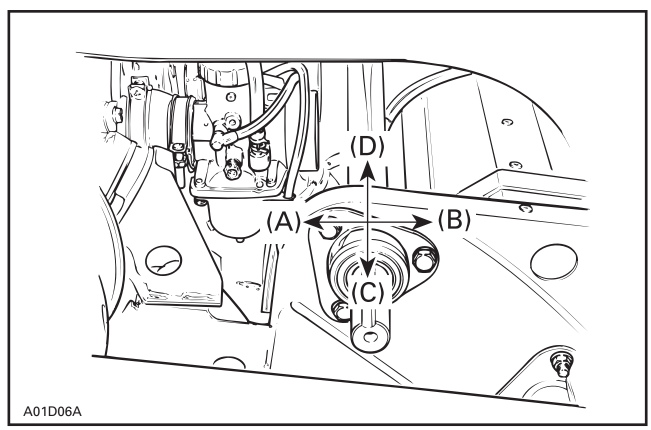
Good chassis set up starts with accurate alignment of the drive axle, countershaft, suspension system, and chassis. Use the following procedure to check your vehicle:

Remove the rear suspension, driven clutch, tuned pipe and muffler, track and drive axle. Check to see that the spacing of the drive sprockets is correct on the drive axle. The sprockets should be centered in the space between the rows of internal drive lugs on the track.

Use a press or special tool (P/N 861 725 700) for shifting the sprockets. The sprocket indexing should also be checked. The maximum desynchronization is 1/16 inch (1.5 mm). The drive axle can be chucked in a lathe and spun to observe the sprocket "wobble" and run out. Wobble should not exceed 2 mm (.080 in). While this amount of wobble may look excessive, it does not affect performance. If wobble is more than allowed, the sprockets should be replaced.

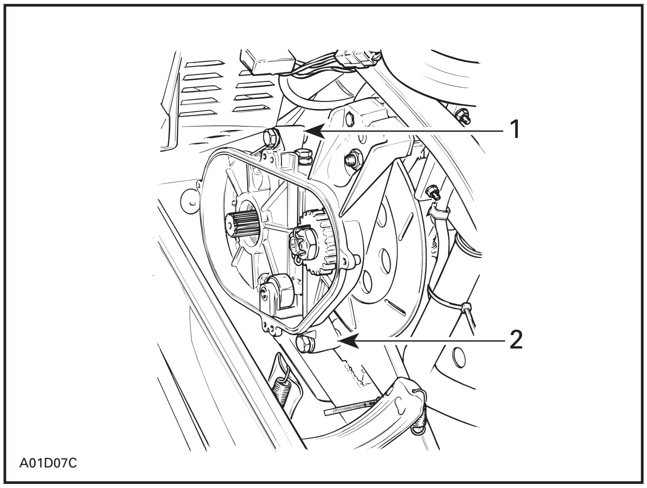
Maximum run out should not exceed 0.5 mm (.020 in). A maximum of 1 mm (.040 in) can be removed from the sprockets to true the diameter.

CAUTION: Do not remove more than 1 mm (.040 in) of material or the sprockets will start to go out of pitch with the track.



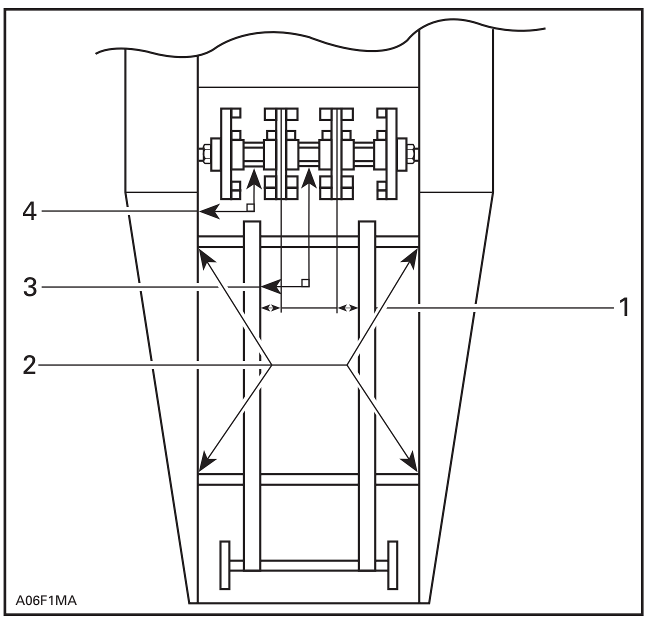
TYPICAL

Now, reinstall the drive shaft. Using a large carpenters square, check to see that the drive axle is square (90°) with the tunnel. If not, slot the left end bearing housing holes and reshim the chaincase to square up the drive axle and the countershaft.



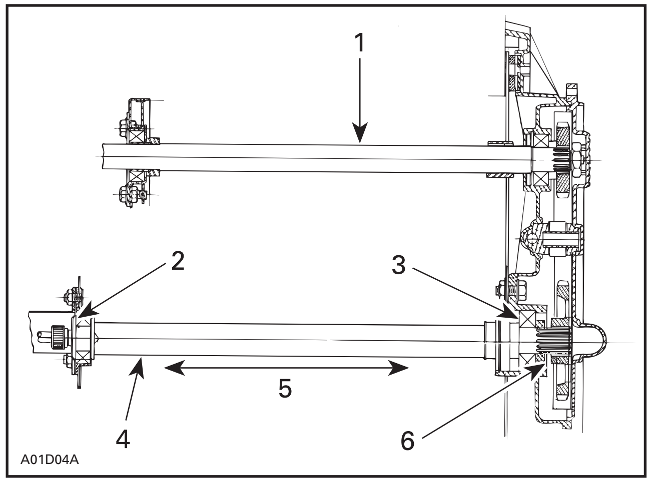
TYPICAL
1. *Shim location*
2. *Shim location*

Reinstall the rear suspension and using a square check to see that the runners are square (90°) with the drive axle. If not, cut and shim the ends of the suspension cross tubes to perfectly align the runners and also remove any side-to-side movement. If the suspension must be shimmed, correlate the adjustment with the next step.



1. *Align runners with drive sprockets. Equal distance both sides. Shim drive axle to reduce end play Maximum end play = .060" (ideal = less than .030")*
2. *Cut ends of tubes and shim as required to align suspension and remove freeplay*
3. *Suspension square with drive axle*
4. *Drive axle square with tunnel*

Now check the axial play (side-to-side clearance) of the drive axle. The axle must not move more than 1.5 mm (.060 in) from side to side. Ideally, the axle has 0.25 – 0.50 mm (.010 – .020 in).

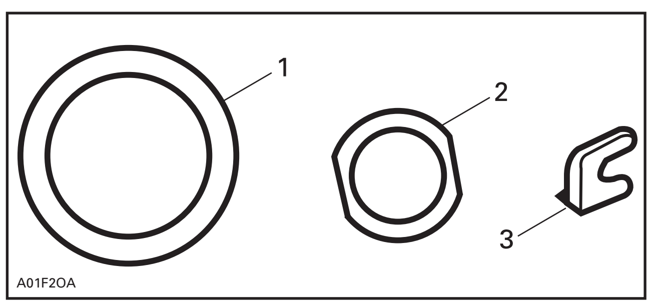


TOP VIEW
1. *Countershaft*
2. *Shim position on end bearing housing side*
3. *Shim position on chaincase side*
4. *Drive axle*
5. *Axial play*
6. *Shim between sprocket and spacer*

If the axle must be shifted left or right, note the direction and distance, and shim the axle as necessary.

Shims can be placed between the left side bearing and the end bearing housing to move the axle to the right or between the right side bearing and the chaincase to move the axle to the left.

NOTE: If shims are placed between the chaincase and the right side bearing, an equal thickness shim must be placed between the drive chain sprocket and the spacer on the axle.

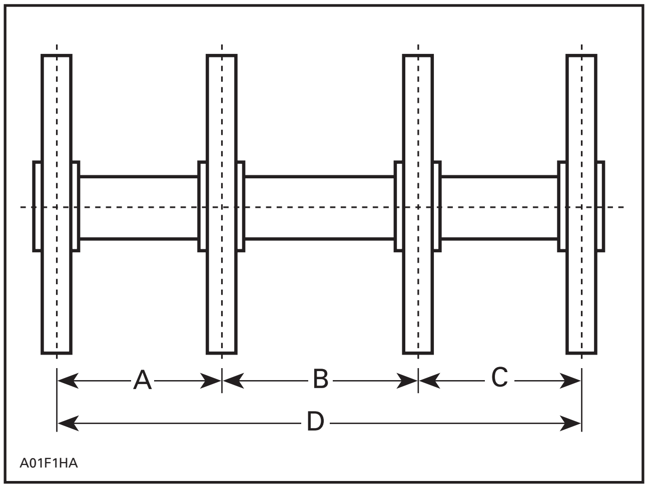


1. *(P/N 501 020 500)*
   Shim, drive axle end bearing housing 1.6 mm (.063 in) thick
2. *(P/N 506 041 400)*
   Shim, drive axle chaincase side 1.6 mm (.063 in) thick
3. *(P/N 504 039 800)*
   Shim, chaincase perpendicularity 0.5 mm (.020 in) thick

Rear Axle

The idlers should be placed so that they run between the left and right double rows of drive lugs. This will help maintain alignment of the track and lessen the chance of derailing.

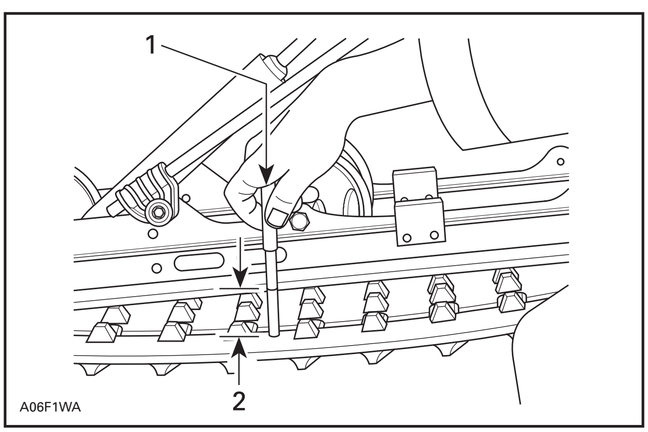
Use the spacing shown in the drawing.



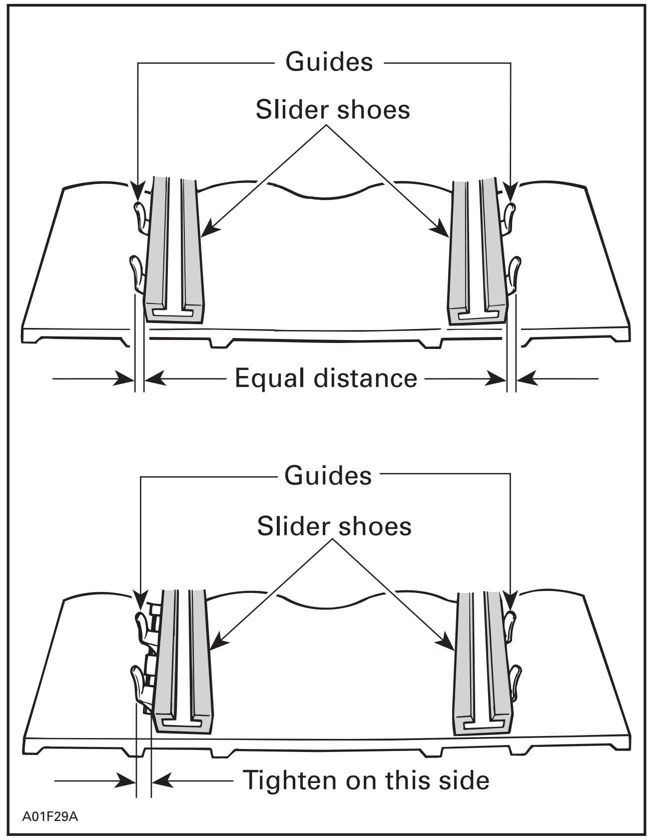
A. 101.5 mm (3-63/64 in)
B. 123 mm (4-27/32 in)
C. 101.5 mm (3-63/64 in)
D. 326 mm (12.83 in)

There are grease fittings on all moving parts of the suspension and they should be greased on a weekly basis with a quality, low temperature grease (P/N 413 711 500).

Finally, adjust the track tension and alignment. Track tension and alignment are most critical to top speed. Make certain the track is aligned so that you have equal clearance between the slider shoe and the track guides on each side of the snowmobile.



TYPICAL
1. 7.3 kg (16 lb)
2. Deflection



For straight line racing, top speed can sometimes be increased by running the track a bit looser. Ratcheting of the drive sprockets during hard acceleration can occur if the track is too loose. Conversely, heavily studded tracks may need to be tighter to achieve top speed because the extra weight of the studs may cause the track to **balloon out** at high speeds.

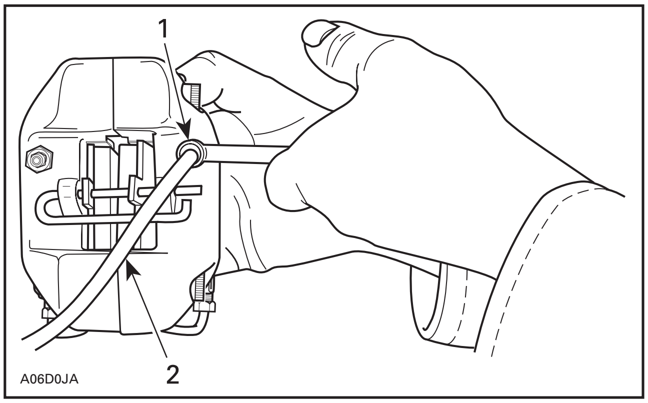
NOTE: Track tension should be checked whenever major changes are made to the limiter strap length and/or ride height changes.

BRAKES

If extreme brake use is anticipated, use 3 inch diameter dryer hose (or equivalent) to route outside air directly from the hood vents to the brake area.

SKI-DOO hydraulic brake systems use DOT 4 brake fluid. For conditions where extreme brake heat is generated, DOT 5 fluid can be used. DOT 5 has a higher boiling point but it is more susceptible to moisture intrusion and should be changed on a regular basis.

If the brakes become **spongy**, the system should be bled to remove any air bubbles. If the brake fluid is dark and/or cloudy, flush the complete system and refill with fresh brake fluid.



1. Hold bleeder adaptor while opening bleeder
2. Clear hose to catch used brake fluid

Pump a few time brake lever and while holding brade lever depressed, open bleeder and check for air to escape.

Repeat with the same bleeder until no air appears in hose.

ADJUSTING RIDE HEIGHT

A cross-country racer will want all the suspension travel you can for a rough snowcross-type event. But when racing a high speed event on a relatively smooth lake, giving up some of the suspension travel to lower the machine is advantageous. Lowering the machine, reducing the ride height, does 3 things for you:

1. Lowers the center of gravity of the machine; which improves cornering.
2. Reduces the frontal area of the sled; which improves aerodynamics.
3. Reduces the approach angle of the track; which reduces drag.

A person wanting to lower the machine for a short event like a radar run may simply chain or strap the machine down. Provided the course is quite smooth, this can work, but realize that strapping down the suspension preloads the springs highly and the ride will be very stiff. This technique is not recommended for most forms of racing.

The most common technique for lowering the machine is to use shorter springs or to shorten the existing springs by heating and collapsing a coil or 2 of the spring as needed. Realize that shortened springs will have very little preload when the suspension is in its "topped out" position, and it may be necessary to safety wire the spring collars into position, and use additional limiter devices like straps, chains to limit the extension of the shock.

NOTE: Some race organizations do not allow shortening springs so a proper optional short spring would be used.

Lowering the Front Suspension

Make limiter straps from standard rubber limiter strap material or link chain and go from shock bolt to shock bolt (longer shock bolts will be required). The length of the strap should be adjusted to obtain the desired ride height. Most rules require you to maintain 2 inches of suspension travel.

Shorter springs should be used to avoid excessive preload.

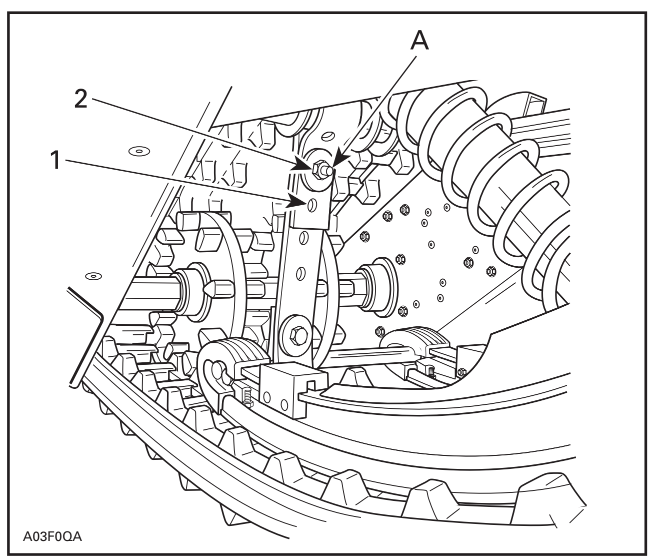
On vehicles with rebuildable shocks (HPG T/A), a spacer can be installed internally on the shock shaft to limit the shock extension. Spacers can be fabricated from 1 in O.D. aluminum round stock. (Refer to the shock rebuilding section for proper installation procedures).

The threaded adjusters can be loosened to provide the desired amount of spring preload.

Lowering the Rear Suspension

Option 1: The rear suspension can be lowered by compressing the rear scissors to the desired ride height and installing a strap to maintain this height. Compressing the rear scissors adds a great deal of preload to the rear torsion springs. Use softer springs.

Option 2: It is also possible to lower the rear suspension on vehicles equipped with HPG T/A shocks, by using a spacer to limit shock extension.



1. 1st hole
2. 2nd hole
A. 11 N•m (97 lbf•**in**)

Center

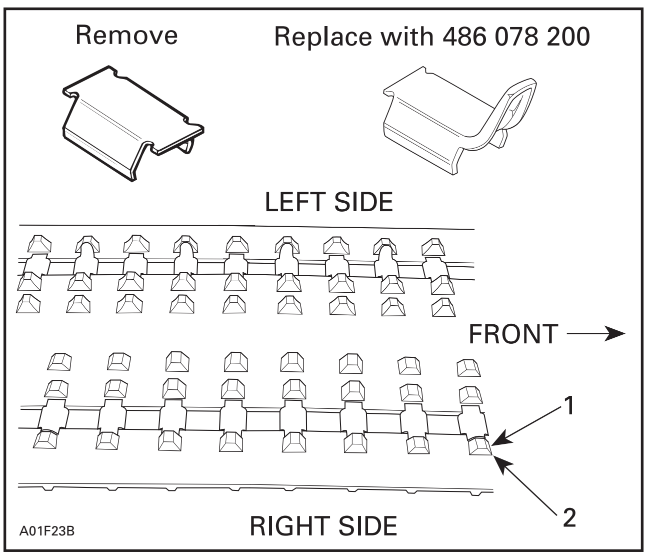
Shorten the limiter strap(s) to match the ride height of the front and rear and obtain the desired amount of weight transfer. New holes can be punched in rubber limiter straps. A shorter nylon limiter strap is available for the vehicles with the strap and bolt style.

On vehicles with HPG T/A shocks the threaded adjusters can be loosened to reduce the amount of spring preload. If less preload is desired or on vehicles with cam adjusters, shorter springs may be used to reduce excessive spring preload.

TRACK GUIDES

Additional taller track guides (P/N 486 078 200) should be installed when oval racing with a heavily studded track. These taller guides help prevent derailing without having to overly tighten the track. When in a turn, the side loads on the guides are extremely high and it is advantageous to reduce the load per guide by adding more of the guides.

All of the flat cleats should be removed from the right side of the track and replaced with guide cleats. (See drawing).



1. *Standard*
2. *(P/N 486 078 200)*

NOTE: When installing taller track guides or studs part (P/N 572 086 100), bushings should be installed inside the rear torsion springs on rear suspensions. Track guide clearance should also be checked on top of the rear suspension A.C.M.

For ice lemans type racing where left and right hand corners are encounted, extra guides should also be installed on the left side of the track.

There are two special tools which greatly enhance the removal and addition of guide clips.

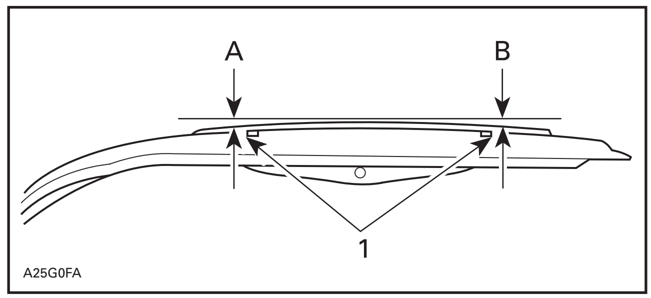
(P/N 529 028 700) Guide clip remover.

(P/N 529 008 500) Guide clip crimper.

SKIS AND RUNNERS

The skis on your Ski-Doo are not flat on their bottoms, they are slightly convex. This is done to improve stability at high speed on straightaways.

The plastic ski on the MX Z X and MX Z incorporates more of its use (rocker effect). This plastic ski will work very well on snowy surfaces as it increases flotation and reduces drag. For oval and Ice Lemans, the new profile is superior to the steel ski.



1. *The above illustration is an example of what is called* rocker
A. *2 mm (3/32 in)*
B. *2 mm (3/32 in)*

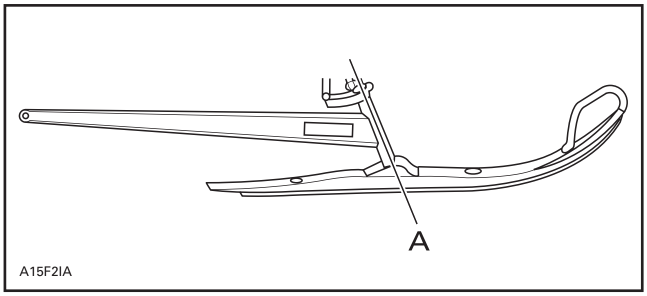
Check your skis from time to time to confirm the 2 mm (3/32 in) (measured at the ski runner studs) bow. If the skis have flattened, use a hydraulic press as necessary to restore the original shape. This is most important for oval racers.

Plastic skis or liners are good for a 2 MPH increase in speed in most snow conditions, more in sticky snow conditions.

Carbide inserted ski runners are necessary for all forms of racing except drag racing and radar runs. The type of racing you are involved in and the condition of the track will determine what style of carbide and how much carbide you will be using.

For the ice race track, special flat-backed race runners with 60° carbide inserts are a must. The flat back of the runner helps to keep the runner from being rolled over by cornering forces. The best racing runners are heat-treated to prevent them from bending under high side loads.

When installing carbide inserts, start with 100 mm (4 in) of carbide in front of a line projected from the center line of the ski leg and 125 mm (5 in) behind the line. Always keep the amount of carbide behind the line longer than in front.



A. 122 mm (5 in) 98 mm (4 in)
147 mm (6 in) 171 mm (7 in)

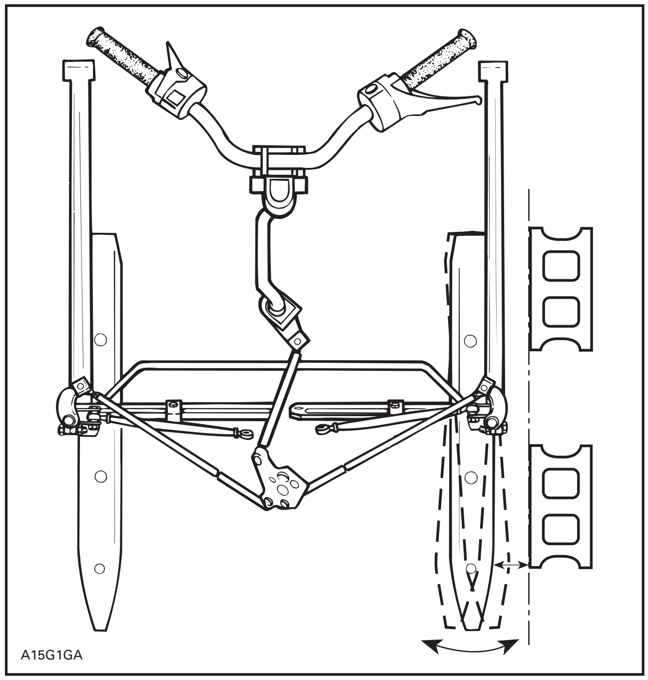
The condition of the skis and runners, as well as their alignment, has an effect on top speed. The ski toe-out must be correct; any irregularities in the skis should be removed, and bent or badly worn runners must be replaced.

CAUTION: The amount of carbide allowed on each runner may be limited by your race association. Check your rule book.

BUMP STEER

Bump steer refers to the amount of change in the toe-out of the skis as the suspension moves through its total vertical travel. Block up the machine so that the skis are just off the ground and remove the springs from the shocks. This will allow you to cycle the suspension and measure the bump steer on your vehicle.

You will need a reference point to measure to as you cycle the suspension through its travel. Because you will be lifting the ski and suspension assemblies as you are measuring, you should use a reference point that is not easily bumped out of position. A pair of concrete blocks set on a line about 50 mm (2 inches) away from the edge of the ski and parallel to the ski works nicely.



Lift the ski up to its upper travel limit. Using a measuring tape, measure the distances from the front and rear edges of the ski to the concrete block reference. The front and rear measurements must be equal or no more than 1.6 mm (1/16 in) difference if the bump steer adjustment is correct.

SKI LEG CAMBER

The camber angle of the ski legs changes how aggressively the ski runners hook up with the driving surface. Adding negative camber will have the most effect on handling. This is because the weight shift in a turn is always to the outside of the turn and the negative camber of the ski leg causes the wear bar to be presented to the driving surface in a more aggressive position. Positive camber will tuck the wear bar in toward the sled, thereby reducing its traction in a turn.

Camber adjustments do have an effect on the width of the machine. Make certain your camber adjustments do not push you beyond the overall width limit imposed in most forms of racing.

Camber is the tilting of the ski leg from the vertical. To obtain a negative camber angle, the ski leg must be tilted inward so that the ski legs are closer together at the top than at the bottom. Positive camber would tilt the top of the ski leg away from the machine. Camber angle is measured in degrees from the vertical and must be noted as positive or negative.

Most oval racers set the left ski leg at 0° camber and the right at - 3° to - 5° camber. Trail riders and drag racers should set both ski legs at 0° camber while cross-country and snowcross riders most often set up both ski legs with - 1° to - 3° camber.

Camber angle is measured using an angle finder available from most tool supply stores.

Adjustment is performed by adjusting the length of the upper control arm.

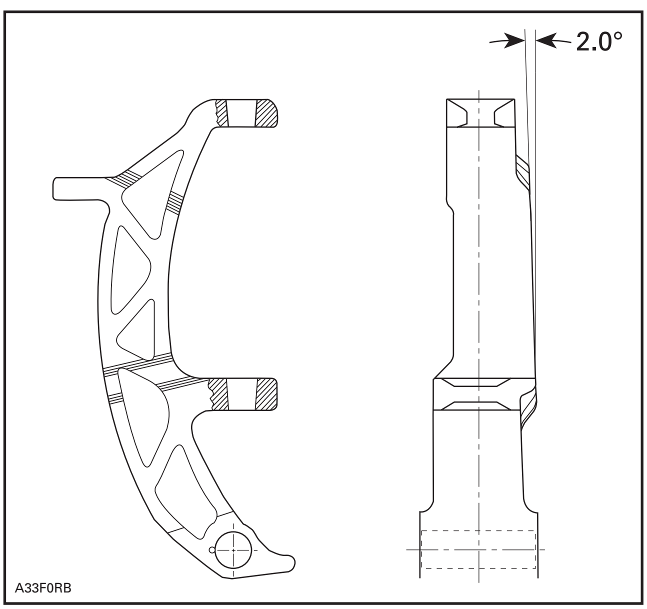
REV Front Suspension Settings

The ski springs rate is 18.39 N/mm (105 lbs/in) (P/N 505 071 201). The spring must be preloaded by 10 mm (3/8 in) at full extension. Attention, the front spring must always have a minimum preload of 3 mm (1/8 in) and a maximum preload of 25 mm (1/8 in to 1 in). Always set the spring preload with a fully extended suspension. For a softer spring, the (P/N 486 130 023) 15.76 N/mm (90 lbs/in) will fit on the production shock. For a stiffer set-up, use (P/N 486 130 024) 21.01 N/mm (120 lbs/in).

The front suspension have 251 mm (9.9 in) of travel, 4.94° negative camber at full extension, 2° negative camber fully compressed. The toe must be 3 mm (1/8 in) open, no bump steer, 13 mm (1/2 in) of scrub at the worst condition.

The ski leg comes with a pilot hole for ice racing purpose. (See picture below)

The side of the ski leg is machined at 2° angle. To measure your camber, add this 2° to your measure.



SKI TOE-OUT

Most oval racers use modified handlebars with loops or angles on the left end. Often a driver prefers a handlebar position that is not horizontal when the skis are in their straight ahead position. This allows a more comfortable driving position when in a corner. Whatever handlebar you prefer should be positioned as you prefer it when going down a straightaway before you begin your toe-out adjustment.

Use a rubber cord stretched between the ski tips to keep constant pressure on the steering system while measuring toe-out. Measure the distance between the inner edges of the skis as far back and as far forward on the skis as possible. Avoid measuring at a point at the top or heel of the ski where the ski is tapered. With aggressive race carbide, the measurements should be taken at the front and back of the runners on the cutting edge for the most precise measurement.

Skis must have a toe-out of 3 to 6 mm (1/8 to 1/4 in) when they are in the straight ahead position.

Adjustment is performed by loosening the lock nuts on the ball joints at the ends of the left and right tie rods. Rotate tie rods as necessary to achieve the proper toe-out and handlebar position. Do not use the short tie rod that runs beneath the engine to adjust ski toe-out.

Never lengthen a tie rod so that the threaded portion of the ball joint extends over 17 mm (11/16 in) beyond the tie rod. To avoid this, distribute the adjustment requirements equally to both left and right tie rods.

Retorque ball joint lock nuts to 29 N•m (21 lbf•ft) when toe-out is correct.

With the aggressive setup of the front end necessary for competitive oval racing, it is important to keep all the steering system components tight and free of play. Worn ball joints and bushings should be replaced, bolts holding the skis to the ski leg must be tight and wear bars must be straight and bolted securely to the skis. Any play in the steering will result in severe chattering in the corners and darting on the straightaways.

CHASSIS TUNING GUIDELINES

How to Deal with Handling Problems

There is usually never one adjustment that will correct a certain handling quirk. You will usually end up with several changes in setup to achieve the same goal. There are certain basics to keep in mind, however, when you are working with your sled:

– Handling problems encountered when entering a corner are usually corrected by working with front end adjustments.
– Handling problems encountered when exiting a corner are usually corrected by working with rear suspension adjustments.
– Basic handling problems are often traced to improper suspension adjustments.

Guide to Handling Problems

NOTE: PUSHING refers to the front of a vehicle not steering as much as the driver wants. The skis are not grabbing the surface with sufficient force. LOOSE refers to the rear of a vehicle sliding outward in a turn. The track is not grabbing the surface with sufficient force.

NOTE: Center spring/shock refers to the front arm of the rear suspension.

1. Problems encountered when entering a corner.
   a. Front end pushes coming into a corner (steering is not precise).
      – Sharpen carbide runners.
      – Add more carbide.
      – Shorten limiter strap on center arm.
      – Increase negative camber of ski legs.
      – Increase ski spring preload.
      – Decrease center spring preload.
   b. Rear of machine starts to come around or is loose when entering a corner.
      – Lengthen limiter strap on center arm.
      – Decrease ski spring preload.
      – Decrease negative camber of ski legs.
      – Increase center spring preload.
      – Sharpen/add track studs.
   c. Inside ski lifts.
      – Reduce the amount of negative camber on the ski legs.
      – Check for free operation of stabilizer bar.
      – Decrease preload of ski springs.
      – Shorten limiter strap on center arm.
2. Problems encountered while going around or exiting a corner.
   a. Front end pushes coming out of corner (steering is not precise).
      – Shorten limiter strap on center arm.
      – Decrease center spring preload.
      – Check condition of carbides.
      – Add more carbide.
      – Increase negative camber of ski legs.
      – Increase ski spring preload.
      – Increase rear spring preload.
      – Tighten A.C.M.
      – Increase rear to front coupling.
   b. Rear of machine starts to come around or is loose when exiting a corner.
      – Lengthen limiter strap on center arm.
      – Decrease ski spring preload.
      – Increase center spring preload.
      – Decrease negative camber of ski legs.
      – Decrease rear spring preload.
      – Loosen A.C.M.
      – Decrease rear to front coupling.
   c. Left ski lifts.
      – Shorten limiter strap on center arm.
      – Decrease center spring preload.
      – Check for free operation of stabilizer bar.
      – Increase stabilizer bar diameter or shorten end levers.
3. General handling problems.
   a. Machine darts from side to side on straightaway.
      – Check ski toe-out.
      – Check for loose ball joints in steering.
      – Too much negative ski leg camber.
   b. Excess effort required to turn handlebars.
      – Check steering linkages for binding and/or corrosion.
      – Rubber blocks between skis and ski legs have too much preload at the rear (causing rear of skis to be pushed down too much).
      – Lengthen limiter strap on center arm.
      – Increase center spring preload.
      – Decrease ski spring preload.
      – Too much carbide on ski runners.
4. Adjusting the suspension for ride and comfort.

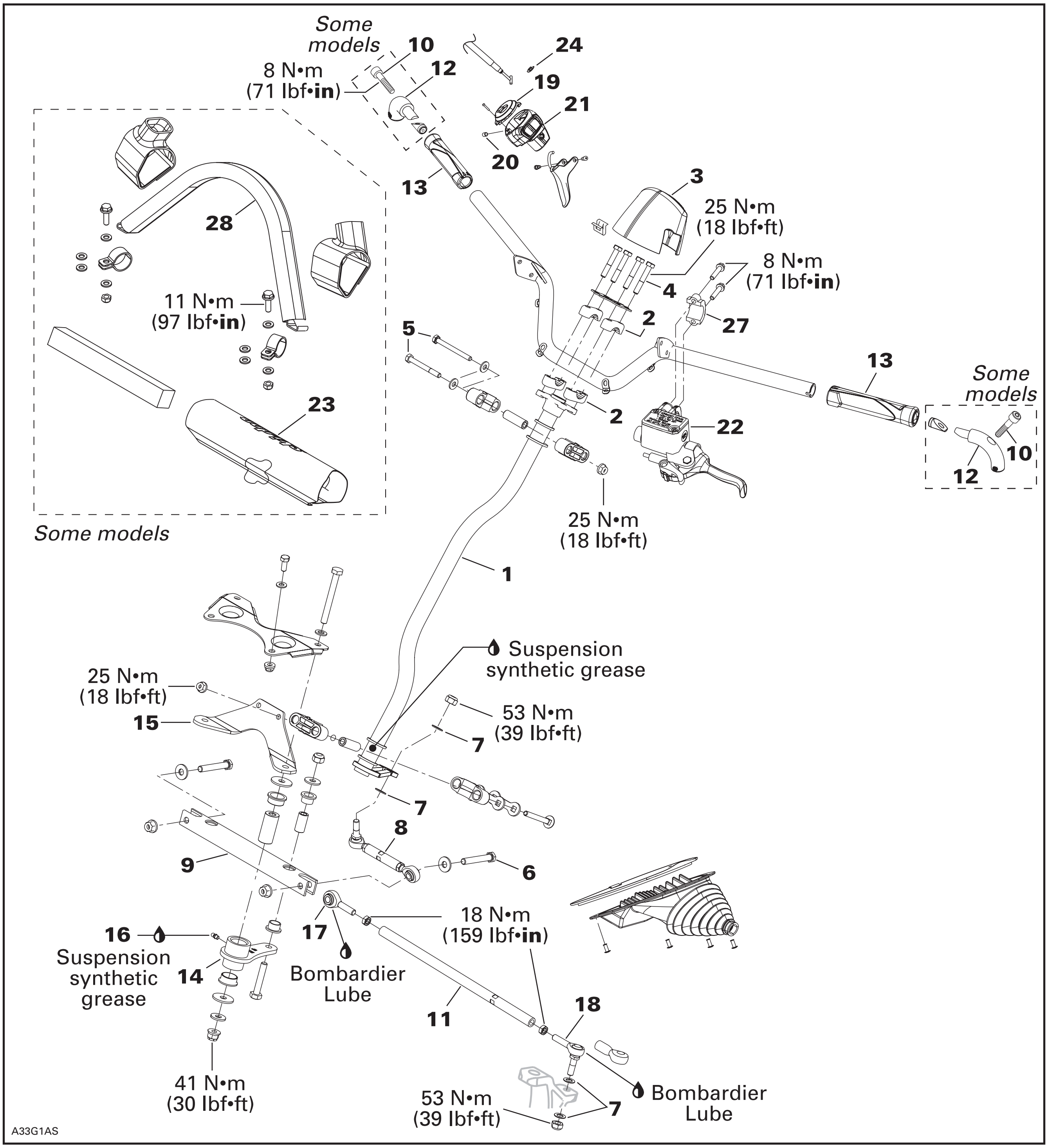
a. The rear springs of the rear suspension should be adjusted as follows:
   - Fully extend the rear suspension.
   - Measure from the floor to the bottom of the rear grab handle (remember this dimension).
   - Load the vehicle as it will be used (1 or 2 people, saddlebags full of equipment, etc.).
   - Again, measure from the floor to the bottom of the rear grab handle. This dimension should be 25 mm to 50 mm (1 in to 2 in) less than the fully extended dimension.
   - If the vehicle settles more than 50 mm (2 in), increase the rear spring preload.
   - If the vehicle settles less than 25 mm (1 in), decrease the rear spring preload.
   - This is a preliminary setting only! Increase and decrease the preload adjustments to fine tune for your preference.
   - The center spring and ski springs will have the most affect on handling, but if the preload is too stiff, it will produce a harsh ride.

General Tips

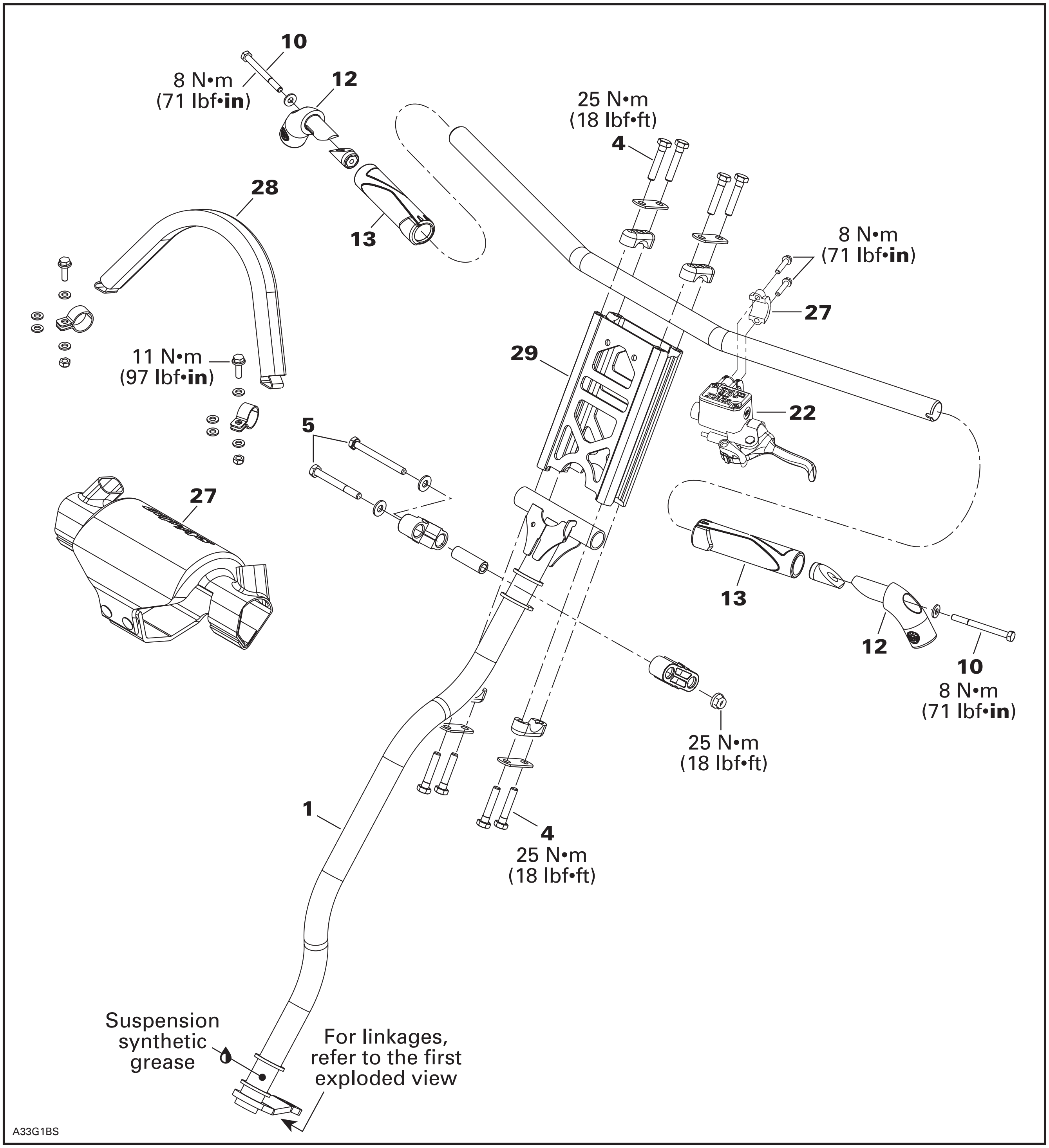
If the spring and preload combination you are using exerts the right amount of pressure at full compression but has too much force at initial compression, try a shorter, stiffer spring. The shorter spring will not be preloaded as much and will “act” softer during initial compression, but will get stiffer as the suspension compresses. Conversely, if a setup is good at initial compression but too stiff at full compression, then a softer spring would be used. The following chart can be used to determine how much force a spring and preload combination will exert during compression.

STEERING SYSTEM

GSX Series, Summit Adrenaline/Sport/Highmark



MX Z 500 SS/600 HO/800 HO, Summit X/Highmark X/Highmark Xtreme



DISASSEMBLY AND ASSEMBLY

Grip

NOTE: These models feature an integrated heating element in the plastic sleeve of the grip **no. 13**.

CAUTION: Removing grip from handlebar might damage the heating element. Do not remove needlessly.

NOTE: If heating grip does not work and needs to be replaced, the grip can be cut with a knife for removal.

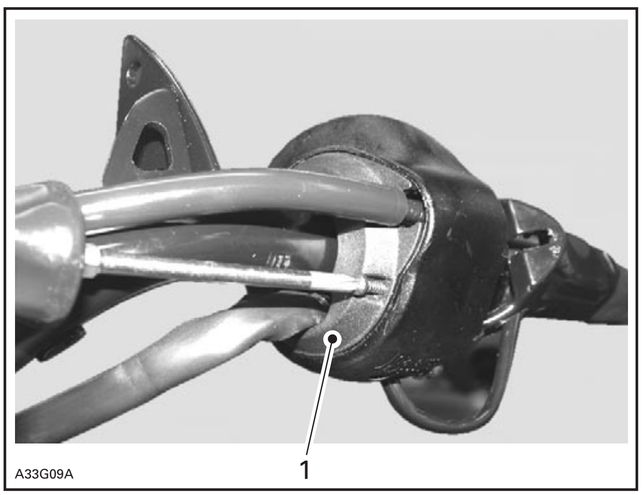
Throttle Side:

Unfasten windshield.

NOTE: Throttle lever housing **no. 21** must come off handlebar along with grip.

Remove cap **no. 3** or steering padding **no. 23** according to model. Unplug RH harness on top of steering column. Cut locking ties retaining RH harness to handlebar.

Remove throttle lever housing cover **no. 19**.



1. Throttle lever housing cover

Remove circlip **no. 24** from throttle cable housing. Unfasten throttle cable from throttle lever, then pull out throttle cable housing from throttle lever housing **no. 21**.

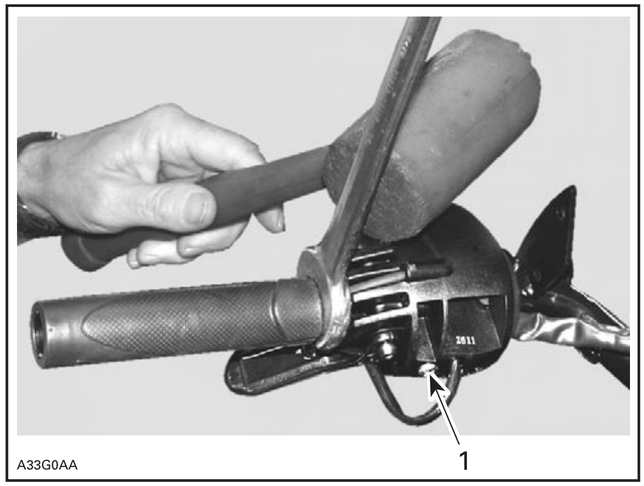
Unscrew screws **no. 10** and remove J-hook **no. 12** from end of grip on so equipped models.

Loosen screw **no. 20** retaining throttle lever housing to handlebar. See photo below.

Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

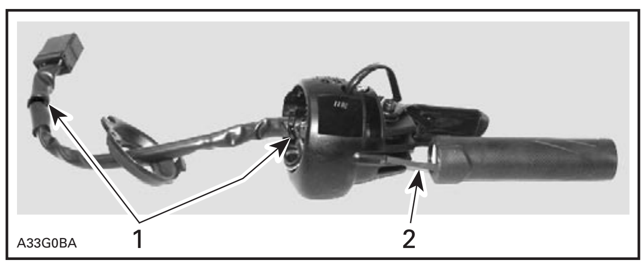
CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip slide out.



1. Screw retaining throttle lever housing

Cut locking ties on harness. Using the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the heating grip harness out of connector housing. Note the position of the wires for reinstallation.



1. Locking ties
2. Heating grip harness

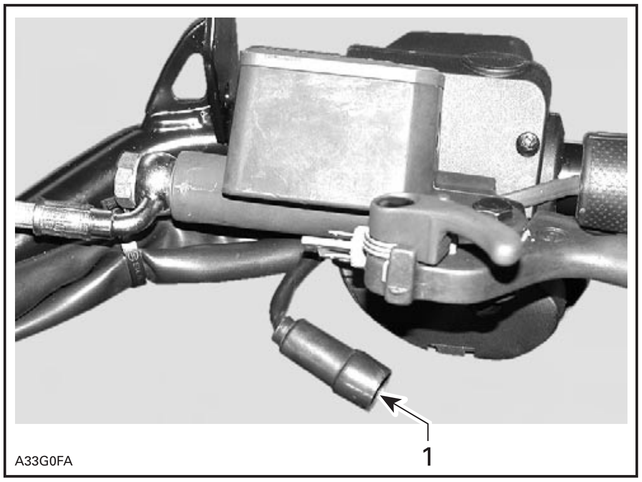
Pull heating grip harness out of throttle lever housing.

For installation refer to grip installation below.

Brake Side:

Unclip windshield.

Unplug connectors from brake light switch located on master cylinder **no. 22**.



1. Connectors unplugged

Unplug LH harness on top of steering column. Cut locking ties retaining brake light switch/heating grip harness to handlebar.

Using the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the heating grip harness out of connector housing. Note the position of the wires for reinstallation.

Pull heating grip wires out of brake light switch/heating grip harness.

Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip sliding out.

Grip Installation:

Installation is the opposite procedure of the removal but pay attention to the following.

Clean handlebar ends and inside of heating grip with isopropyl alcohol. Let dry before installation.

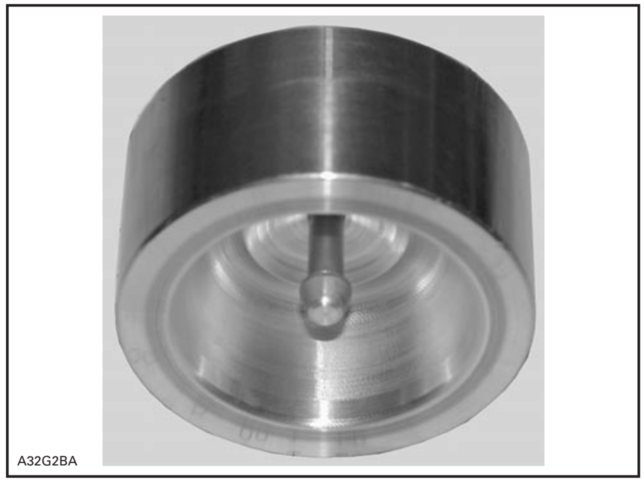
⚠ WARNING

Handlebar end and inside of heating grip must be clean and dry before installing heating grip to ensure proper adhesion.

Position grip on handlebar with its harness aligned with windshield bracket. See next photo.

Use the appropriate insertion tool to properly install grip.

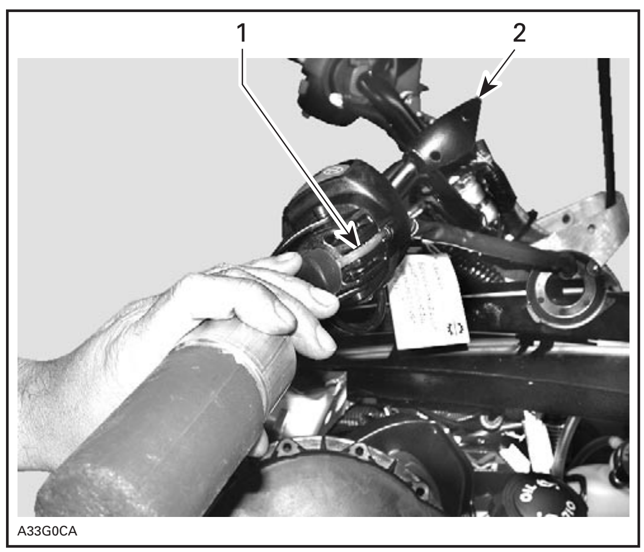
MODEL	TOOL PART NUMBER
Models with straight grips	529 035 897
Models with J-hooks	529 035 936



CAUTION: Installing grip without the insertion tool is likely to damage its heating element.

Position the insertion tool at the outside end of grip.

Using a plastic hammer, tap on tool to push grip on. Continue to tap until grip bottoms.



1. Harness
2. Windshield bracket

Properly route harness then reinstall removed parts.

Reinstall terminals and replug connectors. Test grips to ensure they heat properly.

Steering Column

Unfasten windshield. Remove cap **no. 3** or steering padding **no. 23** according to model.

Remove console. Refer to STEERING COLUMN POSITION ADJUSTMENT below.

Cut locking ties retaining harnesses to steering column **no. 1**.

Unbolt handlebar ass'y and move it aside.

Remove tuned pipe.

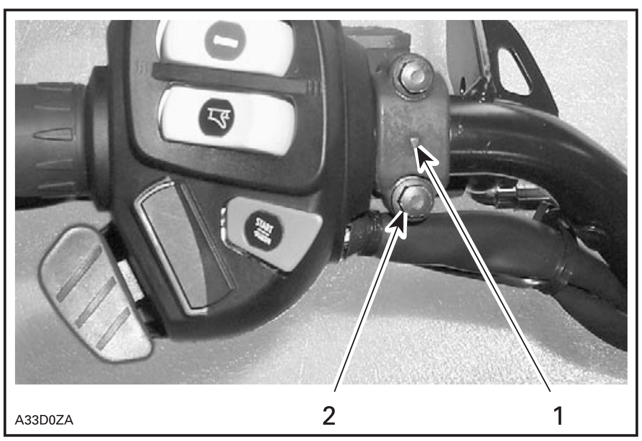
Detach the short tie rod **no. 8** from the steering column. Note that a hardened flat washer **no. 7** goes on each side of steering column lever.

Disengage carriage bolts **no. 6** from steering column support **no. 15**. Remove lower plastic U-clamps from steering column.

Disengage carriage bolts **no. 5** from steering support. Remove upper plastic U-clamps from steering column.

Pull steering column from top.

If, for any reason, the master cylinder has been removed from handlebar note that its clamp **no. 27** must be installed with the embossed arrow pointing downward. Torque screws to 8 N•m (71 lbf•**in**) beginning with the bottom screw.



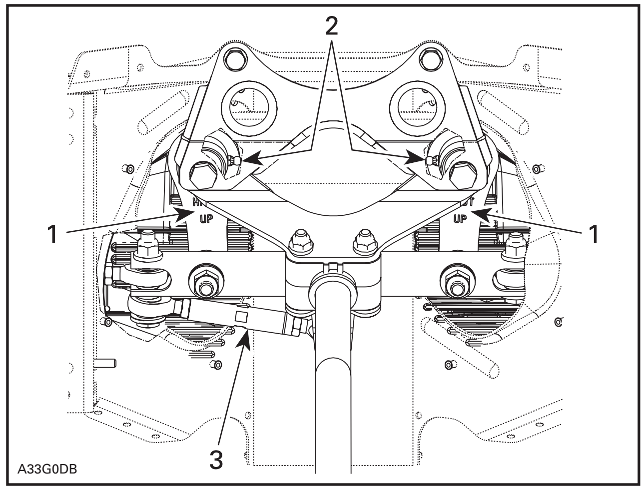
1. Arrow on clamp pointing downward
2. Tighten bottom screw first

Refer to HANDLEBAR POSITION ADJUSTMENT for handlebar reinstallation.

RH and LH Swivel Arm

At assembly respect UP mention.

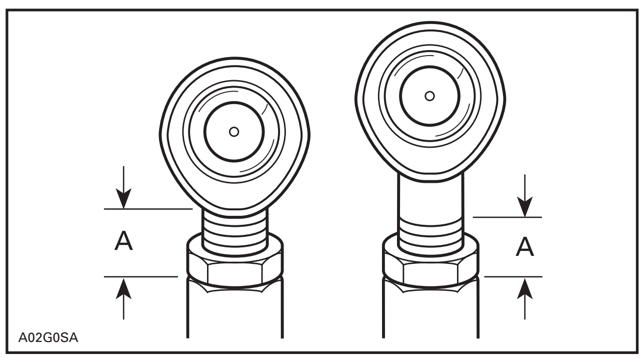
Grease fitting **no. 16** of swivel arms **no. 14** must face toward center of vehicle.



1. UP mention
2. Grease fittings
3. Small tie rod

Ball Joint (left hand and right hand threads)

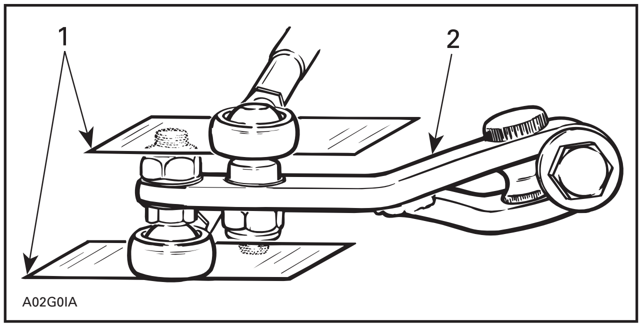
The maximum external threaded length not engaged in the tie rod must not exceed 20 mm (25/32 in).



TYPICAL
A. 20 mm (25/32 in) max.

The ball joint **no. 17** and **no. 18** should be restrained when tightening the tie rod end lock nut. Align it so the tie rod end is parallel to the steering arm when assembled on the vehicle, refer to the following illustration.

For proper torque specifications refer to the specific exploded view for the vehicle being serviced.



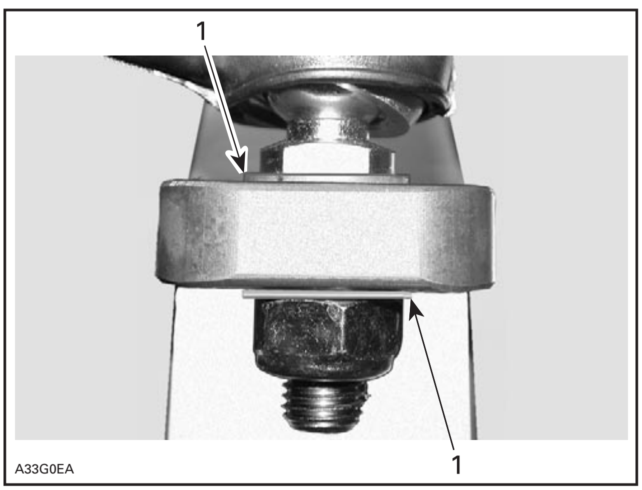
TYPICAL
1. Parallel with steering arm
2. Steering arm

⚠ WARNING

The cut off section of the ball joint must run parallel with the swivel bar no. 9. When tightening lock nuts, restrain ball joint with appropriate size wrench. The maximum external threaded length not engaged in the tie rod must not exceed 20 mm (25/32 in).

Hardened Washer

Install a hardened washer **no. 7** on each side of the ski leg and each side of the steering column lever.



TYPICAL
1. Hardened washers

INSPECTION

Check skis and runners for wear. Replace as necessary. Refer to FRONT SUSPENSION.

Check the general condition of the steering system components for wear. Replace if necessary.

Heating Grip Element

Refer to TESTING PROCEDURE for checking heating element **no. 13** of grip.

Ball Joint (left hand and right hand threads)

Inspect ball joint ends **no. 17** and **no. 18** and small tie rod ends for wear or looseness, if excessive, replace them.

ADJUSTMENT

Steering Column Position Adjustment

Some Models

⚠ WARNING

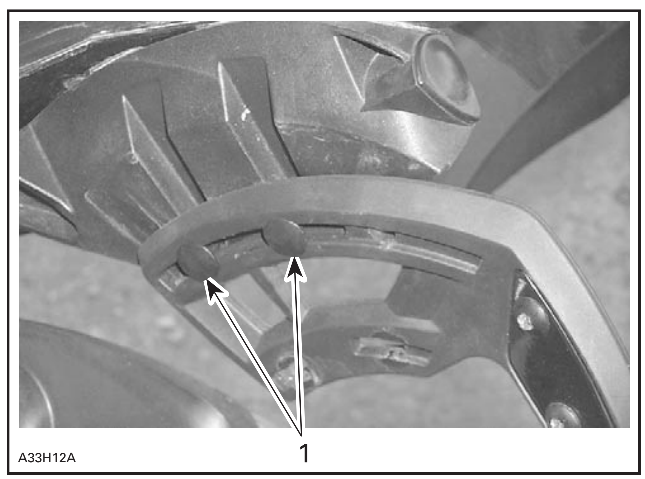
Do not drill additional holes to customize steering column position.

Steering column position is adjustable. Proceed as follows.

There are 2 positions.

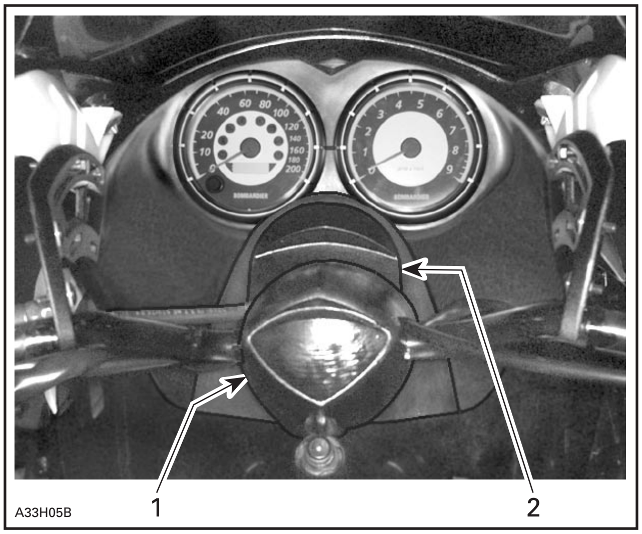
NOTE: Following procedure describes how to change steering column position from rearward to forward position.

Unscrew 4 bolts retaining windshield assembly to handlebar. Remove windshield assembly.



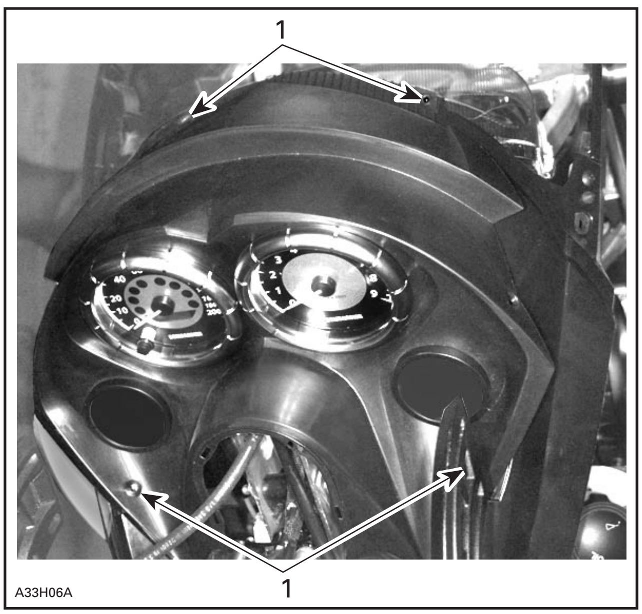
ONE SIDE SHOWN — REARWARD POSITION
1. Bolts retaining windshield assembly

Remove cap **no. 3** or steering padding **no. 23** according to model and remove console cap.



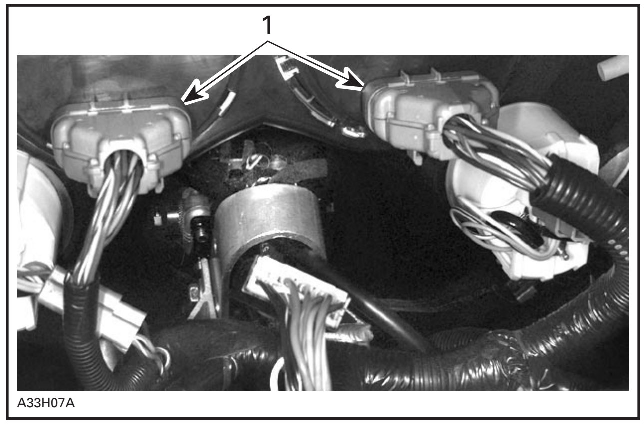
1. Cap
2. Console cap

Unscrew 4 bolts retaining console.



1. Bolts retaining console

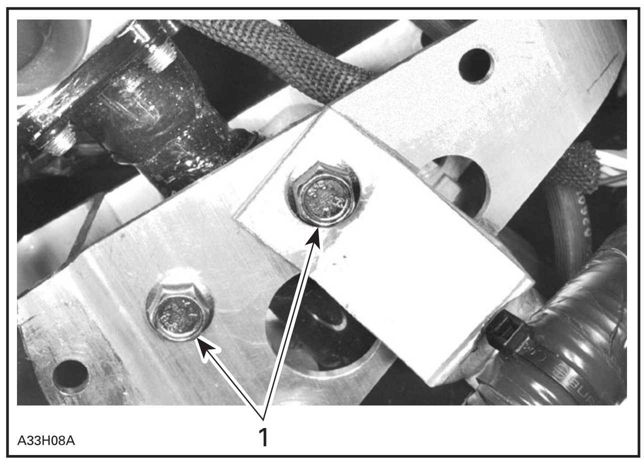
Slightly lift console to gain access to electrical connector housings. Unplug the 2 large connector housings and then separate 3-wire connector.



TYPICAL
1. Large connector housings

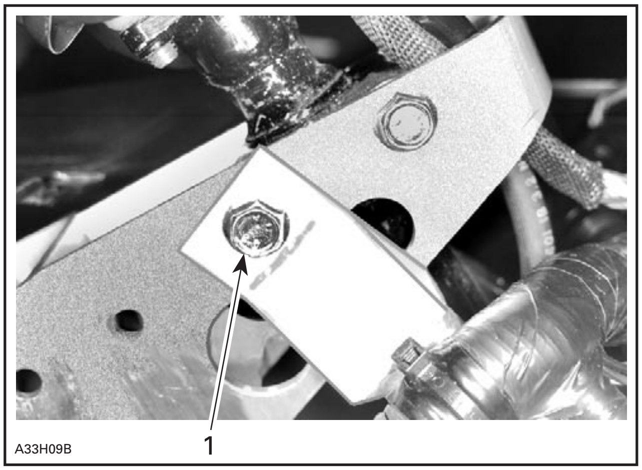
Remove console.

Remove 2 bolts **no. 5** retaining top of steering column.



STEERING COLUMN IN REARWARD POSITION
1. Two bolts retaining top of steering column

Move steering column to forward position.

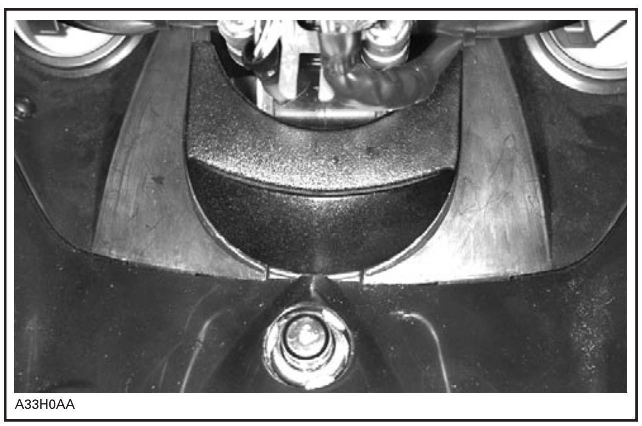


STEERING COLUMN IN FORWARD POSITION
1. Longer bolt

Reinstall the 2 bolts **no. 5**. Always install the longer bolt on thicker portion to be bolted. Use new lock nuts. Torque nuts to 25 N•m (18 lbf•ft).

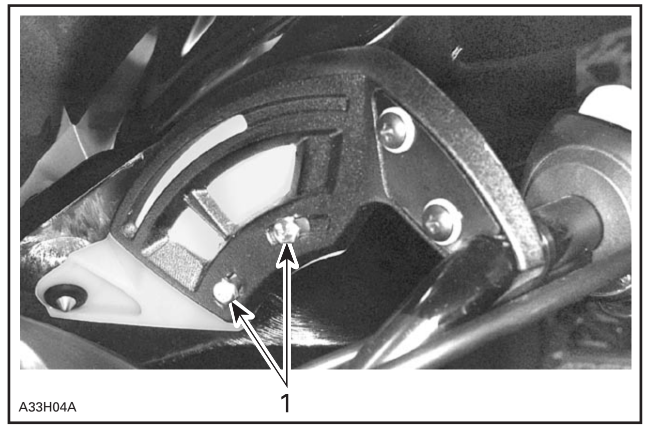
Reconnect the electrical connectors and reinstall all removed parts.

Position of console cap will be inverted. Instead of being above it will be beneath steering column.



CONSOLE CAP INSTALLED BENEATH STEERING COLUMN

Reinstall windshield assembly to handlebar. Refer to WINDSHIELD ADJUSTMENT below.



ONE SIDE SHOWN — FORWARD POSITION
1. Bolts retaining windshield assembly

Readjust throttle lever housing **no. 21** and switch housing accordingly to optimal angle so that you will not need to release your grip to operate levers.

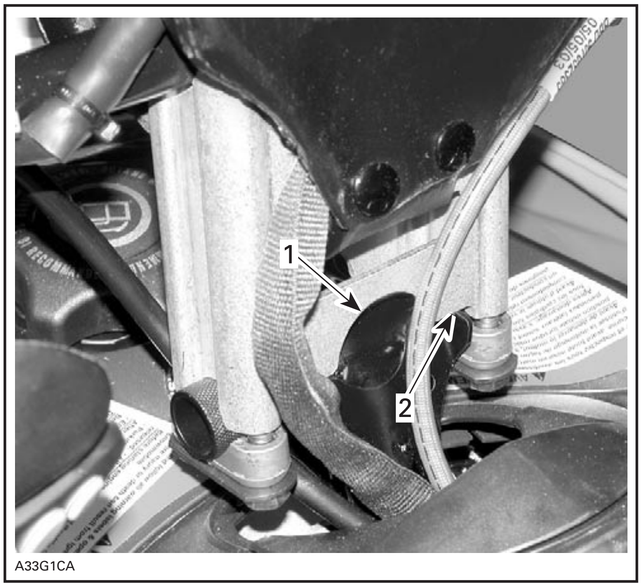
⚠ WARNING

Adjust with vehicle at rest in a safe place. Securely retighten all fasteners. Never rotate throttle lever to operate with fingers instead of thumb.

Handlebar Extension

Some Models

When installing handlebar extension **no. 29**, ensure to position the rounded opening at the bottom and to tilt the extension so that it rests against steering support stopper.

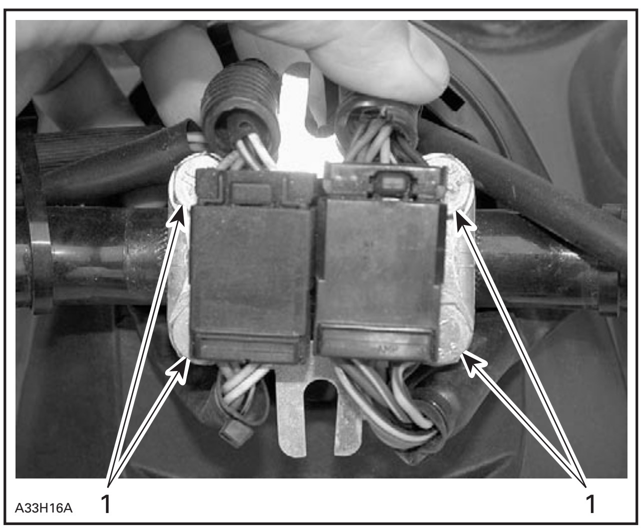


1. *Opening here*
2. *Extension against stopper*

Handlebar Position Adjustment

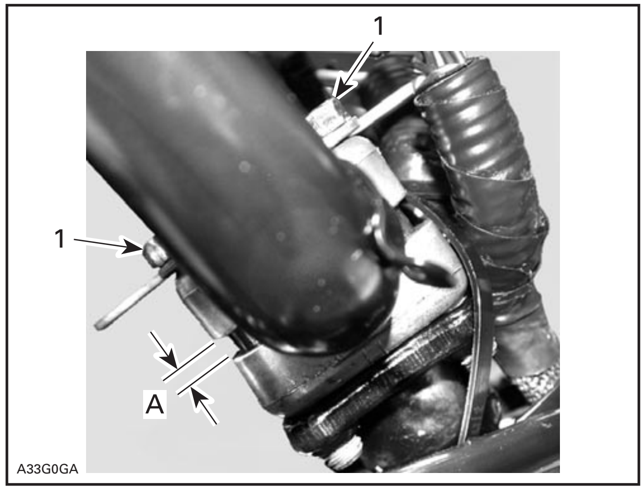
The handlebar position can be adjusted to suit driver's preferences.

Loosen all 4 bolts **no. 4** retaining handlebar to steering column.



1. *Four bolts*

Move handlebar to the desired position. Torque all 4 bolts **no. 4** to 25 N•m (18 lbf•ft).



1. *Torque to 25 N•m (18 lbf•ft)*
A. *Equal gap all around*

CAUTION: **Tighten the bolts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps no. 2.**

⚠ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

Readjust throttle lever housing **no. 21** and switch housing accordingly to optimal angle so that you will not need to release your grip to operate levers.

⚠ WARNING

Adjust with vehicle at rest in a safe place. Securely retighten all fasteners. Never rotate throttle lever to operate with fingers instead of thumb.

Readjust windshield for proper fit with console. Refer to WINDSHIELD ADJUSTMENT below.

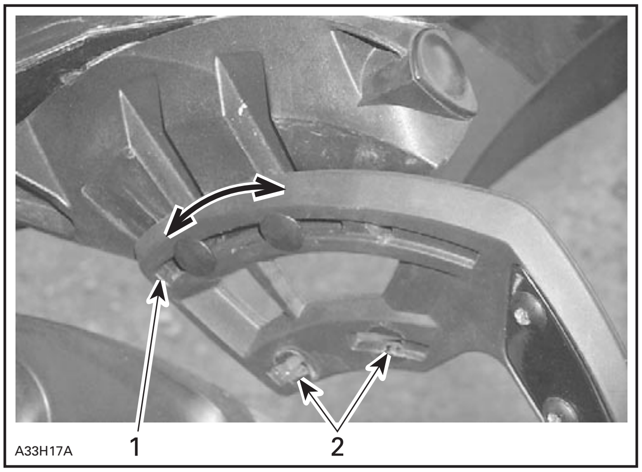
Windshield Adjustment

The windshield can be adjusted to properly fit with console.

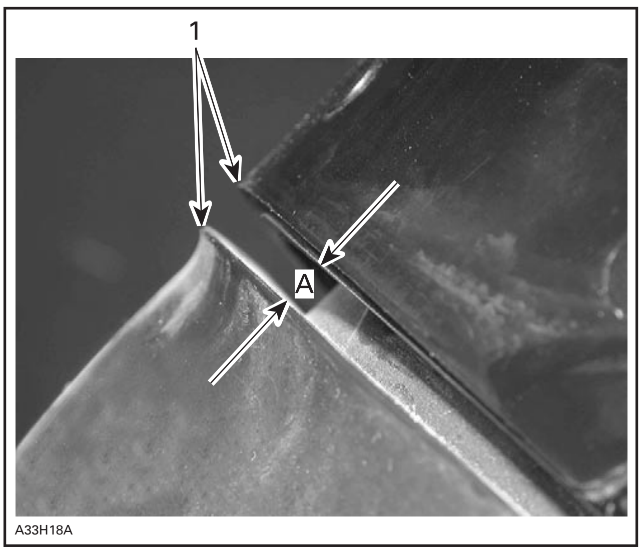
Before adjusting windshield, make sure it is installed on the proper bracket slots according to steering column position. See photos below.

Slots in brackets allow different windshield positions. Move windshield to fit with console. Retighten 4 nuts to 5 N•m (44 lbf•**in**).

Check that windshield does not touch console after adjustment.



1. Slot when windshield is installed in rearward steering column position
2. Slots when windshield is installed in forward steering column position



PROPER FIT OF WINDSHIELD VERSUS CONSOLE
1. In line
A. 8 to 12 mm (3/8 to 1/2 in)

Handlebar Strap

Some Models

Ensure to position strap **no. 28** symmetrically each side of steering support and so that its rubber band is on the inner side. Tilt strap 5° towards driver relative to steering column axis or relative to handlebar extension on so equipped models.

On Renegade X and Summit Series, position strap between rubber band and screw end to protect the rubber band.

Retaining clip and hardware must be installed in the same position on both strap ends.

J-Hook Adjustment

Some Models

Position J-hook so that its curved end is pointing downward and is roughly vertical. Ensure to adjust J-hooks at the same position each side.

Hand Guard Adjustment

Some Models

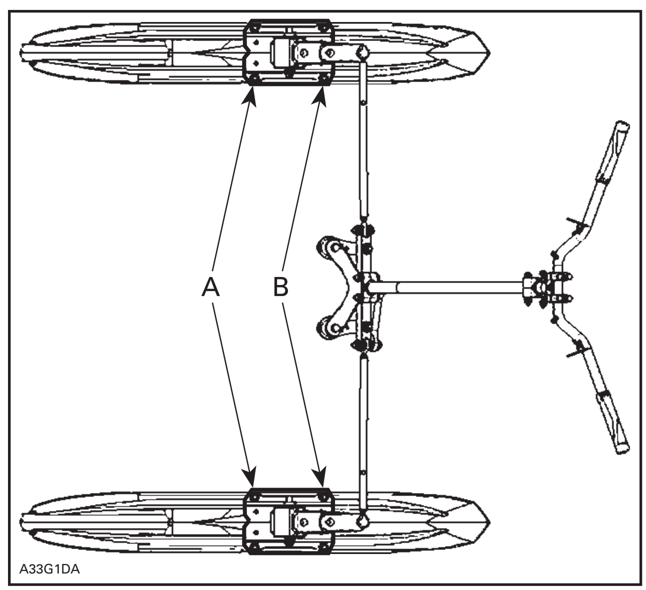
Position RH guard 8 mm (5/16 in) from throttle housing and LH guard 4 mm (5/32 in) from brake retaining clamp. Position hand guards so that their inner face is roughly vertical. Torque top screw first to 3.5 N•m (31 lbf•**in**) then torque bottom screw.

STEERING ADJUSTMENT (SKIS)

Definitions

TOE-OUT:

A difference measured between the front edge of the ski bridge «A» and rear edge of ski bridge «B» as viewed from the top.



Adjustments

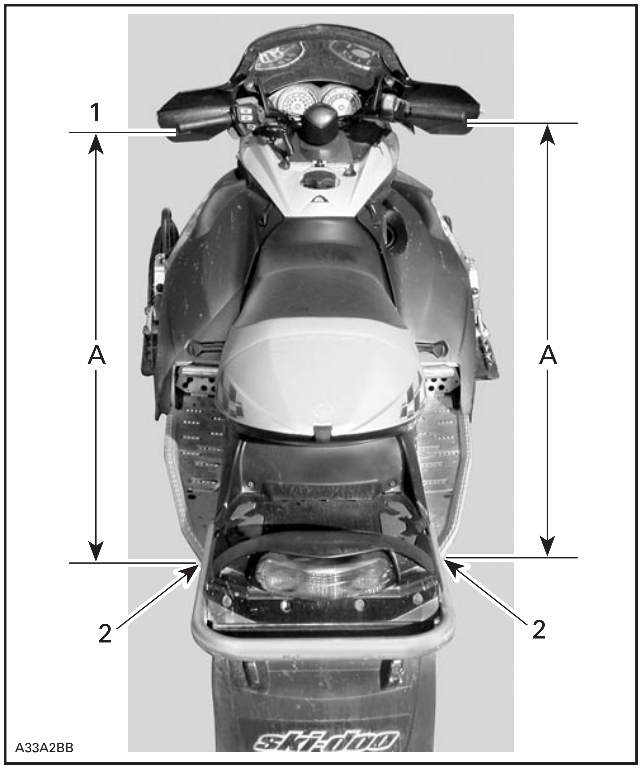
SKI ALIGNMENT AND TOE-OUT

Ski alignment and toe-out are performed by adjusting length of left and right tie rods **no. 11**.

Procedure:

– Position handlebar so that it is in straight ahead position by measuring from the extremities of the grips to the rear most edge of the tunnel, as shown.

NOTE: The reference point must be the same relative to each side.

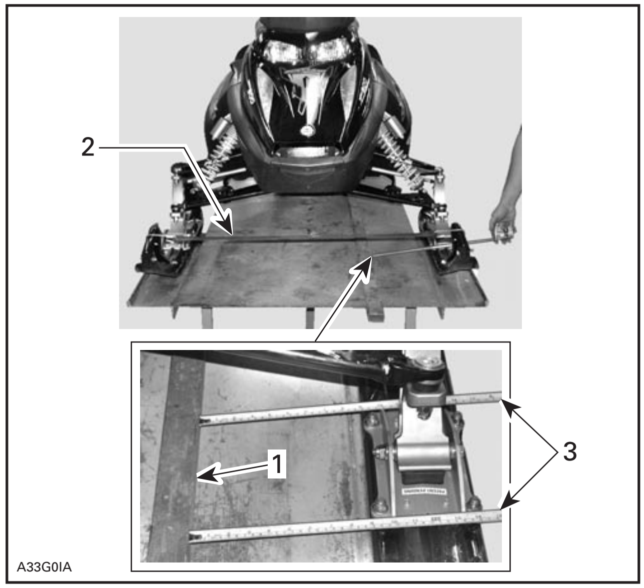


1. Equal distance «A» on each side
2. Same reference point

– Hook a rubber cord in front of skis to keep them closed and to take all slack from steering mechanism.
– Leave the vehicle on the ground on its own weight.
– Place a straight edge against pre-adjusted track and measure the distance between front and rear of ski bridge.

MODEL	TOTAL TOE-OUT ± 1 mm (± 3/64 in)
All REV Series	2 (5/64)

NOTE: To reduce tolerance when measuring, set one ski to proper toe-out (half the total toe-out) then measure from that ski to the opposite ski.



TYPICAL
1. Straight edge
2. Rubber cord
3. Measure at rear and front of ski bridge

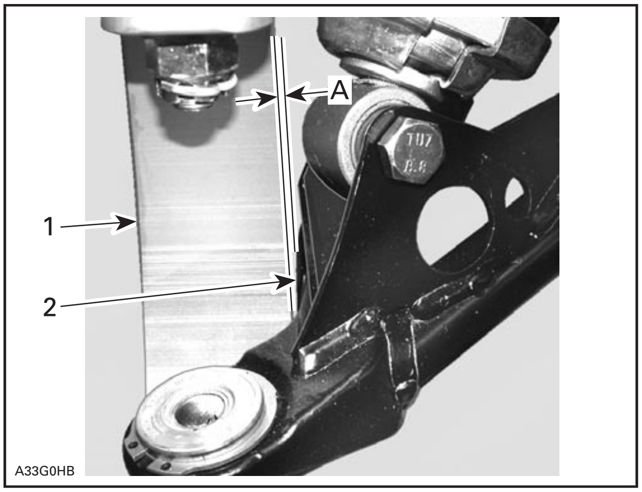
If adjustment is needed:

– Loosen jam nuts of both tie rods **no. 11**.
– Turn the tie rod to change its length.
– Retighten jam nuts.

⚠ WARNING

Never lengthen tie rod so that the external unengaged threaded portion of ball joint exceeds 20 mm (25/32 in).

Once ski alignment is done check that ski leg rests against lower arm or is not more than 2 mm (5/64 in) from lower arm when the handlebar is fully turned.



RIGHT HAND SIDE SHOWN
1. Ski leg
2. Lower arm
A. 2 mm (5/64 in)

If the distance is more than the specified distance on one side then check for bent parts.

LUBRICATION

⚠ WARNING

Do not lubricate throttle cable or housing.

Use suspension synthetic grease (P/N 293 550 033) on:

– Grease fitting **no. 16** of LH and RH swivel arms.
– Lower steering column bushing.

Use BOMBARDIER LUBE (P/N 293 600 016) on:

– Tie rod ball joints.

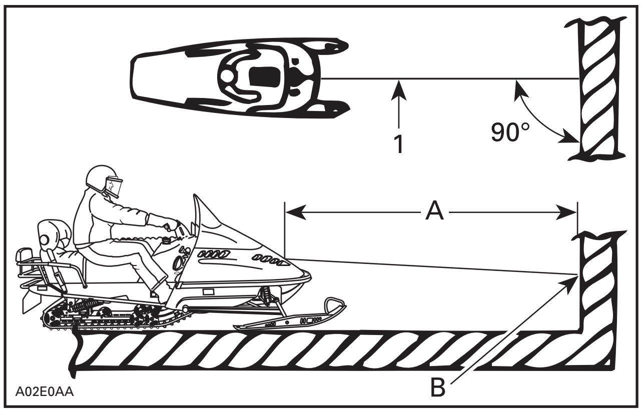
BODY

INSTALLATION AND ADJUSTMENT

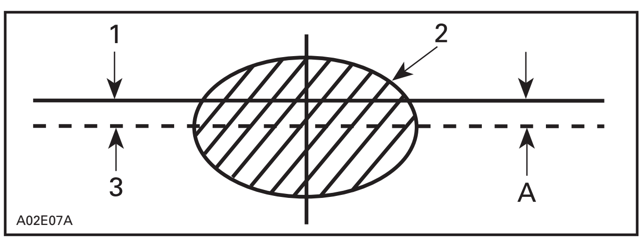
HEADLAMP BEAM AIMING

Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



TYPICAL
1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below center line



1. Headlamp horizontal
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

Select **high** beam.

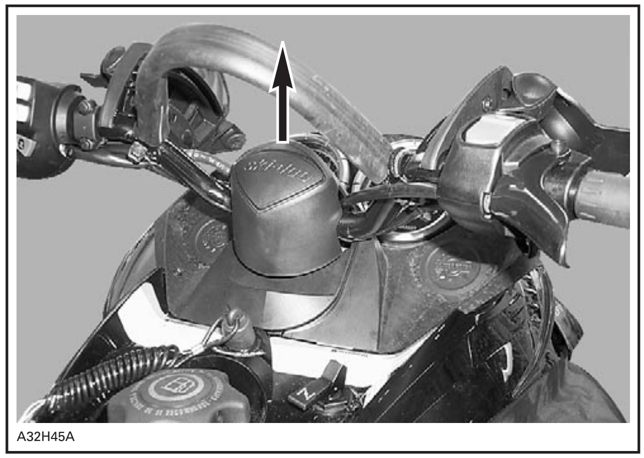
BULB REPLACEMENT

Headlamp

If any headlight bulb is burnt, proceed as follows.

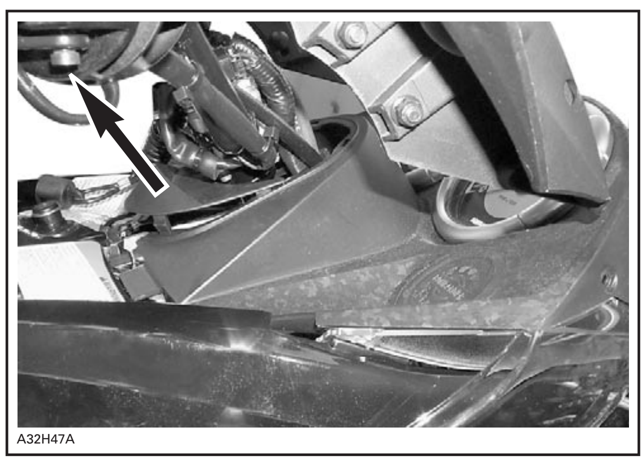
Remove windshield. See below.

Pull out steering support cap.

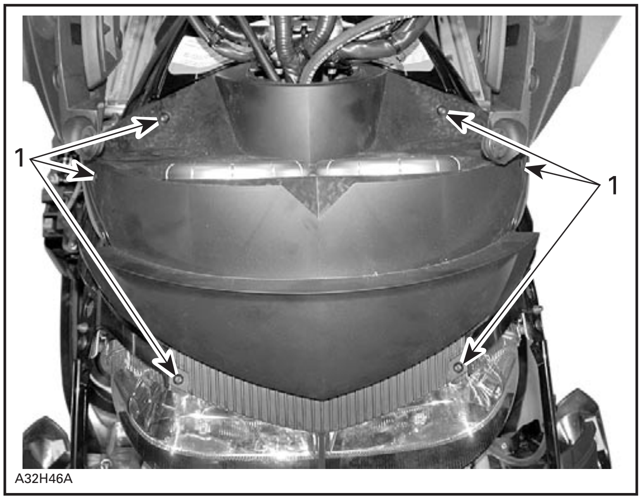


Lift hood.

Pull up front console end cap.



Remove retaining screws and slightly lift front console.



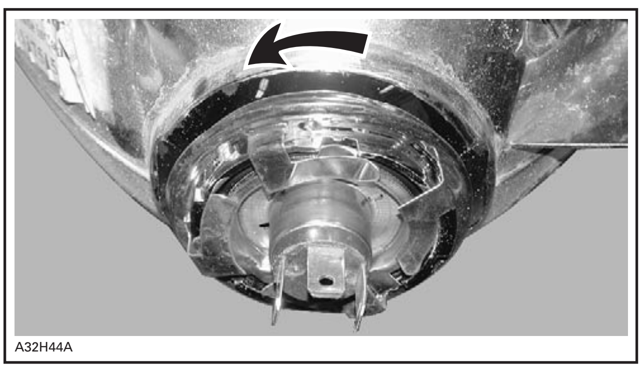
1. Remove screws

Unplug gauge connector(s).

Pull front console out.

Unplug burnt bulb connector. Remove the rubber boot.

Turn bulb retainer ring counterclockwise to unlock. Detach the bulb and replace.



CAUTION: Never touch glass portion of an halogen bulb with bare fingers, as it shortens its operating life. If by mistake glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb. After locking ring installation, ensure bulb is properly secured in place.

Properly reinstall removed parts.

Taillight

If the taillight bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the 2 retaining screws. Verify all lights after replacement.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

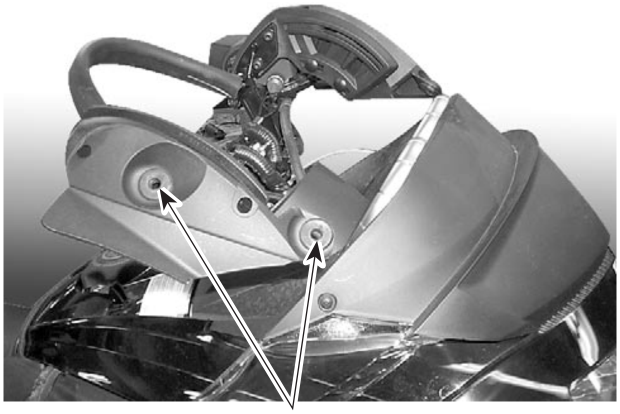
CAUTION: Do not apply isopropyl alcohol or solvent directly on decals. Use only in a well ventilated area.

WINDSHIELD

Pull windshield one side at a time as shown to remove it.

Remove protective film when installing a new windshield.

Apply liquid soap on grommets prior to installing windshield to ease pin insertion.



1. *Grommets*

Position the windshield on the windshield supports then push it down until the pins are fully inserted into the grommets.

GUARD

Disassembly and Assembly

NOTE: For additional information (ex.: exploded view) refer to the correspondent *Parts Catalog*.

⚠ WARNING

Engine should be running only with guard well secured in place.

Inspection

Check guard mounting bosses, clips and retainers for wear.

WIRING HARNESS

⚠ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

⚠ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating or vibrating parts.

TUBING

⚠ WARNING

Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

PLASTIC MAINTENANCE AND REPAIR

MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

CAUTION: Do not apply isopropyl alcohol or acetone directly on decals.

CAUTION: The following products must not be used to clean or wax any of the plastic components used on the vehicles:

– gasoline
– brake fluid
– kerosene
– diesel fuel
– lighter fluid
– varsol
– naphtha
– acetone

- strong detergents
- abrasive cleaners
- waxes containing an abrasive or a cleaning agent in their formula.

Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

CAUTION: If for some reason the snowmobile has to be stored outside, it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

REPAIR

The very first step before repairing plastic materials is to find out exactly which type of material is involved.

CAUTION: Some repair products are not compatible with certain plastics.

⚠ WARNING
Polycarbonate windshields must never be repaired by welding or otherwise.

For hood repair, refer to a specialized shop.

The following company provides a complete line of products to repair plastic materials:

CREST INDUSTRIES, INC.Trenton, MI 48183	Phone: 734-479-4141 Toll Free: 1-800-822-4100 Fax: 1-800-344-4461 Fax: 734-479-4040 E-Mail: info@crestauto.com www.crestauto.com

FRAME

FRAME CLEANING

NOTE: For bare aluminum frames use only aluminum cleaner and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

CAUTION: Never direct high-pressure water jet towards decals. They will peel off.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat Cleaning

For all models, it is recommend to clean the seat with a solution of warm soapy water, using a soft clean cloth.

CAUTION: Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc., that may cause damage to the seat cover.

FRAME WELDING

Aluminum Frame

– No welds should be done on aluminum frame except if mentioned or required on a Bombardier bulletin.
– Use ER-5356 rods for MIG or TIG welding.

CAUTION: Before performing electrical welding anywhere on the vehicle, unplug MPEM. On models equipped with a battery, also unplug the negative cable. This will protect the electronic box and battery against damage caused by flowing current when welding.

A32E0WB

TYPICAL — MPEM UNPLUGGED

CAUTION: If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

FRAME COMPONENT REPLACEMENT

Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 031 800), available in a 5 mm (3/16 in) size and shipped in packs of 2.

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

Partially drill rivet end — not the rivet head.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 803 300) as a cutting oil.

CAUTION: High speed drilling will cause excessive heat which may destroy the cutting edge of the bit; therefore, avoid using pneumatic drills.

A03H2FA

TYPICAL

Cut rivet using a chisel.

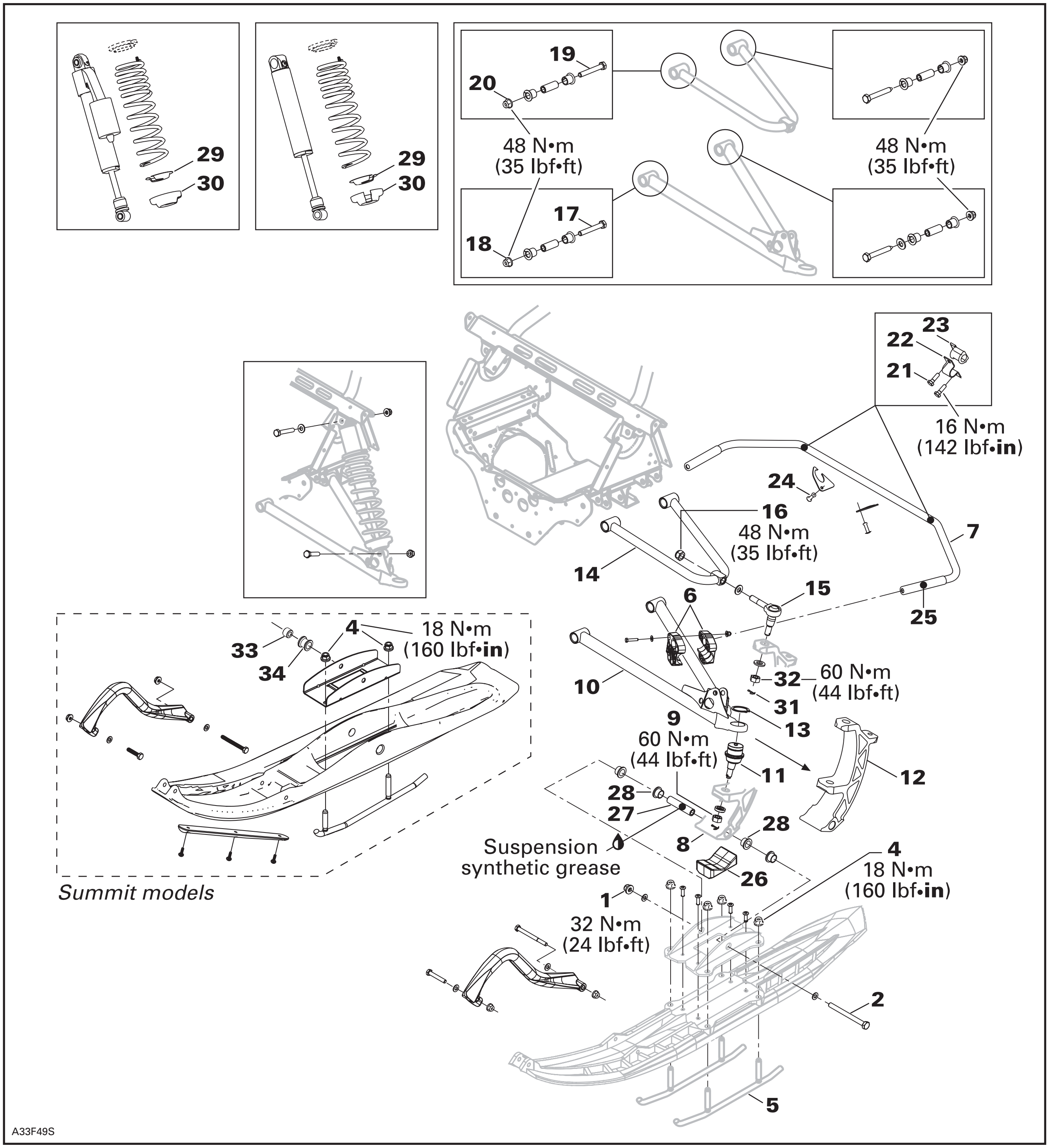
Remove riveted part.

Drive out remaining rivet head using a punch.

TABLE OF CONTENTS

FRONT SUSPENSION

REV Series



NOTE: The same procedure applies on both sides.

GENERAL INSPECTION

Check for looseness, bent, worn out, rusted or other damage on components. Ensure cotter pins are in good condition and properly secured. Replace the faulty component.

To check upper arm bushings and ball joint:

– Let vehicle weight compress the suspension.
– Firmly grab upper part of ski leg and try to move sideways to feel the free-play.
– If excessive play is felt, replace the faulty component.

To check lower arm bushings and ball joint:

– Raise front of vehicle off the ground from the frame to release the suspension.
– Firmly grab lower part of ski leg and try to move sideways to feel the free-play.
– If excessive play is felt, replace the faulty component.

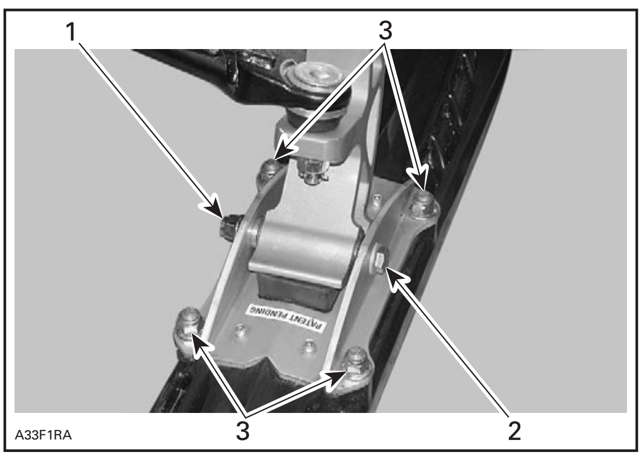
DISASSEMBLY

Ski

Lift front of vehicle and support it off the ground.

Unscrew nut **no. 1** then pull screw **no. 2** out. Remove ski **no. 3**.

Unscrew nuts **no. 4** and remove ski runners **no. 5**.

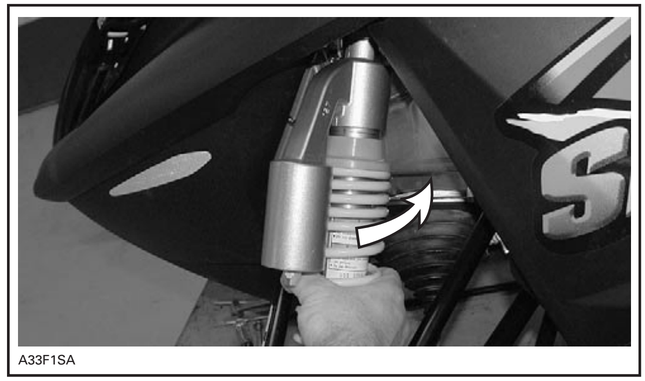


1. Unscrew nut
2. Remove screw
3. Ski runner nuts

Shock Absorber

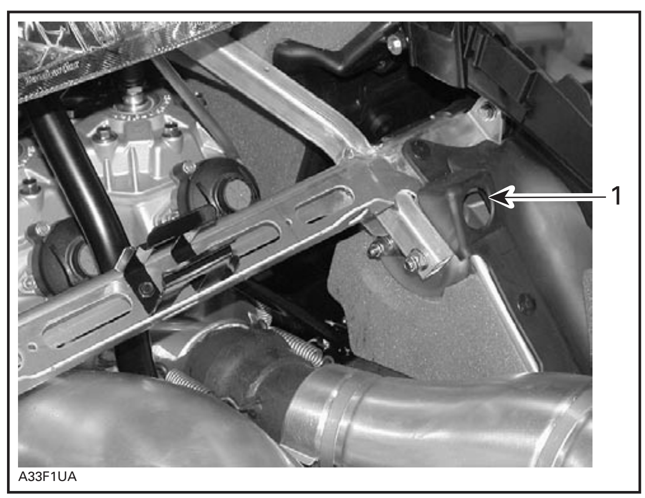
Open hood and remove side panels.

Reduce spring preload by turning adjusting ring towards position 1 and continue until it stops.



Remove lower screw then upper screw of shock absorber.

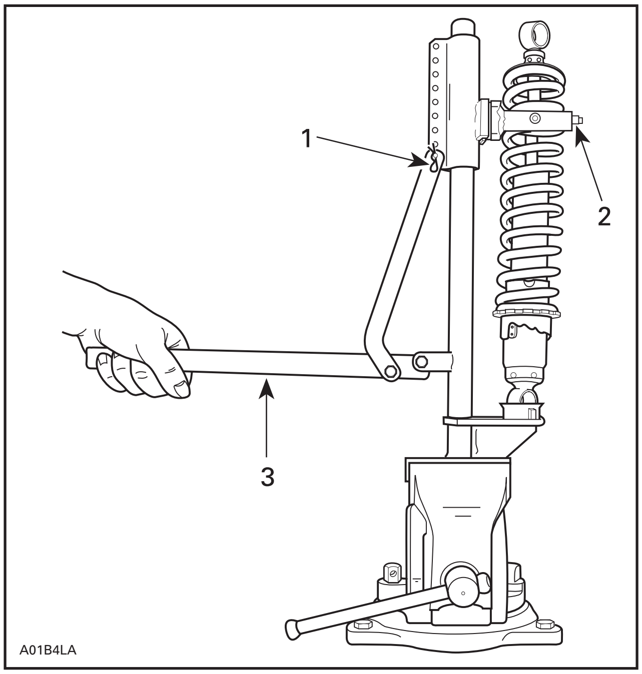
NOTE: To retain upper screw while unscrewing nut, remove access plug in engine compartment.



1. Access hole to reach upper screw

For shock absorber spring disassembly use shock absorber spring remover (P/N 529 035 504) in a vise. Mount shock absorber in it and turn shock absorber so that spring coils match spring compressor.

Close and lock the bar. Adjust the handle at horizontal position by changing the position of the clevis pin.

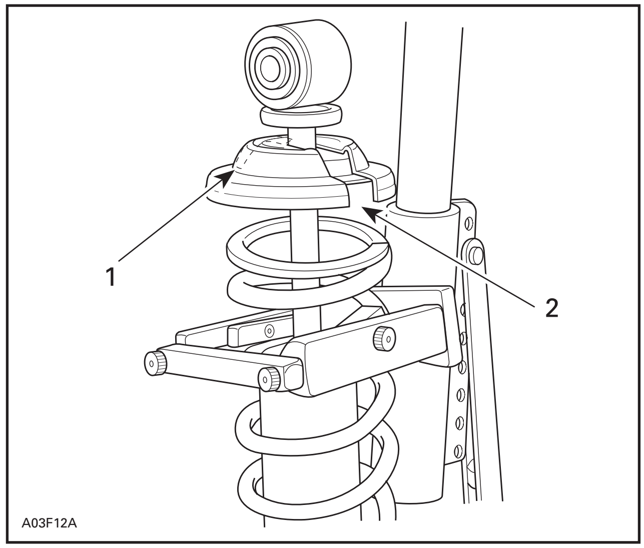


TYPICAL
1. *Clevis pin*
2. *Bar*
3. *Handle horizontal*

Push down on the handle until it locks. Remove spring stopper then release handle.

Some Models

At installation, cap opening **no. 30** must be 180° from spring stopper **no. 29** opening.



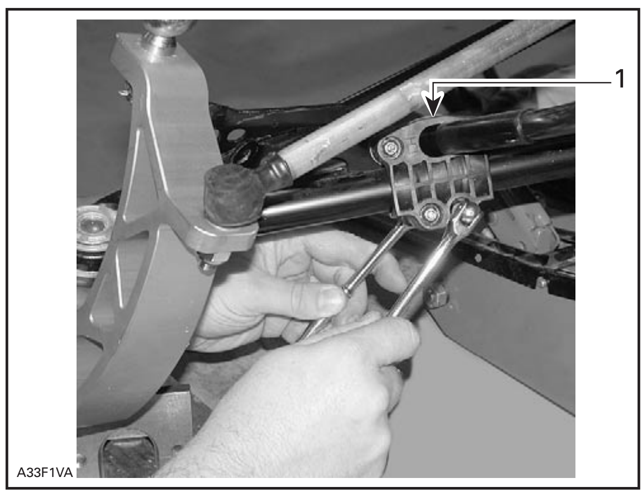
1. *Cap opening*
2. *Spring stopper opening*

Lower Arm

All Models

Remove shock absorber.

Remove sliding blocks **no. 6** of stabilizer bar **no. 7**.

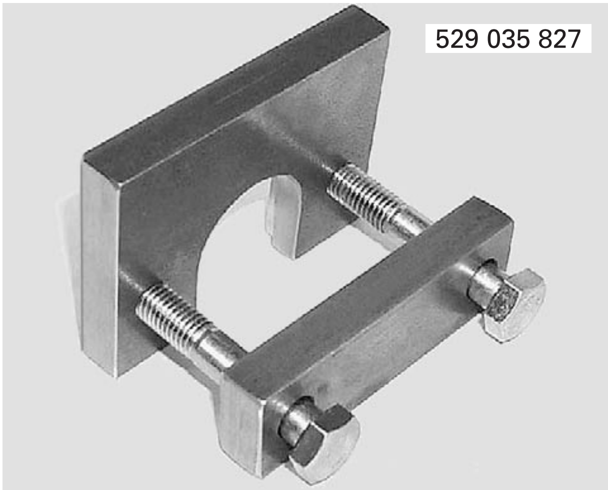


1. *Sliding blocks*

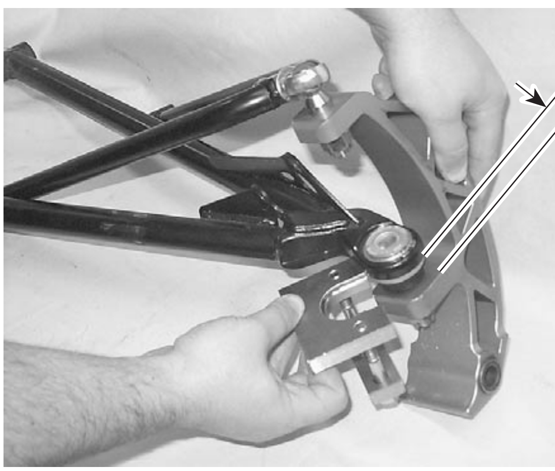
Remove cotter pin **no. 8** and unscrew ball joint nut **no. 9**.

Raise lower arm **no. 10** so that ball joint **no. 11** becomes parallel with ski leg **no. 12**.

Install ball joint remover (P/N 529 035 827) and detach ball joint from ski leg.



A33F1XA



A33F1YA

TYPICAL
1. *Ball joint parallel with ski leg*

Remove lower arm **no. 14** from frame. For front screw **no. 17** removal, hold nut **no. 18** from engine compartment.

To remove ball joint, proceed as follows:

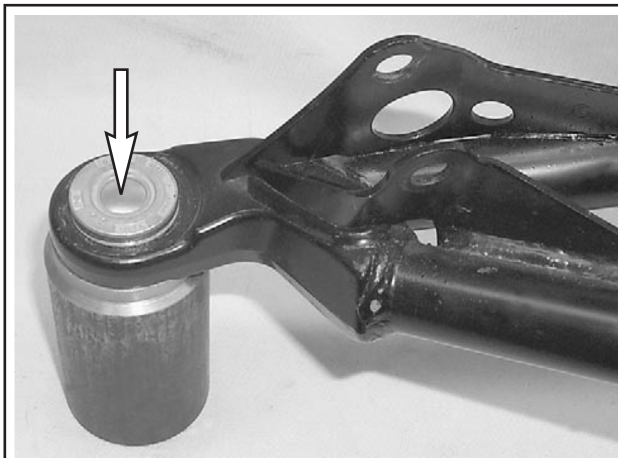
– Remove snap ring **no. 13**.
– Install ball joint remover support (P/N 529 035 873) under joint.
– Press joint out.

A33F1WA

TYPICAL

529 035 873

A33F1ZA



A33F20A

TYPICAL

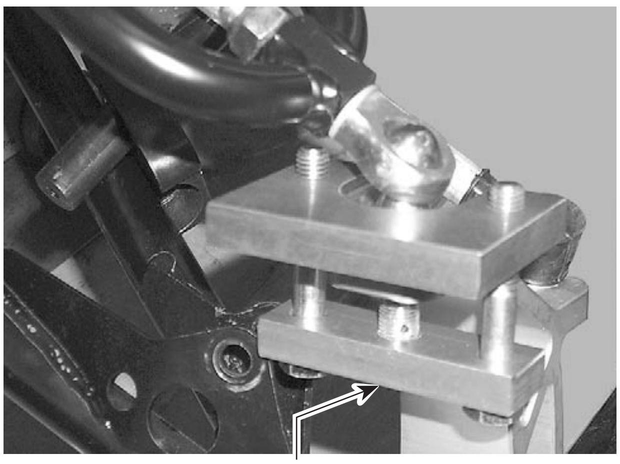
Tie Rod

Refer to STEERING SYSTEM section and remove tie rod from ski leg.

Upper Arm

Remove cotter pin **no. 31** and unscrew ball joint nut **no. 32**.

Install ball joint remover (P/N 529 035 827) and detach ball joint **no. 15** from ski leg.



A33F2BA

529 035 827

Use a 11 mm (7/16 in) open wrench to hold ball joint housing and unscrew nut **no. 16**, then remove ball joint from upper arm.

Remove upper arm **no. 14** from frame. For screws **no. 19** removal, hold nuts **no. 20** from engine compartment.

A33F21A

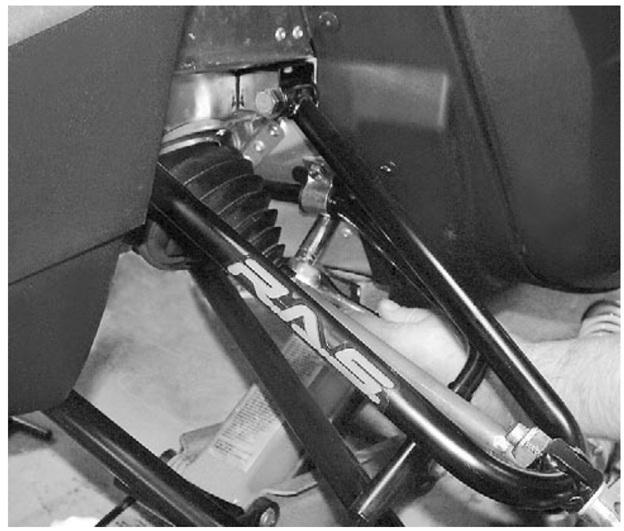
1

1. Remove screws while holding nuts from engine compartment

Stabilizer Bar

Remove shock absorbers, stabilizer bar slider blocks and unfasten lower ball joints from ski legs.

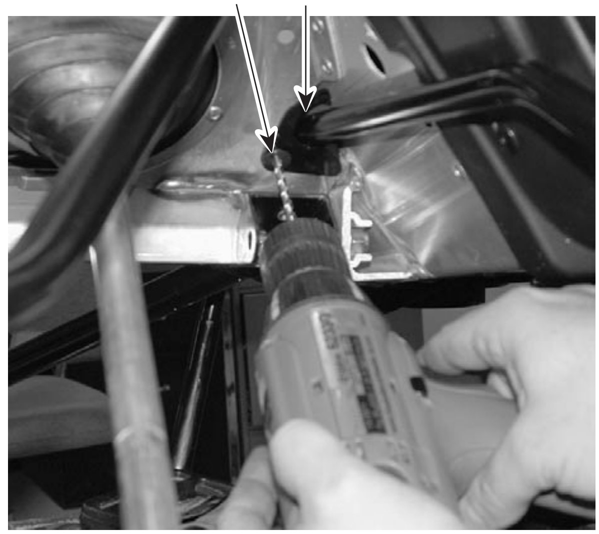
Remove screws **no. 21** from clamps **no. 22**.



A33F27A

Using a 4.8 mm (3/16 in) drill bit, drill rivet **no. 24** out. Remove cap.

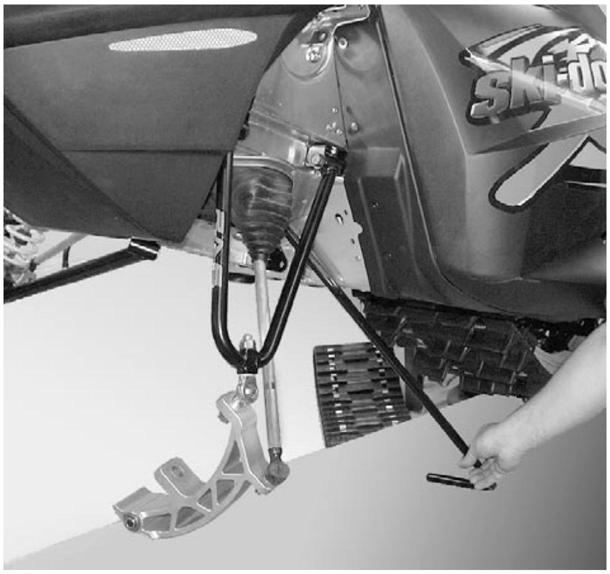
1 2



A33F23A

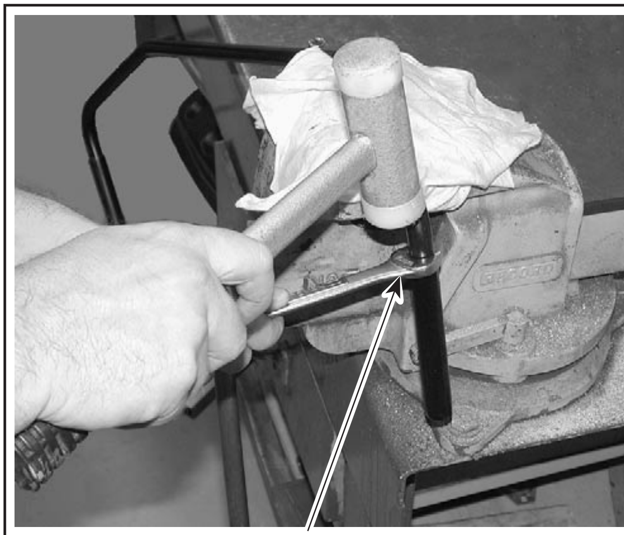
1. Drill rivet out with a 4.8 mm (3/16 in) drill bit
2. Cap

Lift front of vehicle enough so that stabilizer bar **no. 7** can be rotated downward to allow to slide it out.



A33F24A

To remove bushing **no. 25**, use a 13 mm (1/2 in) open wrench and tap bushing out as shown.



A33F25A 1

1. *Use a 13 mm (1/2 in) open wrench to push bushing out*

INSPECTION

Check all plastic bushings for wear. Replace as required.

Check condition of ski leg **no. 12**. Replace as required.

Check for straightness of lower and upper arms. Replace as required.

Check condition of ball joints. Replace as required.

Check skis and runners **no. 5** for wear, replace as necessary.

Check condition of ski stopper **no. 26**. Replace it when deteriorated.

To check condition of shock absorber, refer to SUSPENSION then look for SHOCK ABSORBER INSPECTION.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Tighten nuts and screws to proper torque as mentioned in exploded view.

Nuts with a cotter pin: After applying the proper torque, continue tightening as necessary to allow cotter pin insertion. Ensure to properly secure cotter pin.

⚠ WARNING

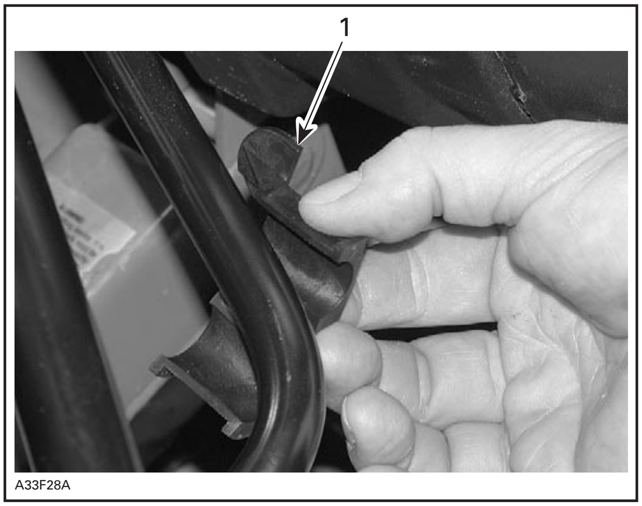
Always install new cotter pins at assembly and properly bend their ends.

Stabilizer Bar

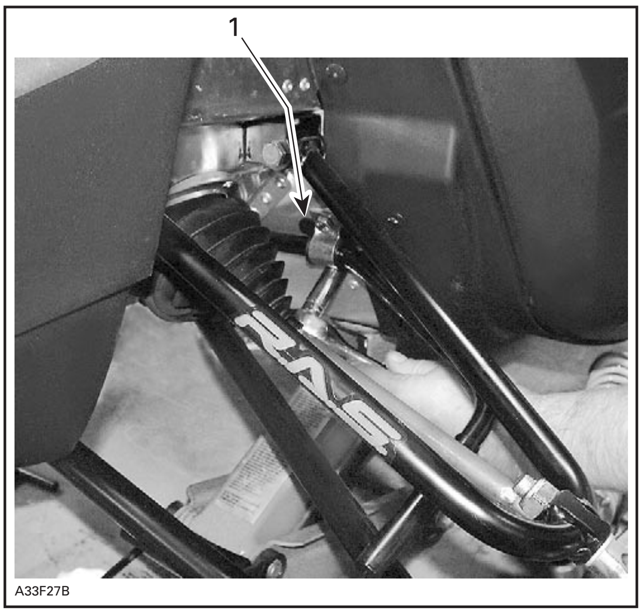
Ensure to properly position stabilizer bar before insertion in frame.

A33F26A

Install the stabilizer bar bushing **no. 23** making sure to place its tab over the access hole located on the LH side.



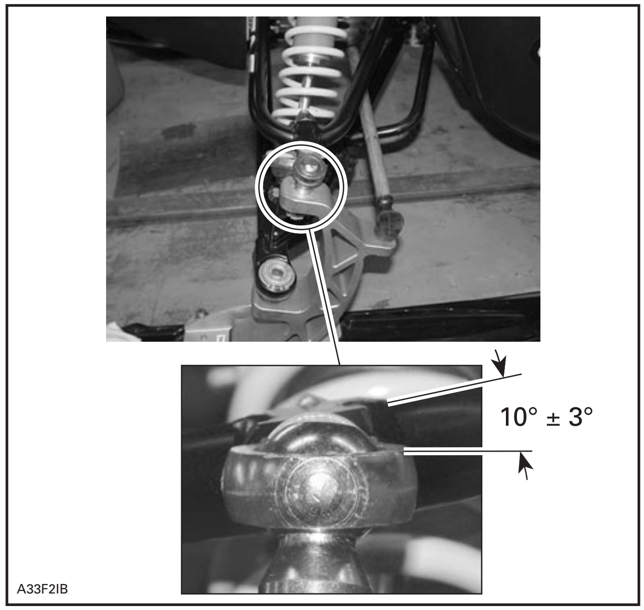
1. *Install bushing as shown*



1. *Tab here to obstruct access hole*

Upper Arm

When installing ball joint **no. 15** to upper arm, ensure to tilt it with the proper angle as shown. The ball joint housing must be parallel to ski leg tab. This mounting position corresponds to 10° ± 3° angle from upper arm.



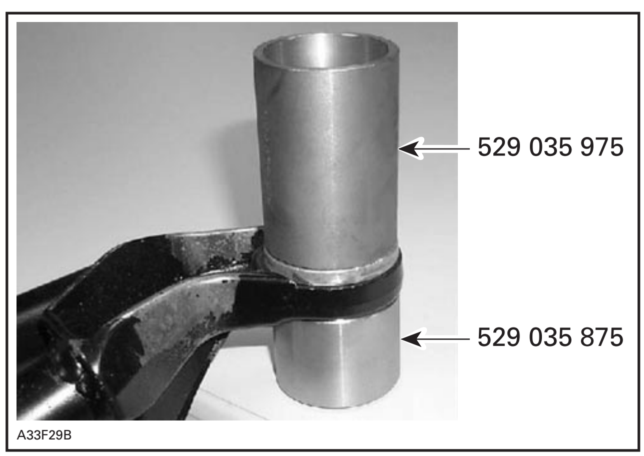
Lower Arm

Position lower arm below stabilizer bar.

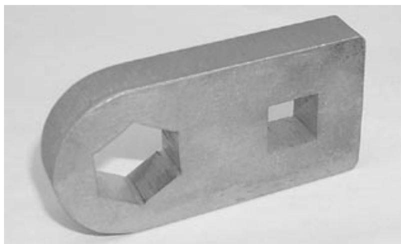
Prior to installing ball joint in lower arm, ensure to clean the tapered surfaces with the Pulley flange cleaner product (P/N 413 711 809). Surface contacts must be clean and free of dirt, oil and grease. Apply the cleaner on a rag then use the rag to clean the surfaces of ball joint and ski leg.

To install ball joint, proceed as follows:

– Install ball joint support (P/N 529 035 875) on top side of lower arm (operating position).
– Position ball joint installer (P/N 529 035 975) on bottom side of lower arm (operating position).
– Press joint in.
– Install snap ring **no. 13** with its opening toward front of vehicle.



To properly torque ball joint nut, use the A-arm nut wrench (P/N 529 035 876).

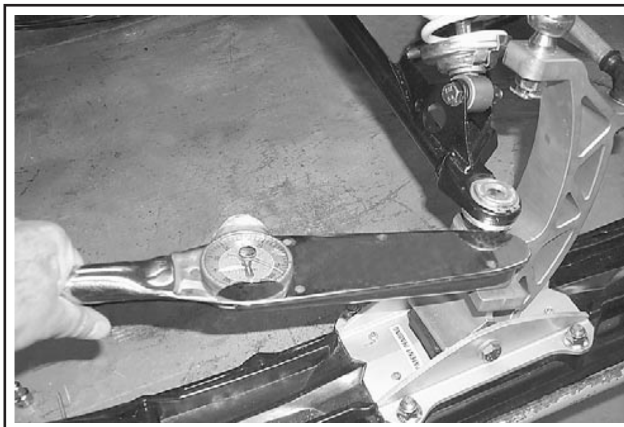


A33F2AA 529 035 876

Ensure to install the tool perpendicularly (90°) to torque wrench.

A33F22A

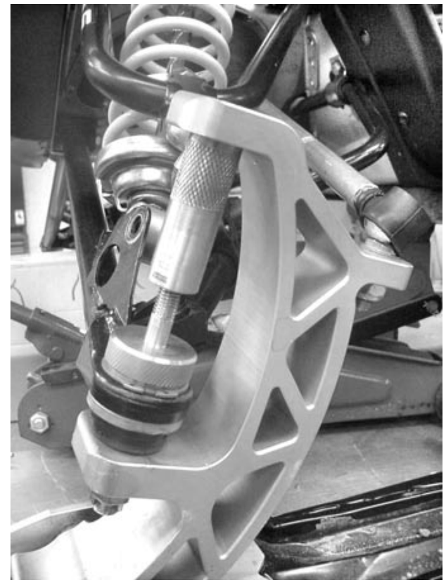
1. *Tool perpendicular (90°) to torque wrench*
A. *90°*



A33F2KA

Use ball joint lock tool (P/N 529 035 945) to restrain ball joint during nut tightening.

NOTE: The upper arm ball joint has to be removed in order to use this tool. Also remove the small screw from top of ball joint to allow proper seating of tool.



A32F3XA

TYPICAL

Stabilizer Bar

Notice that LH and RH sliding blocks are different. Look for their molded identification with LH or RH letters.

A33F2DA

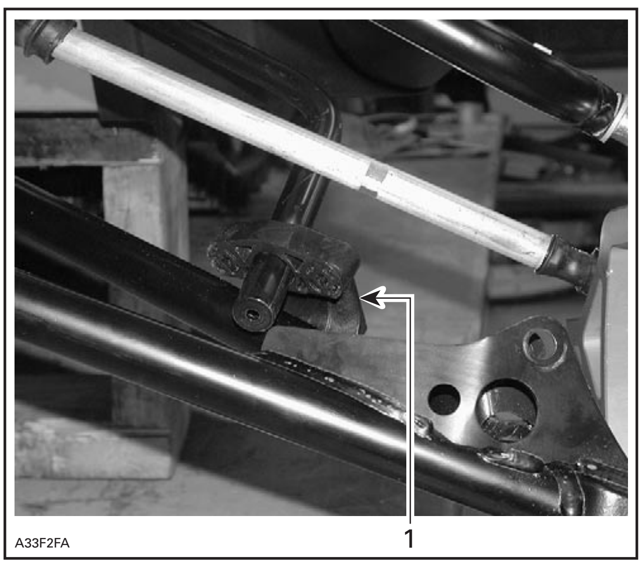
1. *Molded identification for proper side installation*

To install sliding blocks:

– Temporarily rotate the rear block by 180°.
– Insert on stabilizer bar end and push beyond the lower arm.
– Rotate block back by 180° to its normal position.
– Install the other block half.

– Install screws and nuts.
– Ensure blocks slide easily when compressing and releasing suspension.

1. Temporarily rotate block by 180° for its insertion

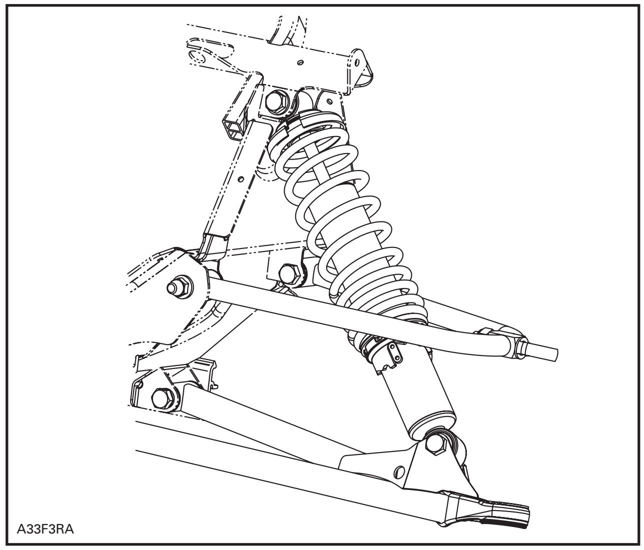


1. Push block on bar end beyong lower arm then rotate back to its normal position

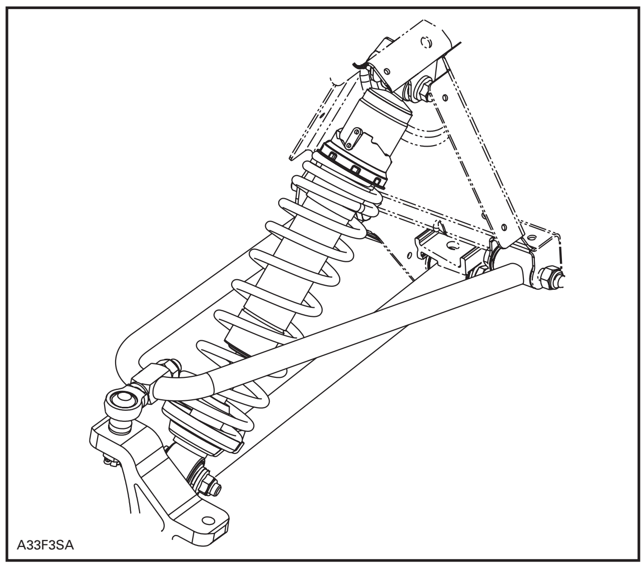
Shock Absorber

Ensure to reinstall shock absorber in the proper position according to model.

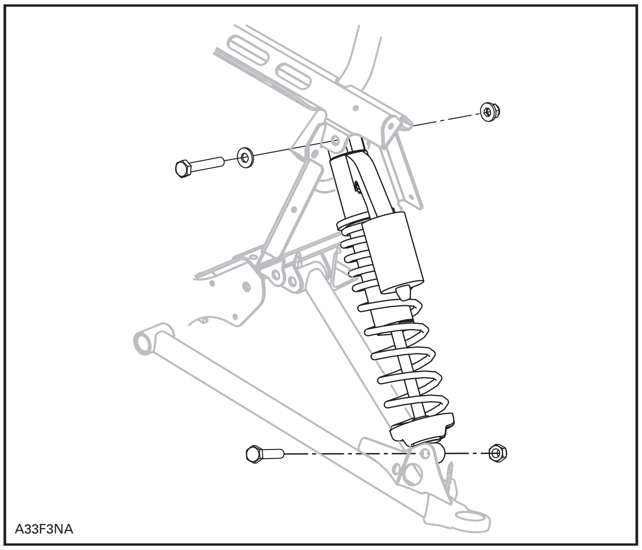
GSX and MX Z Trail



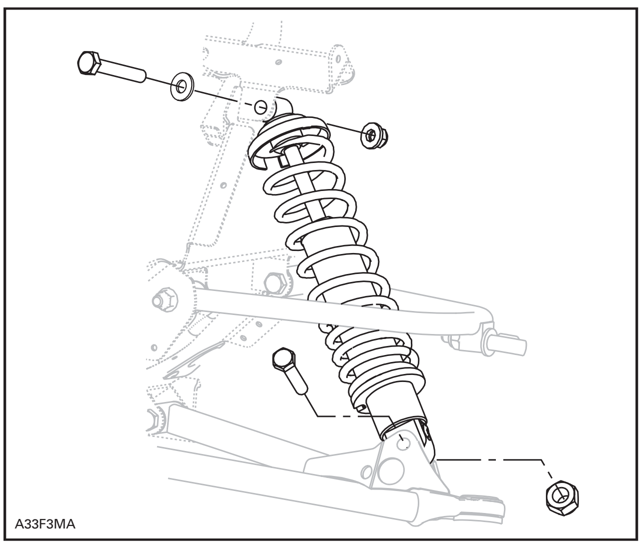
MX Z Adrenaline and Renegade



MX Z X/Renegade X/Trail — Europe



Summit



Readjust spring preload.

Ski

Apply suspension synthetic grease (P/N 293 550 033) between bushing **no. 28** and spacer **no. 27** and also on inner tube of ski leg.

Summit Only

Install bushing **no. 29** and spacer **no. 30** inward on each ski leg for the wide ski stance. Install outward for narrow ski stance.

⚠ WARNING

Install skis with proper side facing inward. Refer to warning on ski.

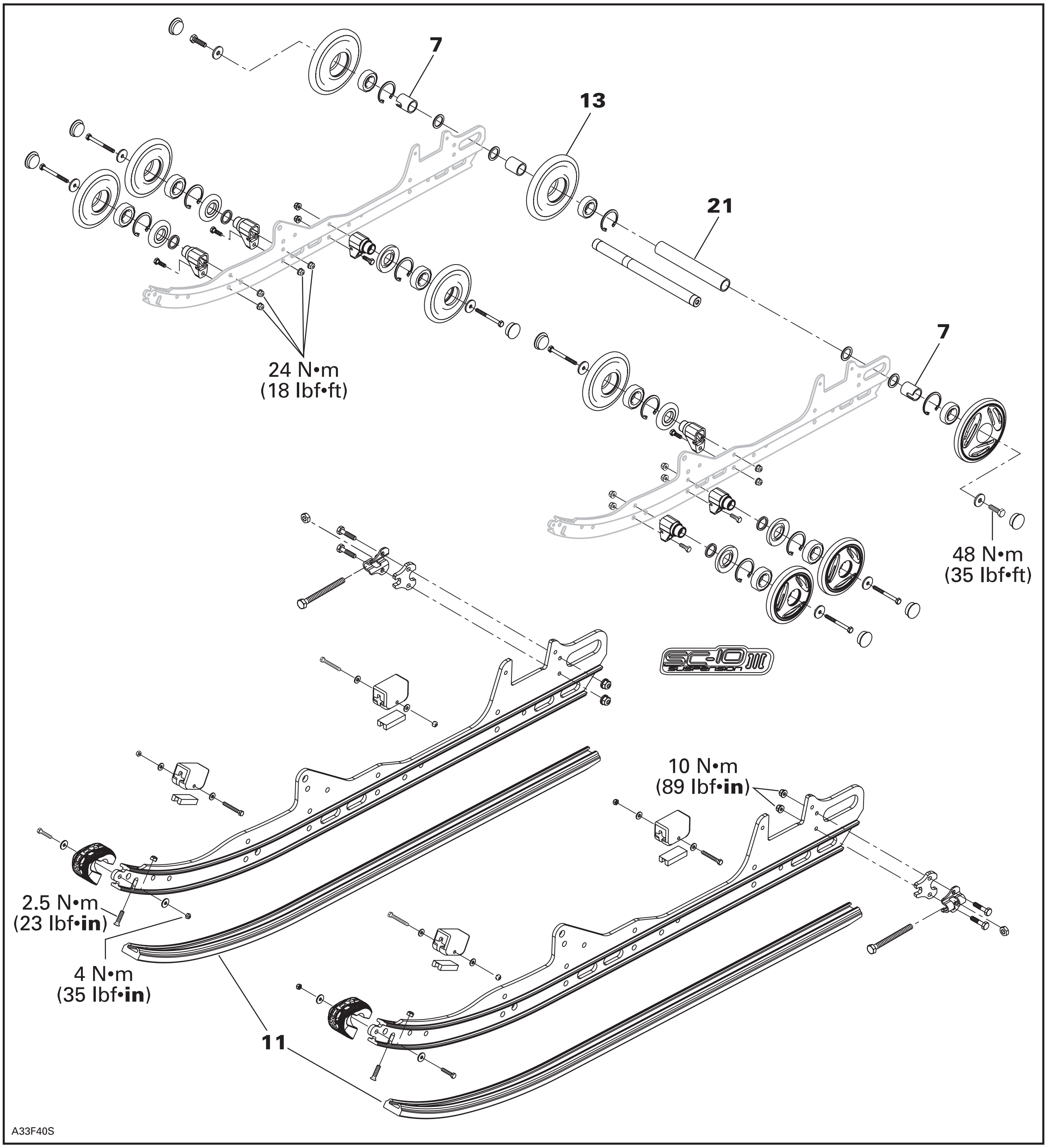
Adjustment

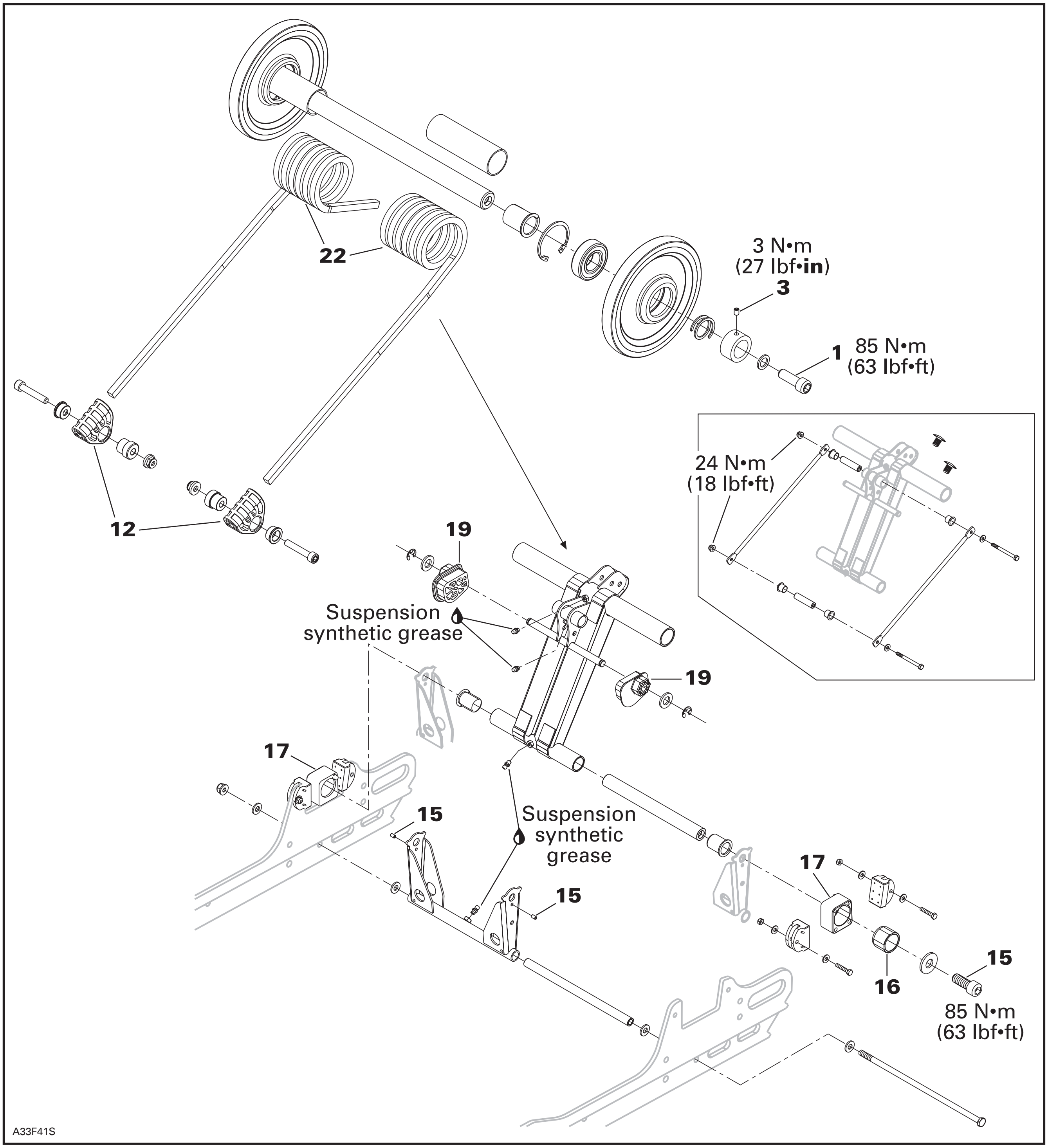
All Models

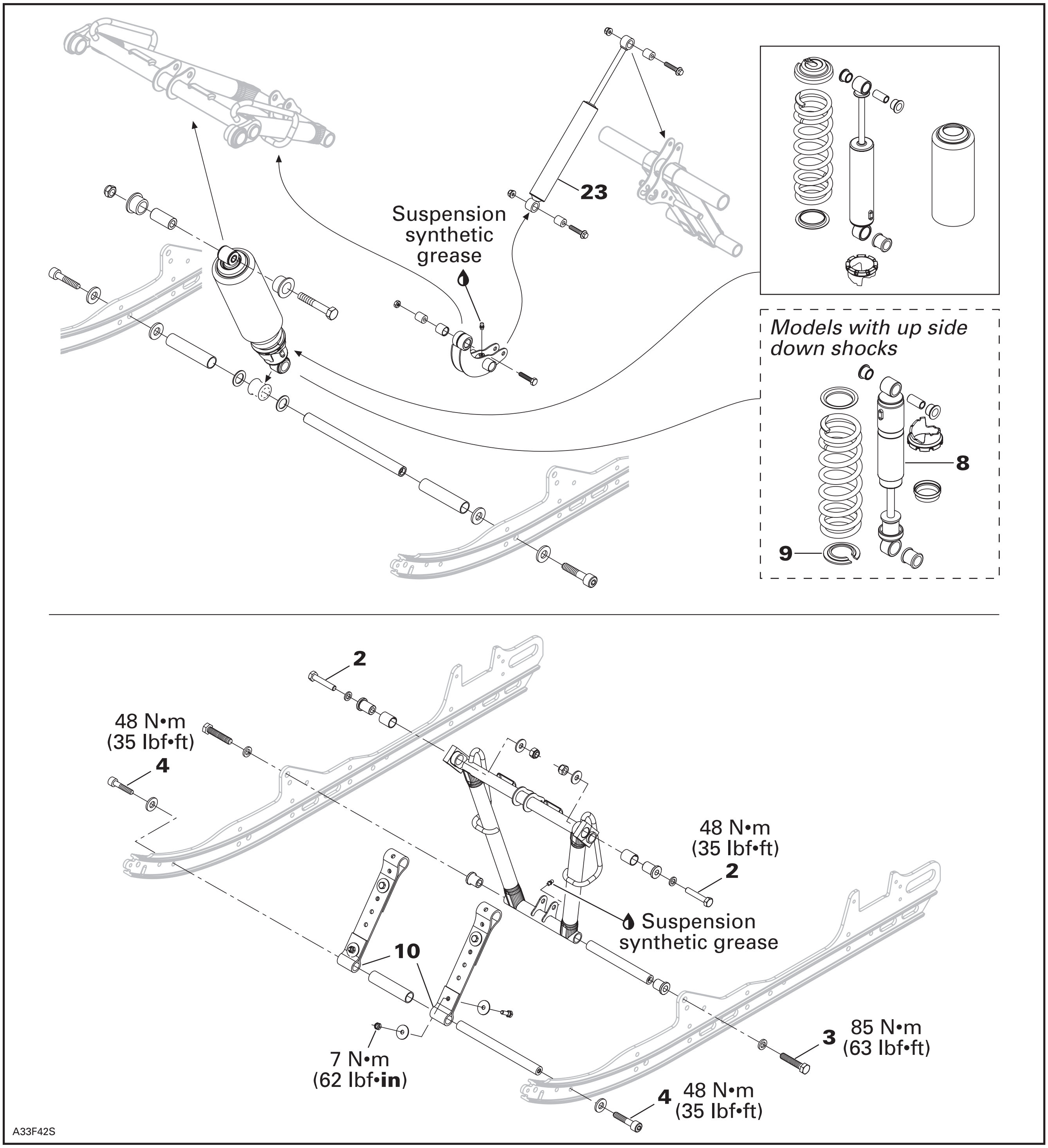
Proceed with ski alignment. Refer to STEERING SYSTEM.

SC-10 III SUSPENSION

SC-10 III




3 N•m
(27 lbf•in)
3
1
85 N•m
(63 lbf•ft)
22
24 N•m
(18 lbf•ft)
12
19
Suspension
synthetic grease
19
17
15
Suspension
synthetic
grease
15
17
15
16
85 N•m
(63 lbf•ft)
A33F41S



Suspension
synthetic
grease
23
Models with up side
down shocks
8
9
2
48 N•m
(35 lbf•ft)
4
48 N•m
(35 lbf•ft)
2
Suspension
synthetic grease
10
3
85 N•m
(63 lbf•ft)
7 N•m
(62 lbf•in)
4
48 N•m
(35 lbf•ft)
A33F42S

COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

Rear Axle

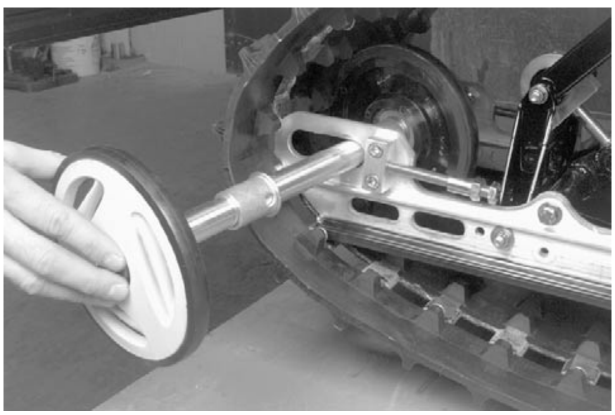
Remove screw on rear axle **no. 21** on side of offset wheel.

Completely loosen track tension.

Pull out rear axle from opposite side of offset inner wheel.

At assembly, align spacer hole with adjusting bolt.

Make sure to reinstall washer on each side of runner.



A03F1LA

TYPICAL

Rear Shock

Lift rear of vehicle.

A32F4BA

TYPICAL

Remove nut on top end of shock **no. 23**.

A33F44A

Remove nut on bottom end of shock.

Installation is reverse of removal procedure.

Front Shock

Unfasten one end of stopper strap(s).

Unbolt shock **no. 8** from the top.

Remove the front idler wheels to gain access to the axle retaining self-locking screws **no. 2** and **no. 3**. Follow the instructions provided in this section to unfasten these screws. Slide out the axle and remove the shock.

Rear Spring

Decrease spring preload by turning cams **no. 19** accordingly.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove both springs from adjusting cams.

Remove spring ends from adjusting cams.

Unbolt rear arm top axle from chassis.

Unscrew set screws from locking ring at each end of top axle.

A33F45A

Remove spacers and top idler wheels.

Remove springs **no. 22**.

A03F1QA

TYPICAL

At reassembly, respect THIS SIDE OUT inscription on wheel.

SUSPENSION ASSEMBLY REMOVAL

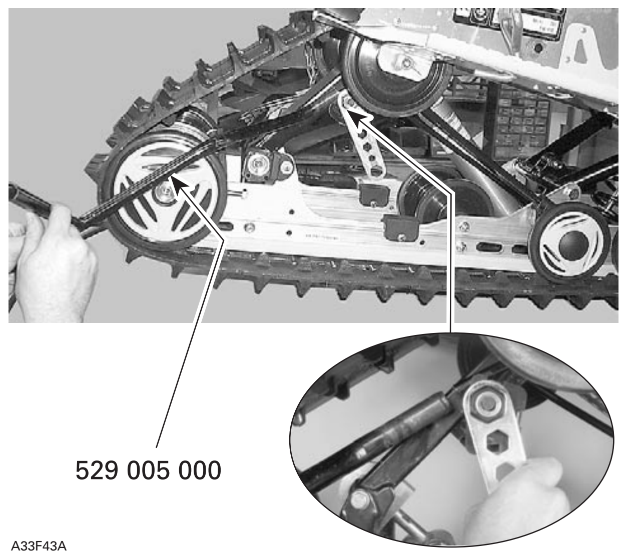
Cam

Lift rear of vehicle and support it off the ground.

Loosen track tension.

Decrease spring preload by turning cams **no. 19** accordingly.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove both springs from adjusting cams.



A33F43A

Self-Locking Screws

CAUTION: These self-locking screws must always be replaced by new ones everytime they are removed.

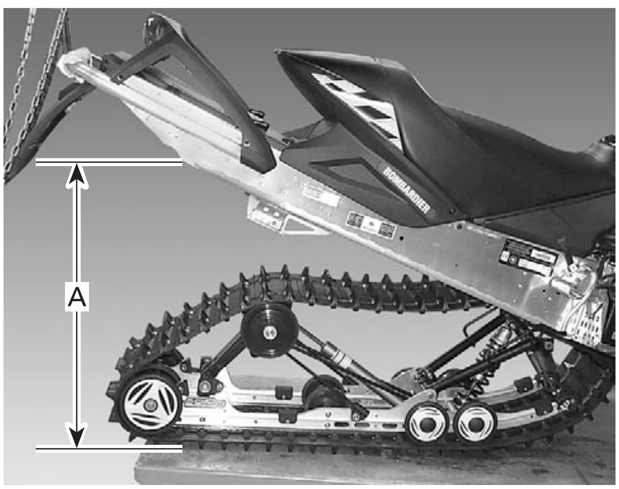
NOTE: To prevent axle from turning when unscrewing self-locking screws **no. 1**, **no. 2**, **no. 3**, **no. 4**, **no. 5**, **no. 6**, proceed as follows:

– Remove one self-locking screw then install a 10 mm shorter non-self-locking one in place. Torque as specified in exploded view.
– Remove the opposite self-locking screw.
– Remove the temporary installed non-self-locking screw.
– If it doesn't work, heat bolt head to melt threadlocker.

Remove rear arm top axle self-locking screws **no. 1** from chassis.

A33F45A

Lift rear of vehicle at least 1 m (3 ft).



A33F46A

TYPICAL
A. At least 1 m (3 ft)

Models with SC-10 III 121 in Suspension

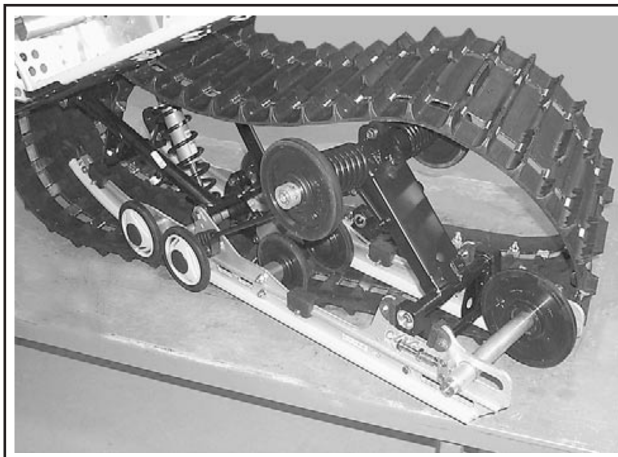
In case of gas pressure shocks, to facilitate the suspension removal, it is necessary to remove the rear shock no. 23.

All Models

Remove both self-locking screws no. 2 retaining front arm to tunnel.

A33F47A

Remove suspension.



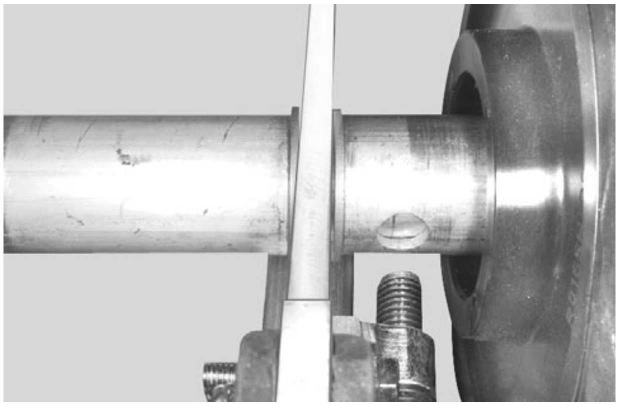
A33F1PA

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK.

Outer Bushing

At installation, hole of outer bushing no. 7 must face adjustment screw.



Center Rear Wheel and Top Idler Wheels

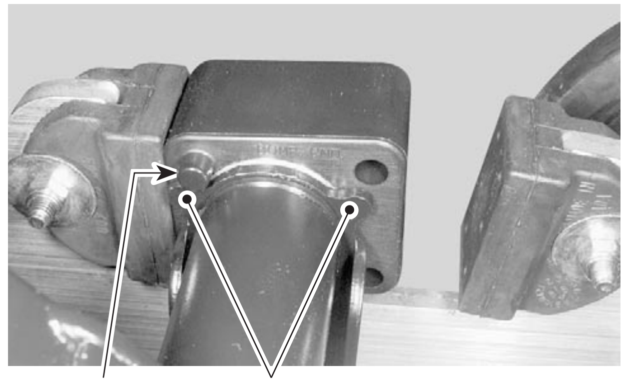
At installation on center rear wheel **no. 13** and top idler wheels **no. 14**, circlip must face inner side.

1. *Circlip facing inner side*

Block

Both blocks **no. 17** are identified R or L (right or left), see second following photo. At installation, make sure to install proper block on proper side.

Also, note that protrusion must be positioned above stoppers.

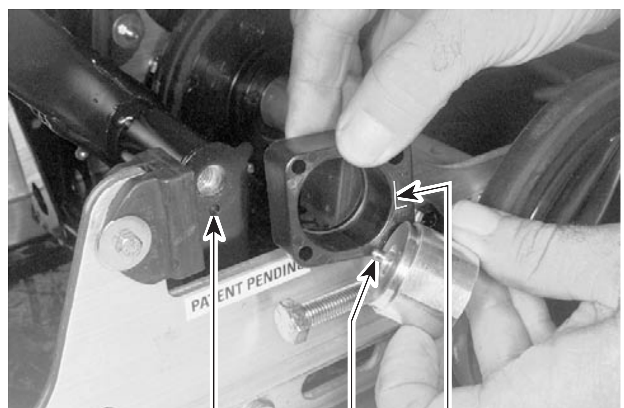


1. *Protrusion*
2. *Stoppers*

Dowel Pin and Block Guide

Dowel pin **no. 15** must exceed block guide **no. 16** by 2 to 2.3 mm (.079 to .091 in).

At installation, insert dowel pin into pivot arm hole.



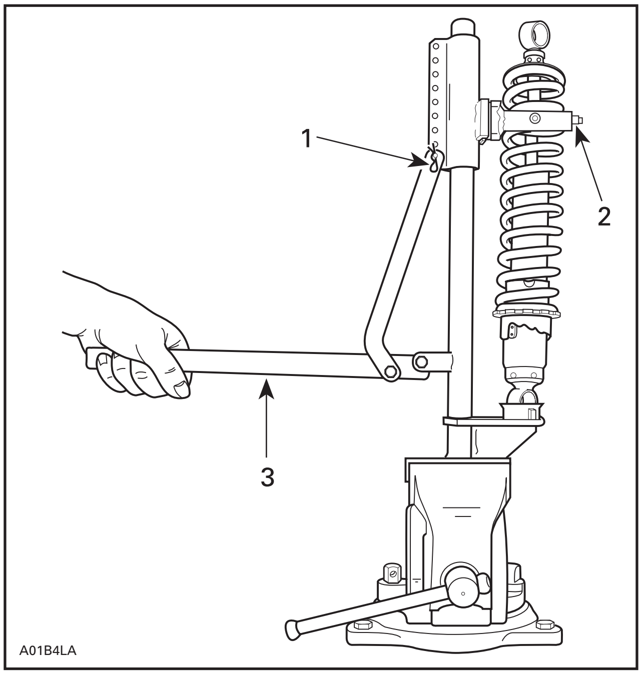
LEFT SIDE SHOWN
1. *Dowel pin*
2. *Pivot arm hole*
3. *«L» identification for left side*

Front Shock and Spring Stopper

Use shock spring remover (P/N 529 035 504) and put it in a vise. Mount shock **no. 8** in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

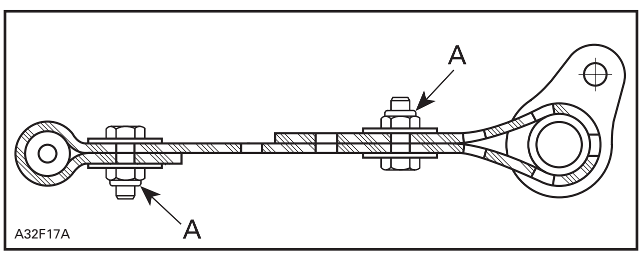
Push down on handle until it locks. Remove spring stopper **no. 9** then release handle.



1. Clevis pin
2. Bar
3. Handle horizontal

Stopper Strap

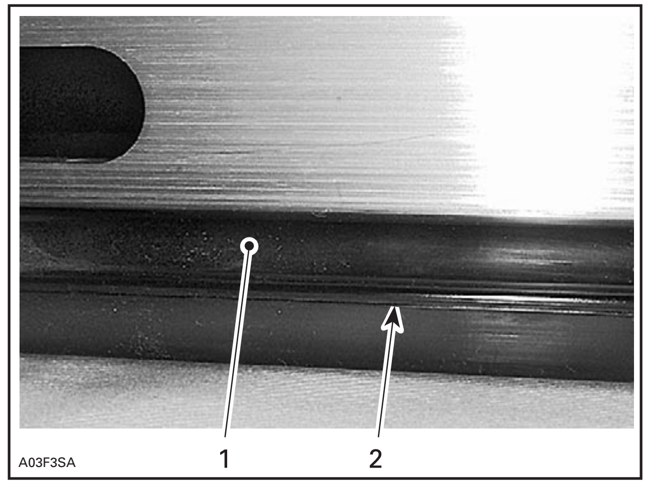
Inspect strap **no. 10** for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper holes. Torque nut to 7 N•m (62 lbf•**in**).



*A. 7 N•m (62 lbf•**in**)*

Slider Shoe

Molding line is the wear limit indicator.



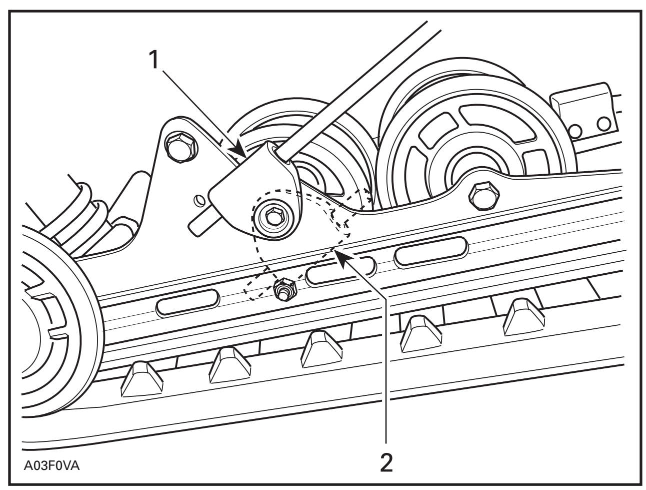
TYPICAL
1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes **no. 11** when wear limit is reached.

CAUTION: Slider shoes must always be replaced in pairs.

Spring Support

CAUTION: To avoid track damage, spring supports no. 12 must be mounted upward.



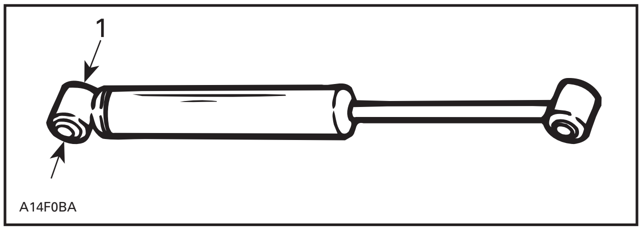
TYPICAL — RIGHT SIDE SHOWN
1. Right position: upward
2. Wrong position

SHOCK ABSORBER INSPECTION

All Models Equipped with Hydraulic Shock

NOTE: Hydraulic shocks are painted black or dark gray.

Secure the shock body end in a vise with its rod upward.



1. *Clamp*

CAUTION: Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

After at least 5 complete strokes, pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

MC VR Shock

For the verification of stroke, install shock in vise keeping the rod upward. Verify the stroke compression when the rod is fully extended.

The feeling will be stiff for around first 25 mm (1 in), soft up to 25 to 50 mm (1 to 2 in) and stiff after that. This stiff, soft and stiff phenomenon shows the normal operation of shock.

All Models Equipped with Gas Pressurized Shock

NOTE: Gas pressurized shocks are light gray or purple painted, or bare aluminum.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release.

Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

HPG VR Shock

NOTE: Gas pressurized shocks are light gray or purple painted, or bare aluminum.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. The rod speed coming out will go slow - faster and slow again due to the VR zone. Renew as required.

For the verification of stroke, install shock in vise keeping the rod upward. Verify the stroke compression when the rod is fully extended.

The feeling will be stiff for around first 25 mm (1 in), soft up to 25 to 50 mm (1 to 2 in) and stiff after that. This stiff, soft and stiff phenomenon shows the normal operation of shock.

All Types of Shock

If suspecting a frozen shock proceed as follows:

Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than for the new one.

HPG T/A SHOCK SERVICING

Disassembly and Assembly

There are two types of high pressure gas take apart (HPG T/A) shock. One type has a tire valve and the other has a needle valve.

SHOCK TYPE	INFLATION TOOL
Tire valve type	529 035 570
Needle valve type	503 190 102

T/A shocks come in two sizes. C-36 shock is 36 mm (1.417 in) in diameter and C-46 shock is 46 mm (1.811 in).

SHOCK SIZE	SERVICING TOOL	(P/N)
C-36	Piston guide	529 026 600
	Seal guide	529 026 500
	Shock wrench	529 035 727
C-46	Piston guide	529 035 608
	Seal guide	529 035 728
	Shock wrench	529 035 727

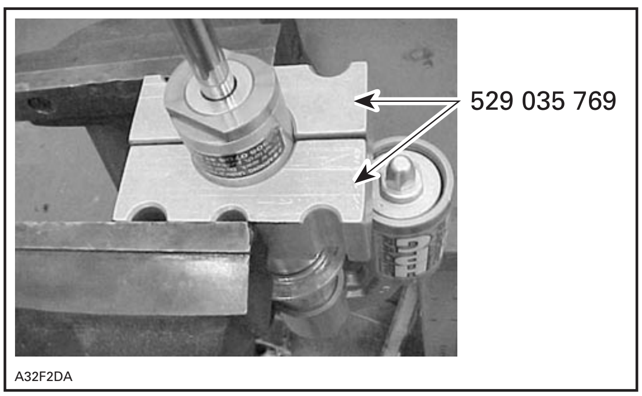
Release N (nitrogen) pressure on any HPG T/A shock with internal floating piston (IFP).

⚠ WARNING

Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.

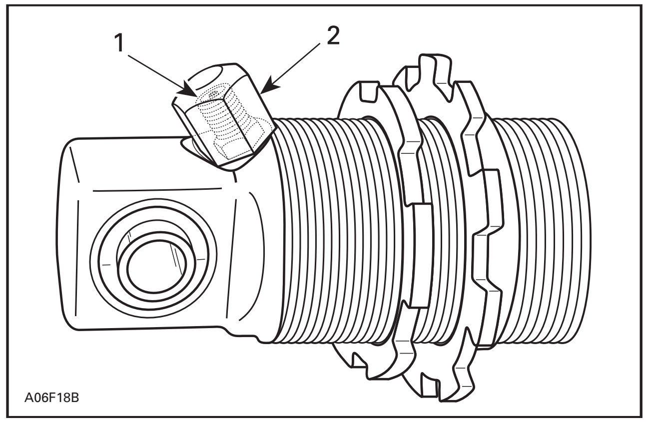
All T/A Shock Types

Mount shock in a vise with HPG shock holding tool (P/N 529 035 769).



Tire Valve Type Shock

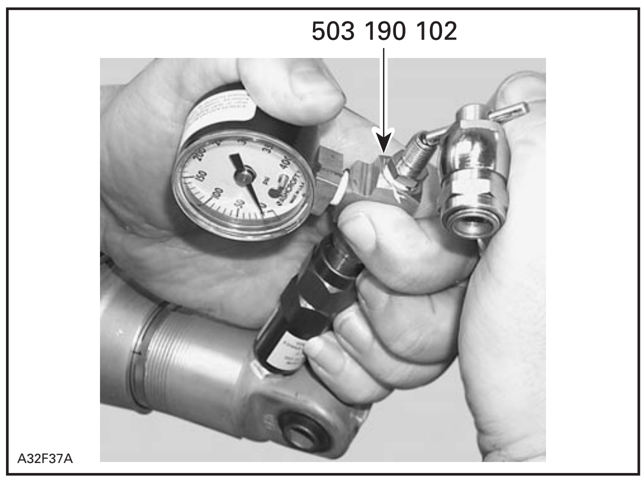
Remove tire valve cap and push on center rod of valve to release gas pressure.



1. *Tire valve*
2. *Tire valve cap*

Needle Valve Type Shock

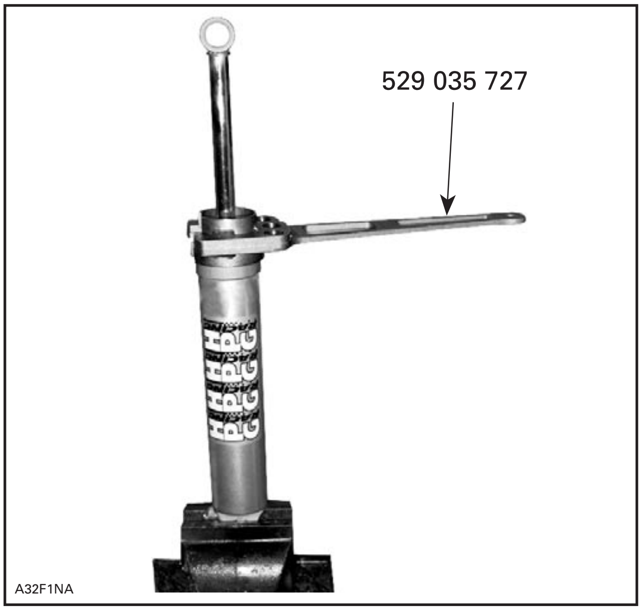
Remove screw on top of valve. Place the needle guide of gas refill needle type shock tool (P/N 503 190 102) on the shock valve. Press the detent pin and push forward the needle assembly very slowly towards rubber of needle valve. Push on shock tool valve center rod to release gas pressure.



Remove tool from shock.

Screw Cap Types of Shock

Using appropriate size of shock wrench (P/N 529 035 727) unscrew seal carrier.



TYPICAL

Snap Ring Cap Types of Shock

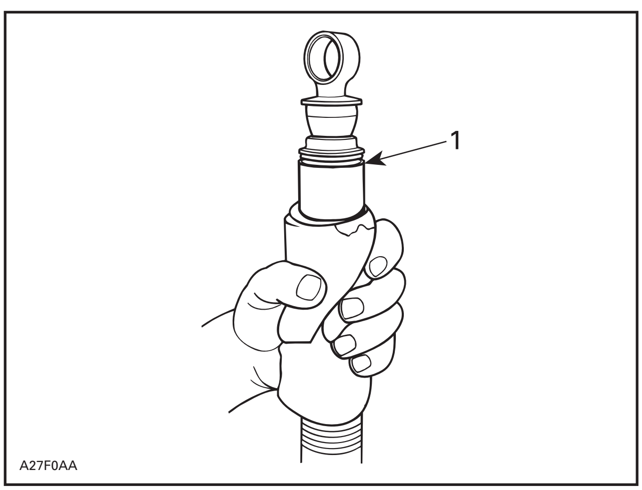
Using a flat tool, pop-out the cap.

Compress the carrier to access and remove the snap ring.

All Types of Shocks

With the seal carrier removed, slowly lift and remove damper rod assembly from the damper body.

NOTE: Remove damper rod assembly slowly to reduce oil spillage and prevent piston seal damage by damper body threads. Wrap the damper body with a shop cloth to capture possible overflow oil while removing the damper piston.

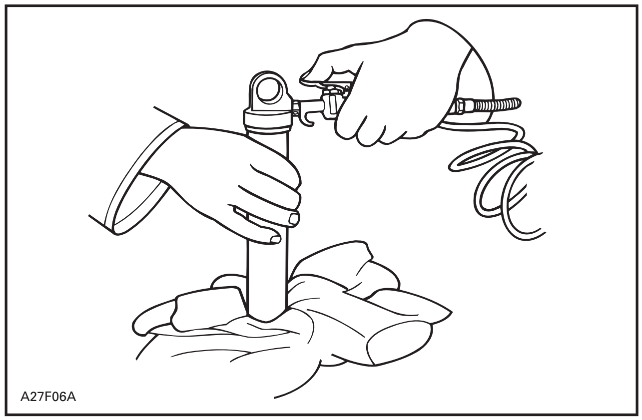


1. *Oil flows*

Discard old oil into storage container. Never reuse damper oil during shock rebuild.

All Types of Shocks except External Reservoir T/A Shocks

Remove valve core. Using compressed air pressure, carefully remove floating piston from damper body. Hold shop cloth over damper body opening to catch released floating piston. Allow room for floating piston to leave damper body.



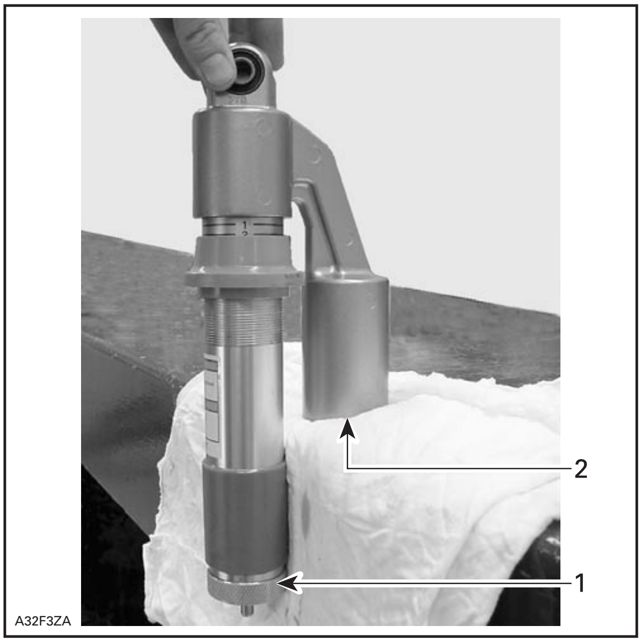
TYPICAL

External Reservoir T/A Shocks

Install floating piston remover tool (P/N 529 035 907) on shock absorber, as shown below.

1. *Floating piston remover tool (P/N 529 035 907)*

Place shock absorber in a position where external gas reservoir opened extremity is blocked. Refer to following photo.



1. Tool
2. Reservoir opened extremity blocked by leaning on work bench

With a low pressure hand pump, pressurize shock absorber until external reservoir piston pops-out.

NOTE: Use towels to prevent damaging external reservoir piston when it pops-out.

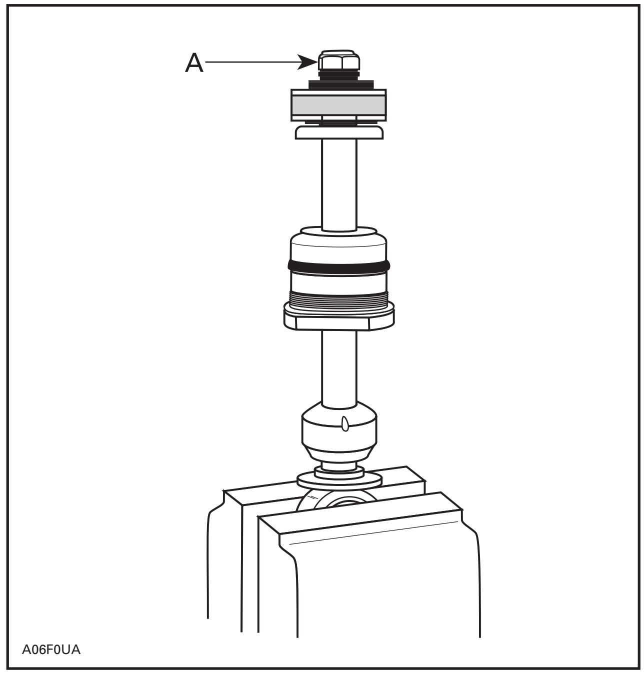
⚠ WARNING

Whenever using compressed air, use an O.S.H.A. approved air gun and wear protective eye wear.

Thoroughly clean, with a typical cleaning solution, and blow dry using low pressure air. Carefully inspect the damper body for any imperfections or signs of wear in the damper bore.

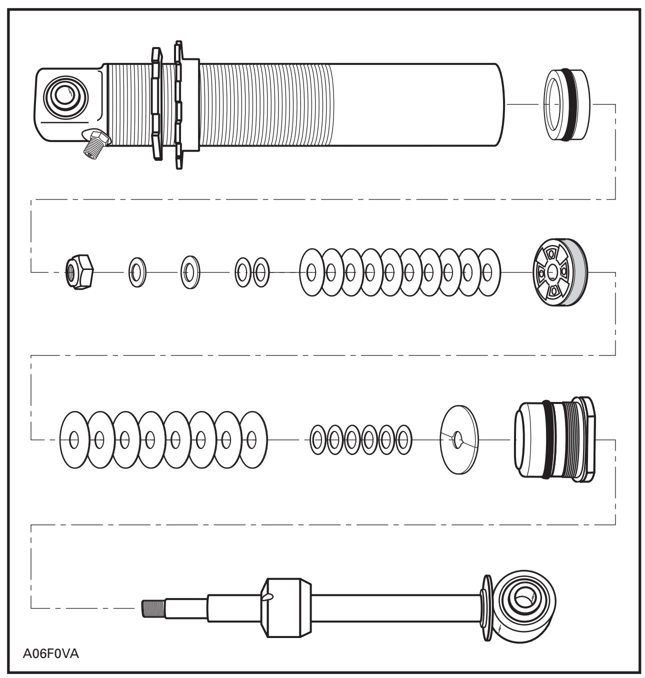
Replace damper body if wear is identified.

Holding the damper rod assembly in a bench vise, begin piston and valve removal.



A. Remove damper nut

Always arrange parts removed in the sequence of disassembly.



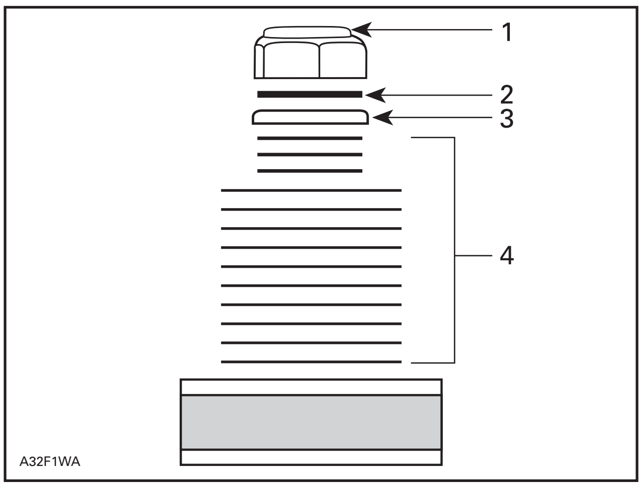
NOTE: As a general rule we suggest replacing the damper rod lock-nut after 4 rebuilds to ensure good locking friction and use Loctite 271 each time.

NOTE: If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). The seal carrier need not be removed if only revalving is to be done.

Shims can be measured by using a vernier caliper or a micrometer.

NOTE: All shims should be carefully inspected and any bent or broken shims must be replaced for the shock to function properly.

After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly. Torque piston nut to 27 - 29 N•m (20 - 21 lbf•ft).



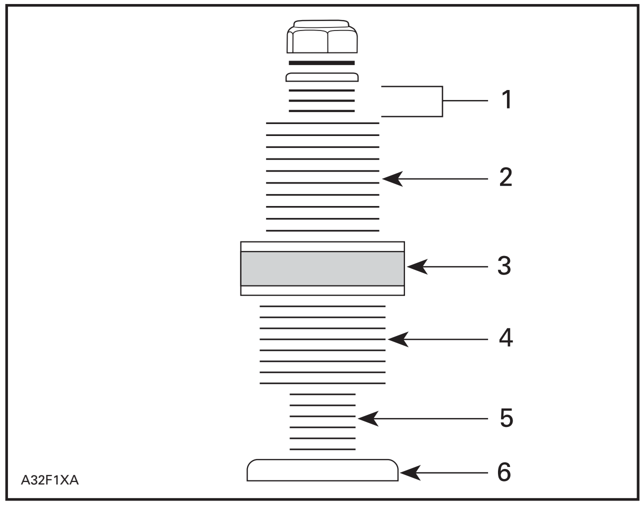
1. *Damper nut*
2. *Spacer*
3. *Stopper with its round edge facing nut*
4. *Shim pack*

CAUTION: The damper rod nut can only be reused 4 times, then, must be replaced. Do not substitute this part for non - O.E.M. use Loctite 271 on nut each time.

This (these) spacer washer(s) must be used as shown to ensure damper rod nut does not bottom out or contact shaft threads.

Rebound valve stopper with round edge facing nut.

NOTE: Rebound shim stack must not reach into threads of damper shaft. Spacer under damper shaft nut is used to prevent damper shaft nut from bottoming on threads.

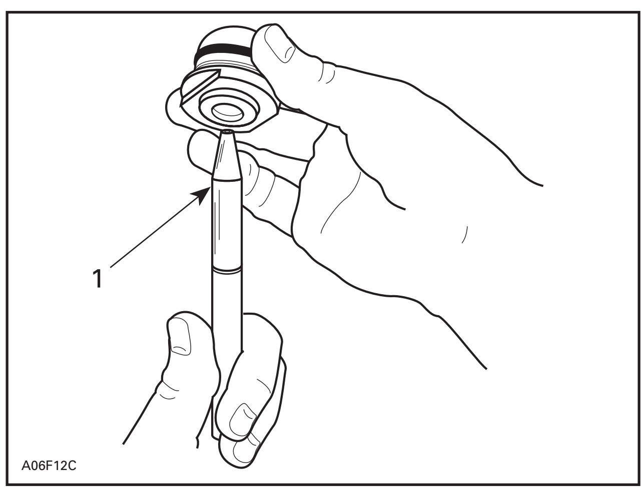


1. *Rebound dampening shim pack*
2. *Rebound dampening shim pack*
3. *Piston*
4. *Compression dampening shim pack*
5. *Compression dampening shim pack*
6. *Stopper*

If the seal carrier assembly is replaced, use seal pilot to guide seal over damper shaft. Lubricate seal carrier guide pilot before use.

CAUTION: Failure to use seal pilot will result in seal damage.

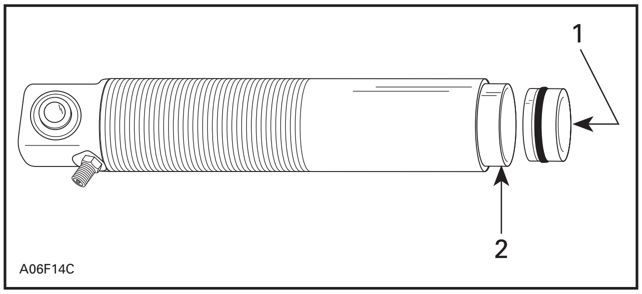
Reassemble damper rod assembly, taking care to properly assemble shim packs as required for your dampening needs. Ensure that the shaft piston is installed with the slits/larger intake holes facing the rebound shim stack.



1. *Seal guide*

If floating piston has been removed, reinstall floating piston into damper body (ensure that valve core has been removed). Use Molykote G-n paste (P/N 711 297 433) to ease O-ring past damper body threads with floating piston guide.

CAUTION: Failure to install IFP correctly could result in shock damage.

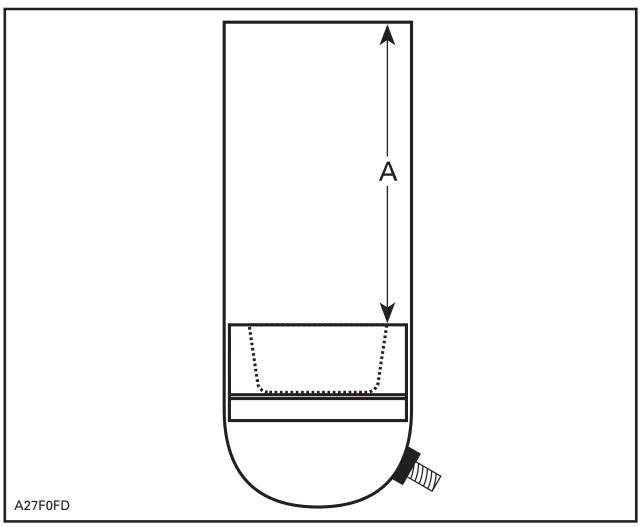


1. Push (slowly) by hand
2. Floating piston guide

NOTE: Lubricate inside of piston guide with Molykote G-n paste (P/N 711 297 433).

Install floating piston to the proper depth refer to following the table.

On all HPG take apart shocks, the floating piston is installed hollow side up.



A. Installation distance for floating piston installation

SHOCK P/N	INSTALLATION DISTANCE OF FLOATING PISTON mm
505 070 903	44.5
505 070 904	44.5
505 070 937	44.5
505 070 938	44.5
503 190 016	128
503 190 247	128
503 190 289	130
503 190 008	132
503 190 019	132
503 190 201	132
503 190 015	134
503 190 017	134
503 190 226	134
505 070 753	176
503 190 007	185
503 190 205	185
503 190 290	185
505 070 966	186
505 071 111	186
503 190 020	187
503 190 024	187
503 190 013	188
503 190 248	188

NOTE: If the floating piston is installed too far into the damper body, light air pressure through valve (with core removed) will move piston outward.

NOTE: Reinstall tire valve core after IFP has been installed at correct height and before adding oil.

⚠ WARNING

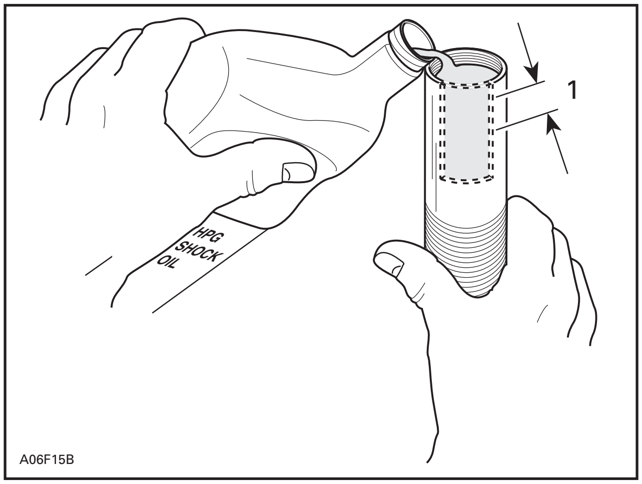
Whenever using compressed air exercise extreme caution, cover damper opening with shop cloth to reduce chance of possible injury.

CAUTION: Moisture laden compressed air will contaminate the gas chamber and rust floating piston.

⚠ WARNING

Always wear protective eye wear whenever using compressed air.

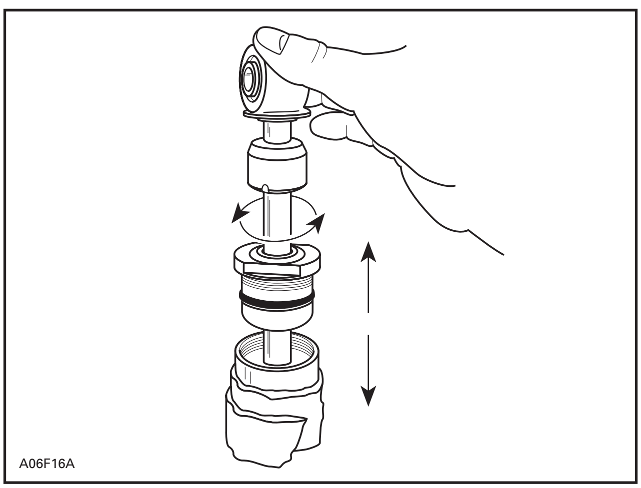
Fill the shock with Bombardier HPG shock oil (P/N 293 600 035) to approximately 10 mm (.393 in), from the base of seal carrier threads.



1. *Fill to 10 mm (.393 in)*

NOTE: Although we do not measure the exact amount of oil added to the damper, approximately 252 mL (8.52 oz. U.S.) will be used.

Carefully insert damper rod into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.



NOTE: Some shock oil will overflow when installing damper. Wrap damper with shop cloth to catch possible overflow oil.

CAUTION: Use care when passing piston into damper body at damper body threads.

Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required on short stroke to allow all air to pass through piston assembly. The gentle tapping of a small wrench, on the shock eye, may help dislodge air trapped in the submersed piston. Be careful not to drive the shaft any deeper into the oil than is necessary to just cover the shim stack.

NOTE: Fast installation of the damper rod may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.

With damper rod piston into oil, TOP OFF damper oil volume. Oil level should be to damper body thread base.

Screw Cap Types of Shock

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weapage of oil and to minimize IFP displacement. Torque seal carrier to 90 to 100 N•m (66 to 74 lbf•ft).

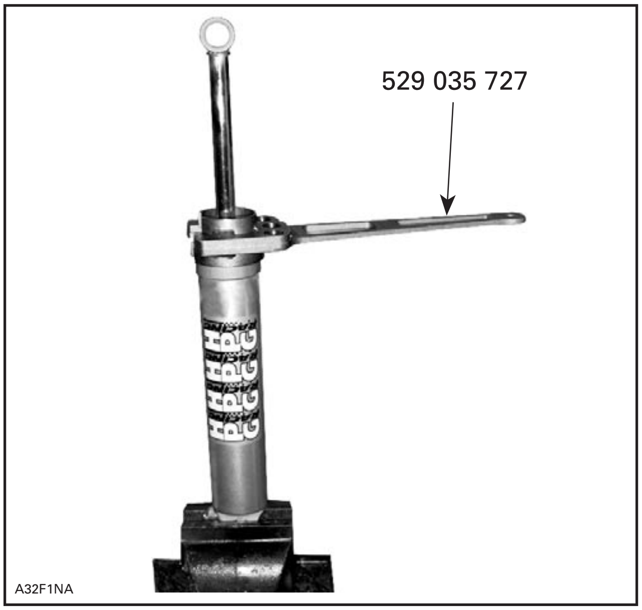
Snap Ring Cap Types of Shock

Seal carrier assembly can now be pushed into damper body to pass snap ring grove. Install snap ring into groove.

Tap the cap on the shock body.

All Types of Shocks

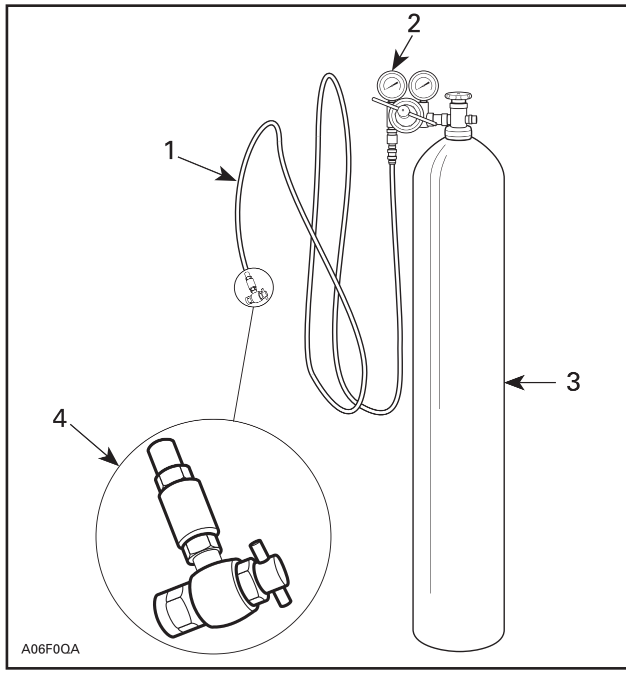
After the seal carrier is fully in place avoid pushing the shaft into the body until the nitrogen charge is added.



When removing and retightening the tire valve acorn nut use minimal torque. When the cap is over tightened and subsequently removed it may prematurely break the seal of the tire valve to the shock body and cause a loss of nitrogen charge without being noticed. If you suspect this has happened then recharge the shock as a precaution. Inspect the tire valve cap before installation to ensure that the internal rubber gasket is in its proper position.

Adding Gas Pressure

Nitrogen (N) can now be added to damper body.



1. *High pressure hose*
2. *2 stage regulator, delivery pressure range 2070 kPa (300 PSI)*
3. *High pressure cylinder filled with industrial grade nitrogen*
4. *Valve tip (P/N 529 035 570) permanently installed*

NOTE: Never substitute another gas for nitrogen. Nitrogen has been selected for its inert qualities and will not contaminate the gas chamber of the shock.

Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N), this gas pressure will restore the correct pressure for your damper.

CAUTION: Do not exceed the recommended pressure values.

⚠ WARNING

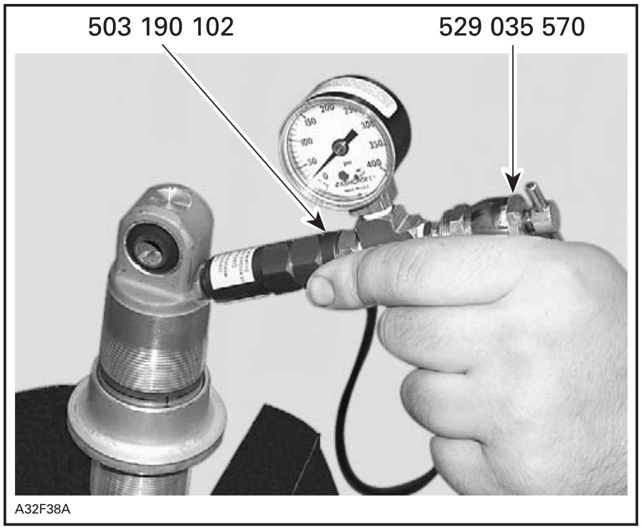
Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

Use appropriate inflation tool.

Needle Valve Type Shock

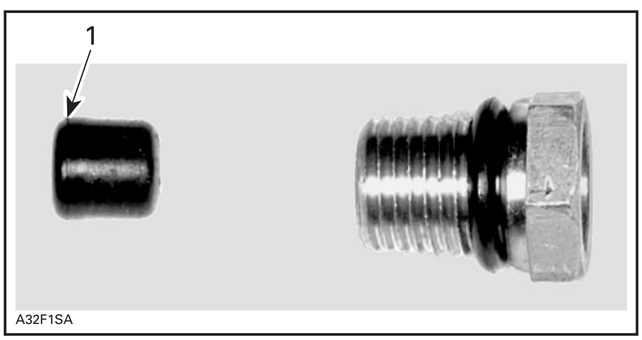
Install the gas refill needle type shock tool (P/N 503 190 102) on valve tip (P/N 529 035 570). Set the regulator pressure on the nitrogen cylinder as per the shock requirement.

Mount the shock on vise. Remove screw on top of valve. Place the needle guide of gas refill tool on the shock valve. While depressing the detent pin of the gas refill tool and pushing forward the needle assembly, insert the needle through the rubber core of the pressure valve assembly of the shock.



NOTE: For replacement of the needle or filling the shock, carefully follow the instructions provided with the gas refill needle type tool kit (P/N 503 190 102).

On some models, rubber may pop out of needle valve when inserting tool needle. If so, remove valve core and rubber then, reinstall rubber with its larger diameter last.



1. *Larger diameter*

When the shock is filled with gas, install back the screw on top of the valve.

All Shock Types

NOTE: Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing.

Damper gas pressure cannot be confirmed by using a pressure gauge. The volume of gas in the shock is very small, and the amount lost during gauge installation will lower the pressure too much and require refilling.

After recharging is complete the rebuilt shock should be bench-tested. Stroke the shock to ensure full travel and smooth compression and rebound action. If the shaft moves in or out erratically this could indicate too much air is trapped inside. If the shaft will not move or has partial travel then it may be hydraulically locked. In either event the shock must be rebuilt again. Pay particular attention to the placement of the IFP, quantity of oil and shim stack/piston assembly.

INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt front arm and rear arm.

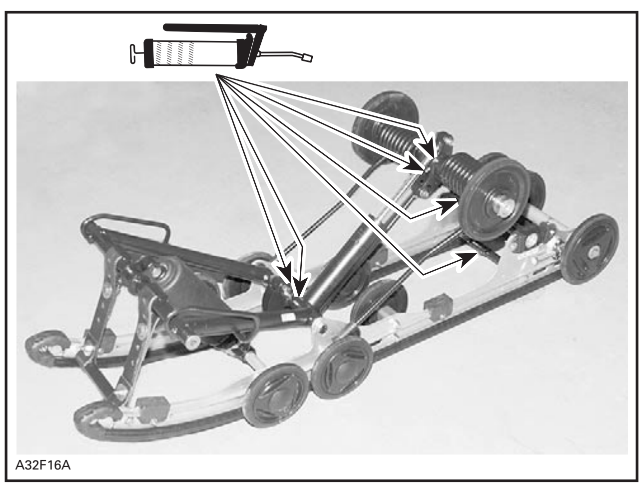
Adjust track tension.

RIDE ADJUSTMENT

Refer to *Operator's Guide*.

LUBRICATION

Lubricate front and rear arms at grease fittings using suspension synthetic grease (P/N 293 550 033).



SC-10 III: 6 GREASE FITTINGS

INTERNAL FLOATING PISTON MEASUREMENT

SHOCK P/N	MEASUREMENT MM
505 070 903	44.5
505 070 904	44.5
505 070 937	44.5
505 070 938	44.5
503 190 016	128
503 190 247	128
503 190 289	130
503 190 008	132
503 190 019	132
503 190 201	132
503 190 015	134
503 190 017	134
503 190 226	134
505 070 753	176
503 190 007	185
503 190 205	185
503 190 290	185
505 070 966	186
505 071 111	186
503 190 020	187
503 190 024	187
503 190 013	188
503 190 248	188

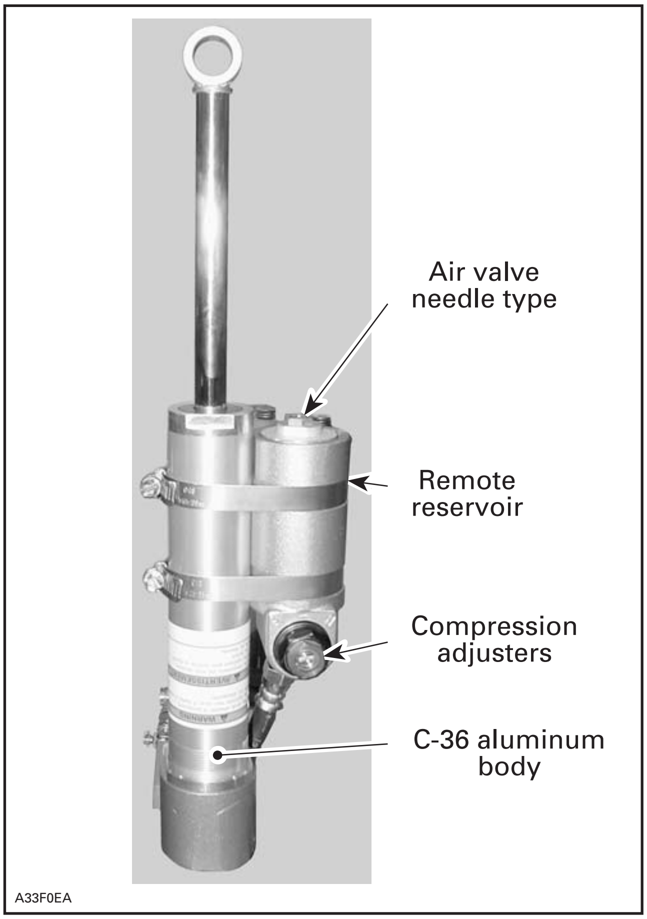
NOTE: If the floating piston is installed too far into the damper body, light air pressure through valve (with the core removed) will move the piston outward.

03-05 MX Z X 440 HPG C-36 SHOCK PART LIST

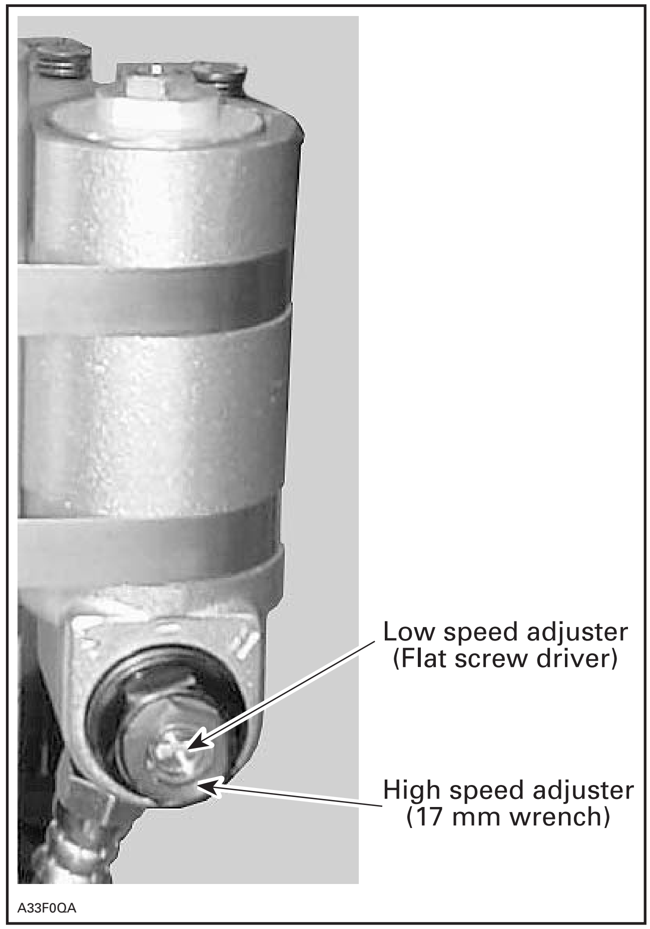
P/N	DESCRIPTION
505 070 953	Shock ass'y left front
505 070 952	Shock ass'y right front
503 189 972	Shock ass'y center
503 189 974	Shock ass'y rear
486 140 026	Stop ring (spring protector) right & left
486 140 027	Collar (spring protector) right & left
486 140 028	Rubber bush (top eye)
486 140 029	Valve ass'y (base valve adjusters)
486 140 030	Bearing comp (seal head)
486 140 031	Label
486 140 032	Nut (hose)
486 140 033	O-ring (hose)
486 140 034	Packing (brass washer hose)
486 140 035	Bolt (hose)
486 140 036	Hose comp right & left
486 140 037	Hose comp center
486 140 038	Hose comp rear
486 140 039	Guide spring (abutment)
486 140 040	O-ring (remote cover)
486 140 041	Stop ring (remote cover)
486 140 042	Guide (remote cover)
486 140 043	O-ring (air valve)
486 140 044	Screw (air valve)
486 140 045	Air valve comp
486 140 046	Piston ring (floating)
486 140 047	O-ring (floating)
486 140 048	Free piston
486 140 049	Tank comp (remote) right & left
486 140 050	Tank comp (remote) center
486 140 051	Tank comp (remote) rear
486 140 052	Cylinder comp right & left
486 140 053	Cylinder comp center
486 140 054	Cylinder comp rear
486 140 055	Piston rod sub ass'y right & left
486 140 056	Piston rod sub ass'y center
486 140 057	Piston rod sub ass'y rear

C-36 HPG shocks use the same valve shims as other model HPG shocks except C-46.

03-05 MX Z X 440 HPG C-36 SHOCKS



The 2005 MX ZX 440 REV will come equipped with four C-36 HPG shocks. Each shock will be equipped with high and low speed adjustable compression dampening (rear shock pictured).



Low speed compression adjuster

The low speed adjustment is used to change the dampening force for relatively slow suspension movement. It is used to tune the vehicle for braking, cornering, holeshots and all the bumps that create low speed movement in the suspension. The low speed adjuster has 4 turns of adjustment. Turning the adjuster clockwise increases the dampening.

High speed compression adjuster

The high speed adjustment is used to change the dampening force for fast suspension. It is used to tune the vehicle for large, high speed jumps and bumps that create high speed movement in the suspension. The high speed adjuster has three turns of adjustment. Turning the adjuster clockwise increases the dampening.

SHOCK REBUILD PROCEDURE

1. Tightly secure the shock base in vise. DO NOT CLAMP ONTO SHOCK BODY.
2. Using a 12 mm wrench, slowly remove air valve, allowing the gas inside the reservoir to escape.
3. Remove top seal cap using a 36 mm wrench. Pull shaft/valve stack assembly out of main shock body.

A33F0GA

4. Dispose of used oil properly.

A33F0MA

5. Push down the remote reservoir cover, remove the retaining clip.

A33F0IA

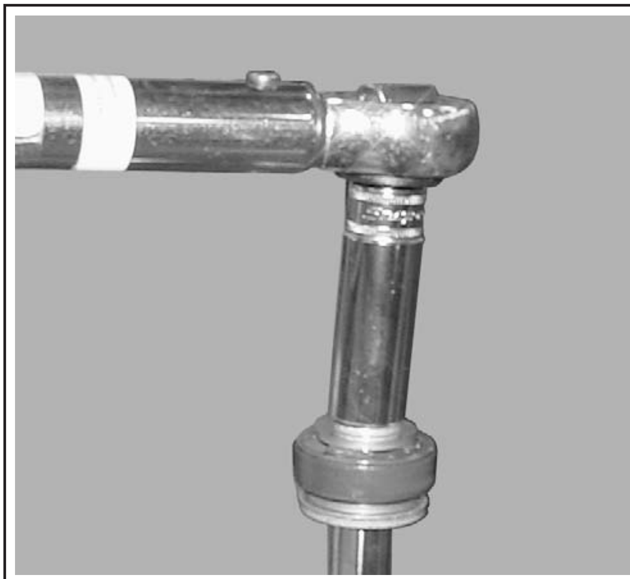
6. Remove the remote reservoir cover.

A33F0FA

7. Remove the floating piston inside the remote reservoir.

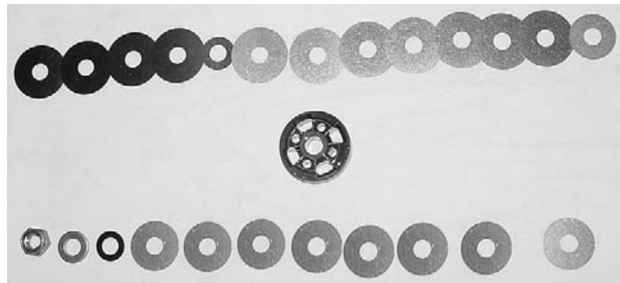
A33F0JA

8. Remove lock nut using a 14 mm wrench securing valve stack and piston to shaft.



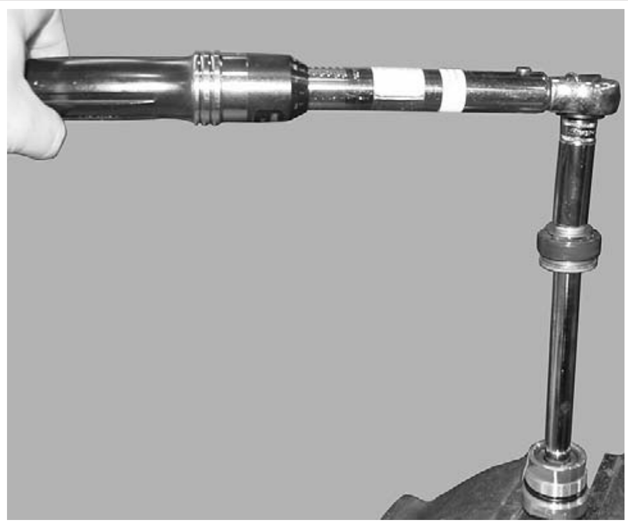
A33F0SA

9. Carefully remove and layout shims, washers, and piston from shaft. Play close attention to shim sequence and piston position.



A33F0NA

10. Clean all shock components using Bombardier Sheave Cleaner. DO NOT MIX SHIMS AND WASHERS TOGETHER.
11. Assemble valve shims, washers, and piston in proper order and place them back onto shock shaft.
12. Torque the rod nut at 24-27 N•m (18-20 lbf•ft).



A33F0LA

13. Fill main shock body with shock oil (P/N 413 711 806) to a level of half full.
14. Fill remote reservoir with Bombardier shock oil to within 6.4 mm (1/4 inch) from the top.
15. Hold the remote reservoir as to have the oil level in it at the same height of the oil level in the shock.

16. Cup your hand and place it over the remote reservoir. Pump with your hand to circulate oil through the base valve (adjustment system) to remove any trapped air. Low speed adjuster must be open 1 turn minimum.
17. Fill the remote reservoir with oil. Lubricate O-ring seal on floating piston with shock oil and install. The key to good shock performance is to remove all the air from shock body, reservoir, and valve stack.

A33F0KA

18. Push the floating piston to the bottom of the remote reservoir. Oil will rise in the main shock body almost to the top.
19. Fill the shock body with oil until level with bottom of threads.
20. Lubricate seal around piston and valve stack and gently push into main shock body.
21. Stroke the piston and valve stack slowly to remove any trapped air. Using a small hammer or wrench, gently tap on the shaft mounting eyelet to help remove air.
22. Again, push the floating piston to the bottom of the remote reservoir.
23. Pull the shock shaft as far out as possible and replace the seal cover and torque to 89-101 N•m (66-74 lbf•ft). Oil must spill from the shock body before the seal cover O-ring seals the shock.
24. Install the remote reservoir cover. Install the retaining clip. Pull cover to seat against the retaining clip. Make sure the cover is firmly seated against the retaining clip before filling with gas.
25. Install air inlet valve.
26. Pressurize the shock at 2068 kPa (300 PSI) with nitrogen. Use the correct needle tool (P/N 529 035 614).

A33F0PA

27. Install the safety screw into the air inlet valve and clean your shock with Bombardier Sheave Cleaner.

C-36 HPG

SHIMS

P/N	SIZE (mm)	MOQ (minimum order quantity)
415 039 100	30 × .254	5
414 888 318	30 × .203	15
414 888 319	30 × .152	1
414 888 320	28 × .203	5
414 888 321	28 × .152	5
415 039 000	26 × .254	5
414 888 322	26 × .203	5
414 888 323	26 × .152	50
414 888 324	22 × .203	5
414 888 325	22 × .152	5
414 888 326	20 × .203	5
414 888 327	20 × .152	5
414 888 328	20 × .144	5
414 888 329	18 × .203	5
414 888 330	18 × .152	5
414 888 331	16 × .254	10
414 888 332	16 × .203	10
414 888 333	16 × .152	10
415 038 900	16 × .114	10
414 888 334	15 × .254	10
414 888 335	15 × .203	10
414 888 336	15 × .152	10
414 888 337	15 × .114	10
414 888 338	12 × .203	10
414 888 339	12 × .152	10
415 038 800	12 × .114	10
414 888 340	21 × .114	10
414 888 341	24 × .114	10

PISTONS

P/N	SIZE	MOQ (minimum order quantity)
414 888 304	0 slit	1
414 888 305	2 slits	2
414 888 306	4 slits	1
414 888 307	6 slits	1
	1 slit	

C-46

REAR SHOCK SHIMS

P/N	SIZE (mm)	MOQ (minimum order quantity)
503 189 011	22 × .114	5
503 189 012	22 × .152	5
503 189 013	22 × .203	5
503 189 014	22 × .254	5
503 189 015	22 × .305	5
503 189 016	24 × .114	5
503 189 017	24 × .152	5
503 189 018	24 × .203	5
503 189 019	24 × .254	5
503 189 020	24 × .305	5
503 189 021	26 × .114	5
503 189 022	26 × .152	5
503 189 023	26 × .203	5
503 189 024	26 × .254	5
503 189 025	26 × .305	5
503 189 026	28 × .114	5
503 189 027	28 × .152	5
503 189 028	28 × .203	5
503 189 029	28 × .254	5
503 189 030	28 × .305	5
503 189 031	30 × .114	5
503 189 032	30 × .152	5
503 189 033	30 × .203	5
503 189 034	30 × .254	5
503 189 035	30 × .305	5
503 189 036	36 × .152	5
503 189 037	36 × .203	5
503 189 038	36 × .254	5
503 189 039	40 x 114	5
503 189 040	40 x 203	5
503 189 041	40 x 254	5

PISTONS

P/N	SIZE	MOQ (minimum order quantity)
503 189 004	0.0	1
503 189 003	1.2	1
503 189 002	1.7	1
503 189 001	2.0	1

SHOCK CALIBRATION WORK SHEET

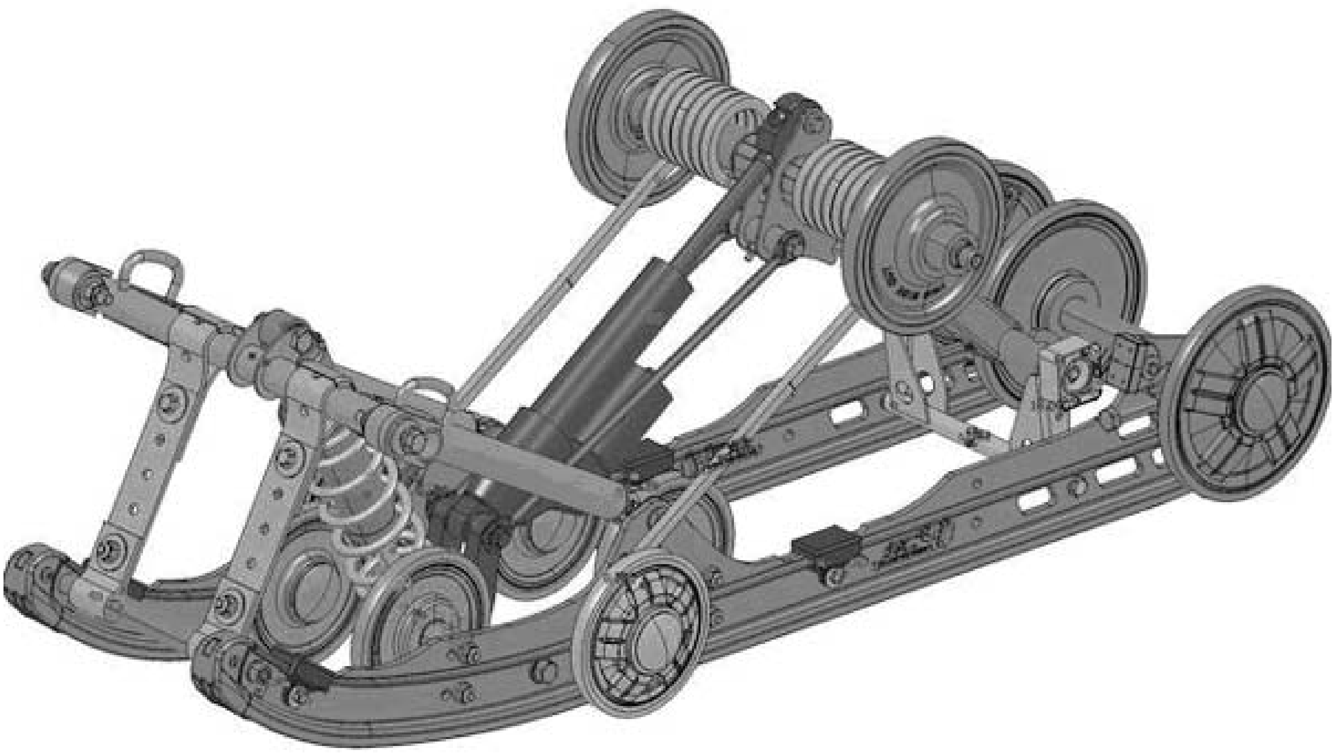
MODEL: ______________________________ DATE: ____________________

RIDING CONDITIONS: ____

	FRONT	CENTER	REAR	OPTION
PISTON SLITS				
IFP HEIGHT				
COMPRESSION				
REBOUND				
SPRING				
PRELOAD				

NOTES: ____

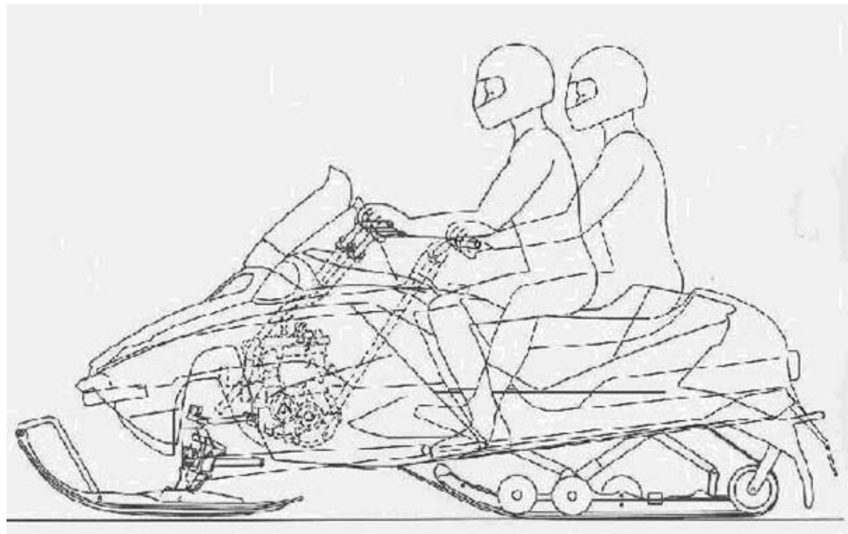
SC IV REAR SUSPENSION



THE SC IV REAR SUSPENSION

All suspensions in the past have been designed with the fact that the rider was sitting over the rear arm.

With this in mind, engineers have designed most of the bump absorption into the rear arm. The front arm was for the most part looked at only as a means of adjusting weight transfer and has always been of a falling rate design. The SC-10, II & III are both excellent suspensions and have been finely tuned to work very well over the past few years. However with the advent of the REV and it's forward riding position engineers decided to rethink and improve the rear suspension.



Since the rider is now seated close to the front arm the roles of the front and rear arm were changed.

Conventionally designed suspensions work very well in most riding conditions, however, weight transfer and bump absorption in the deepest moguls could be made even better.

This is where the SC IV comes in, it is the first rear suspension designed from the ground up with the rider sitting close to the front arm in mind.

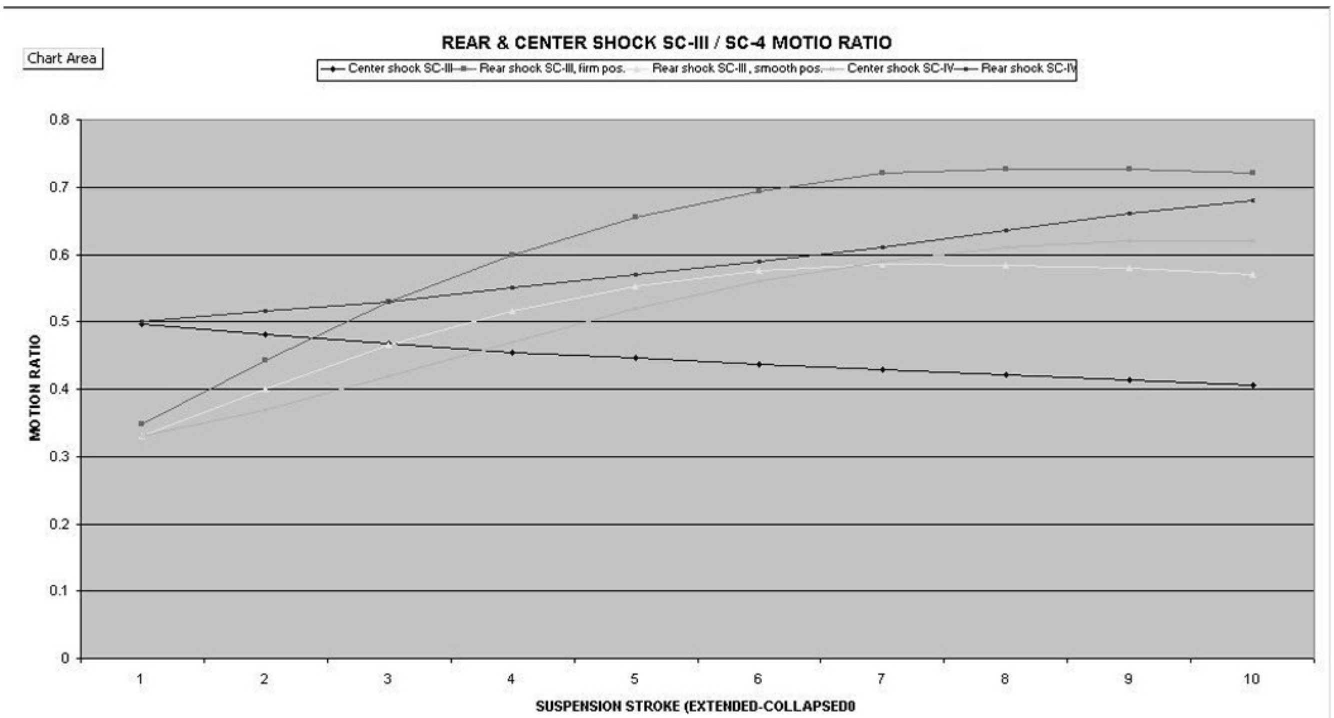
The goals were relatively simple however they have taken a total redesign to achieve.

1. Increase weight transfer from 0-30 mph.
2. Decrease weight transfer at higher trail speeds to improve feel when exiting out of corners.
3. Optimize center shock motion ratio for the REV and RT chassis.
4. Increase rear suspension travel.
5. Increase overall strength.
6. Reduce overall weight.

The engineers have accomplished all of this and more with the SC IV rear suspension which was race tested for the past two seasons on our open mod race sleds. As part of our continued efforts to improve our products, this suspension is now making its way to production on selected 2005 models.

ON RIDER FORWARD VEHICLE:

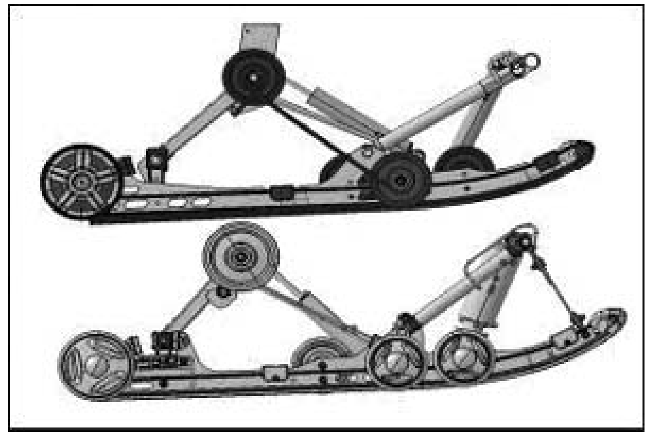
In the bumps, on a rider forward vehicle, the front arm and center shock do more of the work, since the rider and most of the vehicle's mass is concentrated over the center arm. Conversely, on acceleration weight transfer is more difficult since the rider and vehicle's mass are moved farther forward compaired to conventional vehicle.



The motion ratio curve above depicts the major differences between the SC III & SC IV rear suspensions. If we take a close look at the center shock's motion ratio, you will see the SC III's front arm is a 15% falling rate design, the SC IV's is a 78% rising design.

CONSTRUCTION:

This major change allows the front arm to be supple in the little bumps and still resist bottoming if the rider encounters big ones.

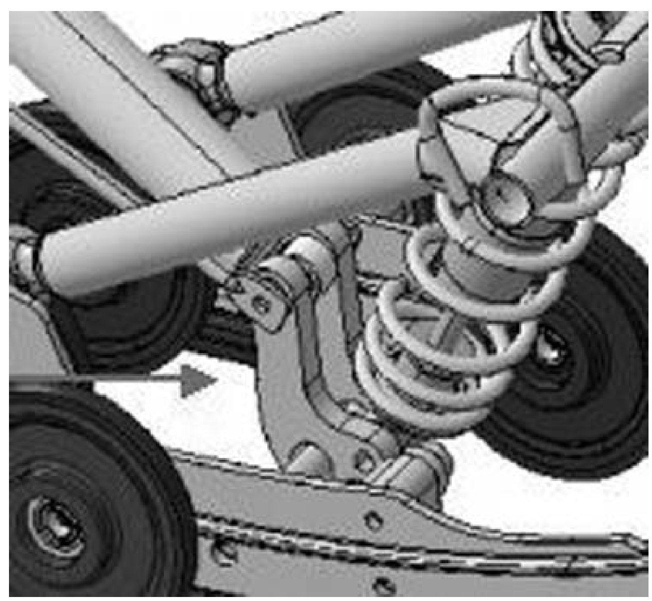


By designing the rear arm into a "slight" rising rate design, the weight transfer under acceleration is enhanced from 0-30 mph and is decreased at higher trail speeds. These changes were accomplished by linking the front shock through a pivoting mechanism to the rear arm. The front arm has also been lengthened and lowered.

Another unique change is the pass through front arm design.

This along with the longer rear arm allows the suspension 1" more travel. The pivoting bell cranks are made of aluminum for lightweight.

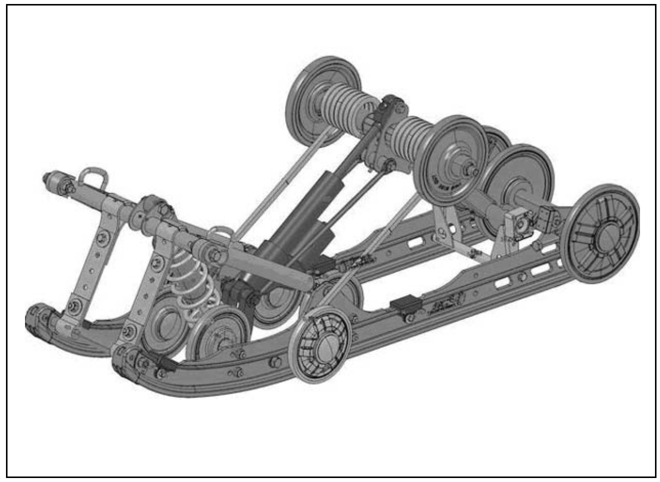
Note that the motion ratio rods are non-adjustable.



Here are some of the other highlights of this suspension:

1. Total weight of SC IV is 1.36 KG (3 lbs) less than the SC-3.

2. Rails are 3mm (1/8”) taller and slightly thicker for a 26% decrease in vertical flex and a 30% improvement in lateral flex.



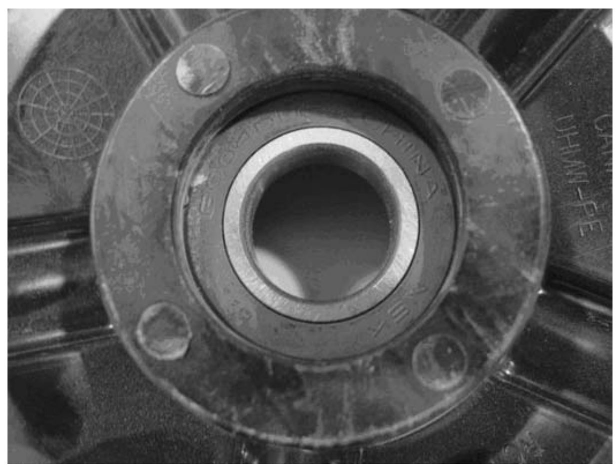
3. Offset idler wheels on rail to reduce noise.

4. Idler wheels are larger, 141mm versus 135mm due to increased rail height.

5. Labyrinth seals on idler bearings to reduce risk of water infiltration.

6. Smaller diameter idler wheel bearings used throughout.

7. Rear axle and bearings are smaller diameter.

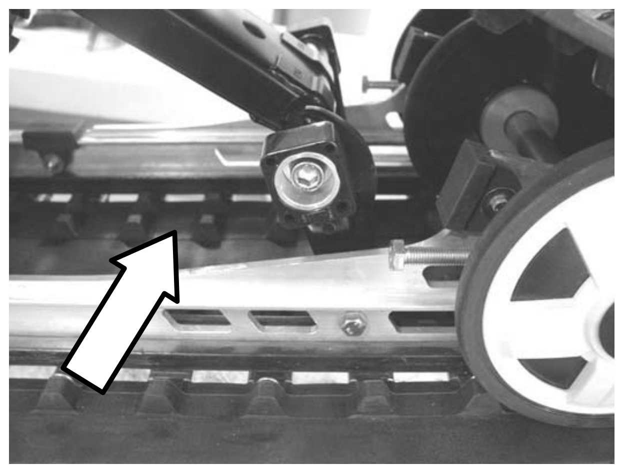


8. Teflon pivot bushings used throughout suspension.

9. Coupling blocks can now be used on their 4 sides thus 4 different adjustments.

10. No coupling front to rear. This reduces kick in downhill bumps and deceleration.

11. Rear coupling area is larger allowing more weight transfer.



Mission accomplished!

The SC IV suspension was designed to optimize the rider forward vehicle type. On the REV and the RT chassis, the front arm and center shock do more of the work.

TABLE OF CONTENTS

ENGINE TUNING CAUTIONS

Here are a few items to keep in mind when working with your engine.

If you are in stock classes, know what adjustments are legal.

Modifications to the power curve of an engine will require recalibration of the transmission.

The lower the RPM at which you can generate the torque you need, the higher the percentage of that power that will reach the track.

Sloppy engine modification usually results in less power than you had stock.

Use the proper octane gasoline for your engine (Modification may require higher octane.).

Correct your carburetor jetting for the atmospheric conditions which exist at the time as close as possible to the time you will be competing.

Follow the assembly and disassembly procedures outlined in the appropriate *Shop Manual.*

BASIC ENGINE THEORY

Terminology

CYCLE	In a combustion engine, a cycle is accomplished when the four (4) phases; intake, compression, ignition and exhaust are complete.
TDC	**Top Dead Center:** The position of the piston when it reaches the upper limit of its travel inside the cylinder. BTDC: Before Top Dead Center ATDC: After Top Dead Center
BDC	**Bottom Dead Center:** The position of the piston when it reaches the lower limit of its travel inside the cylinder. BBDC: Before Bottom Dead Center ABDC: After Bottom Dead Center
BORE	Diameter of the cylinder.
STROKE	The maximum movement of the piston from BDC to TDC. It is characterized by 180° of crankshaft rotation.
COMBUSTION CHAMBER	Space between cylinder head and piston dome at TDC.
DISPLACEMENT	The volume of the cylinder displaced by the piston as it travels from TDC to BDC. The formula is: $\frac{\text{Bore}^2 \times \text{Stroke} \times \pi}{4}$ 20 = (π = 3.1416) Expressed in cc (cubic centimeters)
NOTE: To transfer cc to cubic inches, divide cc by 16.387.	
COMPRESSION	Reduction in volume or squeezing of a gas.

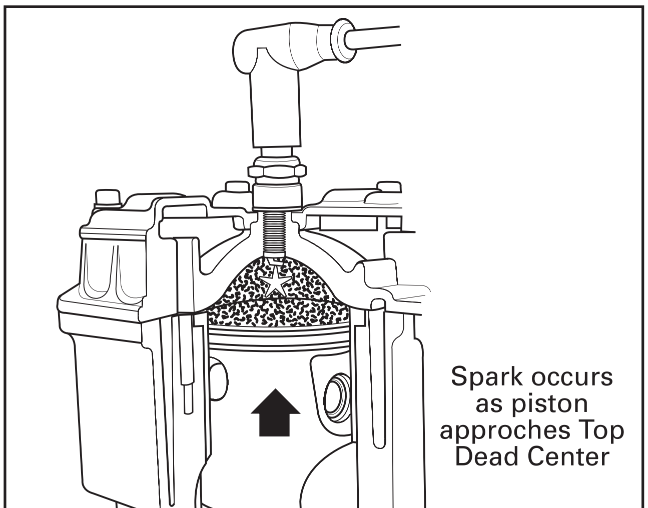
Combustion Process

NORMAL COMBUSTION

Since the beginning of this study we have spoken of air/fuel mixture combustion rather than explosion. This combustion is a slow then accelerated burning of the mixture within the combustion chamber. Ignition occurs with the firing of the spark plug.

This initial process generates heat and pressure which in turn, is transmitted by conduction to the contiguous portion of the unburned mixture. When this portion has reached the point of self-ignition it starts to burn releasing more pressure and heat.

This burning action, called a flame front, travels at a speed of approximately 30.3 m (100 feet) per second until all mixture is burned, thus providing maximum piston thrust.



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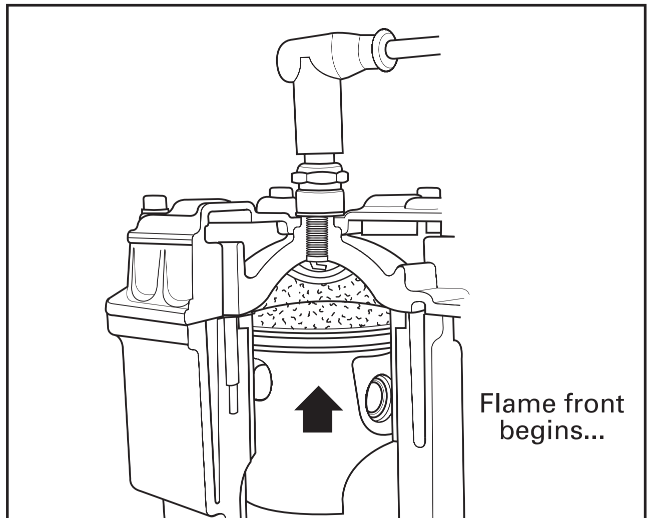

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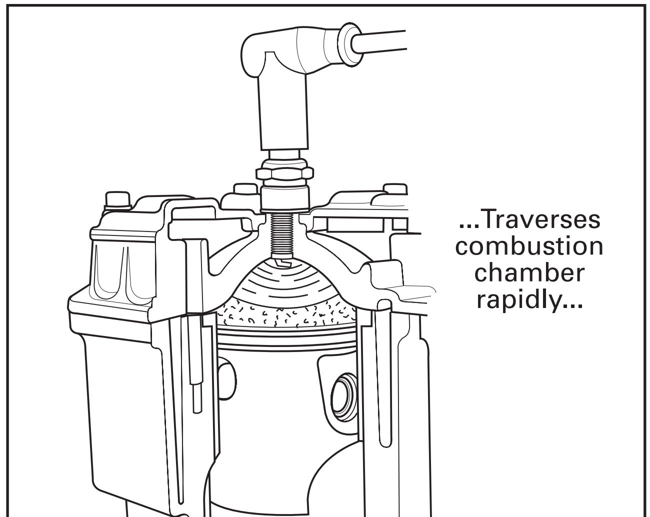

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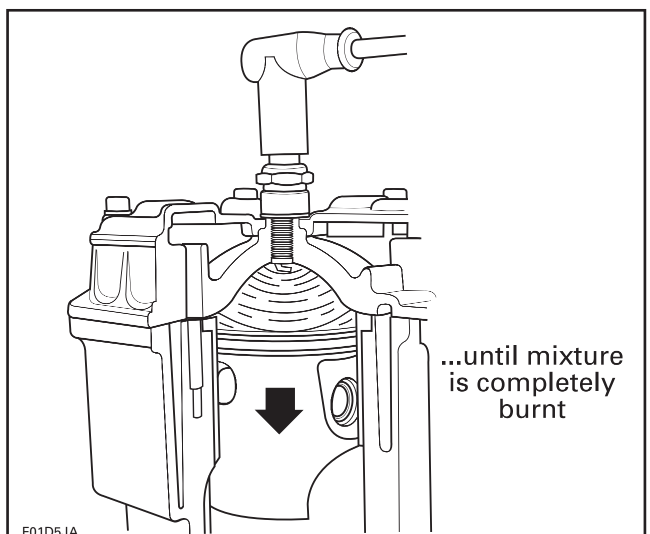

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With all operating parameters correct, normal combustion will take place. However, if for some reason the temperature inside the cylinder is increased during combustion, abnormal combustion will occur and lead to serious engine damage.

DETONATION

In detonation, the spark plug initiates burning and the air/fuel mixture starts to burn in the usual manner but as combustion continues, the heat generated affects the large portion of the yet unburned air/fuel mixture.

This unburned mixture temperature becomes so high that it burns spontaneously creating high-velocity pressure waves within the combustion chamber.

These shock waves can sometimes be heard as pinging. While these shock waves can be detrimental to the mechanical integrity of the engine, it is the excessive heat that causes most problems in 2-strokes. The piston may expand excessively causing a seizure or the piston may melt. The melting will occur at the hottest points, which will be right below the spark plug and around the edge of the piston — often at a ring locating pin. If allowed to continue, a hole may melt completely through the top of the piston.

PRE-IGNITION

Pre-ignition is the ignition of the mixture inside the combustion chamber before the timed spark. Pre-ignition sources are generally an overheated spark plug tip or a glowing carbon deposit on the piston head. Since ignition occurs earlier than the timed spark, the hot gases stay longer in the combustion chamber, thus increasing cylinder head and piston temperatures to a dangerous level.

Usually the piston is subject to damage. It may seize or the aluminum on the exhaust side of the piston dome may melt. Pre-ignition is always preceded by detonation.

CAUSES OF DETONATION:

Octane of the fuel is too low.

Air/fuel mixture is too lean.

a. Incorrect jetting.
b. Air leaks.
c. Varnish deposits in carburetor.
d. Malfunction anywhere in fuel system.

Spark plug heat range too high.

Ignition timing too far advanced.

a. Initial timing incorrect.
b. Ignition component failure.

Compression ratio too high.

a. Improperly modified engine.
b. Deposit accumulation on piston dome or head.

Exhaust system restrictions.

a. Muffler plugged/restricted.
b. Tail pipe diameter too small.
c. Incorrect design of expansion chamber.

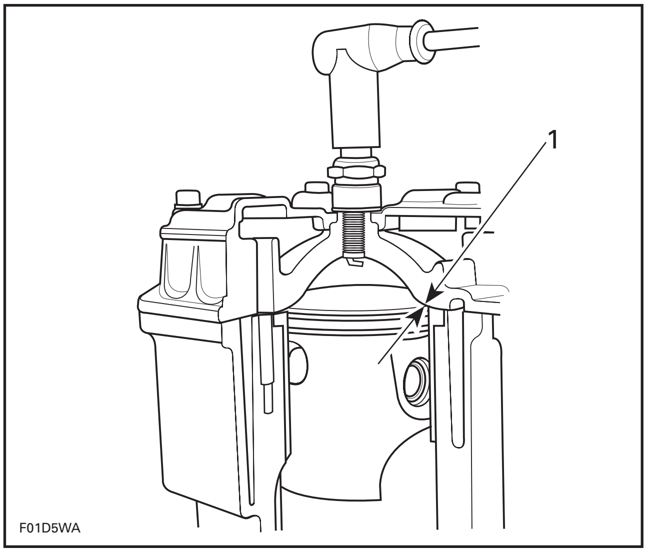
General overheating.

a. Broken fan belt.
b. Loss of coolant.
c. Lack of snow on heat exchangers.

Coolant or water entering combustion chamber.

SQUISH AREA

Rotax cylinder heads incorporate a squish area. This area is basically a **ledge** projecting beyond the combustion chamber area. In operation, as the piston ascends and approaches the ledge, a rapid squeezing action is applied to the air/fuel mixture contained in the area immediately between the piston dome and the ledge. This squashing action forces the entrapped mixture rapidly into the combustion chamber area, creating a greater mixture turbulence. Additionally, the small volume and large surface area of the squish band allow a better cooling of the end gases to help prevent detonation.

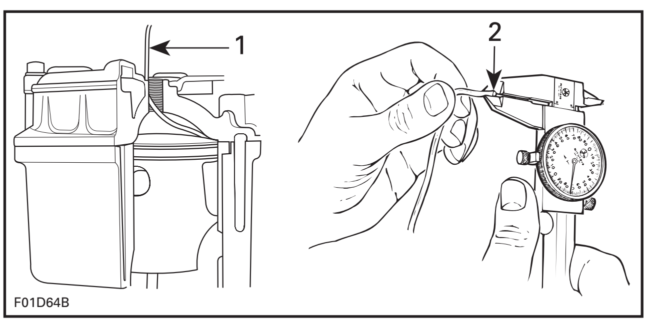


1. *Squish area*

If the squish clearance is increased, a loss in power will occur while too small a squish clearance will lead to detonation.

The squish clearance can be measured by inserting a piece of rosin core solder into the combustion chamber, rotating the engine through TDC, removing the solder and measuring the thickness of the compressed solder.

The solder should be inserted above and in line with the wrist pin. Measure the squish on both sides of piston as it may vary from side to side.



1. *Solder*
2. *Flattened area*

CAUTION: Do not use acid core solder; the acid can damage the piston and cylinder.

OPERATION OF THE RAVE VALVE

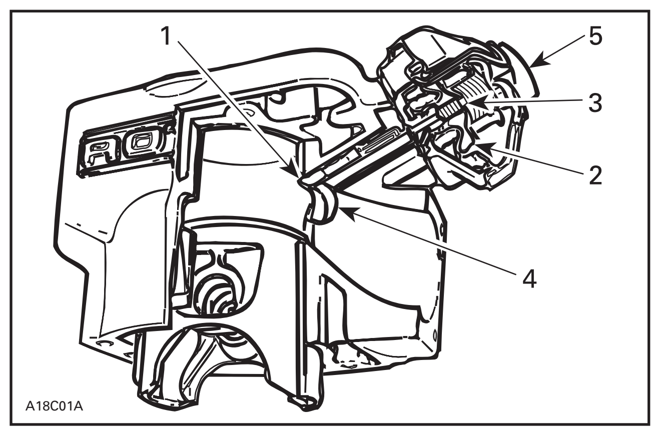
NOTE: Rave stands for Rotax Adjustable Variable Exhaust.

Theory

For a two-stroke-cycle engine to have high power capacity at high crankshaft speeds, a high volumetric or breathing efficiency is required and the fresh charge losses must be minimized. The result is achieved by opening the exhaust port early (94.5° BBDC) and utilizing the resonant effects of the tuned exhaust system to control fresh charge losses.

When an engine of this design is run at a medium speed, efficiency falls off quickly. The relatively high exhaust port effectively shortens the useful power stroke and because the exhaust system is tuned for maximum power, there is a large increase of fresh charge losses. As a result, the torque decreases along with a dramatic increase of the specific fuel consumption. Higher torque along with lower fuel consumption can be obtained at lower engine speeds if the time the exhaust port is open is shortened.

BOMBARDIER-ROTAX has patented a remarkably simple system to automatically change the exhaust port height based on pressure in the exhaust system.



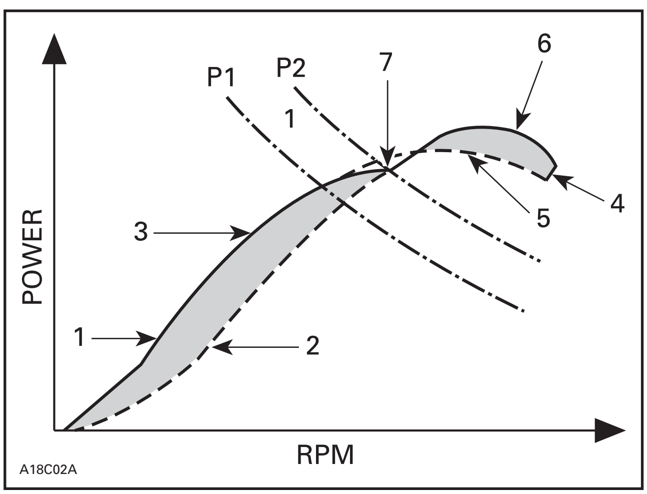
1. *Guillotine*
2. *Diaphragm*
3. *Return spring*
4. *Exhaust port*
5. *Red plastic adjustment knob*

Located above the exhaust port is a guillotine-type slide valve (item 1). This rectangular valve is connected by a shaft to a diaphragm (item 2) which is working against the return spring (item 3). Two small passages in the cylinder just outside the exhaust port (item 4) allow exhaust gas pressure to reach the diaphragm. As the throttle is opened and the engine begins producing more power, the pressure against the diaphragm will overcome the pressure of the return spring and the RAVE valve will open.

To the outside of the return spring is a red plastic adjustment knob (item 5). Turning the adjustment in or out changes the preload on the return spring which, in turn, will change the RPM at which the RAVE valve opens and closes. The exhaust port height changes a total of 4 mm to 6 mm (depending on engine type) from the RAVE valve fully closed to fully open.

Operation

The RAVE valve does not allow an engine to make higher peak horsepower than an engine not so equipped, it can make moving the peak higher practical because of its effect on the rest of the power curve. Item 2 in following illustration is the power curve of an engine with the RAVE valve held fully open through its entire RPM range. Item 6 notes the peak power produced. That peak will not change if the exhaust port time of a similar engine without a RAVE valve was the same (with all other features equal).



Item 1 is the power curve of the engine with the RAVE closed through its entire RPM range. The shaded area (item 3) is the improvement in power at lower engine speeds that is gained because of the lower exhaust port. If the port remains at this height, however, the power would peak as noted in item 5. Raising the exhaust port at the proper RPM (item 7) will allow the engines peak power to continue to rise to item 6.

Item P1 in the illustration is the pressure of the return spring against the diaphragm. The exhaust pressure must be high enough to overcome this pressure before the valve begins opening. Item P2 is the pressure required to completely open the RAVE valve. Between P1 and P2, the usable power curve of the engine is moving from power curve 1 to power curve 2. This transition takes place very rapidly at full throttle and from a practical standpoint can be considered to be instantaneous at item 7 which for the type 583 engine is at 6300 - 6400 RPM. Gradual application of the throttle, however, will result in the RAVE valve opening much later, i.e. 7300 - 7500 RPM.

If the RAVE valve opens too late, the engine will bog or hesitate momentarily as the RPM increases. Full peak performance (item 6) is still available. From a functional point of view. it is better to have the valve open a bit early than a bit late. This fact is due to certain dynamic conditions that exist on the snowmobile, i.e., the clutch and torque converter.

Adjustment

The red cap on the RAVE valve cover should be turned all the way in and bottomed in normal use. Backing the red adjuster out will reduce the spring preload and allow the RAVE valve to open at a lower RPM.

At high altitudes, exhaust gas pressures will drop and the spring preload may have to be decreased. It is doubtful that any adjustment will be required up to an altitude of 2400 m (8000 ft). Above that, however, the spring preload can be reduced by turning the red adjustment screw out up to a maximum of four turns.

The only other time adjustment of the spring preload should be considered is if the engine has been modified in any way.

AVAILABLE RAVE SPRINGS

Spring P/N	Wire Dia. mm (in)	Free Length mm (in)	Preload in N (LBF) at Compressed Length of 14 mm (.551 in)
420 239 948	1.0 (.039)	38.0 (1.50)	19.5 (4.37)
420 239 944	0.9 (.035)	48.5 (1.91)	15.9 (3.56)
420 239 942	0.8 (.031)	42.5 (1.67)	7.3 (1.64)
420 239 941	0.8 (.031)	52.5 (2.07)	10.5 (2.36)

Maintenance

There are no wear parts anywhere in the system and there are no adjustments to be periodically checked. The only possible maintenance required would be cleaning of carbon deposits from the guillotine slide. Cleaning intervals would depend upon the user's riding style and the quality of the oil used. Using Ski-Doo oil, we would suggest annual cleaning of the valve. If a customer uses a lower quality, high ash oil, more frequent cleaning may be required.

No special solvents or cleaners are required when cleaning the valve.

Bench Test for Checking RAVE Valve Operation

The operation of the valve can be checked by pressurizing the engine as one would when checking for crankcase leaks.

The engine must be sealed at all exhaust flanges, all carburetor inlets, and at the fuel pump impulse fitting. Depending on the design of your pressure test kit, you may be pressurizing the engine through the crankcase or right at the exhaust flange cover plate. If you are pressurizing through the crankcase, make certain the piston uncovers the exhaust port on the side you are checking.

Install the RAVE valve movement indicator (P/N 861 725 800) in place of the red plastic adjuster on the diaphragm cover so that you can observe the diaphragm movement.

The movement indicator must be turned all the way in to provide maximum spring pre-load. As you begin pressurizing the engine using engine leak tester kit (P/N 861 749 100), you will find the RAVE valve beginning to move at 5 kPa (0.7 PSI or 20 inches of water) and the valve will be fully displaced when you reach 10 kPa (1.4 PSI or 40 inches of water).

NOTE: Due to the low pressure conditions when using the leak tester kit (P/N 861 749 100) to check the RAVE valve operation, install a gauge with a range of 0-200 inches of water (P/N 861 749 100) on leak tester. As reference 6.89 kPa 1 (PSI) = 27.71 inches of water.

Troubleshooting

SYMPTOM	CAUSE	REMEDY
Engine revs 500 to 1000 RPM lower than its maximum operational RPM; Rave valve is not opening.	1. Bent valve rod	Replace
	2. Stuck valve	Clean
	3. Wrong spring tension (too high)	Replace
	4. Clogged passages	Clean
	5. Damaged bellows or clamp(s)	Replace
Engine hesitation in mid RPM range and full peak performance is available only after a while. Rave valve opens too early.	1. Broken or weak spring	Replace
	2. Adjustment screw too far out	Turn until it bottoms
	3. Valve stuck open	Clean

SKI-DOO utilizes cylinder reed induction technology on the new Series 3 twin cylinder engines. This technology is beneficial in three ways.

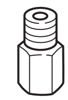
1. It uses less parts, (i.e. shafts, rotary valve discs, etc.). Resulting in a lighten engine package.
2. This technology results in positive control of fuel mixture, while providing a straight pathway to the intake and transfer ports as it is not obstructed by the rotating crankshaft.
3. By locating the carburetors higher on the engine this design allows for lower engine placement in the chassis.

BASE GASKETS		
453	P/N 420 931 580	0.3 mm
	P/N 420 931 581	0.4 mm
	P/N 420 931 583	0.5 mm
	P/N 420 931 582	0.6 mm
	P/N 420 931 584	0.8 mm
493	P/N 420 931 588	0.5 mm
	P/N 420 931 589	0.8 mm
	P/N 420 931 960	0.7 mm
	P/N 420 931 587	0.6 mm
593	P/N 420 931 582	0.6 mm
	P/N 420 931 962	0.7 mm
	P/N 420 931 583	0.5 mm
	P/N 420 931 584	0.8 mm
693	P/N 420 931 892	0.6 mm
	P/N 420 931 893	0.5 mm
	P/N 420 931 894	0.7 mm
	P/N 420 931 895	0.8 mm
793	P/N 420 931 838	0.5 mm
	P/N 420 931 837	0.6 mm
	P/N 420 931 964	0.7 mm
	P/N 420 931 839	0.8 mm

CARBURETION

Carburetor Main Jet Correction Chart

CARBURETOR MAIN JET CORRECTION CHART



FT/METER	°F/°C							
	- 60/ - 50	- 40/ - 40	- 20/ - 30	- 0/ - 20	+ 20/ - 5	+ 40/ - 5	+ 60/ - 15	+ 80/ - 25
0	111.10	107.40	103.70	% 100.00	96.30	92.60	88.90	85.20
2000/ 600	105.77	102.07	98.37	94.67	90.97	87.27	83.57	79.87
4000/ 1200	100.43	96.73	93.03	89.33	85.63	81.93	78.23	74.53
6000/ 1800	95.10	91.40	87.70	84.00	80.30	76.60	72.90	69.20
8000/ 2400	89.7	86.07	82.37	78.67	74.97	71.27	67.57	63.27
1000/ 3000	84.44	80.74	77.04	73.34	69.64	65.94	62.24	58.54

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NOTE: When the answer gives an unavailable jet size, select the next highest (richer) jet.

Example:

With a 250 stock main jet, at an altitude of a 600 m (2000 ft) and a temperature of - 5°C (20°F):

$$250 \times \frac{90.97}{100} = 227\text{; use 230 jet.}$$

CAUTION: These values are guidelines only. Specific values/adjustments vary with temperature, altitude and snow conditions. Always observe spark plug condition for proper jetting.

This table is more than adequate for stock engines. Two-stroke engines with high specific outputs that are heavily modified (twin pipes, high compression, large carburetors, etc.) and performing at high RPM are very sensitive to air density changes. The following is a very accurate formula for correcting jetting.

First, a baseline for jetting must be established.

Jetting, horsepower, and B.S.F.C. data can be obtained with dyno testing but also confirmed with field testing. The tried and true method of determining mixture ratio is to inspect the parts of the engine that are directly exposed to the combustion process. The two best indicators are the spark plug and the piston dome. The color and where it is located are the two things to look for. Chocolate brown on the insulator, ground electrode, and piston dome indicate a proper mixture. The ground electrode should show a difference in color just at the radius of the electrode.

The engine must be operated under load for at least one minute to obtain accurate readings.

Establish the C.R.A.D. by using the following formula:

$$\text{C.R.A.D.} = \frac{1737{,}97 \text{ x C.A.P.}}{460 + T}$$

C.A.P. = Corrected air pressure

C.A.P. = B - E

B = Barometric pressure readings (in – Hg)

$$E = \text{Vapor pressure} = \left(\text{S.P. x } \frac{\text{R.H.}}{100}\right)$$

See saturation pressure (chart 1).

S.P. = Saturation pressure (in – Hg)

R.H. = Relative humidity (%)

Record the C.R.A.D. when correct jetting has been established. This is your base line for future use.

Example: Testing established a 400 main jet at C.R.A.D. of 100%. One week later, the C.R.A.D. at the track is 110%. Use the following formula to establish the new main jet.

$$\text{New main jet} = \frac{\text{New C.R.A.D.} \times \text{Baseline main jet}}{\text{Base line C.R.A.D.}}$$

$$\text{Example: } \frac{110 \times 400}{100}$$

New main jet = 440

Record the C.R.A.D. when correct jetting has been established. This is the baseline for future use. Jetting corrections for a different C.R.A.D. can be obtained with the following ratio:

$$\text{New main jet} = \frac{\text{New C.R.A.D.} \times \text{Base line M.J.}}{\text{Base line C.R.A.D.}}$$

Example: Testing results in a 570 M.J. at a C.R.A.D. of 105.4%. Two weeks later at the race track, the C.R.A.D. is 110.9%.

$$\text{The new M.J.} = \frac{110.9 \times 570}{105.4}$$

New M.J. = 600

Useful Equations

$$\text{C.F.} = \frac{29.92}{B - E} \times \frac{460 + T}{520}$$

C.A.P. = B – E

$$\text{C.R.A.D.} = \frac{1737.97 \times \text{C.A.P.}}{460 + T}$$

Where:

B = barometer reading (in-Hg)

E = vapor pressure (in – Hg) = S.P. × $\frac{\text{R.H.}}{100}$ or use wet bulb/dry bulb temperature and psychrometric chart

T = carb. inlet air temp (°F)

S.P. = saturation pressure (in-Hg)

R.H. = relative humidity (%)

C.A.P. corrected air pressure (in-Hg)

C.HP = Corrected brake horsepower

B.S.F.C. = Brake specific fuel consumption

C.R.A.D. = Corrected relative air density (%)

E.G.T. = Exhaust gas temperature

W.O.T. = Wide open throttle

SATURATION PRESSURE (CHART 1)	
T = TEMP. (°F)	S.P. = SATURATION PRESSURE (in-Hg)
- 40	.004
- 30	.008
- 20	.012
- 10	.020
0	.040
5	.055
10	.070
15	.090
20	.110
25	.140
30	.170
35	.208
40	.247
45	.314
50	.380
55	.450
60	.521
65	.630
70	.739
75	.884
80	1.030
85	1.225
90	1.420
95	1.675
100	1.930

Most racers use an air density gauge. This gauge is fairly inexpensive. It basically establishes C.R.A.D. for you by combining the variables on any given day.

First, establish a base line main jet by testing.

After you have determined the correct main jet, record the jet number and the air density gauge reading.

Example: Base line

Gauge reading 90

Main jet 300

The next day at the track, your air density gauge now reads 105. This means you have gained 15% air density.

New density 105

Base line 90

105 – 90 = 15

Multiply your base line main jet by 115.

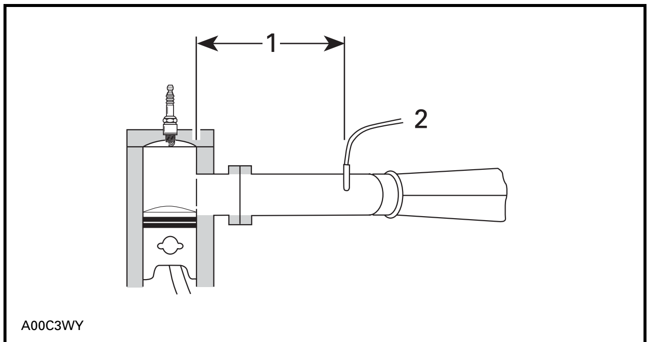
Example: 300 x 115 = 345

Round off to next highest jet size.

New main jet = 350

Air density can change rapidly during the course of the day. Check your gauge frequently. Always use the same gauge for a different gauge may read differently.

Exhaust Gas Temperature Probe Location



Detonation = 720°C (1330°F)

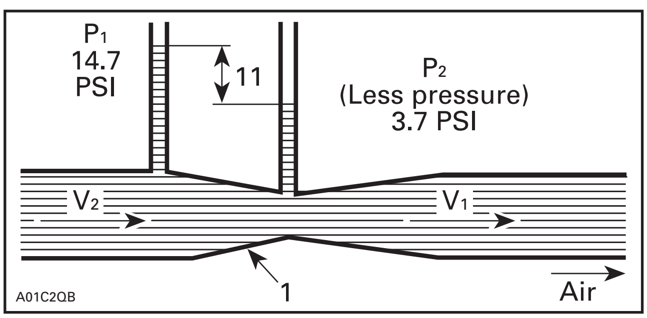
1. 100 mm from piston
2. Probe

NOTE: Temperature at wide open throttle at maximum HP RPM.

Exhaust gas temperatures (E.G.T.'s) can also give an indication of mixture ratio. At wide open throttle (W.O.T.) at maximum HP RPM, a leaner mixture will produce higher E.G.T.'s and a richer mixture will result in lower E.G.T.'s. (E.G.T.'s are not absolute. Engines have seized with E.G.T.'s in the allowable range).

Carburetor Operation

The operation of the carburetor is based on the physical principle that fluids (air is a fluid) under pressure gain speed but lose pressure when passing through a converging pipe (venturi).

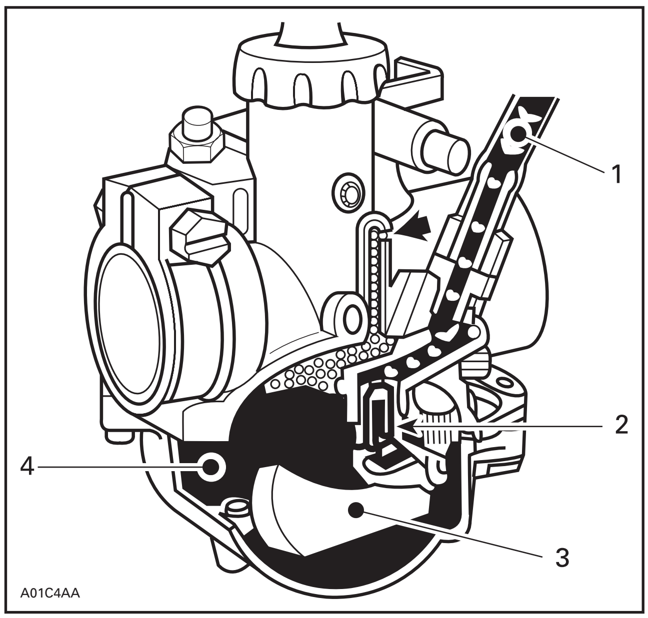


1. Venturi

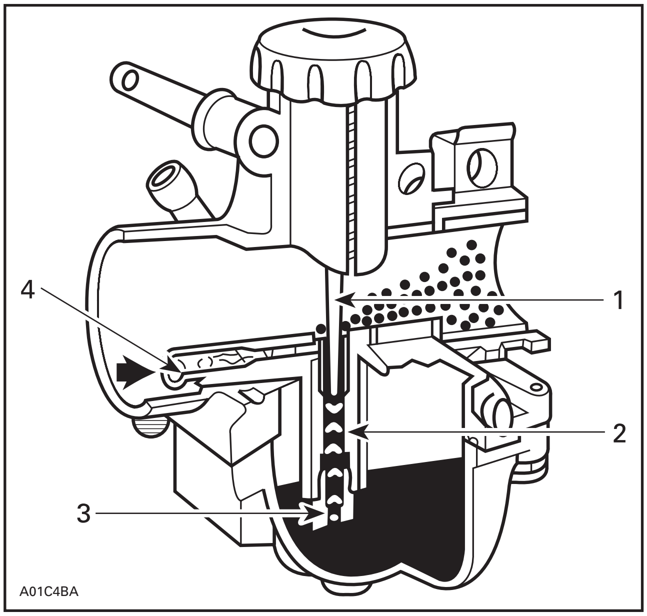
Air entering the bell of the carburetor has a speed of V_1 and pressure of P_1. As the air is forced into the smaller diameter of the venturi, speed increases (V_2) but pressure drops (P_2).

Passages in the carburetor connect the venturi to a reservoir of fuel (float bowl). The float bowl is vented to the atmosphere (P_1). P_1 is greater than P_2 so fuel is pushed from the bowl to the venturi via the jets and passages. Varying the size of jets varies the amount of fuel the engine receives. Engine speed is controlled by varying the amount of air/fuel mixture that the engine receives.

Liquid gasoline does not burn, so for the engine to run efficiently, the fuel must be broken down into small droplets, and mixed with the oxygen molecules in the incoming air. This is referred to as atomization. The shape of the venturi and the shape and location of the jets and fuel delivery passages will determine how well the fuel and air are mixed.



1. Float bowl
2. Needle valve
3. Float
4. Fuel inlet

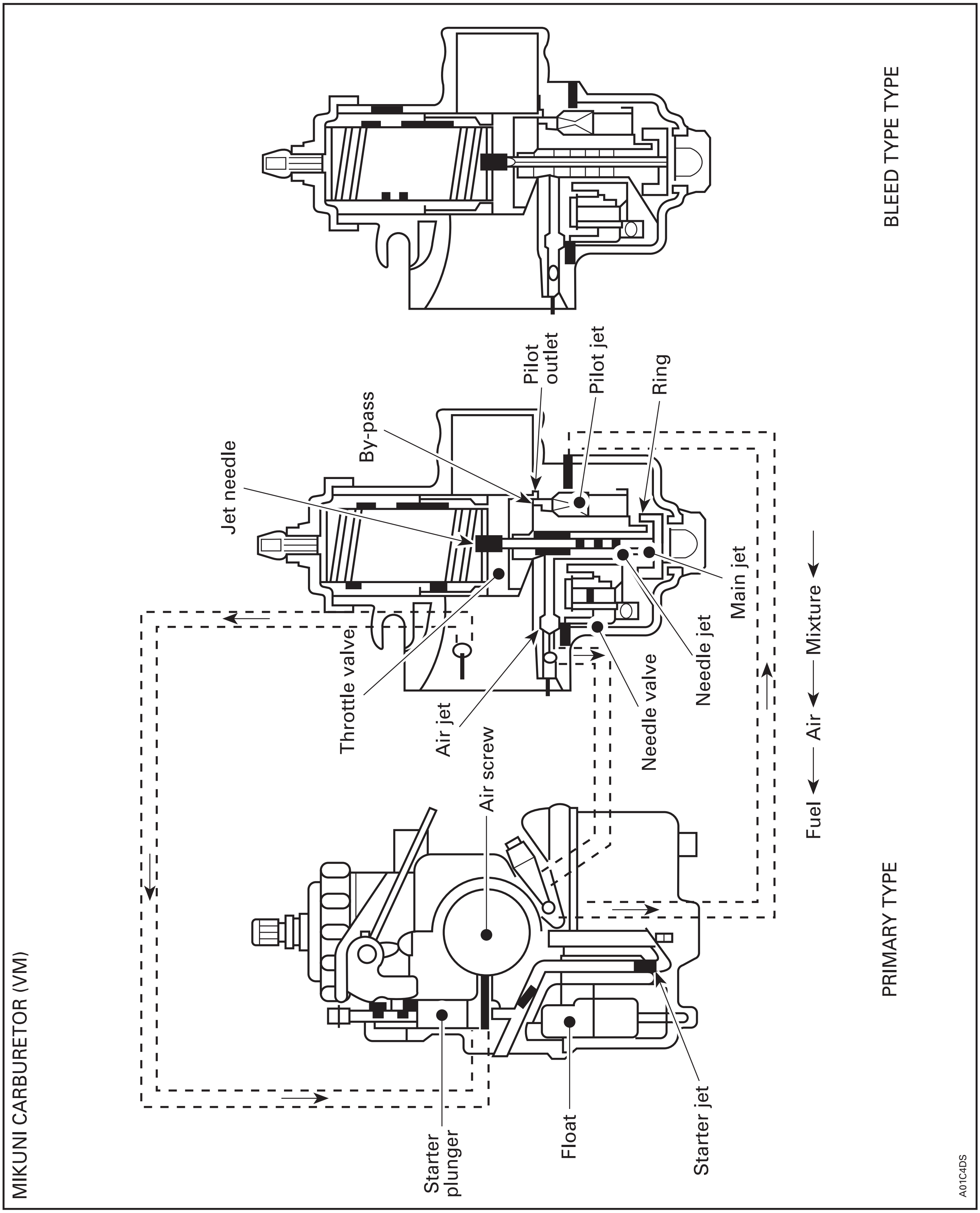


1. Jet needle
2. Needle jet
3. Main jet
4. Air jet

MIKUNI VM AND TM TYPE CARBURETORS

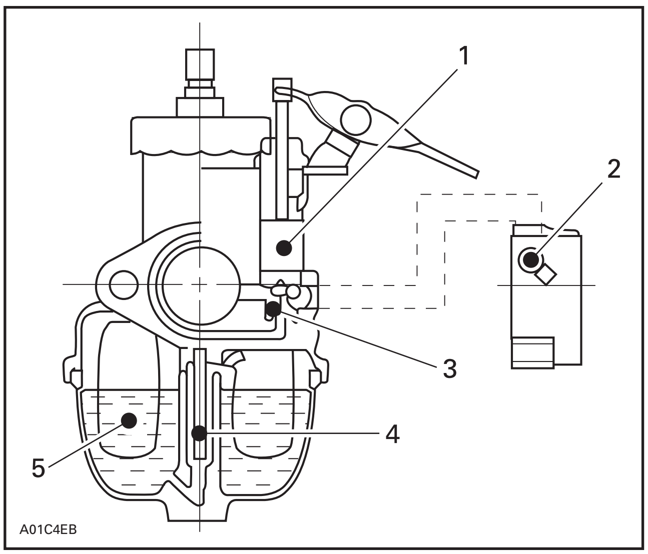
Snowmobile engines are operated under a wide range of conditions, from idling with the throttle valve remaining almost closed to the full load (the maximum output) with the throttle valve fully opened. In order to meet the requirements for the proper mixture ratio under these varying conditions, a low-speed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

While this text covers the VM-type carb., the TM flat slide carb. functions the same. The circuits function the same and tuning a TM would be done in the same manner as the VM.


MIKUNI CARBURETOR (VM)
PRIMARY TYPE
BLEED TYPE TYPE
Jet needle
By-pass
Pilot outlet
Pilot jet
Ring
Main jet
Needle jet
Needle valve
Throttle valve
Air jet
Air screw
Starter plunger
Float
Starter jet
Fuel
Air
Mixture
A01C4DS

Starting Device (enrichner)

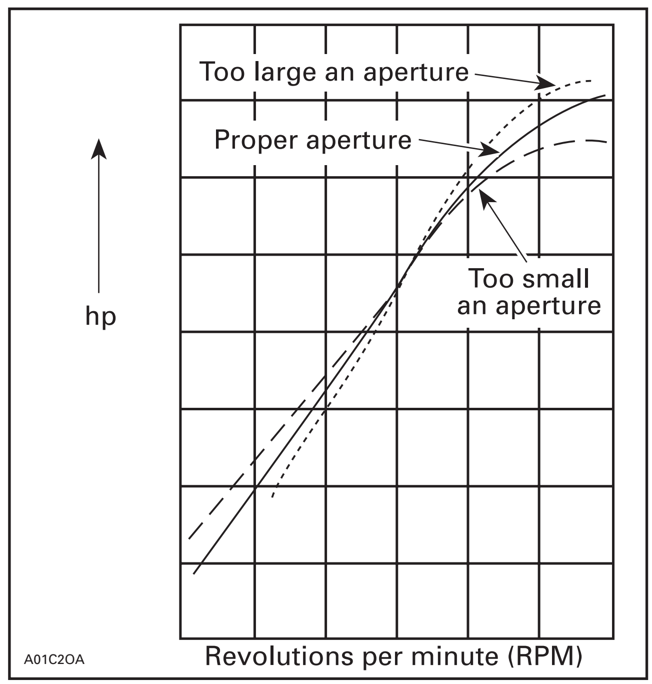
Instead of a choke, the enrichner system is used on some Mikuni carburetors. In the starter type, fuel and air for starting the engine are metered with entirely independent jets. The fuel metered in the starter jet is mixed with air and is broken into tiny particles inside the emulsion tube. The mixture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



1. *Plunger area*
2. *Emulsion tube*
3. *Inlet pipe*
4. *Needle jet*
5. *Float*

Selection of the Aperture of Carburetor

One of the prerequisites for improving the output is to use a carburetor with as large an aperture as possible. However, a large aperture alone does not necessarily improve the output. As shown in the following illustration, it is true that a large aperture improves the power output in the high speed range. In the slow speed range, on the other hand, the output drops. The aperture of a carburetor is determined by various factors. These factors include (1) whether the vehicle is intended for racing, (2) the design of the engine, (3) driving technique of the driver, (4) the driver's preference, etc. In addition, the maximum output, the maximum torque and the minimum number of revolutions for stable engine operation must also be taken into account.



Size of Mikuni Carburetors

Mikuni VM-type carburetors come in various sizes, with the main bore ranging from 10 mm (.39 in) to 44 mm (1.73 in) (in even numbers for the most part.) The carburetor body is made of aluminum or zinc.

Carburetor Test

Once the aperture of the carburetor is determined, a test to select the proper jet should be made. The size of the jet is determined by measuring the output in a bench or in a chassis dynamo test. For racing, it is best to determine the proper size of the jet on the racing track, because the following points must be taken into account:

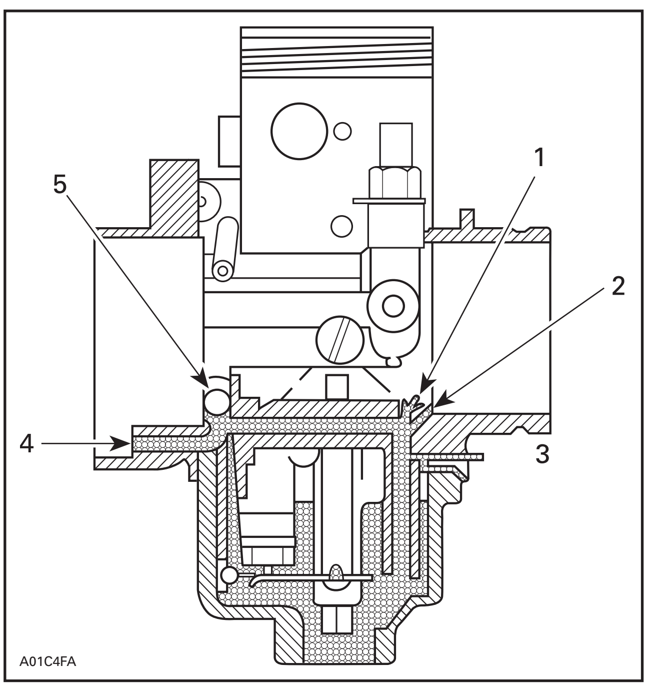
a. The altitude (atmospheric pressure), temperature and humidity of the race track.
b. The operation of the engine based on the topography of the race track.

Pilot/Air System

PRINCIPLES OF OPERATION

The pilot/air system controls the fuel mixture between idle and approximately the 1/4 throttle position. As the throttle is opened wider for low speed operation, the pilot outlet cannot supply adequate fuel, and fuel then enters the carburetor bore from the bypass as well as the pilot outlet. The pilot/air system is tuned by first adjusting the air screw; then, if necessary, by replacing the pilot jet.

Adjusting Air Screw



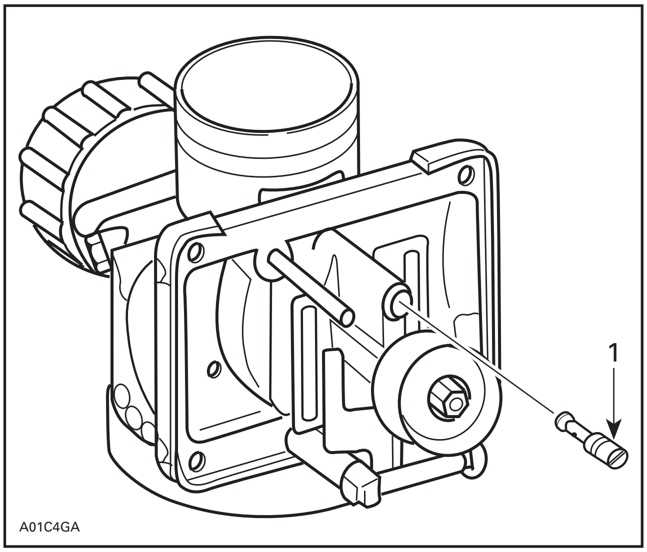
1. Pilot bypass
2. Pilot outlet
3. Pilot jet
4. Air intake
5. Air screw

NOTE: This procedure may be performed for single and dual carburetors. Never adjust screws more than 1/4 turn at a time.

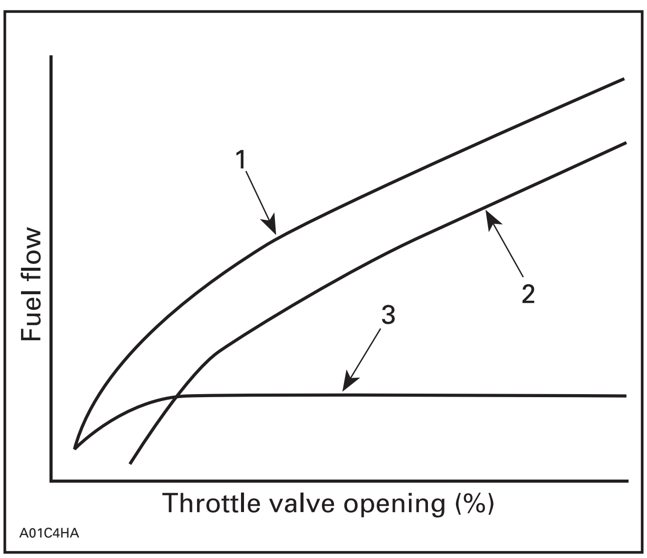
1. Turn idle stop screw in until screw contacts throttle valve. Then turn idle stop screw in 2 additional turns.
2. Start and warm up engine. Adjust idle stop screw to 500 RPM above normal idle speed. See Low-Speed Fuel System.
3. Turn air screw in or out using 1/4-turn increments until engine RPM peaks or reaches its maximum RPM.
4. Readjust idle stop screw to return engine to normal idle speed. See pages Low-Speed Fuel System.
5. Repeat Steps 3 and 4 until engine operates at normal idle speed and air screw is peaked.
6. When air screw is adjusted stop engine. Note the setting of air screw and turn it all the way in. If it takes less than 1 turn, the pilot jet is too small and a larger one must be installed. If it takes more than 2-1/2 turns to set air screw, the pilot jet is too large and must be replaced by a smaller one.
7. Turn the air screw left and right (between 1/4 and 1/2 turn) and select the position where the engine revolution reaches the maximum. Adjust the throttle stop screw to bring down the engine revolution to your target speed for idling. After this adjustment of the throttle stop screw is made, select once more the position where the engine revolution reaches the maximum, by turning the air screw left and right (between 1/4 and 1/2 alternately). At this point, attention should be paid to the following points.
   a. If there is a certain range in the opening of the air screw where the fast engine revolution can be obtained (for instance, the number of revolutions does not change in the range of 1-1/2 to 2.0 turns), it would be better for acceleration to 1-1/2 turns.

b. To determinate the **fully closed** position of the air screw, turn the air screw slightly. Excessive tightening of the air screw would damage the seat. The position where the air screw comes to a stop should be considered the **fully closed** position. The maximum number of turns in the opening of the air screw must be limited to 3.0. If the air screw is opened over 3.0 turns, the spring will not work and the air screw can come off during operation of the vehicle.

Replacing Pilot Jet



1. *Pilot jet*



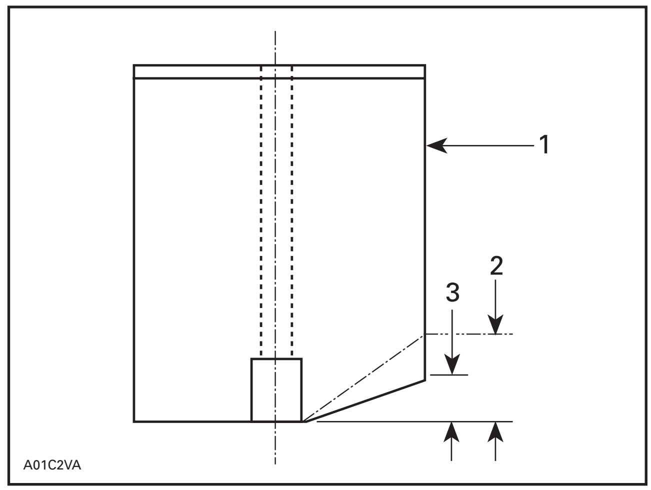
1. *Total amount of fuel flow*
2. *Main fuel system*
3. *Pilot fuel system*

Pilot jets are numbered from no. 15 (the smallest) to no. 80 (the largest). The number corresponds to fuel flow and not necessarily to drill size or through-hole diameter. After changing the pilot jet, check and adjust air screw as described above.

NOTE: Since the pilot/air system provides some fuel up to wide open throttle, changes in this system will affect the throttle valve, jet needle/needle jet, and main jet metering systems.

Throttle Valve

PRINCIPLES OF OPERATION



1. *Throttle valve*
2. *3.0*
3. *2.0*

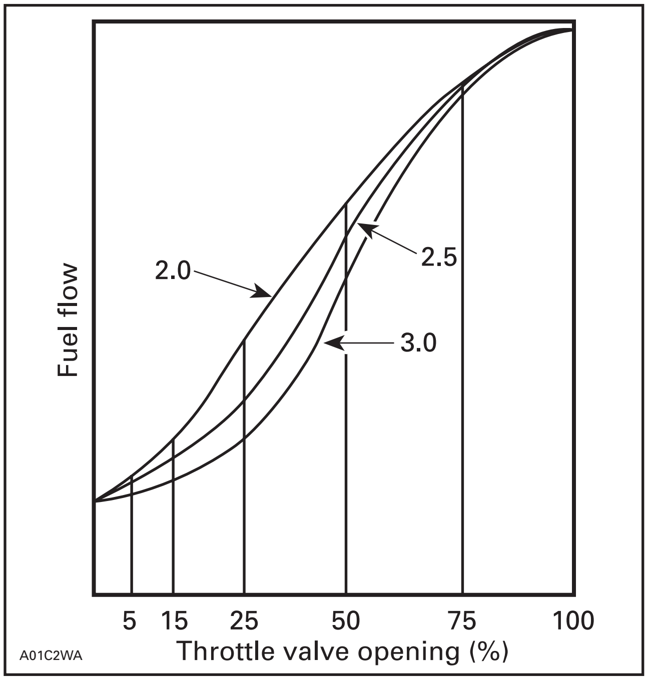
The throttle valve is cut away on the air inlet side to help control the fuel/air mixture at low and intermediate throttle settings. The size of cut-away also affects acceleration.

Throttle valves are numbered from 0.5 to 4.5 in 0.5 increments based on the size of the cut-away. The most commonly used configurations are 1.5 to 3.5. The higher the number, the greater the cut-away and the larger the air flow.

The throttle valve functions in about the same range as the pilot/air system. After the air screw is adjusted, it can be used to check the throttle valve selection.

NOTE: Too lean of a slide cut-away can cause piston seizures during sudden throttle closures from large throttle settings.

CHECKING AND SELECTING THROTTLE VALVE



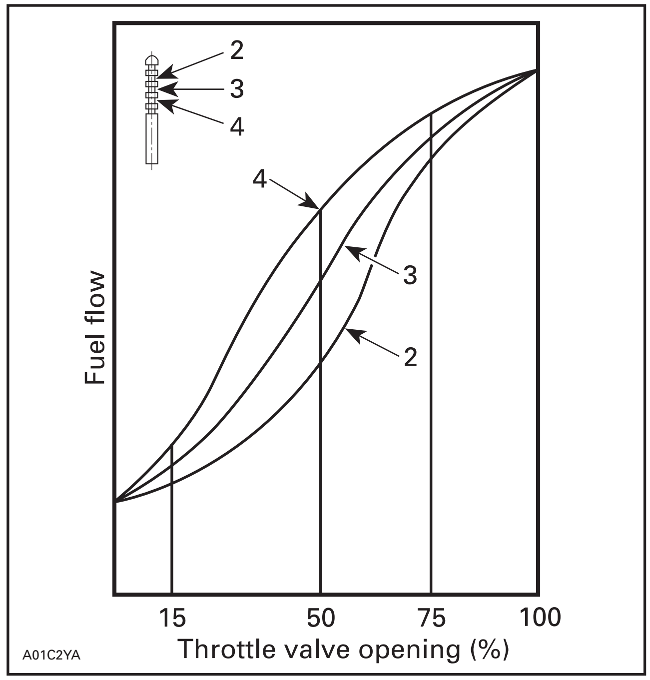
1. Operate engine at low throttle settings, accelerating from idle to 1/4 throttle.
2. If engine bogs during acceleration, there is probably insufficient fuel. Turn in air screw about 1/4 turn at a time. If engine acceleration is improved, after adjusting air screw, the throttle valve cut-away needs to be decreased.
3. If engine runs rough or smokes excessively during acceleration, there is probably too much fuel. Turn out air screw 1/4 turn at a time. If engine operation is improved, the throttle valve cut-away needs to be increased.

NOTE: Illustration above indicates fuel flow according to throttle valve size and the amount throttle valve is opened.

4. Increase or decrease throttle valve cut-away size in 0.5 steps.
5. Return air screw to its original setting and operate engine at low throttle settings. Accelerate engine from idle to 1/4 throttle; engine should accelerate smoothly.
6. As a final check, change the position of the air screw. If this does not significantly affect engine performance (as in steps 2 and 3), the throttle valve is correct.

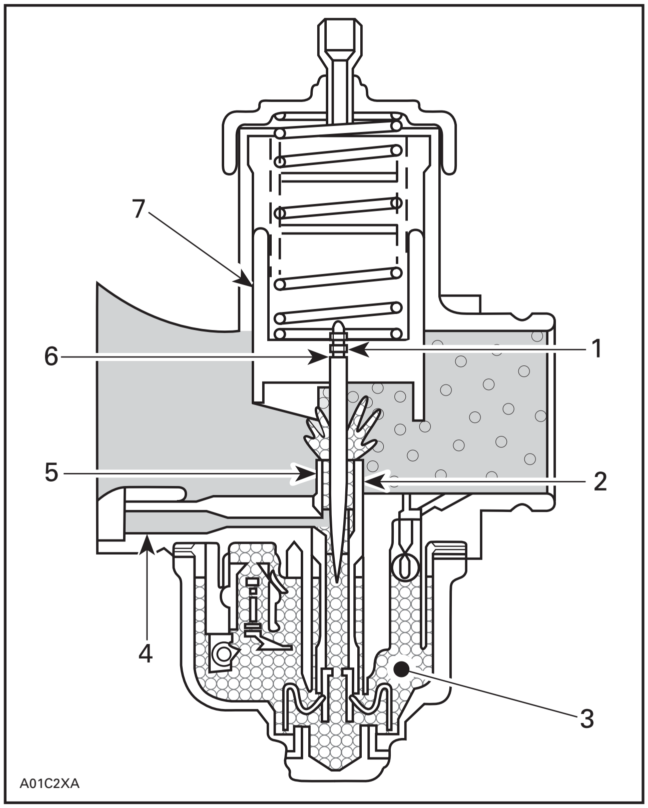
Jet Needle

PRINCIPLES OF OPERATION



The jet needle works with the needle jet to increase the amount of fuel as the throttle valve is raised.

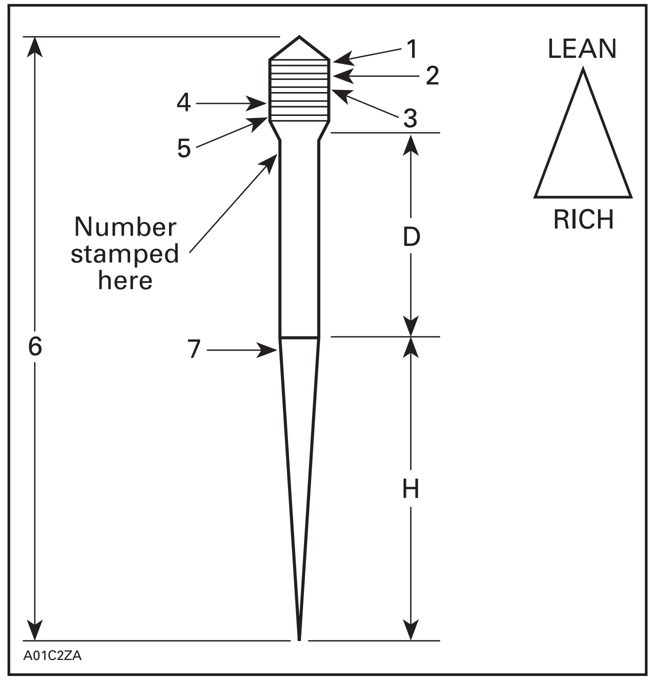
Although the jet needle and needle jet function in the 1/4 to 3/4 throttle range, they also affect the amount of fuel present at wide open throttle. When tuning the jet needle, also check main jet system operation.



1. E-ring
2. Needle jet
3. Fuel
4. Air
5. Metered here
6. Jet needle
7. Throttle valve

The jet needle raises and lowers with the throttle valve which changes jet needle position in the needle jet. Because the jet needle is tapered from top to bottom, an increasing amount of fuel is delivered through the needle jet whenever the throttle valve is raised. Increased or decreased air flow, by the throttle valve position, regulates the amount of fuel through the needle jet and around the jet needle.

The jet needle works on combination of length, taper, and E-ring position. Each jet needle has a number and letter series stamped on the body.



Example: 6DH7

6 - Basic length of needle.

DH - A single letter would indicate a single taper of the needle, double letter a double taper, and three letters mean there is a triple taper.

D - Amount of taper at top of needle.

H - Amount of taper at bottom of needle.

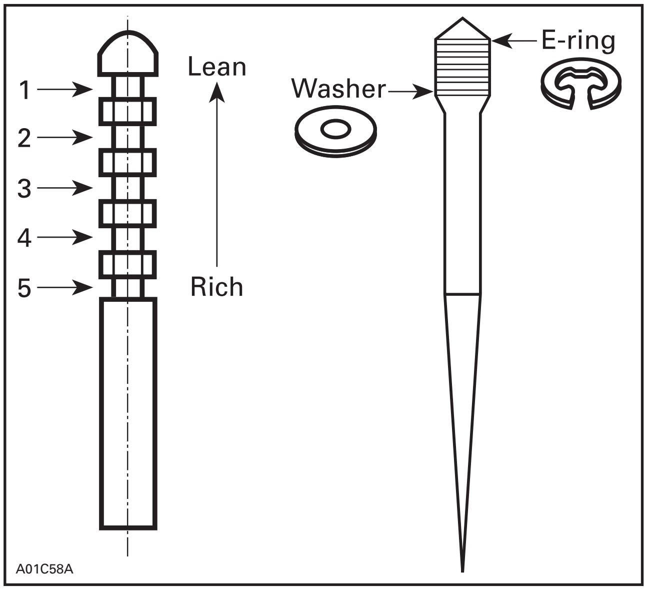
7 - Material, type of coating and start of second taper on needle.

NOTE: Letter designation of the jet needle indicates the angle of taper. Each letter (starting with A is 0.25° greater than preceding letter. Example: D = 1°, E = 1-1/4°, F = 1-1/2°, G = 1-3/4°, and H = 2°. This applies to both single and double taper needles.

At the top of the jet needle are five grooves numbered 1 through 5 from top to bottom. The number 3 or middle groove being the starting point for the E-ring. The E-ring position on any jet needle determines the rich or lean part throttle or mid-range carburetor operation.

Moving E-ring to position 1 or 2 lowers jet needle into needle jet and leans out the fuel/air mixture. Similarly, moving E-ring to position 4 or 5 raises jet needle in needle jet and enriches the fuel/air mixture.

POSITIONING THE E-RING



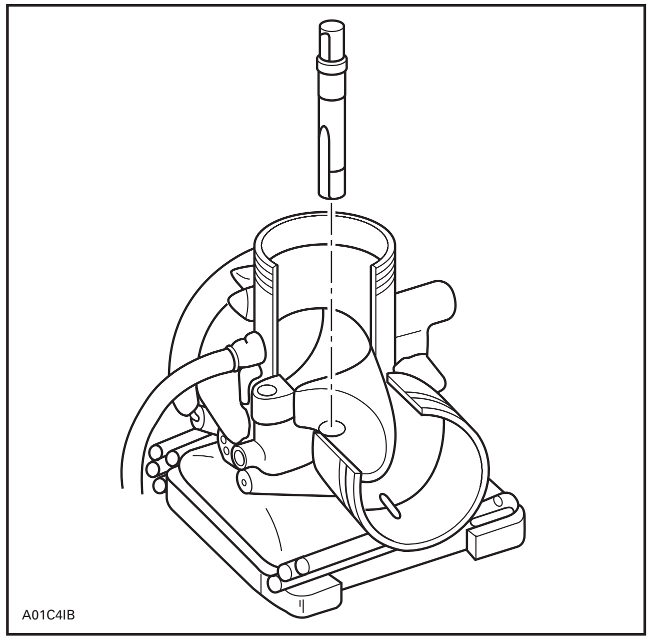
1 to 5 = E-ring position

1. Check for a rich or lean setting by examining exhaust manifold. A very light brown or white color indicates a lean mixture. A very dark brown or black color indicates a rich mixture. The proper color is tan.
2. Move E-ring one groove at a time to correct the fuel/air mixture.
3. If proper operation is obtained at all but the 3/4 throttle setting after the main jet has been tuned, operation may be improved by changing the jet needle taper. Do not, however, change the jet needle until main jet and E-ring position have been thoroughly checked.
4. If the E-ring is in the number 5 position and operation is still lean, a needle jet with a larger orifice may be installed. This may be done only after thoroughly checking the main jet, jet needle, and E-ring positions.

NOTE: Make sure washer is installed under E-ring on vehicles so equipped.

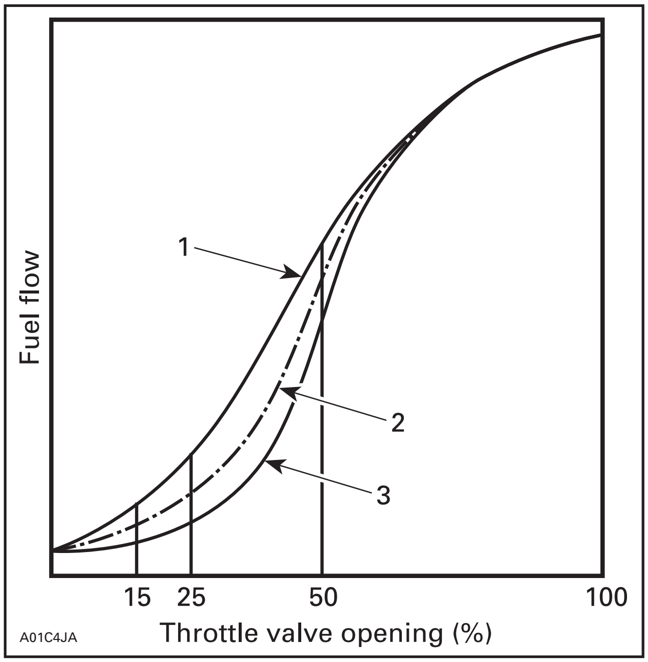
Needle Jet

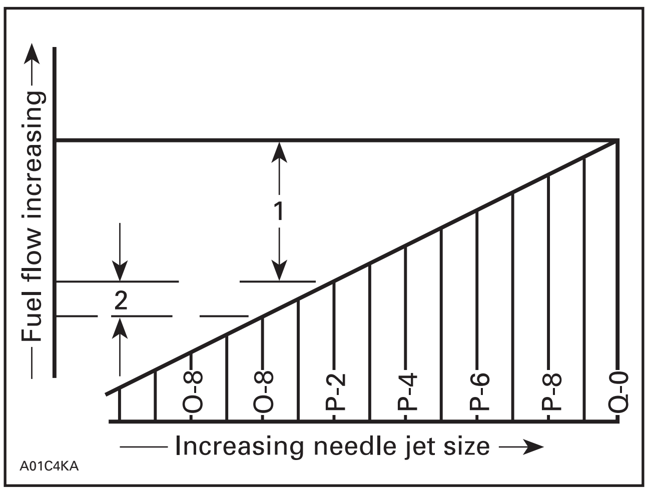
PRINCIPLES OF OPERATION



The needle jet works in combination with the jet needle to meter the fuel flow in the mid range.

Changes to the needle jet should be made only if the results of changing the jet needle position are unsatisfactory. In stock applications, except for specific calibration changes necessary at high altitudes, the needle jet should not be changed. Selection of the proper needle jet requires much care and experience. Decreasing the needle jet size can prevent the main jet from metering the proper amount of fuel at wide open throttle.



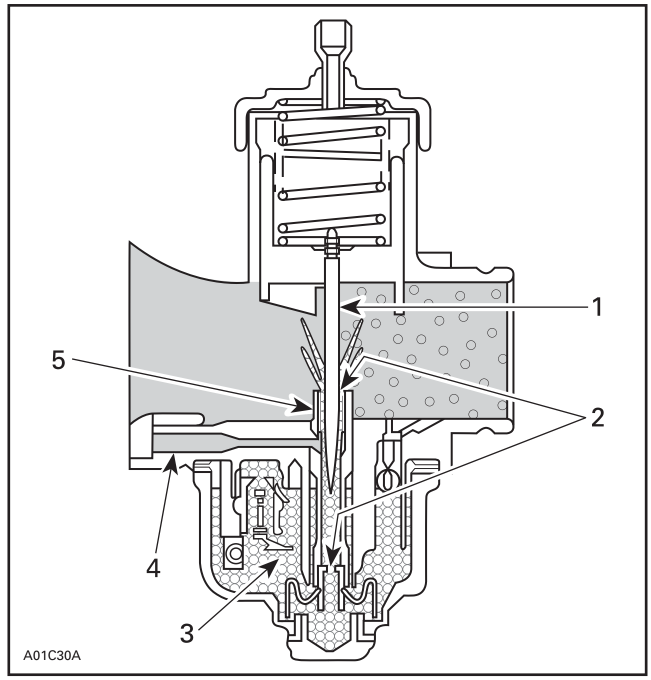


Needle jets are stamped with an alphanumeric code. The letter indicates a major change in fuel flow. P-2, for example, indicates low flow; P-4, greater flow, and so on. The number indicates minor adjustments in fuel flow. The first diagram shows the relationship between the alphanumeric needle jet size number and fuel flow.

NOTE: Needle jets carrying the numbers 166, 159 or 169 in addition to the P-2 or P-4 and are not interchangeable. Be sure correct needles are used as specified for your snowmobile.

Main Jet System

PRINCIPLES OF OPERATION



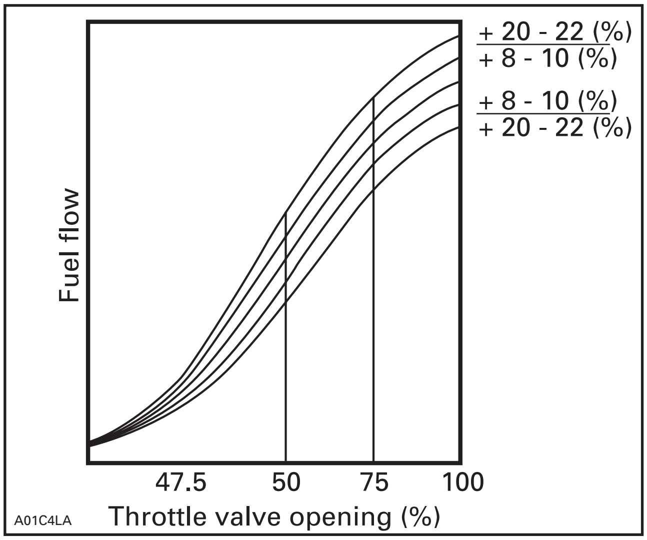
1. *Jet needle*
2. *Metered here*
3. *Fuel*
4. *Air*
5. *Needle jet*

The main jet system starts to function when the throttle is approximately 1/4 open. The mid range fuel is supplied by the main jet and regulated by the needle jet/jet needle combination. The main jet meters the fuel when the throttle is in the wide open position.

The main jets are available in sizes from number 50 to number 840. The size number corresponds to flow and not necessarily to hole size.

When experiencing erratic operation or overheating, check the main jet for dirt which can plug the orifice.

TUNING THE MAIN JET SYSTEM



Before operating the snowmobile, make sure all parts, including clutch and drive belt, are in good operating condition.

1. Operate snowmobile at wide open throttle for several minutes on a flat, well packed surface. Change main jet if snowmobile fails to achieve maximum RPM or labors at high RPM.
2. Continue to operate at wide open throttle and shut off ignition before releasing throttle. Examine exhaust manifold and spark plugs to determine if fuel/air mixture is too lean.

NOTE: Do not change jet sizes by more than one increment (step) at a time.

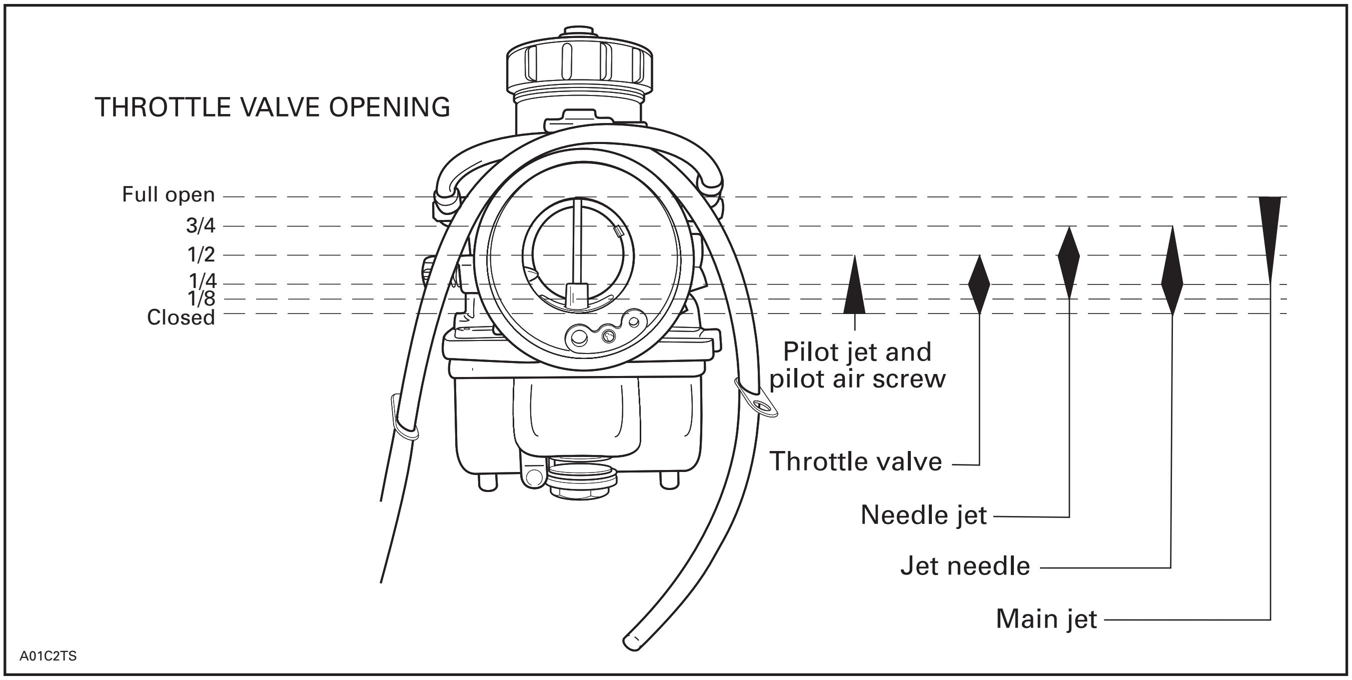
3. If the exhaust manifold or spark plug insulator is dark brown or black, the fuel/air mixture is too rich. Decrease jet size.
4. If the exhaust manifold or spark plug insulator is very light in color, the fuel/air mixture is too lean. Increase jet size.
5. If you cannot determine the color, proceed as if fuel/air mixture were too lean and increase jet size. If operation improves, continue to increase jet size to obtain peak performance. If operation becomes worse, decrease jet size to obtain peak performance.
6. After proper main jet is selected, recheck jet needle and needle jet.

Troubleshooting

When the carburetor setting is not correct for the engine, various irregularities are noticed. These can be traced to two causes as a whole:

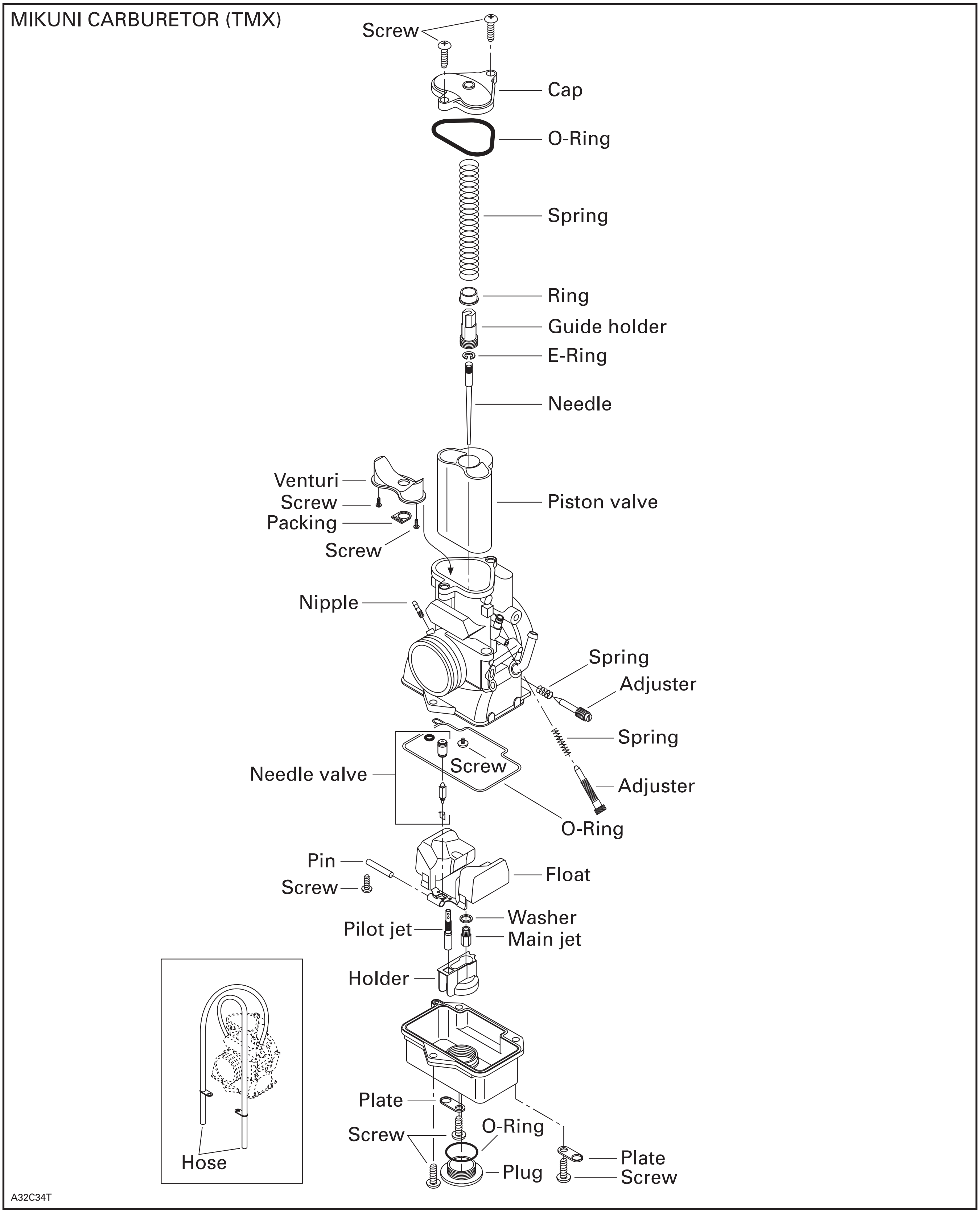
1. When the air/fuel mixture is too rich:
   a. The engine noise is full and intermittent (four stroking).
   b. The condition grows worse when the enrichner is opened.
   c. The condition grows worse when the engine gets hot.
   d. Removal of the air cleaner will somewhat improve the condition.
   e. Exhaust gases are heavy.
   f. Spark plug is fouled.
2. When the air/fuel mixture is too lean:
   a. The engine overheats.
   b. The condition improves when the enrichner is opened.
   c. Acceleration is poor.
   d. Spark plug electrodes are melted.
   e. The revolution of the engine fluctuates and a lack of power is noticed.
   f. Piston seizure or scuffing occurs.

Functional Range Effectiveness in Relation to Throttle Opening



2005 MX Z X 440

MIKUNI CARBURETOR (TMX)



Mikuni TMX Carburetor (tuning parts)

P/N	DESCRIPTION
486 212 400	Pilot Jet, 15
486 212 500	Pilot Jet, 17.5
486 212 600	Pilot Jet, 20
486 212 700	Pilot Jet, 22.5
404 161 870	Pilot Jet, 25
486 212 800	Pilot Jet, 27.5
404 162 042	Pilot Jet, 30
707 200 100	Pilot Jet, 32.5
707 200 168	Pilot Jet, 35
707 200 136	Pilot Jet, 40
486 230 100	Pilot Jet, 45
486 230 200	Pilot Jet, 50
486 230 300	Pilot Jet, 55
486 230 400	Pilot Jet, 60
486 230 500	Pilot Jet, 65
486 213 200	Piston Valve, 3.0
486 213 300	Piston Valve, 3.5
404 161 867	Piston Valve, 4.0
486 213 400	Piston Valve, 4.5
486 213 500	Piston Valve, 5.0
404 161 868	Inlet Needle & Seat 1.5
404 161 871	Needle, J8-6FIY05-58
404 161 872	Needle, J8-6FIY04-59
404 161 873	Needle, J8-6FIY06-57

Part numbers with a 486 prefix must be ordered from Valcourt Race Dept. All others must be ordered from your local Ski-Doo dealer.

IGNITION SYSTEMS, SPARK PLUGS

Two-stroke engines in snowmobiles rely on an electric spark to initiate combustion of the fuel/air charge which has been inducted into the cylinder. For the engine to operate efficiently, the spark must be delivered at precisely the right moment in relation to the position of the piston in the cylinder and the rotational speed of the crankshaft.

Additionally, the spark must be of sufficient intensity to fire the fuel mixture, even at high compression pressure and high RPM.

It is the function of the ignition system to generate this voltage and provide it to the spark plug at the correct time.

The Nippondenso capacitor discharge ignition (CDI) system has magnets located on the crankshaft flywheel. AC voltage is induced in the generating coil(s) as the poles of the magnets rotate past the poles of the coils. Timing is controlled by a trigger coil or the position of the coil poles relative to the magnet poles, which are directly related to piston position. The CD (or amplifier) box contains the electronic circuitry to store and control the initial voltage and deliver it to the ignition coil (and then the spark plug) at the correct moment. The ignition coil is a transformer that steps up the relatively low voltage, 150-300 V, of the generating coil to the 20,400 – 40,000 volts necessary to jump the spark plug gap and initiate the burning of the fuel/air mixture in the combustion chamber.

Maximum power from a given engine configuration is produced when peak combustion chamber pressure (about 750 PSI) takes place at about 15° of crankshaft rotation ATDC. Normal combustion is the controlled burning of the air/fuel mixture in the cylinder. The flame is initiated at the spark plug and spreads to the unburned mixture at the edges of the cylinder.

This flame front travels through the cylinder at about 100 feet per second. In order to achieve maximum pressure at about 15° ATDC, the spark must occur about 15° before TDC. Complete combustion will finish at about 35° ATDC. The actual amount of spark advance BTDC is dependent upon bore size, combustion chamber shape, operating RPM, mixture turbulence and the actual flame speed.

Flame speed is directly proportional to piston speed in an almost linear fashion. Though it is not completely understood why this relationship exists, it is thought to be related to intake speed and mixture turbulence. Hence, flame speed increases as RPM increases. It also increases as the air/fuel ratio becomes leaner.

Because the flame speed is slower at lower RPM's, more advance at low RPM is necessary for maximum performance. Advancing the spark too much BTDC for the needs of the engine will cause the engine to go into detonation.

The optimum ignition would then have timing significantly advanced at lower RPM, but would retard the timing at higher RPM to keep the engine out of detonation. Generally, as the ignition timing is advanced, the low end mid range power will be improved and the peak power will be moved to a lower RPM. Retarding the timing will generally reduce low and mid range power but may allow jetting to be leaner and increase peak power. Peak power will be moved to a higher RPM. These are generalizations and ignition timing must be optimized depending on engine design, RPM range and operating conditions.

Ignition advance on Rotax engines is measured by a linear distance of piston travel BTDC. A dimension taken through a straight spark plug hole in the center of the head is a direct measurement. A dimension through an angled plug hole on one side of the head is an indirect measurement. A direct measurement can be converted to degrees of crankshaft rotation by the appropriate formulas. Initial ignition timing procedures can be found in the *Shop Manual* for the particular model being worked on.

Ignition Timing

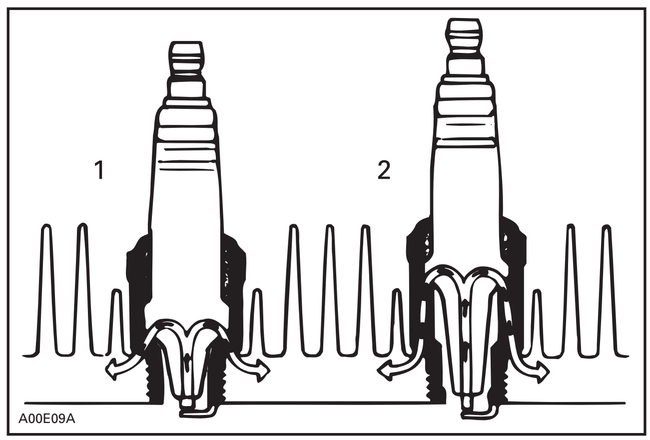
Ignition timing is no longer able to be adjusted mechanically. It must be done by your dealer with an MPEM programmer.

Spark Plug Heat Range

Spark plug heat ranges are selected by measuring actual combustion chamber temperatures. A colder spark plug, one that dissipates heat more rapidly, is often required when engines are modified to produce more horsepower.

The proper operating temperature or heat range of the spark plugs is determined by the spark plugs ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the higher the spark plug operating temperature will be — and inversely, the shorter the heat path, the lower the operating temperature will be.



1. *Cold*
2. *Hot*

A cold type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The hot type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.

Generally speaking, if you have increased horsepower by 10-15%, you will have to change to the next colder heat range spark plug.

Most Ski-Doo's are equipped stock with NGK BR-9ES spark plugs.These are resistor-type plugs which help reduce radio frequency interference.

To help prevent spark plug fouling use BR9ECS type plug. Used **ONLY** resister type plugs.

Design Symbols Used on NGK Spark Plugs

First letter prefix for thread and hexagon size

Letter	Thread size	Hexagon size
A	18 mm	25.4 mm
B	14 mm	20.6 mm
C	10 mm	16.0 mm
D	12 mm	18.0 mm
F	7/8 in-18	23.8 mm
G	PF 1/2 in-14	23.8 mm

Second and third letter prefix for construction feature, except single prefix

Letter	Construction feature
B	Hexagon size 20.6 mm
C	Hexagon size 16.0 mm
G	Hexagon size 23.8 mm
L	Compact type (SHORTY)
M	Compact type (BANTAM)
P	Projected insulator nose type
R	Resistor type
S	Shielded type
U	Surface discharge type

Heat rating number

Heat rating		Type
2	Hotter	
4		
5		
6		
7		Ordinary plug
8	(85)	
9	(95)	
10	(105)	Racing plugs
11		
12		
13	Colder type	
14		

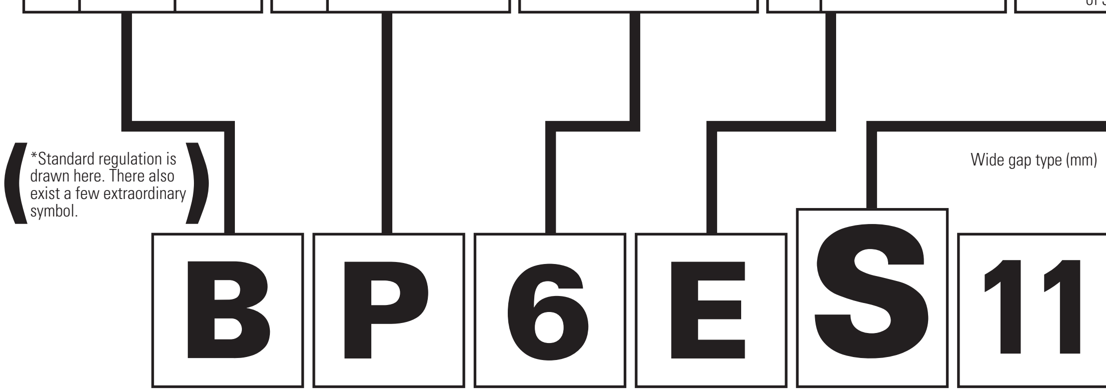
First letter suffix for thread: reach

Letter	Thread reach
None	12.0 mm (thread dia. 18 mm) 9.5 mm (thread dia. 14 mm) 22.5 mm (thread dia. PF 1/2 in-14 mm) 16.0 mm (thread dia. 7/8 in-18mm)
L	11.2 mm
H	12.7 mm (racing type 18.0 mm)
E	19.0 mm (racing type 18.0 mm)
F	Conical seat type A -F 10.9 MM B - F 11.2 MM BM - F 7.8 MM BE - F 17.5 MM

Second letter suffix for construction feature, etc.

Letter	Construction feature, etc.
A	-Specials
B	-Special plug for Honda vehicles
C	-Competition type
G	-Racing plugs, center electrode of nickel alloy
GV	-Racing plugs, center electrode of precious metal
N	-Racing plugs, nickel electrode
P	-Racing plugs, platinum ground electrode
R	-Shielded resistor plugs
S	-Copper core center electrode (Super)
V	-Center electrode of precious metal
W	-Tungsten electrode
X	-Series gap plugs
Y	-V-Grooved center electrode

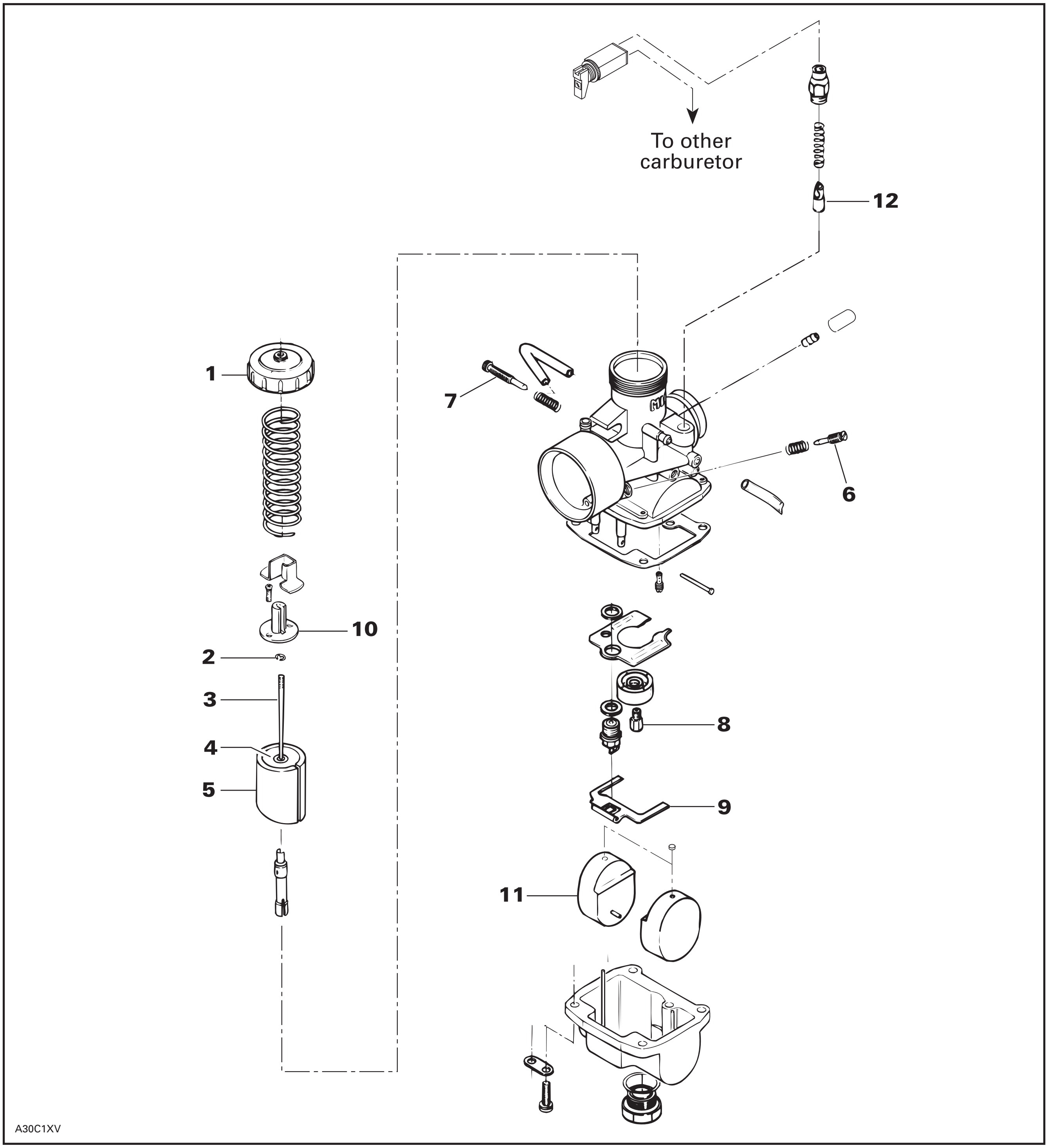
Multiple ground electrodes type
K 2 T 3
M 2 Q 4
Others Expect for above letters, there are special plugs of J, L, Z, etc



A01E1GS

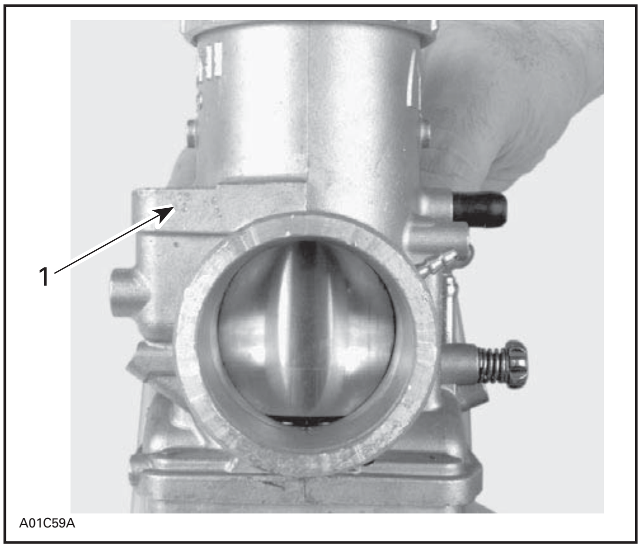
CARBURETOR AND THROTTLE CABLE

CARBURETOR — VM TYPE



IDENTIFICATION

All carburetors are identified on their body.



TYPICAL
1. Identification: 34-482

REMOVAL

Unfasten clamps then, remove air silencer from left hand side.

Disconnect fuel inlet lines.

Unscrew carburetor cover **no. 1** then pull out throttle slide **no. 5** from carburetor.

Disconnect throttle cable from throttle slide.

Remove carburetors from engine.

Unscrew choke plunger from each carburetor.

CLEANING AND INSPECTION

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

NOTE: Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide **no. 5** for wear. Replace as necessary.

Check idle speed screw straightness. Replace as necessary.

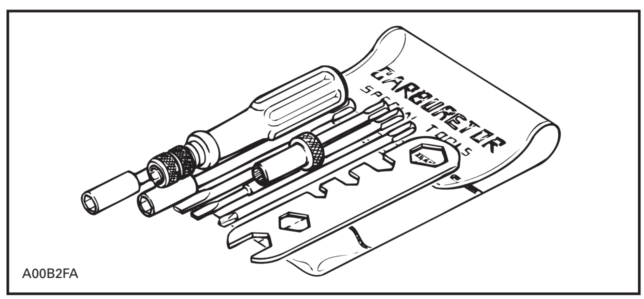
Check for fuel soaked into float **no. 11**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Inspect throttle cable and housing for any damages. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 112 000).

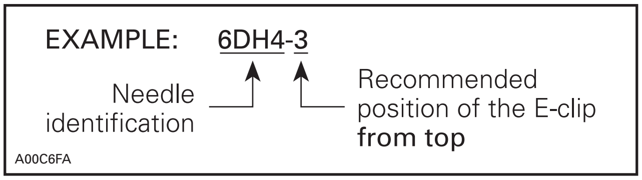


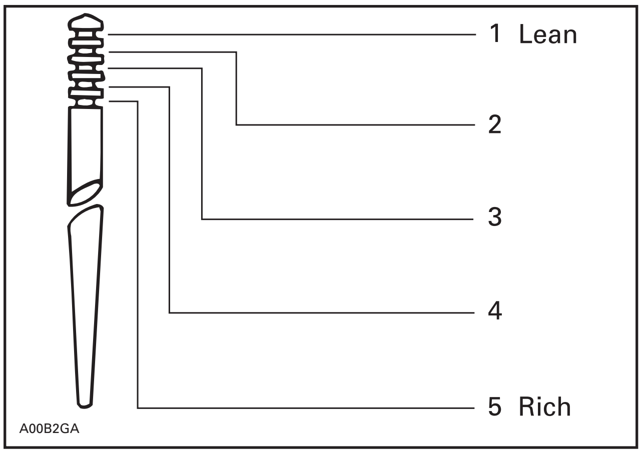
E-Clip and Needle

Remove screws from needle retaining plate **no. 10** to remove the needle **no. 3**.

The position of the needle in the throttle slide is adjustable by means of an E-clip **no. 2** inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

NOTE: The last digit of the needle identification number gives the recommended calibrated position of the E-clip **from the top** of the needle.





CLIP POSITIONS

Main Jet

The main jet **no. 8** installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. A service bulletin will give information about calibration according to altitude and temperature.

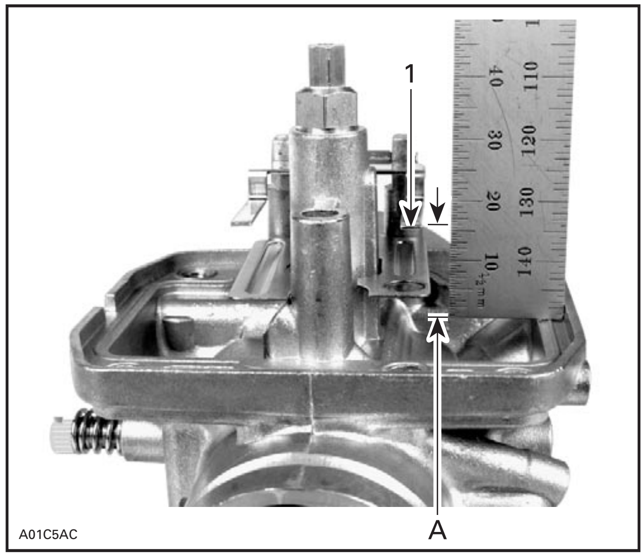
CARBURETOR FLOAT LEVEL ADJUSTMENT

CAUTION: Spark plugs will foul if float is adjusted too low. Engine may be damaged if float is adjusted too high.

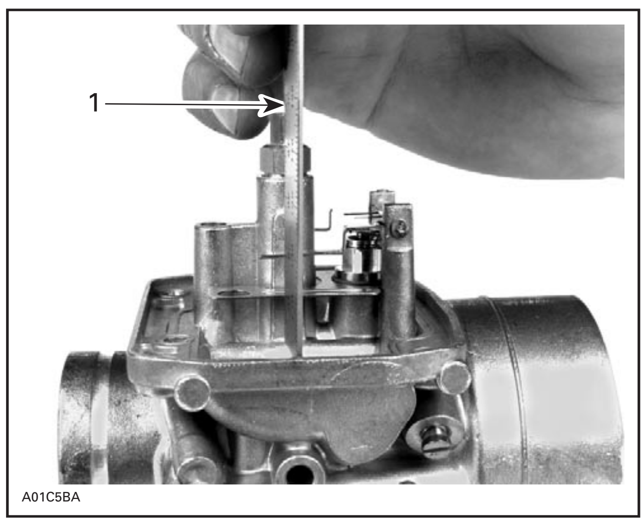
Float Arm

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

– Make sure that float arm **no. 9** is symmetrical — not distorted.
– Remove float bowl and gasket from carburetor.
– With carburetor chamber upside-down on a level surface, measure height H between bowl seat and top edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.

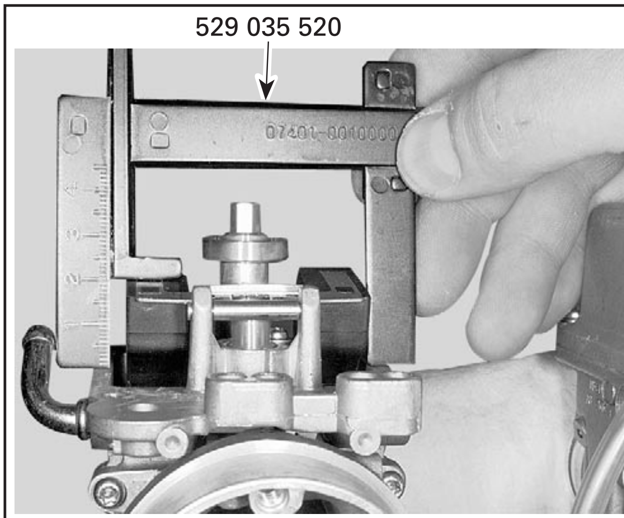


TYPICAL — VM TYPE
1. Measure from top of float arm
A. Float height (including float arm thickness)



TYPICAL — VM TYPE
1. Ruler vertical and in line with main jet

Float level height can be checked using tool (P/N 529 035 520). Keep tool in line with main jet as explained above.



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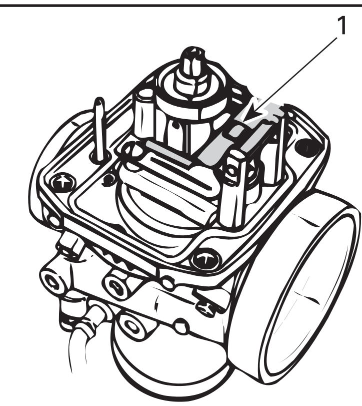
CARBURETOR IDENTIFICATION	FLOAT HEIGHT
VM 30-210	23.9 mm (.941 in)
VM 34-590	
VM 34-591	

To Adjust Height

– Bend the contact tab of float arm until the specified height is reached.



A00C03A

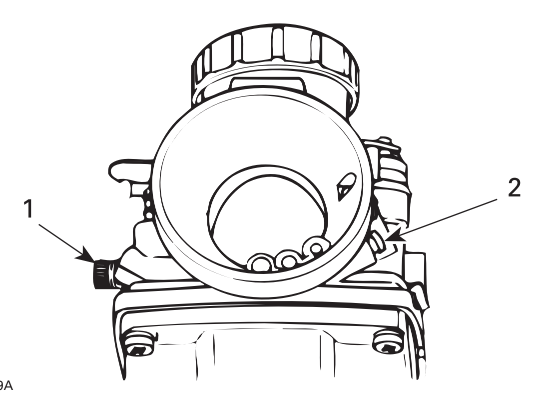
TYPICAL
1. Contact tab

CARBURETOR ADJUSTMENTS

NOTE: For high altitude regions, a Service Bulletin will give information about calibration according to altitude and temperature.

Adjustments should be performed following this sequence:

– air screw **no. 6** adjustment
– throttle slide **no. 5** height (preliminary idle speed adjustment)
– throttle cable adjustment
– carburetor synchronization
– final idle speed adjustment (engine running)
– oil pump and carburetor synchronization.



A02C09A

1. Idle speed screw
2. Air screw

Air Screw Adjustment

Completely close the **air screw no. 6** (until a slight seating resistance is felt) then back off as specified.

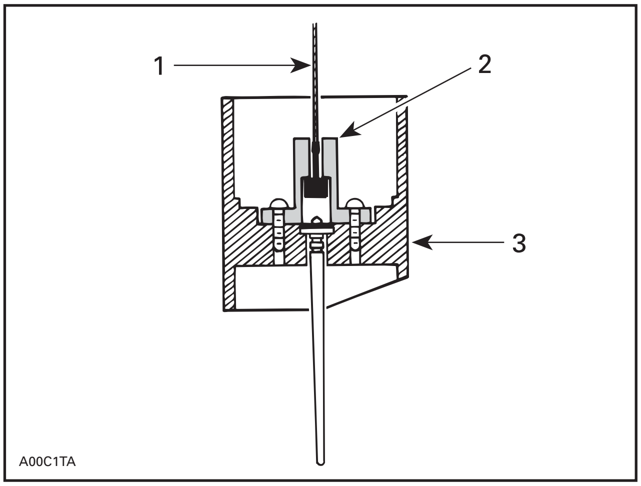
Turning screw in clockwise enriches mixture and conversely, turning it out counterclockwise leans mixture.

Refer to TECHNICAL DATA for the specifications.

Throttle Slide Height (preliminary idle speed adjustment)

Hook throttle cable into the needle retainer plate.

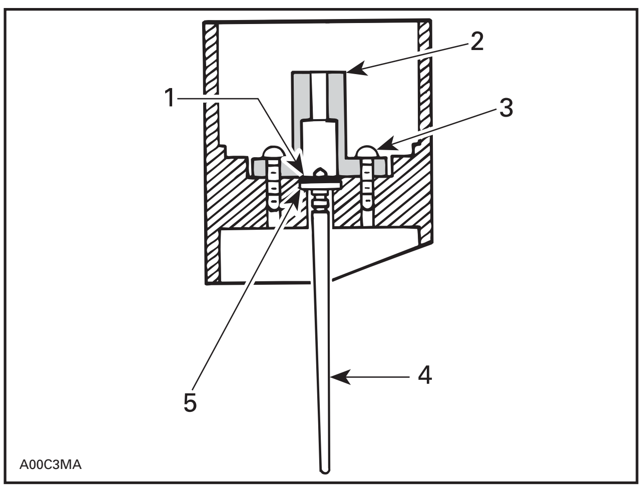
NOTE: Do not obstruct hole in throttle slide when installing needle retaining plate. This is important to allow air escaping through and thus allowing a quick response.



CENTER POST TYPE
1. *Throttle cable*
2. *Needle retaining plate*
3. *Throttle slide*

Make sure the nylon packing **no. 4** is installed on all applicable throttle slides.

CAUTION: Serious engine damage can occur if this notice is disregarded.



CENTER POST TYPE
1. *E-clip*
2. *Needle retaining plate*
3. *Screw*
4. *Needle*
5. *Nylon packing*

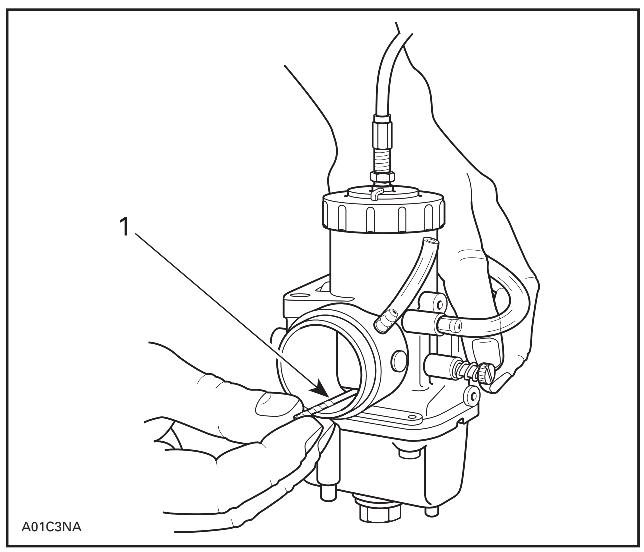
Using a drill bit, adjust throttle slide height (see following table) by turning idle speed screw **no. 7**.

Throttle slide height is measured on outlet side of carburetor (engine side).

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT (drill bit size) ± 0.1 mm (± .004 in)
MX Z 550 FAN	1.6 (0.063)
MX Z 380 FAN	1.7 (0.067)
Summit 550 Fan (Can/US)	1.9 (0.075)



TYPICAL
1. *Drill bit used as gauge for throttle slide height*

INSTALLATION

CAUTION: Never allow throttle slide(s) to snap shut.

Prior to installing carburetor, adjust air screw and preliminary idle speed as described above.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

On applicable models, make sure to align tab of carburetor and air silencer with notch of adaptor(s). On applicable models, install adaptor with up mark facing up.

CAUTION: The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air manifold or severe engine damage will occur.

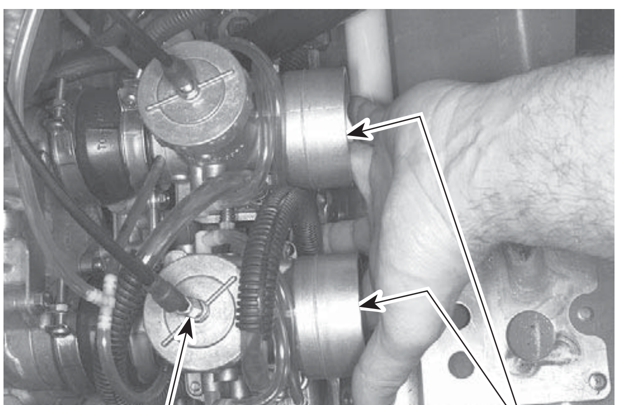
Install clamps in a way that their tightening bolts are staggered — not aligned.

Adjust throttle cable, refer to THROTTLE CABLE ADJUSTMENT to the end of this section.

Carburetor Synchronization

When depressing throttle lever, both carburetor slides must start to open at same time.

Unlock cable adjustment lock nut on one carburetor. Screw or unscrew cable adjuster until all carburetor slides start to open at same time. Cable play will be identical on all carburetors. Retighten jam nut.



TYPICAL
1. *Screw or unscrew adjuster*
2. *Check that all slides start to open at the same time*

Check throttle slide position at wide open throttle. Throttle slide must be flush or 1.0 mm (.040 in) lower than carburetor **outlet** bore. At that same position, check that throttle slide does not contact carburetor cover. Turn cable adjuster and recheck synchronization.

CAUTION: If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

CAUTION: Make sure all carburetors start to operate simultaneously.

CHOKE

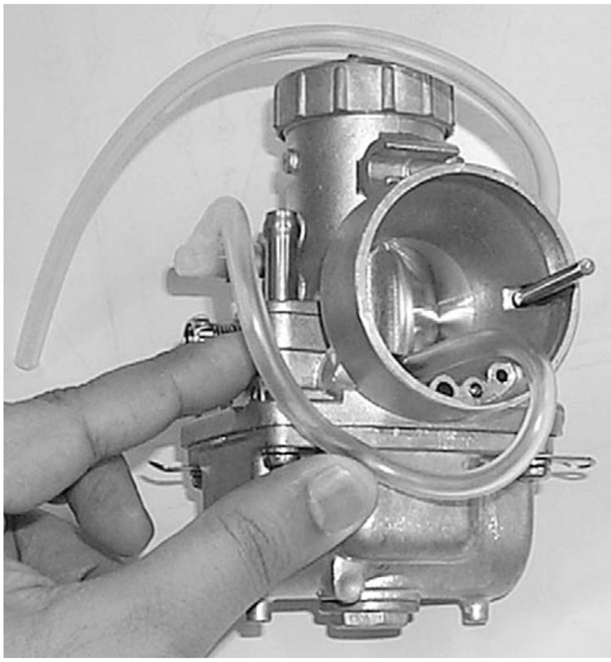
Choke Plunger Adjustment

Set choke lever to half open position.

CHOKE LEVER — HALF OPEN POSITION

Use choke plunger tool (P/N 529 035 602).

Insert the choke plunger tool into choke air inlet of carburetor. Tool stopper may not lean against recess wall.



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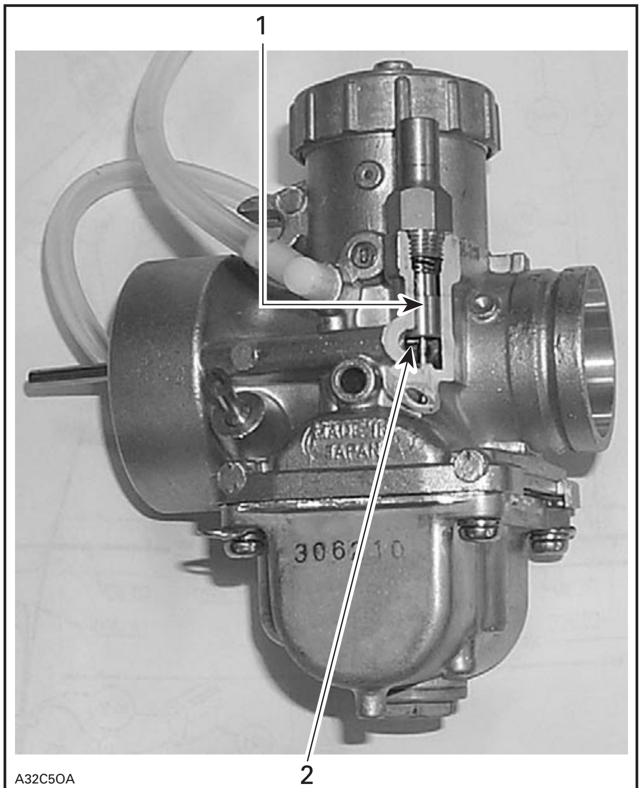
AIR SILENCER SIDE SHOWN



A32C5OA

CUT-AWAY (ENGINE SIDE SHOWN)
1. Choke plunger
2. Tool properly seated under choke plunger

If tool tip does not seat under choke plunger no. 12, adjust as follows:

Make sure choke lever is at half open position.

Turn choke cable adjustment nut by hand until tool properly seats under choke plunger.

NOTE: A light pressure should be needed to position tool under plunger.

Tighten choke cable lock nut and reinstall protector cap.

Set choke lever to close and open positions and ensure that tool properly seats under plunger only when lever is set to half open position.

Set choke lever to close position and, by pulling and pushing choke lever, make sure there is no tension on cable (free play).

Idle Speed Final Adjustment

CAUTION: Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked after each time carburetor idle is adjusted. Refer to OIL INJECTION SYSTEM.

Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

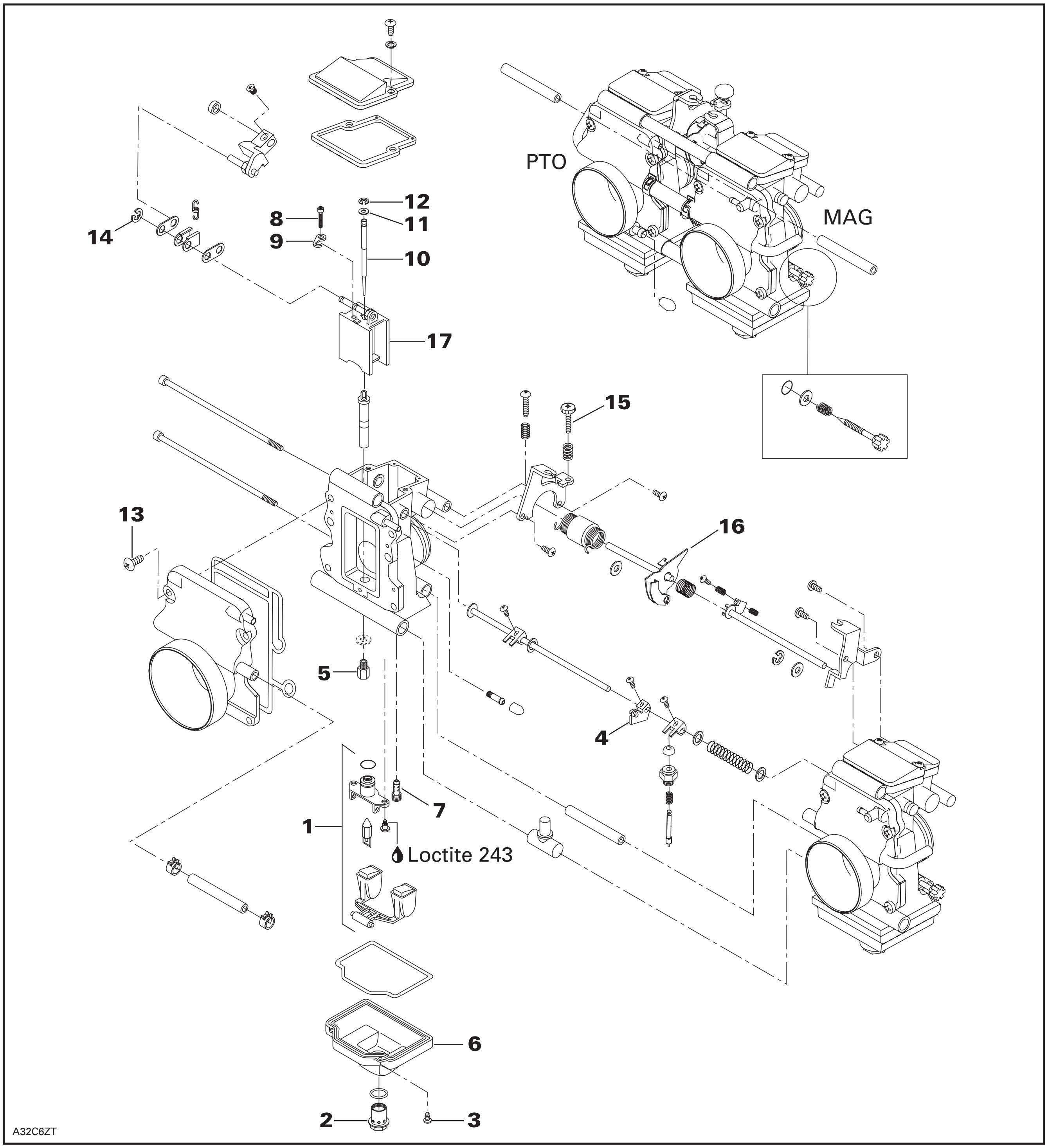
Refer to TECHNICAL DATA for the specifications.

NOTE: Turn adjustment screw the same amount on each carburetor to keep carburetors synchronized.

CAUTION: Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

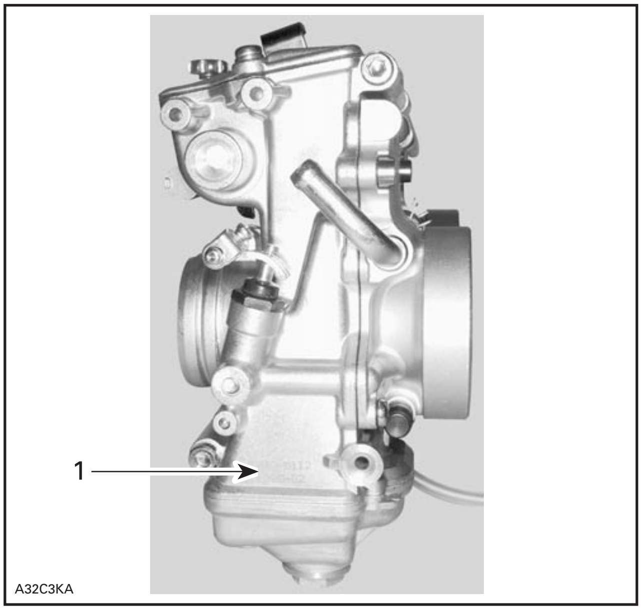
CARBURETOR AND THROTTLE CABLE

CARBURETOR TM TYPE



IDENTIFICATION

TM type dual carburetor ass'y is identified on PTO side carburetor body.



TYPICAL
1. Identification: TM 40-B112

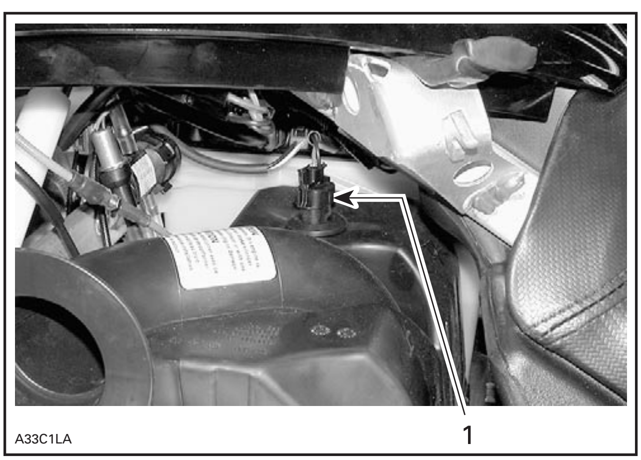
REMOVAL

All Models

Lift hood and open LH side panel.

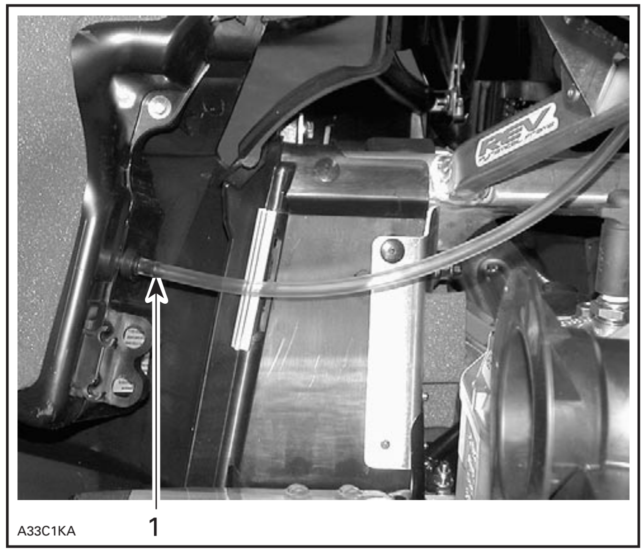
DPM Models

Disconnect air temperature sensor connector at air silencer.



1. Disconnect

Disconnect DPM air vent hose nipple from air silencer.



1. Disconnect here

Non-DPM Models

Disconnect carburetor float bowl vent hose nipple from air silencer.

DPM Models

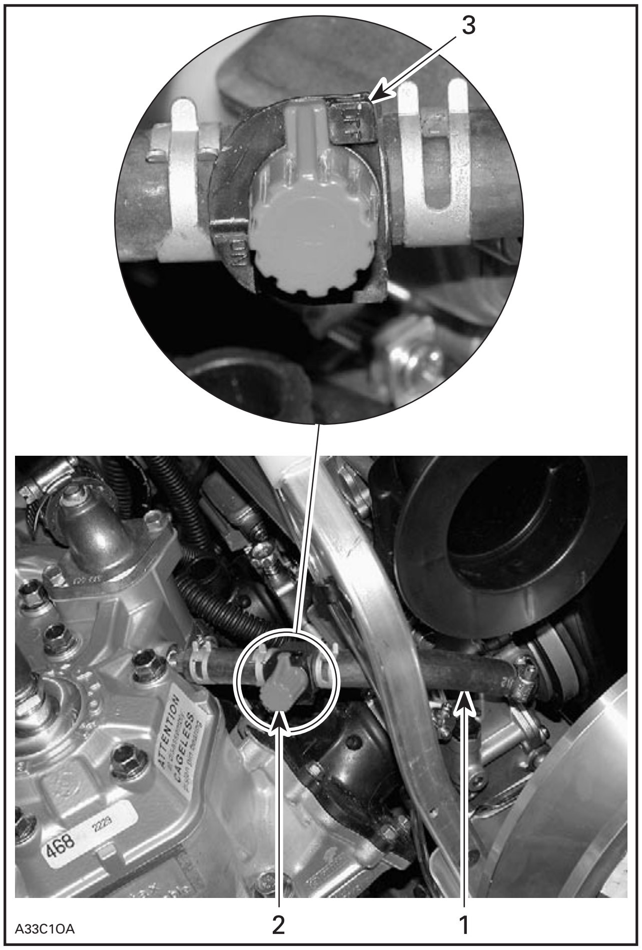
Unhook DPM manifold from its support.

All Models

Loosen clamps retaining air silencer adapter to carburetor assembly and remove air silencer.

Heated Carburetor Models

Close valve at heated carburetor coolant inlet line.



1. Inlet line
2. Valve
3. OFF

Disconnect heated carburetor coolant **inlet** line taking care to recuperate coolant.

All Models

Disconnect throttle and choke cables.

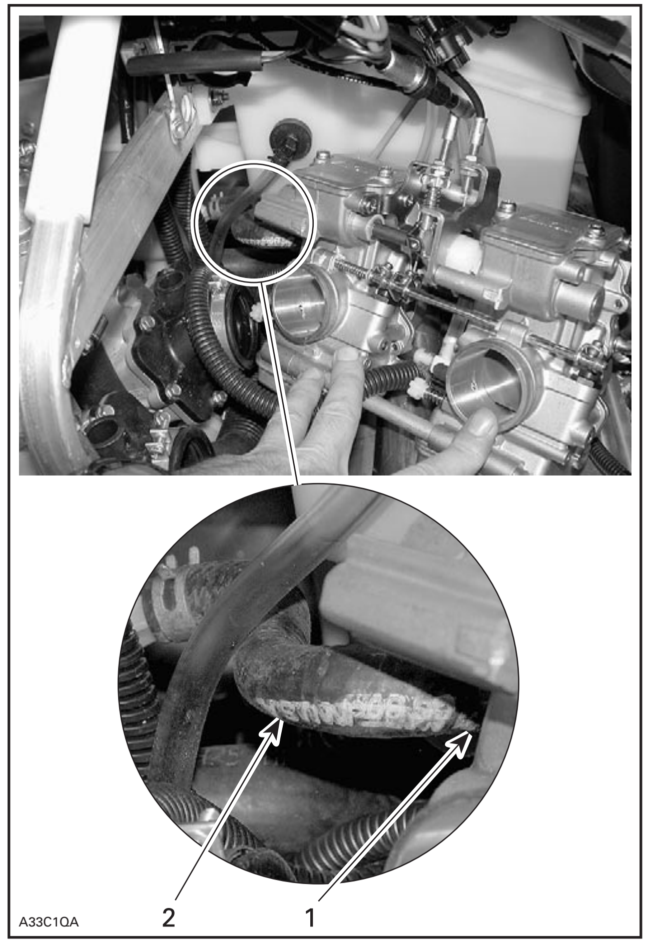
Loosen clamps retaining dual carburetor assembly to carburetor sockets.

Remove dual carburetor assembly, pinch and disconnect fuel line. Take care to recuperate fuel.

⚠ WARNING

Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Pinch heated carburetor coolant **outlet** line.



1. Outlet line
2. Pinch here

Disconnect **outlet** line from carburetor assembly taking care to recuperate coolant.

CLEANING AND INSPECTION

All Models

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions. When jets are very dirty or coated with varnish and gum, replace them.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

Check throttle slide for wear. Replace as necessary.

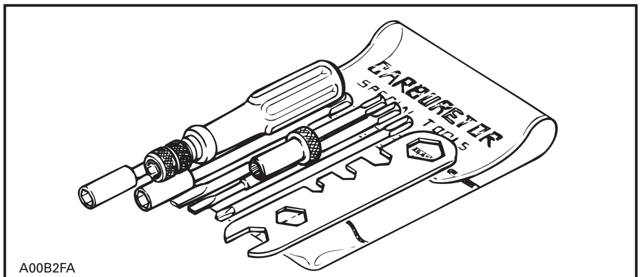
Check for fuel soaked into float **no. 1**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

Inspect throttle and choke cables and housings for any damage. Replace as necessary.

DISASSEMBLY AND ASSEMBLY

NOTE: To ease the carburetor disassembly and assembly procedures, it is recommended to use carburetor tool kit (P/N 404 112 000).



A00B2FA

Float Bowl

Unscrew drain screw **no. 2** and screw **no. 3**. Remove float bowl **no. 6**.

Float and Needle Valve Ass'y

Unfasten both screws then, pull out float and needle valve ass'y.

At assembly, apply Loctite 243 on screw threads.

Main Jet

The main jet **no. 5** installed in the carburetor has been selected for a temperature of - 20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. A service bulletin will give information about calibration according to altitude and temperature.

Main jet **no. 5** may be removed without removing float bowl **no. 6** by first removing drain screw **no. 2**.

Pilot Jet

Use narrow screwdriver from carburetor tool kit (P/N 404 112 000) to unfasten pilot jet **no. 7**.

Throttle Slide

⚠ WARNING

It is critical to the free operation of the throttle slide that the 2 connecting plates as assembled in one carburetor be of the exact same length. Always replace the connecting plates by a pair of new ones that were matched at the factory for length and discard the old ones. Simultaneously replace all the plates of the carburetors of a same rack.

Do not disassemble throttle slide **no. 17** needlessly.

CAUTION: After throttle slide reassembly, proceed with a leak test. See below for procedure.

Heated Carburetor Models

Disassemble both carburetors at the same time. Coolant hose between carburetor throttle slide covers must remain in place during the complete disassembly and assembly.

All Models

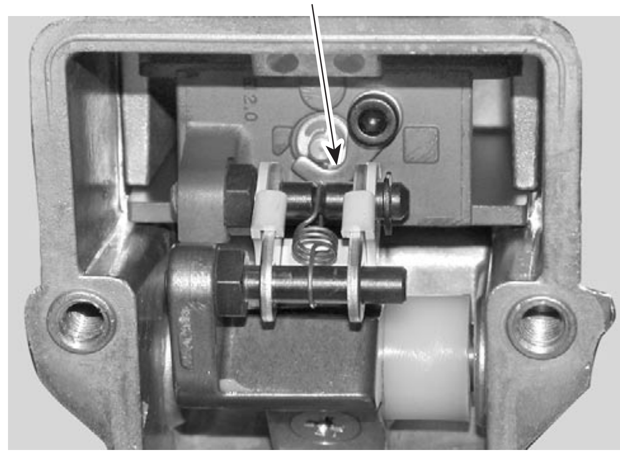
Remove carburetor cover.

Loosen needle retainer screw **no. 8**.

Fully open throttle and hold in this position for the following step.

Move aside needle retainer **no. 9**.

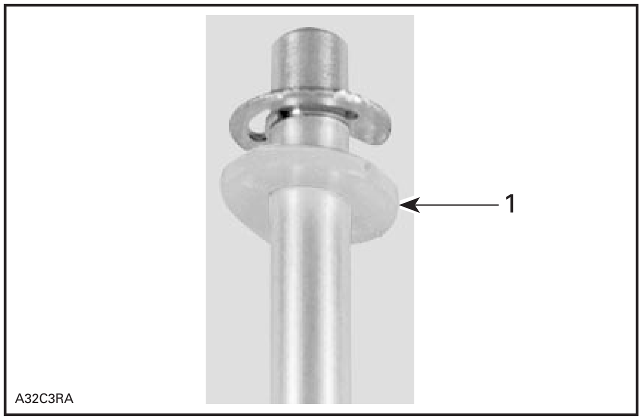
1



A32C6TA

1. Needle retainer moved aside

Turn dual carburetor ass'y upside down to free needle **no. 10**. Take care not to loose plastic washer **no. 11** under needle circlip **no. 12**.

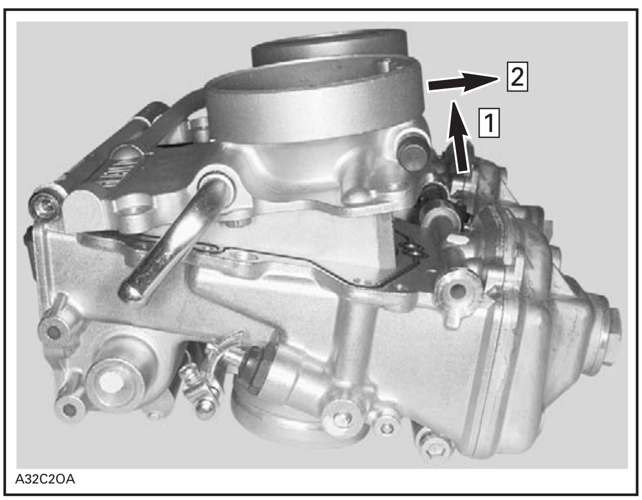


1. Plastic washer

Unscrew throttle slide cover screws **no. 13**.

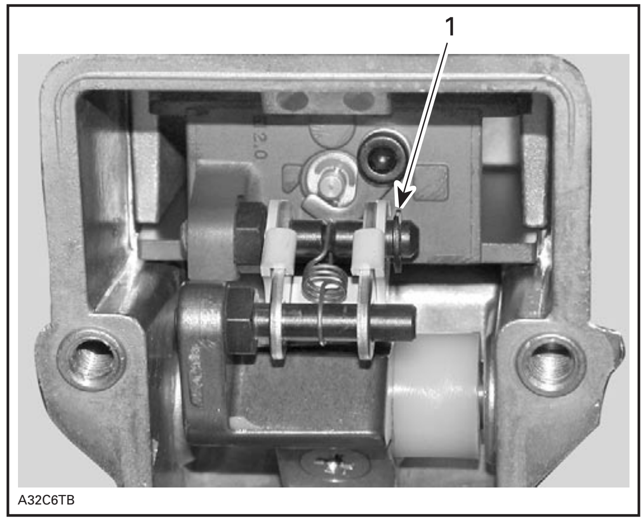
Open throttle 3/4 wide and keep that opening.

Lift throttle slide covers bottom first until they are free from carburetor bodies. Then, slide them out.



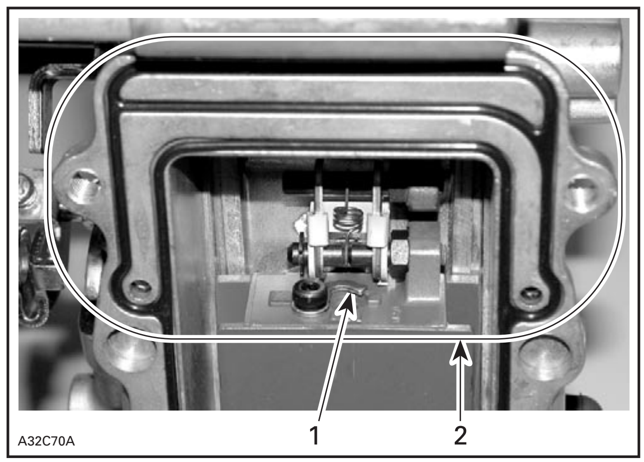
1. Lift bottom first
2. Slide out

Remove circlip **no. 14** retaining throttle slide.



1. Circlip

At throttle slide assembly, needle retainer must face carburetor body.



1. Needle retainer
2. Ensure O-ring gasket is properly seated in nipple area

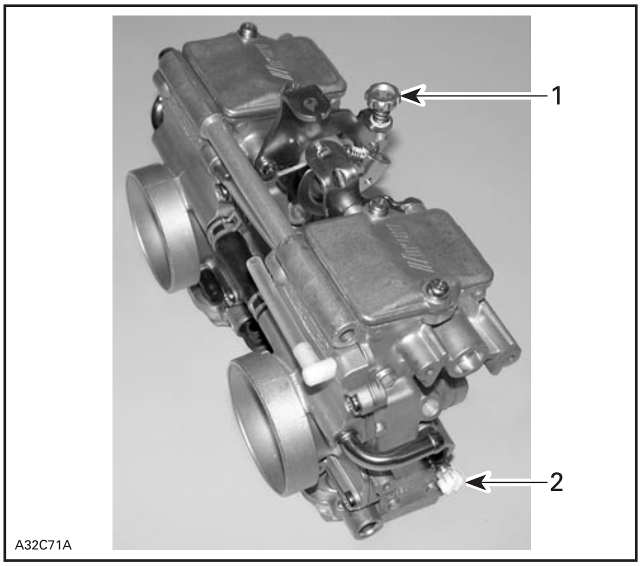
After inserting throttle slide cover in place and before installing screws, ensure O-ring gasket is properly seated in its groove especially in the area around vent nipple. See illustration above.

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

– pilot screw adjustment
– carburetor synchronization and throttle slide height (preliminary idle speed adjustment)
– throttle cable adjustment
– choke cable adjustment

– oil pump and carburetor synchronization
– final idle speed adjustment (engine running).



1. *Idle speed screw*
2. *Pilot screw (one on each carburetor)*

Pilot Screw Adjustment

Completely close the pilot screw (until a slight seating resistance is felt) then back off as specified.

Turning screw in clockwise leans mixture and conversely, turning it out counterclockwise enriches mixture.

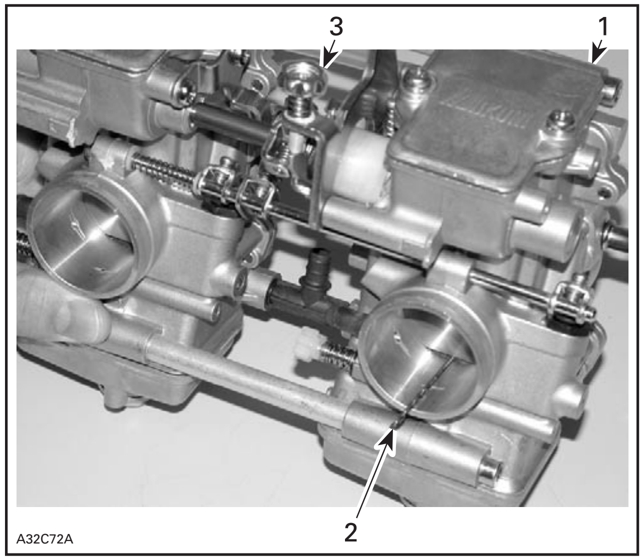
Refer to TECHNICAL DATA for the specifications.

Carburetor Synchronization and Throttle Slide Height (preliminary idle speed adjustment)

First proceed on PTO carburetor.

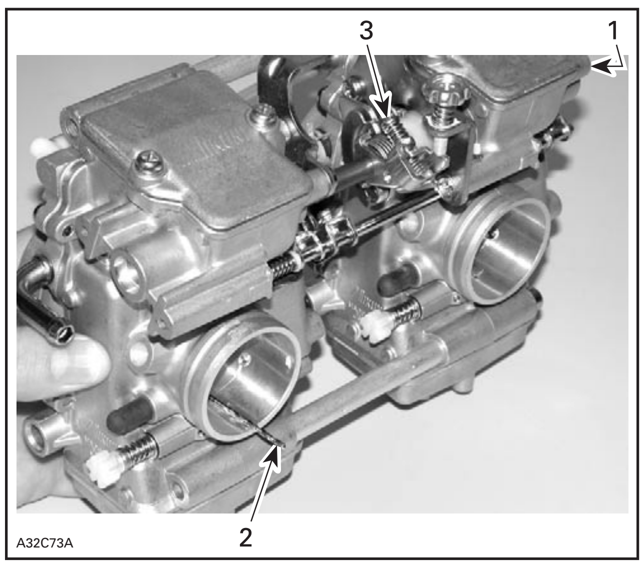
Use a drill bit to measure throttle slide height (see following table) on **outlet** side of carburetor (engine side).

Adjust by turning idle speed screw **no. 15**.



1. *Adjust PTO carburetor first*
2. *Drill bit used as a gauge to measure throttle height*
3. *Idle speed screw*

For MAG carburetor use synchronization screw. Use same drill bit as for PTO carburetor to measure throttle slide height. Turn synchronization screw to adjust.



1. *PTO carburetor adjusted first*
2. *Drill bit used as a gauge to measure throttle height*
3. *Synchronization screw*

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly.

Final idle speed adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

MODELS	THROTTLE SLIDE HEIGHT (drill bit size) ± 0.1 mm (± .004 in)
GSX 500 ss Sport MX Z 500 ss Trail MX Z 500 ss R Adrenaline/Trail	1.5 (.059)
GSX 600 R Sport MX Z 600 Trail MX Z 600 R Adrenaline/ Renegade/ Renegade X/Trail/X	1.6 (0.063)
Summit 600 R Adrenaline/X	2.0 (.079)
GSX 800 R Limited MX Z 800 R Adrenaline/ Renegade/ Renegade X/X	1.7 (0.067)
Summit 800 Sport Summit 800 R Adrenaline/HM/HM X/HMXtrem/Sport/X	2.0 (.079)

INSTALLATION

CAUTION: Never allow throttle slide(s) to snap shut.

Install dual carburetor assembly.

Make sure dual carburetor assembly is properly inserted into carburetor sockets, hold it in place and tighten retaining clamps.

Secure heated carburetor inlet and outlet lines with clamps, tighten to 1.5 to 2.0 N•m (13 to 18 lbf•**in**) and remove pincher on outlet line.

Allow coolant to flow from coolant tank to carburetor before opening valve.

Connect all hoses to dual carburetor assembly and to DPM, making sure there are no kinked hoses after reconnection.

Throttle Cable Adjustment

To adjust throttle cable, refer to THROTTLE CABLE at the end of this section.

Choke Cable Adjustment

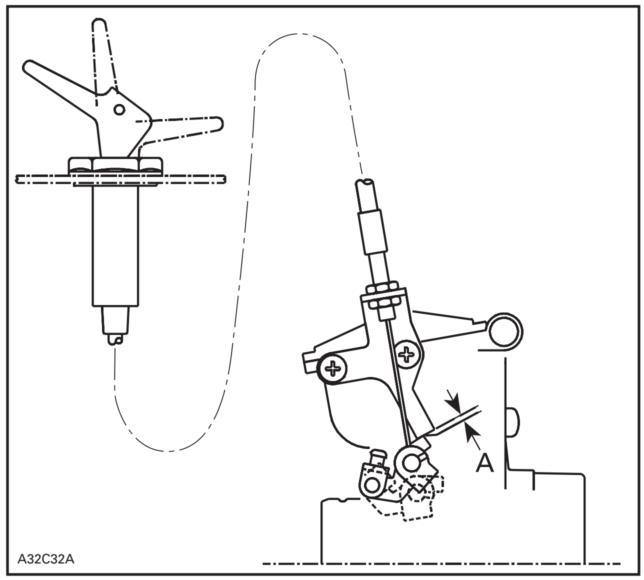
Adjust choke cable as per following procedure:

Loosen choke cable housing adjusting and locking nuts.

Connect choke cable on starter lever **no. 4**.

While choke lever is fully open, pull choke cable until starter lever reaches the stopper. Tighten cable housing adjusting and locking nuts in this position.

As a confirmation, the gap between the stopper and the bracket should be within 0 and 0.5 mm (0 and 1/64 in).



A. Within 0 and 0.5 mm (0 and 1/64 in)

Reinstall air silencer and DPM.

Reconnect DPM air vent hose at air silencer.

Make sure dual carburetor assembly properly slides into air silencer adapters; hold it in place and tighten clamps.

Reconnect DPM air vent hose nipple to air silencer.

Reconnect air temperature sensor connector to air silencer.

Idle Speed Final Adjustment

CAUTION: Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked after each time carburetor idle is adjusted. Refer to OIL INJECTION SYSTEM.

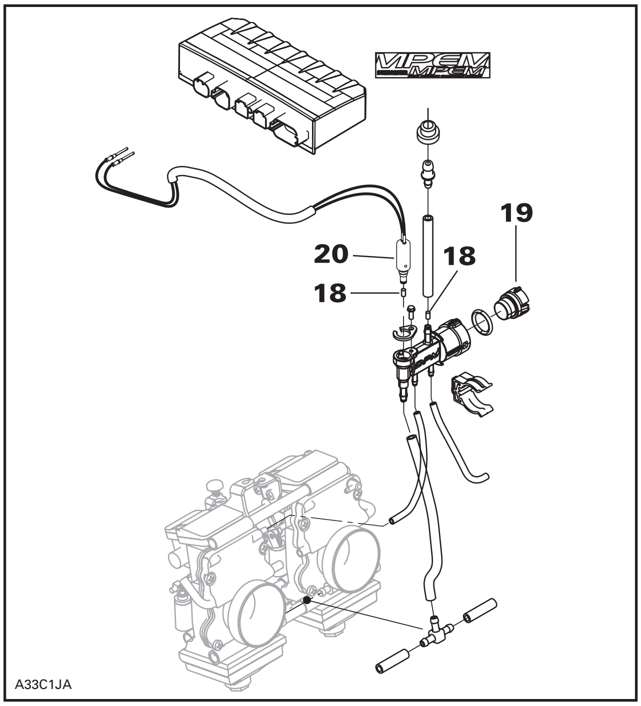
Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

Refer to TECHNICAL DATA for the specifications.

CAUTION: Do not attempt to set the idle speed by using the pilot screw. Severe engine damage can occur.

DPM

Some Models



TESTING

Air Temperature Sensor

At 20 °C (68 °F), the sensor resistance must be 2500 Ω ± 300.

Sensor should also be tested through all its operating range. Use the following chart.

Replace sensor if not within specifications.

TEMPERATURE		RESISTANCE (OHMS)
°C	°F	
- 30	- 22	28 000
- 20	- 4	14 500
0	32	5 500
20	68	2 500
40	104	1 200
60	140	600
80	176	320
100	212	180
120	248	120

Solenoid and MPEM

Static Test

Unplug electric connector of solenoid **no. 20** and connect it to a 12 V battery. The solenoid must sound when it opens. Otherwise, replace solenoid. Repeat test several times.

Dynamic Test

Air temperature sensor must be at 20 °C (68 °F). For the test, operate the engine at the RPM specified in the following chart.

MODEL	TEST RPM
GSX 800 R Limited MX Z 600 R Renegade MX Z 800 R Adrenaline/Renegade/ Renegade X/X Summit 600 R Adrenaline/X Summit 800 R Adrenaline/HM/HM X/HM Xtrem/X	3800

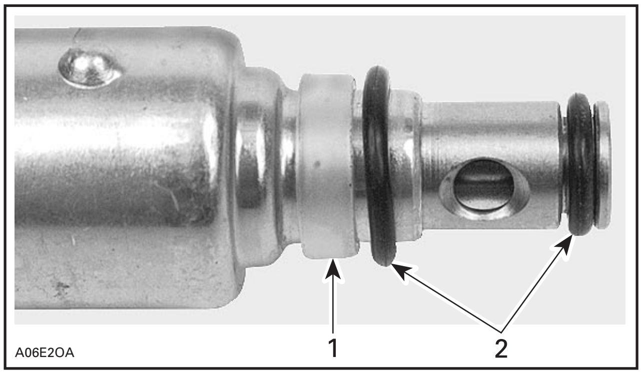
The solenoid must vibrate.

Otherwise, ensure fuse(s), wiring harness and connections are in good condition and if so, try a new MPEM and retest. Refer to ELECTRICAL section.

PARTS REMOVAL AND INSTALLATION

Solenoid

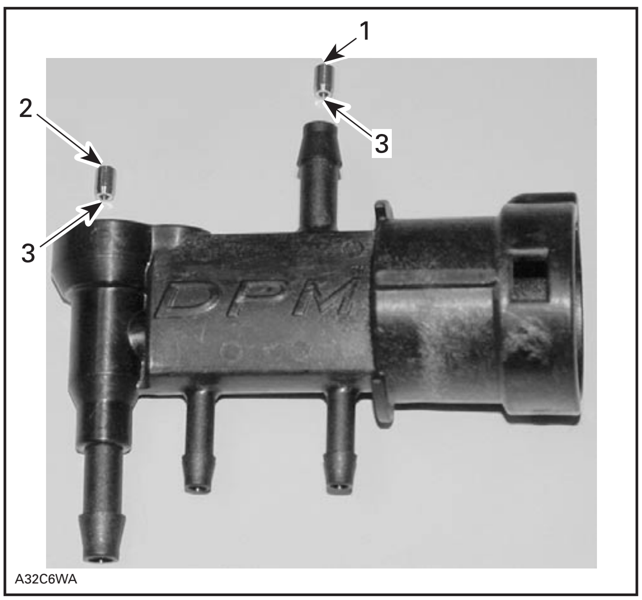
At reassembly, ensure that solenoid seals are in place.



1. *Plastic seal*
2. *O-rings*

Jet

When installing jet **no. 18** in DPM, ensure to position the taper end as shown.



1. *Vent jet*
2. *Lean jet*
3. *Taper end here*

Pay also attention not to mix jets. Refer to the following table for the proper inner diameter size. Refer to the illustration above for the jet location.

MODEL	INSIDE DIAMETER mm (in)	
	VENT JET	LEAN JET
GSX 800 R Limited MX Z 600 R Renegade MX Z 800 R Adrenaline/Renegade/ Renegade X/X Summit 600 R Adrenaline/X Summit 800 R Adrenaline/ HM/HM X/HM Xtrem/X	1.2 (.047)	2.0 (.079)

Cap

Prior to installing cap **no. 19**, ensure O-ring is in good condition. To install cap, firmly push until tabs click and lock on both sides in DPM.

DPM MANIFOLD TESTING

Visual Inspection

With DPM manifold removed from vehicle and all hoses disconnected from DPM manifold, inspect for any broken fittings or missing dust caps. If any part is broken, replace DPM manifold and **do not proceed** with leak test procedure. If any part is missing, order necessary part as listed in parts catalog, replace, **then perform leak test procedure**.

If there is no apparent breakage or missing part on DPM manifold, perform the following leak test procedure.

Leak Testing

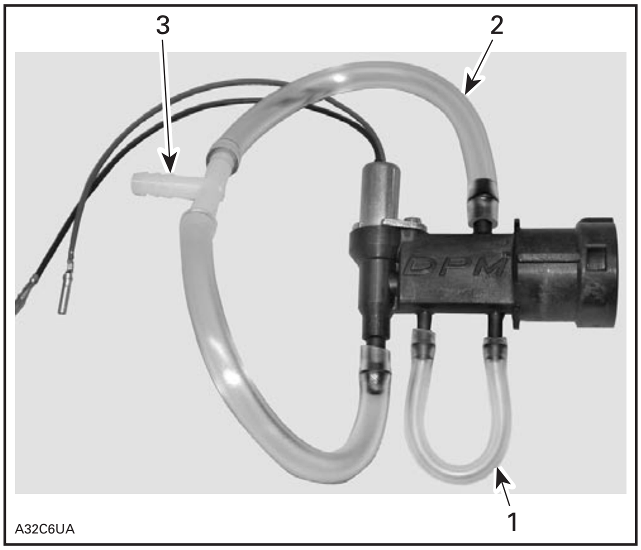
Required Items

The following items will be required:

– Water column with at least 350 mm (13-3/4 in) in height.
– Engine leak test kit (P/N 861 749 100).
– 4.8 mm (3/16 in) T-fitting.
– 6 mm (15/64 in) T-fitting.
– 3.5 mm (9/64 in) ID x 100 mm (4 in) hose.
– 6 mm (15/64 in) ID x 300 mm (12 in) hose.

DPM Manifold Preparation

Connect hoses as shown.

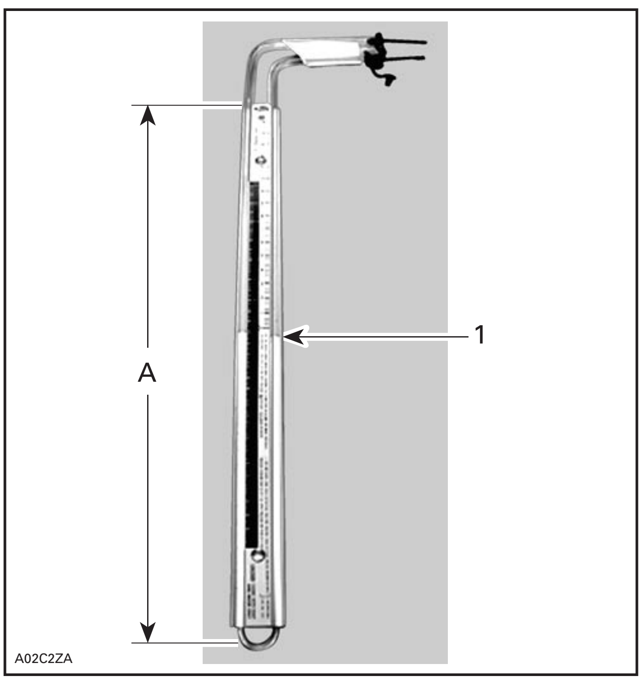


1. 3.5 mm (9/64 in) ID hose
2. 6.0 mm (15/64 in) ID hose
3. 6.0 mm (15/64 in) T-fitting

Water Column Preparation

Mount water column vertically and secure it to a wall or workbench.

Fill water column to center line (at least 175 mm (6-7/8 in)) in height. Refer to following photo.

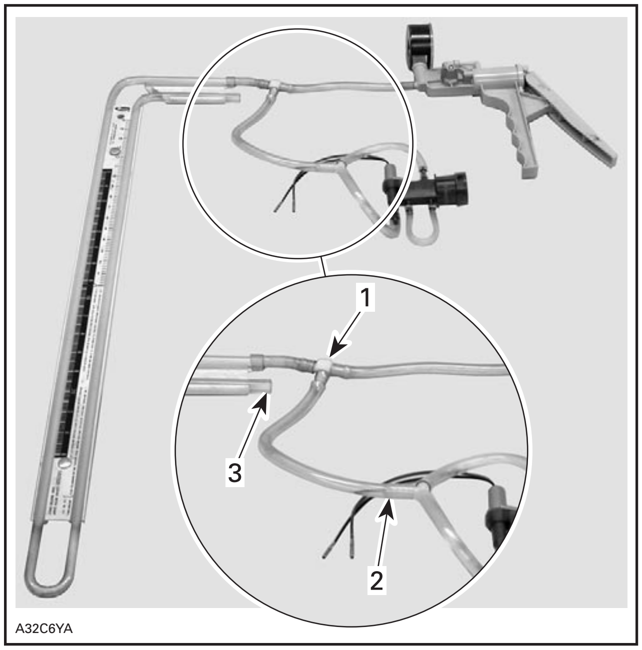


1. Center line at 175 mm (6-7/8 in)

A. 350 mm (13-3/4 in)

Connecting the Pump, DPM Manifold and Water Column

Connect hoses as shown.



1. 4.8 mm (3/16 in) T-fitting
2. T-fitting
3. Vented to atmosphere

Collect hose into one of the water column tubes, leave the other tube at atmospheric pressure.

Testing

Set pump to «vacuum».

CAUTION: Never use pump directly on DPM to make a pressure test. The vacuum produced by the pump is too high and would damage DPM components. Use the water column as explained above.

Apply negative pressure (vacuum) until the extremities of the water in the tube attain a difference of 350 mm (13-3/4 in).

Stop pumping and allow water levels to stabilize in tube.

Analysis

If water level remains unchanged, the DPM manifold **is not** defective.

If water level drops slowly to return to an even level in **more than** 10 seconds, the DPM manifold **is not** defective.

If water level drops to an even level in **less than** 10 seconds, the DPM manifold **is** defective. Replace DPM manifold parts, (refer to *Parts Catalog*) and re-test. If test fails again, replace DPM manifold.

If you are unable to attain any amount of vacuum (water level increases and decreases immediately in tube), check your set-up and re-do the test.

If you still cannot attain any vacuum, DPM manifold **is** defective. Replace DPM manifold.

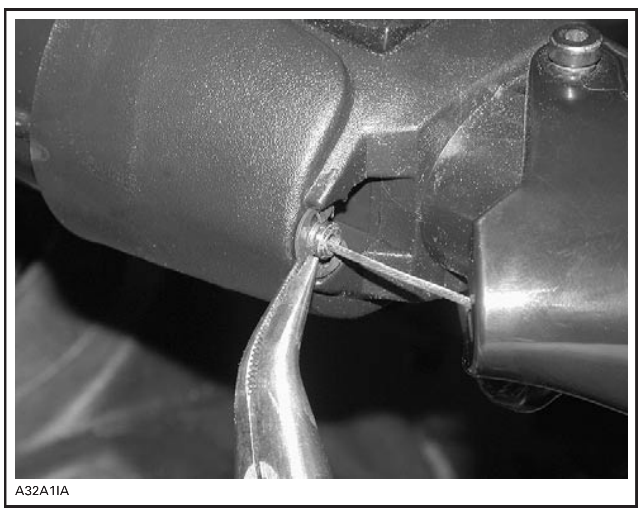
THROTTLE CABLE

THROTTLE/OIL PUMP CABLE REMOVAL

NOTE: Before removing the cable from vehicle, note its routing for installation.

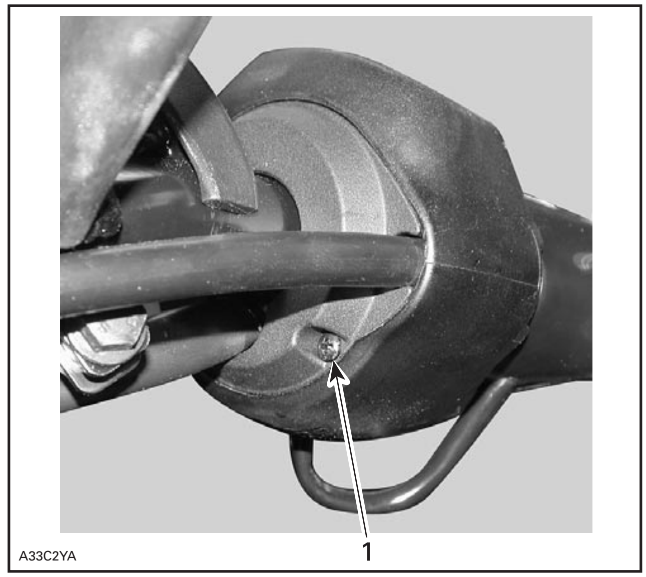
Using long nose pliers to hold the cable, push the end of cable out of its location.

Remove the retaining circlip.



TYPICAL

Remove the handle cover.



1. *Handle cover screw*

Unhook the cable sheath then remove the cable from handle.

Remove air intake silencer.

Disconnect the cable end from carburetors or throttle body.

Disconnect cable end from oil pump.

NOTE: The carburetors or the throttle body can be removed to allow an easier access to the oil pump.

THROTTLE/OIL PUMP CABLE INSTALLATION

For installation, reverse the removal procedure.

To adjust throttle and oil pump cables see further in this section.

THROTTLE CABLE ADJUSTMENT

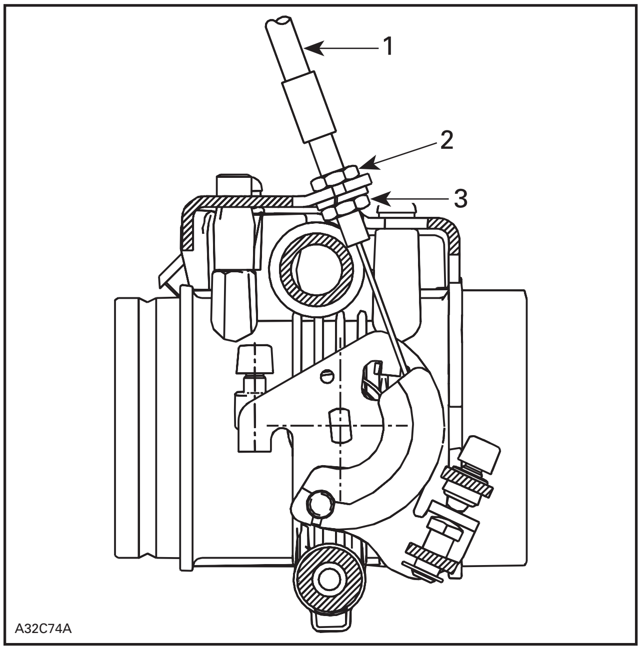
Adjust throttle cable as per following procedure:

Loosen throttle cable housing adjusting and locking nuts.

Connect throttle cable barrel to carburetor cam lever **no. 16**.

While holding throttle lever to wide open throttle position, pull on the throttle cable until mechanism touches the stopper. In this position, turn cable housing adjusting nut and tighten lock nut.

Also ensure that, when throttle is released to idle position, the idle adjusting screw end touches its stopper.



1. Throttle cable
2. Adjusting nut
3. Locking nut

After throttle cable adjustment, synchronized carburetors (refer to CARBURETOR SYNCHRONIZATION) and adjusted oil pump cable (refer to OIL INJECTION PUMP).

SDI Models

Refer to COMPONENT INSPECTION AND ADJUSTMENT in ENGINE MANAGEMENT (2-TEC).

SPARK PLUGS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

⚠ WARNING

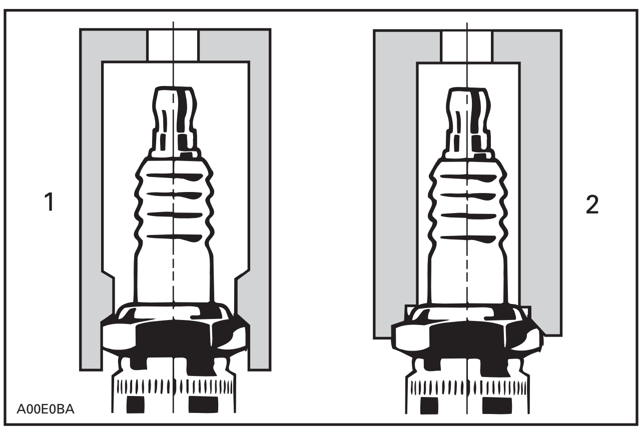
Whenever using compressed air, always wear protective eye wear.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

CAUTION: Do not adjust electrode gap of spark plug BR9ECS.

1) Apply anti-seize lubricant (P/N 293 800 070) over the spark plug threads to prevent possible seizure.
2) Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



TYPICAL
1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODEL	SPARK PLUGS	TORQUE N•m (lbf•ft)
All models	NGK	27 (20)

IGNITION TIMING

593, 593 HO, 593 HO SDI and 793 HO Engines

Normally ignition timing adjustment should not be required. It has been set at factory and it should remain correctly adjusted since every part is fixed and not adjustable. The only time the ignition timing might have to be changed would be when removing and reinstalling the magneto housing, replacing the crankshaft, the magneto flywheel, the trigger coil or the MPEM or ECM. If the ignition timing is found incorrect, first check for proper crankshaft alignment. This might be the indication of a twisted crankshaft. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

The ignition timing can be checked with either the engine hot or cold. Also, the ignition timing is to be checked at 3500 RPM with a timing light.

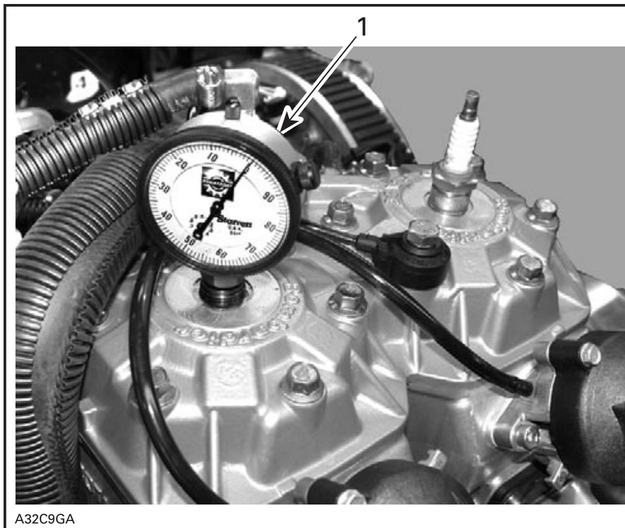
Engine retard timing varies depending on engines/ models for their first hours of operation.

ENGINE/MODELS	ENGINE RETARD TIMING (°)/DURATION (h)
593	- 3°/1 h
593 HO, 593 HO SDI	- 2°/3 h
793 HO	- 2°/3 h

NOTE: Between 3000 and 4000 RPM, the spark advance does not change. So when checking ignition timing at 3500 RPM, a change in engine speed within ± 500 RPM will not affect the timing mark when checked with the timing light.

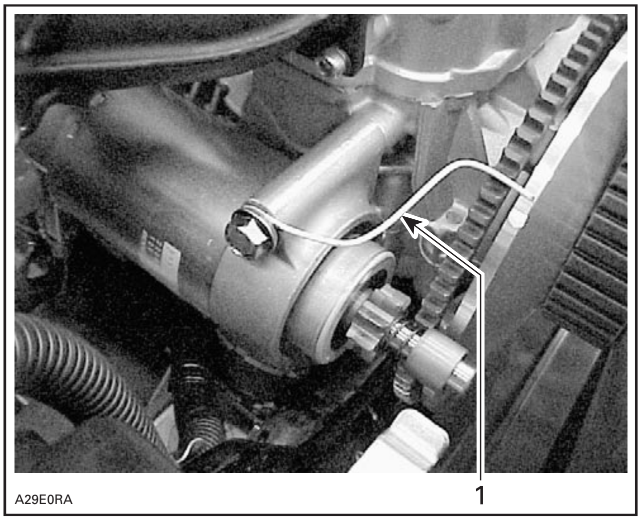
SCRIBING A TIMING MARK

- Clean the area around the MAG spark plug, and remove it.
- Install the TDC gauge in the spark plug hole, (magneto side) and adjust as follows:
  – Position the MAG piston at approximately TDC.



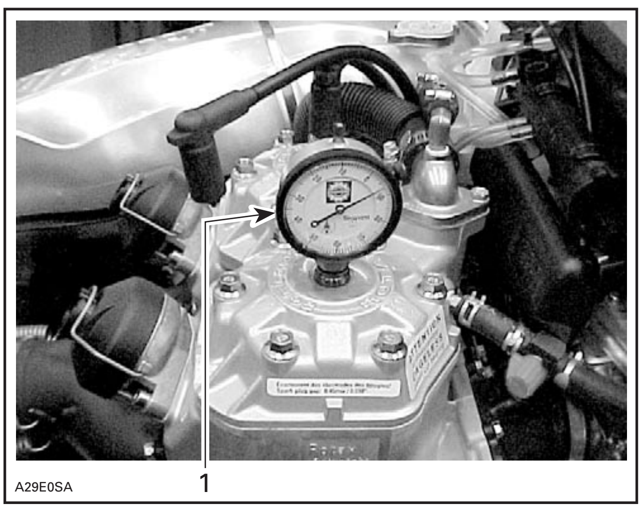
TYPICAL
1. TDC gauge on MAG side

  – Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
  – Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
  – Position the dial face toward the PTO. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
- Locate the piston TDC position as follows:
  – Slowly rotate the drive pulley back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
  – Rotate the dial face so that «0» is in line with the needle when it stops moving.
  – Again, slowly rotate the drive pulley back and forth across TDC and adjust the dial face to «0», until the needle always stops exactly at «0» before changing direction.
  – «0» now indicates exact TDC.
- Rotate the drive pulley clockwise, one-quarter turn then carefully rotate it counterclockwise until the needle indicates the specified measurement, indicated in TECHNICAL DATA.
- Twist a wire as shown and use it as a pointer. Install the wire on upper starter bolt.

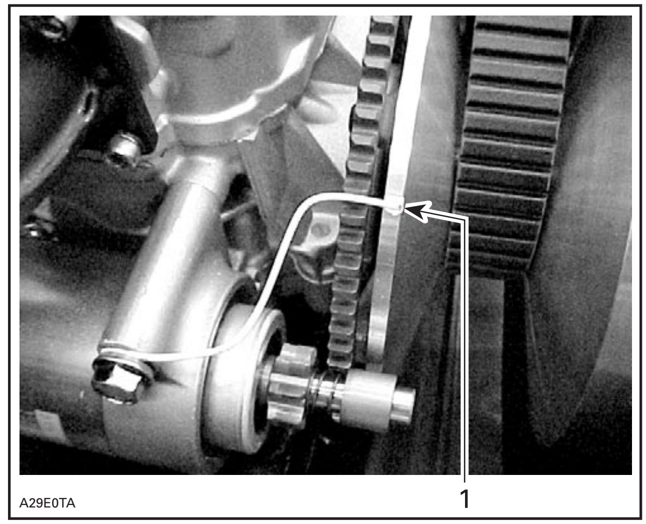


1. *Pointer*

- With the TDC gauge indicating specified timing, scribe a mark on drive pulley inner half in line with pointer end.



TYPICAL
1. *TDC gauge indicating specified timing*



1. *TIMING MARK IN LINE WITH POINTER END*

CHECKING IGNITION TIMING

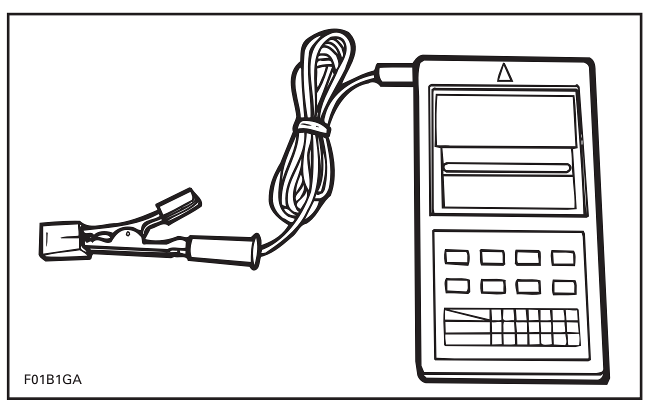
Use a timing light.

To check the ignition timing proceed as follows:

> ⚠ **WARNING**
>
> **Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.**

Connect the timing light pick-up to a spark plug cable.

Connect a digital induction type tachometer (P/N 529 014 500).



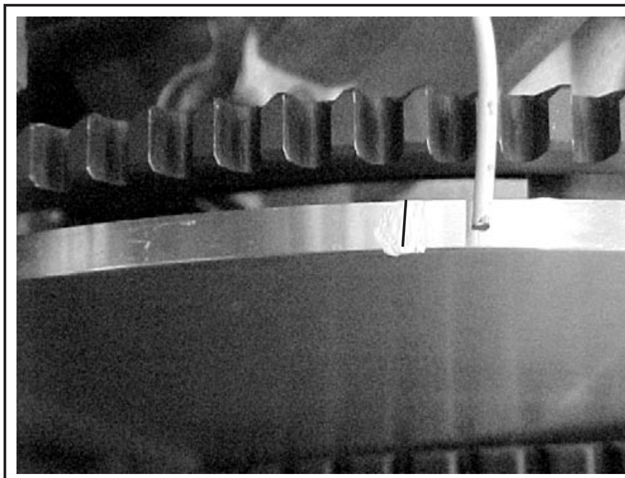
TACHOMETER

Start the engine and point timing light on timing mark. Bring engine to 3500 RPM for a brief instant.

A29E0UA

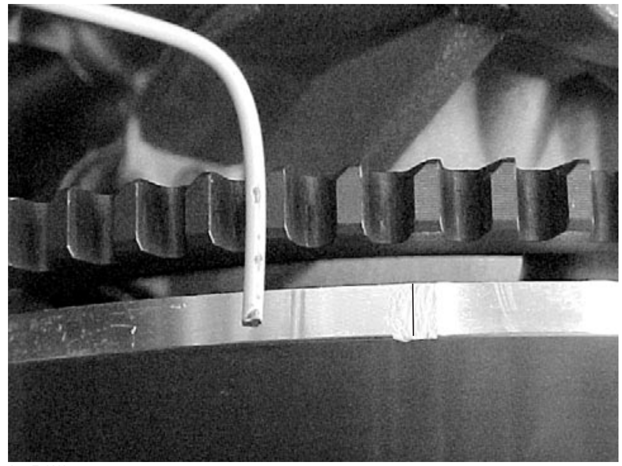
The timing mark must be aligned with pointer end. If such is not the case, note if timing is retarded or advanced.

ENGINE TYPE	TOLERANCE
593	± 1°
593 HO, 593 HO SDI, 793 HO	± 0.5°



A29E0VA

TIMING RETARDED BY ABOUT 1°



A29E0WA

TIMING ADVANCED BY ABOUT 2°

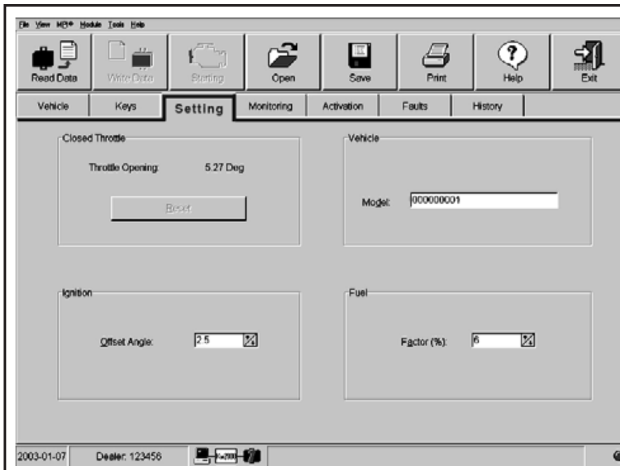
CHANGING TIMING

All Engine Types

NOTE: To change the timing on the SDI engines, the VCK is mandatory. The MPEM programmer cannot be used with these engines.

VCK (Vehicle Communication Kit)

VCK (Vehicle Communication Kit) (P/N 529 035 981) can be used, with B.U.D.S. software to change the ignition timing. Look under the proper **Setting** section of the B.U.D.S. software to change the ignition timing.



A32A1TA

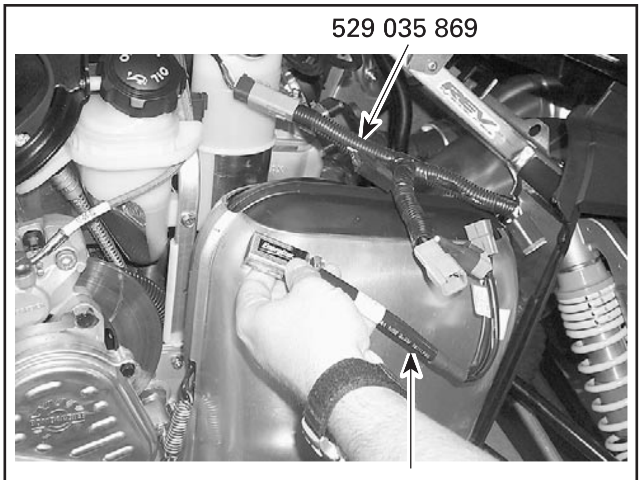
Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

MPEM Programmer

All Engine Types except SDI

Timing can also be changed using the MPEM programmer (P/N 529 035 878).

Connect 9-volt adaptor (P/N 529 035 675) to supply cable (P/N 529 035 869) and supply cable to diagnostic connector, located on right side of the vehicle.



A33E0LA

Connect MPEM programmer to DESS post.

Turn on programmer then enter password.

From main menu select no. 3. INFO VEHICLE.

A30E1XA

Vehicle information is transferred from MPEM to programmer.

A30E1YA

NOTE: In fact the programmer takes a copy of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

Select no. 4. ENGINE PARAMETER.

A30E1ZA

Select no. 1 TIMING ADJUSTMENT.

A30E2GA

Press ENTER.

Now the display shows the engine timing correction factor that is programmed in the MPEM. In the following example timing correction factor is no. 4.

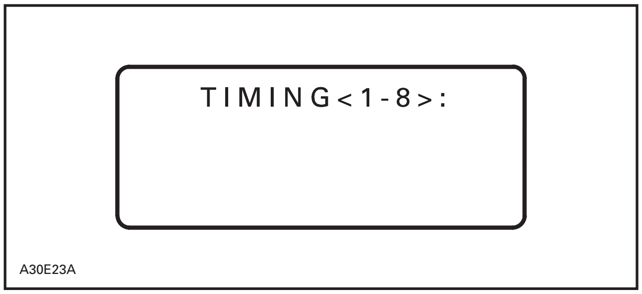
A30E21A

Press any key.

A00A3DA

Select YES using the key ↔.

Press ENTER.

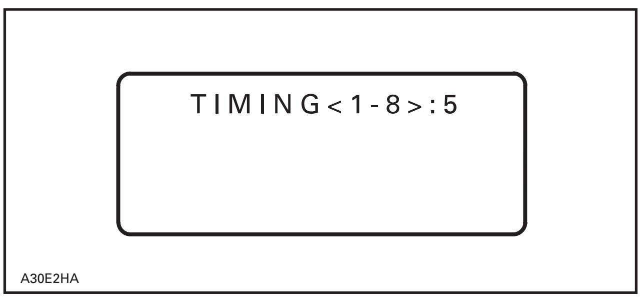


A30E23A

Select a timing correction factor corresponding to correction needed.

Example: Timing mark as verified with a timing light at 3500 RPM was too early by 2°. The correction factor programmed is no. 4.

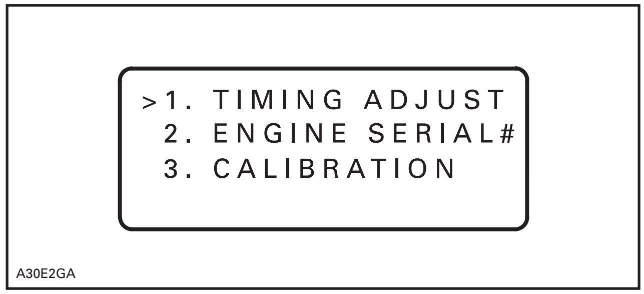
Select correction factor no. 5. This will retard the timing by 2° because the difference between correction factor no. 4 and no. 5 is - 2° (passing from 1° to - 1°).



A30E2HA

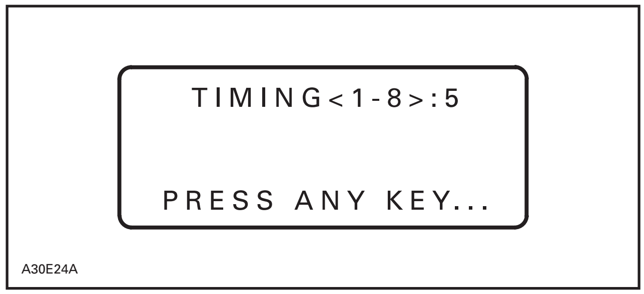
IGNITION CORRECTION FACTOR	
CORRECTION FACTOR PROGRAMMED IN MPEM	IGNITION TIMING CORRECTION
2	3°
3	2°
4	1°
1	0°
5	- 1°
6	- 2°
7	- 3°
8	- 4°

Press ENTER.



A30E2GA

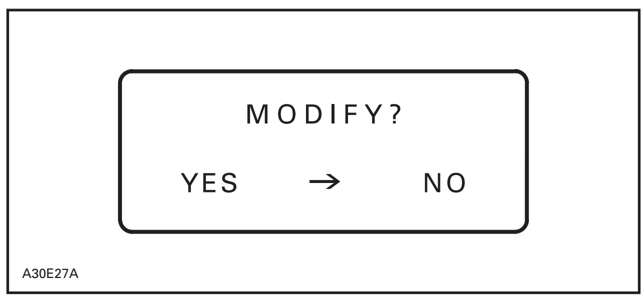
Press ENTER.



A30E24A

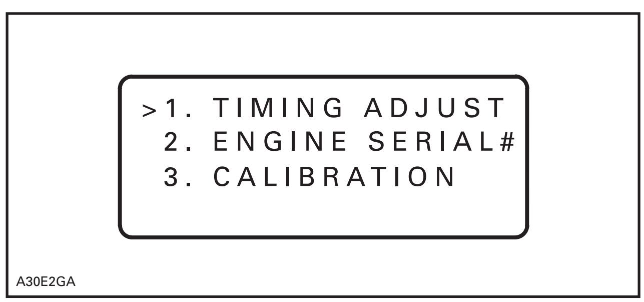
The display confirms that correction factor has been changed to no. 5.

Press any key.



A30E27A

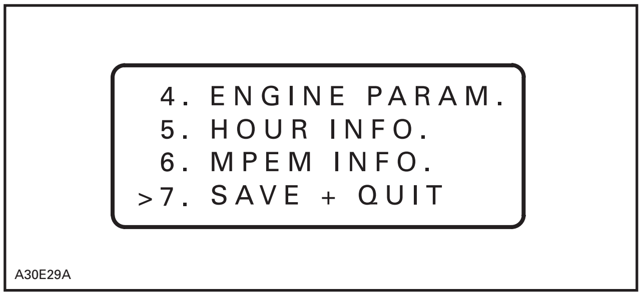
If the new correction factor selected above is the good one select NO and press ENTER. Otherwise select YES to choose an other correction factor.



A30E2GA

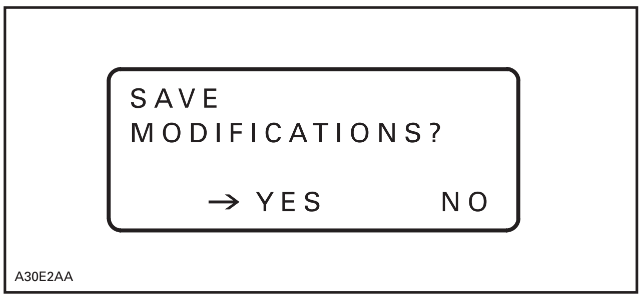
Press MENU.

Scroll to no. 7 SAVE AND QUIT.



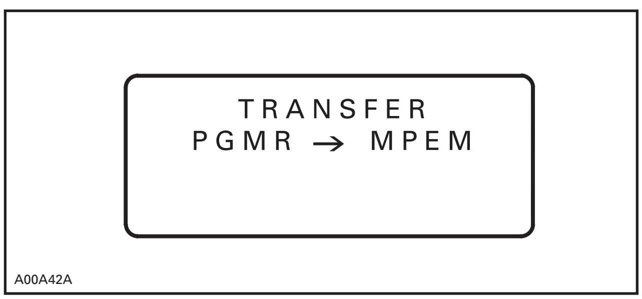
A30E29A

Press ENTER.



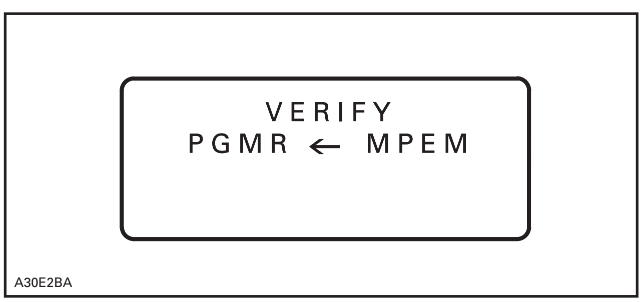
A30E2AA

Press ENTER.



A00A42A

During a very short period of time the following message will appear.

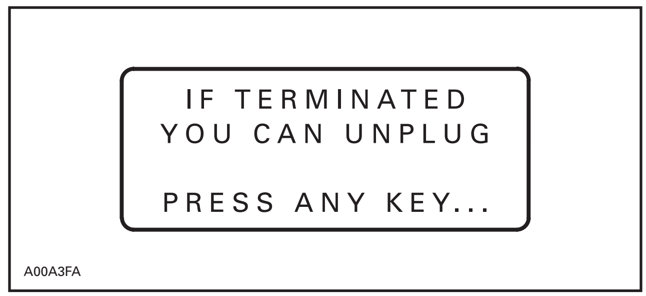


A30E2BA

After the programmer has verified, following message will appear.

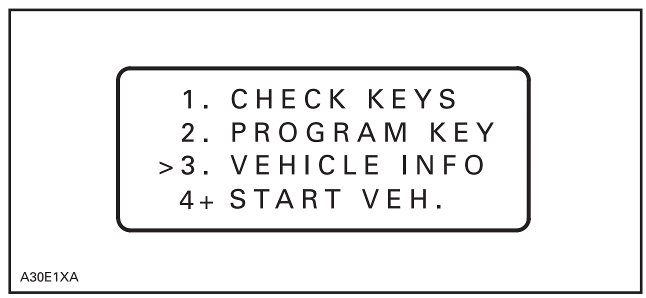
A00A3EA

Press any key.



A00A3FA

Press any key.



A30E1XA

Unplug supply cable and 9-volt adaptor.

Recheck ignition timing with timing light when completed.

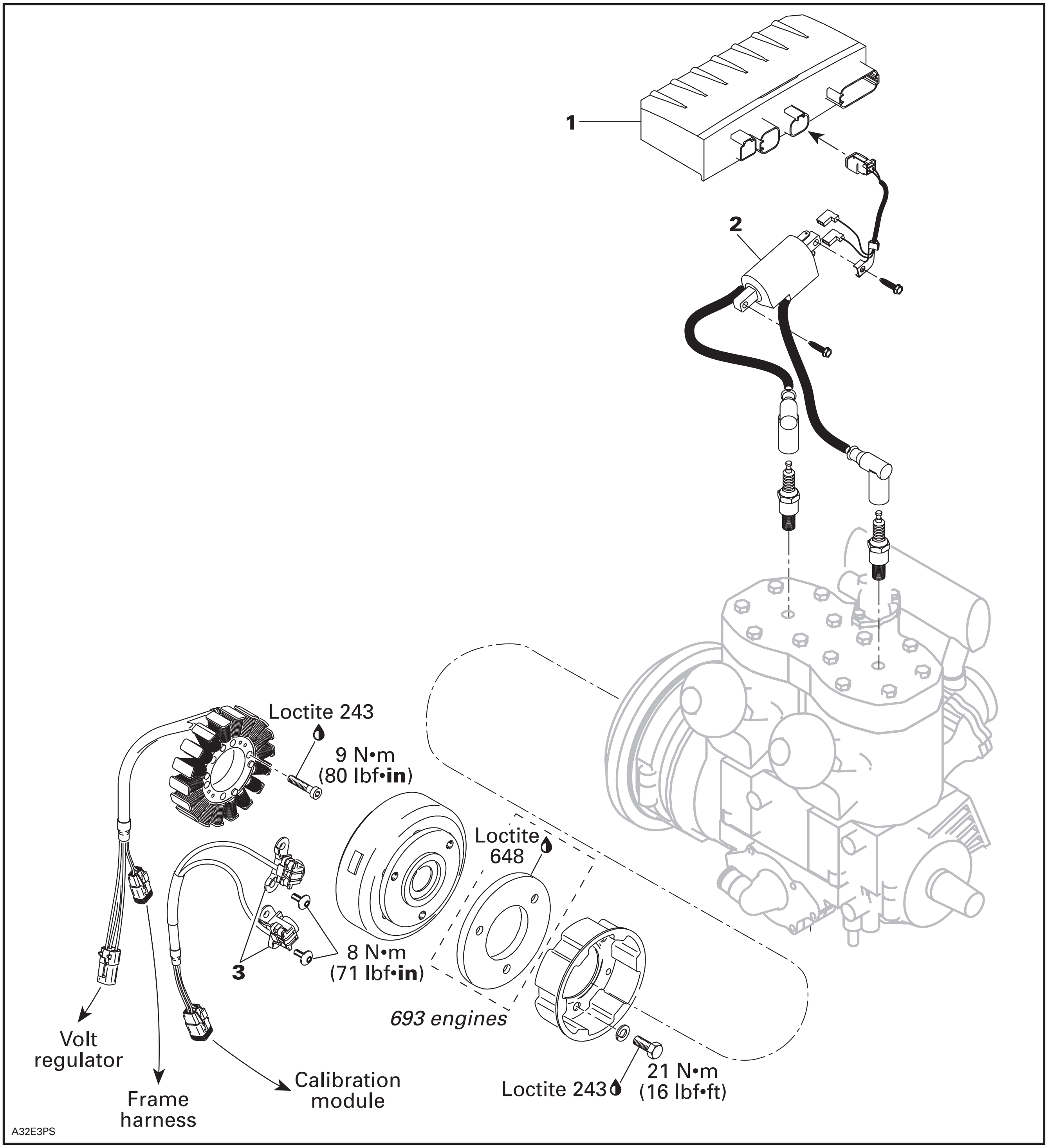
TESTING PROCEDURE

GENERAL

The following chart gives the engine types with their implemented system.

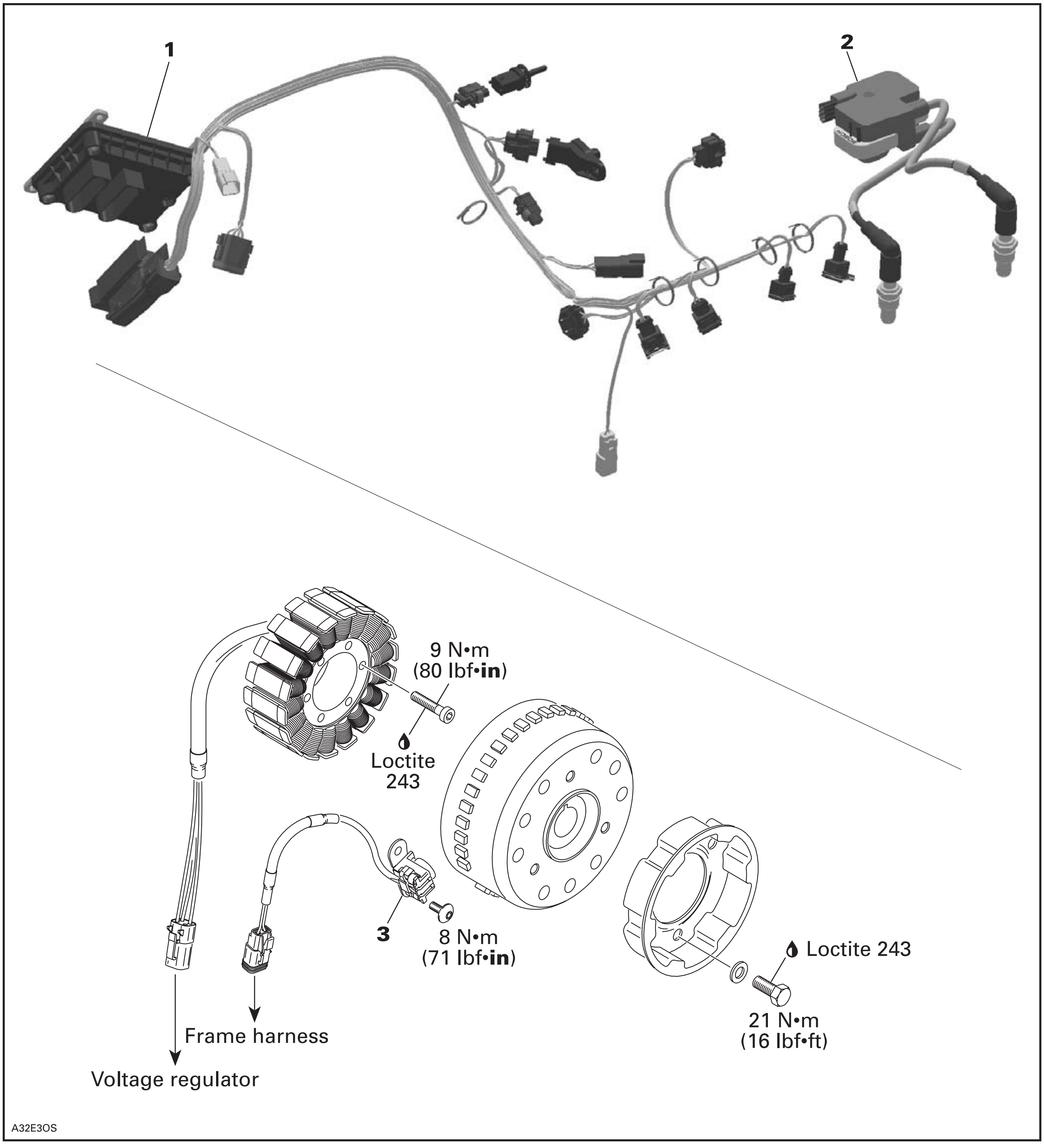
MODELS	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
All REV liquid cooled except SDI models	BOMBARDIER DC 360 W	360
SDI models	BOMBARDIER DC 480 W	480

Bombardier DC 360 W



1. MPEM
2. Ignition coil
3. Trigger coils

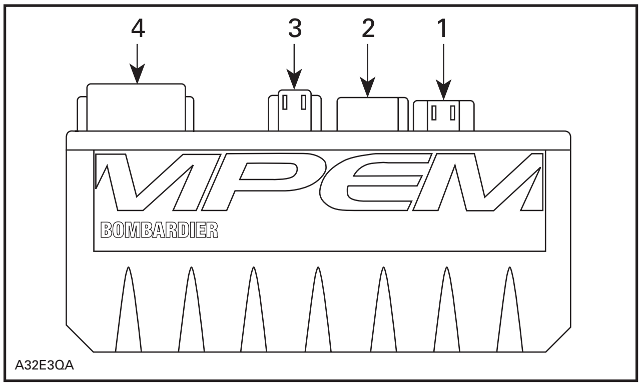
Bombardier DC 480 W



1. *ECM*
2. *Ignition coil*
3. *Trigger coil*

Multi-Purpose Electronic Module (MPEM) Connections

Bombardier 360 W



1. *Trigger coil*
2. *Cooling temperature sensor*
3. *High tension coil*
4. *DESS, ignition and engine stop switches, DESS pilot lamp*

Bombardier 480 W

For more informations concerning the Engine Control Module (ECM) refer to OVERVIEW in ENGINE MANAGEMENT (2-TEC) section.

TYPICAL — ECM

CHECKING CALIBRATION PROGRAM

Using VCK (Vehicle Communication Kit)

All Models

The VCK (P/N 529 035 981) can be used with the B.U.D.S. software to check the calibration. Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

Using MPEM Programmer

All Models except SDI

Calibration can also be checked using the MPEM programmer (P/N 529 035 878).

CAUTION: Do not interchange MPEM from a model to an other. Even if the P/N stamped on the MPEM is the same, calibration program may be different. When ordering a new MPEM always refer to appropriate model parts catalog. The service P/N published in parts catalogs are the ones with the good calibration program according to model.

With Engine Running

If the below mentioned tool is not available start engine. Turn on programmer then enter password.

Increase engine speed to 2000 - 2500 RPM then follow the same procedure as WITH ENGINE STOPPED.

CAUTION: Engine must run till the end of the procedure.

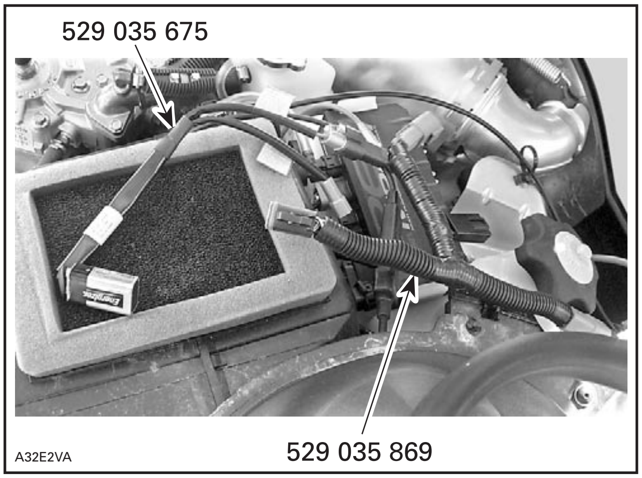
When data are being transferred, you must rev the engine at 2000 - 2500 RPM and make sure connection between programmer and vehicle is good.

IMPORTANT: In following procedure each time ← **Trs** symbol appears, make sure to rev engine between 2000 and 2500 RPM.

Engine will misfire while vehicle information is being transferred from MPEM to programmer. If engine stalls, restart it, keep engine speed at 2000 - 2500 RPM and select no. 3 VEHICLE INFO again.

With Engine Stopped

Connect 9-volt adaptor (P/N 529 035 675) to supply cable (P/N 529 035 869) and supply cable to diagnostic connector, located on right side of the vehicle.



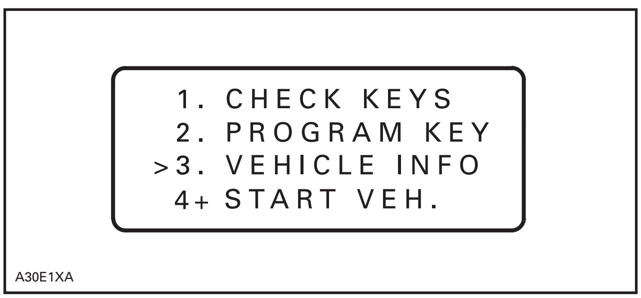
TYPICAL

When cables are connected a beeping signal from the reverse buzzer will be heard (if vehicle is so equipped). This indicates that the MPEM is now ready to transfer programming operations.

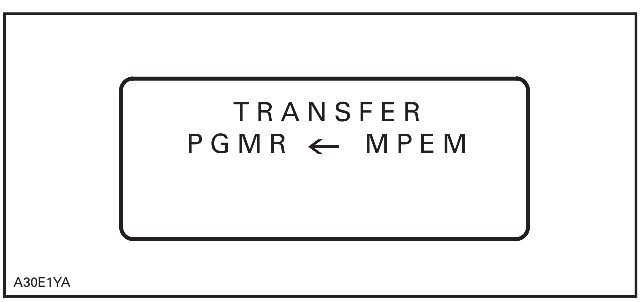
Once MPEM calibration program checking is done, unplug 9 volt adaptor and supply cable.

Turn on programmer then enter password.

From main menu select no. 3. VEHICLE INFO; ← Trs.

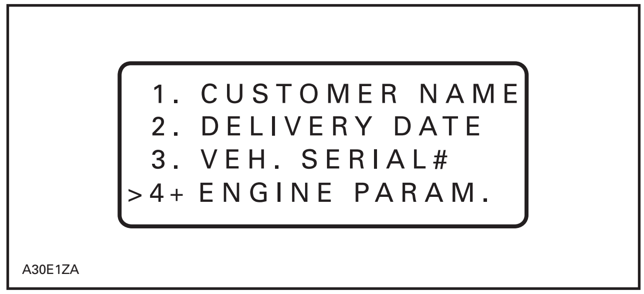


Vehicle information is transferred from MPEM to programmer.

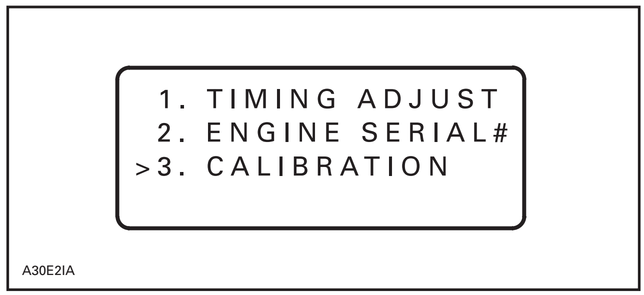


NOTE: In fact the programmer takes a copy of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

Select no. 4. ENGINE PARAMETER.

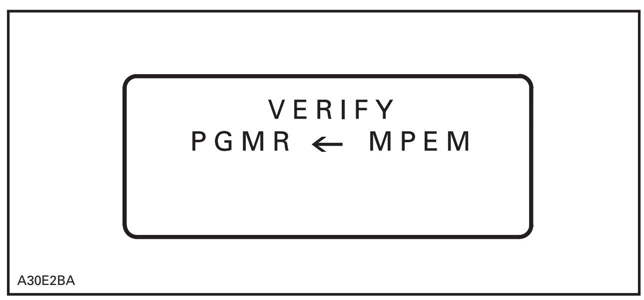


Select no. 3 CALIBRATION.

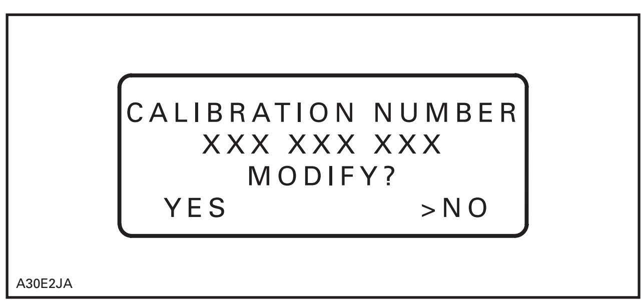


Press ENTER ← Trs.

Following screen appears temporarily:



And then following screen showing the actual calibration number in the MPEM.



Check for proper calibration number. See table below.

Select NO and press ENTER.

Press MENU twice; ← **Trs** then turn off programmer, unplug it from MPEM. Remove 9-volt adaptor.

Stop engine when using WITH ENGINE RUNNING procedure.

MODEL	ENGINE	CALIBRATED MPEM P/N	CALIBRATION P/N	MPEM P/N
GSX				
Sport 500 SS	593	512 059 850	512 059 849	512 059 796
Sport 600	593 HO	512 059 852	512 059 932	512 059 796
Limited 800	793 HO	512 059 853	512 059 854	512 059 799
MX Z				
Adrenaline 500 SS	593	512 059 850	512 059 849	512 059 796
Adrenaline 600	593 HO	512 059 852	512 059 932	512 059 796
Adrenaline 800	793 HO	512 059 855	512 059 854	512 059 796
Renegade 600	593 HO	512 059 861	512 059 932	512 059 799
Renegade X 600	593 HO	512 059 852	512 059 932	512 059 796
Renegade 800	793 HO	512 059 853	512 059 854	512 059 799
Renegade X 800	793 HO	512 059 853	512 059 854	512 059 799
Trail 500 SS	593	512 059 848	512 059 849	512 059 795
Trail 500 SS (R)	593	512 059 850	512 059 849	512 059 796
Trail 600	593 HO	512 059 851	512 059 932	512 059 795
Trail 600 (R)	593 HO	512 059 852	512 059 932	512 059 796
X 600	593 HO	512 059 852	512 059 932	512 059 796
X 800	793 HO	512 059 853	512 059 854	512 059 799
Summit				
Adrenaline 600	593 HO	512 059 866	512 059 867	512 059 799
X 600	593 HO	512 059 866	512 059 867	512 059 799
Adrenaline 800	793 HO	512 059 868	512 059 869	512 059 799
X 800	793 HO	512 059 868	512 059 869	512 059 799
HM 800	793 HO	512 059 868	512 059 869	512 059 799
HM X 800	793 HO	512 059 868	512 059 869	512 059 799
HM Xtrem 800	793 HO	512 059 868	512 059 869	512 059 799
Sport 800	793 HO	512 059 870	512 059 928	512 059 795
Sport 800 (R)	793 HO	512 059 871	512 059 928	512 059 796

NOTE: When a new MPEM is necessary, always order CALIBRATED MPEM P/N.

CHANGING MPEM CALIBRATION PROGRAM

Using VCK (Vehicle Communication Kit)

All Models

The VCK (P/N 295 035 981) can be used with the B.U.D.S. software to change the MPEM calibration. Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

Using MPEM Programmer

All Models except SDI

Proceed the same as for checking MPEM calibration but select YES to MODIFY? and press ENTER following screen appears:

ENTER
CALIBRATION NUMBER
XXX XXX XXX
PRESS ENTER

A00A5NA

Enter new calibration number and press ENTER, following screen appears:

PLUG-IN KEY
TO END:
PRESS ANY KEY

A00A5OA

Simultaneously with the following operation a transfer will occur; ← **Trs**. At this point, be ready to rev the engine so it won't fall below the 2000 RPM mark when not using 9-volt adaptor.

Plug-in the desired calibration cartridge (special red key) onto the programmer post, the following screens will appear temporarily:

TRANSFER
+
VERIFY

A00A41A

TRANSFER
PGMR → MPEM

A00A42A

VERIFY
PGMR ← MPEM

A30E2BA

OPERATION
→ SUCCESSFULL ←
PRESS ANY KEY...

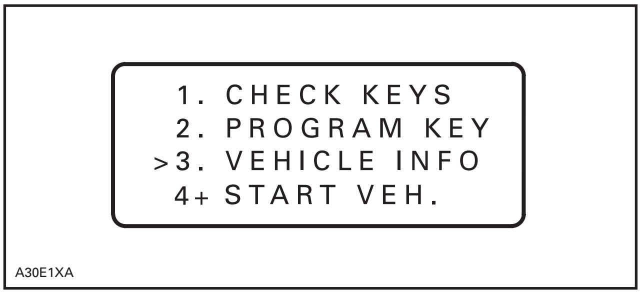
A00A3EA

Press any key, display will show followed by next screen:

1. TIMING ADJUST
2. ENGINE SERIAL #
3. CALIBRATION

A00A5YA

Press MENU twice, following screen will show:



After procedure is completed, ensure engine idle speed with engine hot is 1800 - 2000 RPM.

Stop the engine.

SYSTEM TESTING

Ignition System Testing Sequence

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1) Sparking/spark plug condition.
2) Electrical connectors.
3) Ignition switch, DESS switch or tether cut-out switch and engine cut-out switch.
4) Ignition generator coil.
5) Trigger coil.
6) MPEM voltage (liquid cooled models only).
7) High voltage coil (liquid cooled models only).
8) Buzzer testing.

Lighting System Testing Sequence

1) Electrical connectors.
2) Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon vehicle starting. Readings when the engine is running will be higher than indicated range. Part temperature must be approximately 20 °C (68 °F) (room temperature), otherwise readings could be distorted.

Analysis of Readings

- Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and must be replaced.

- Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

CAUTION: When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

- Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

- Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. Sparking

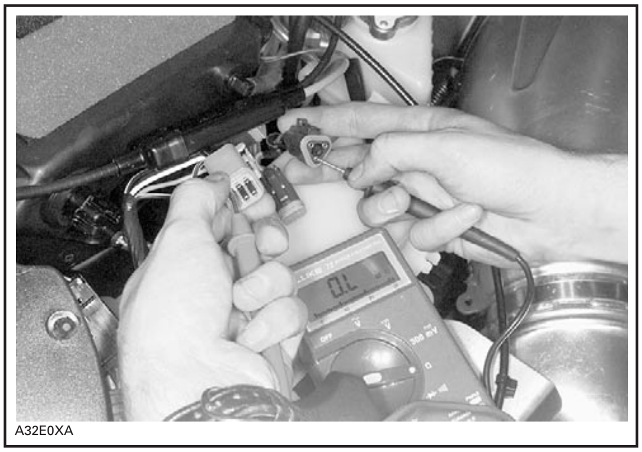
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. Pull rewind starter. If no spark is produced, replace the spark plug with a new one and do the test again.

2. Electrical Connector Testing

Make sure that none of the connectors are disconnected.

3. Ignition Switch, DESS Switch or Tether Cut-Out Switch and Engine Cut-Out Switch Testing

Disconnect connector housings and check resistance as indicated in IGNITION table.



A32E0XA

TYPICAL

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (if so equipped)

Disconnect switch housing. Using a multimeter, check between MAG and GRD terminals if the circuit is open (0.L MΩ) in operating position and if the circuit is closed (0 Ω) in off position.

DESS Switch

All Models

Check using a multimeter by connecting probes to BLACK/GREEN and BLACK/WHITE wires. The multimeter should indicate a closed circuit (0 Ω) in operating position and a open circuit (0.L MΩ) in off position.

If readings do not correspond to the above mentioned indications, replace switch.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

Engine Cut-Out Switch

All Models

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to appropriate wires. Refer to corresponding ignition and electrical system testing table in this subsection. The multimeter should indicate an open circuit (0.L MΩ) in operating position and a close circuit (0 Ω) in off position.

NOTE: For the next step, no switch must be connected to the main wiring harness.

Disconnect all switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L MΩ).

Repair or replace if necessary.

4. ignition Generator Coil Testing

Resistance Testing

– Disconnect housing between the magneto and the MPEM.
– Connect multimeter probes to appropriate wires and measure resistance. Refer to corresponding IGNITION and ELECTRICAL SYSTEM TESTING table in this subsection.

A32E0YA

TYPICAL

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

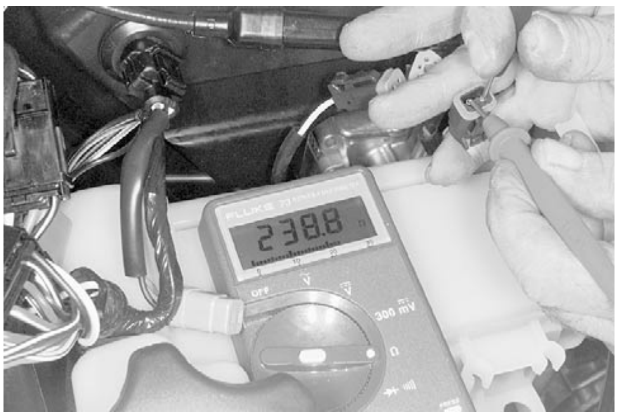
– Disconnect housing between the magneto and the MPEM.
– Connect multimeter probes to appropriate wires. Refer to corresponding ignition and electrical system testing table in this subsection. Bring the selector switch to V and the scale to 00.0 Vac.

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

5. Trigger Coil Testing

Resistance Testing

– Connect probes to appropriate wires from trigger coil housing. Refer to corresponding ignition and electrical system testing table in this subsection.



A32E10A

TYPICAL

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

– Connect probes to appropriate wires from trigger coil housing. Refer to corresponding IGNITION and ELECTRICAL SYSTEM TESTING table in this subsection.
– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

6. MPEM Voltage Testing

– Disconnect the housing between module and high voltage coil.
– Connect multimeter probes to WHITE/BLUE and BLACK wires coming out from module. Place the selector switch to V and the scale to 00.0 Vac.

A32E0ZA

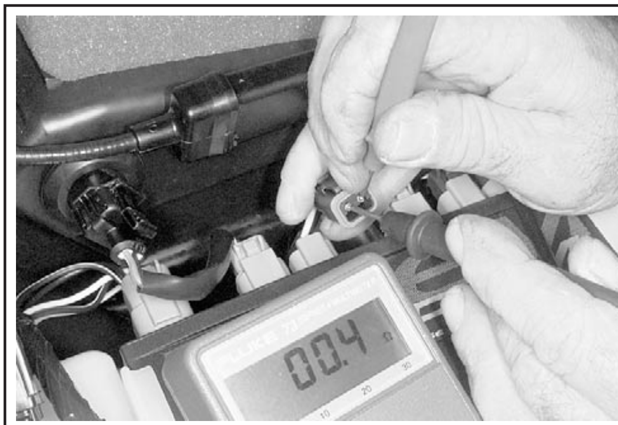
TYPICAL

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

7. High Voltage Coil Testing

Resistance Testing

– Unplug housing between high tension coil and MPEM.
– Connect multimeter probes to WHITE/BLUE and BLACK wires and measure resistance.



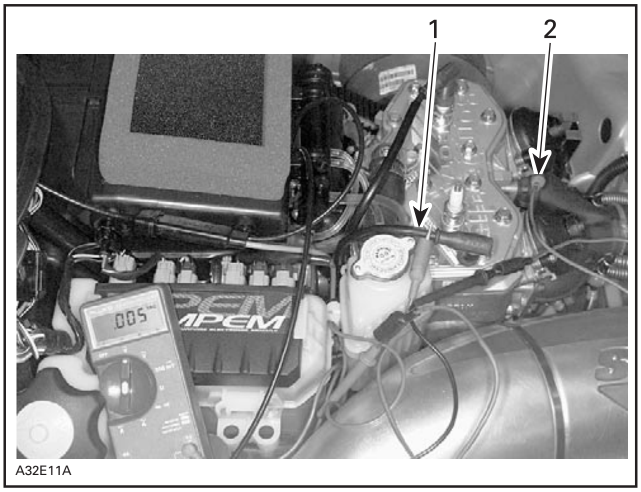
A32E12A

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

– Disconnect spark plug cap from spark plug.
– Fasten alligator clip to spark plug cable, near the spark plug.

– Connect other multimeter wire to engine (ground), then place selector switch to V and scale to 0.00 Vac.

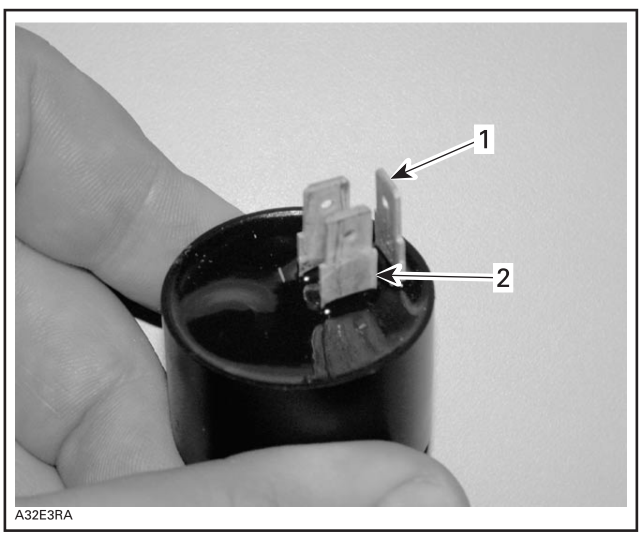


1. MAG side spark plug cable
2. Connected to ground

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

8. Buzzer Testing

NOTE: Before testing the buzzer, make sure the connectors are installed on proper buzzer tabs.

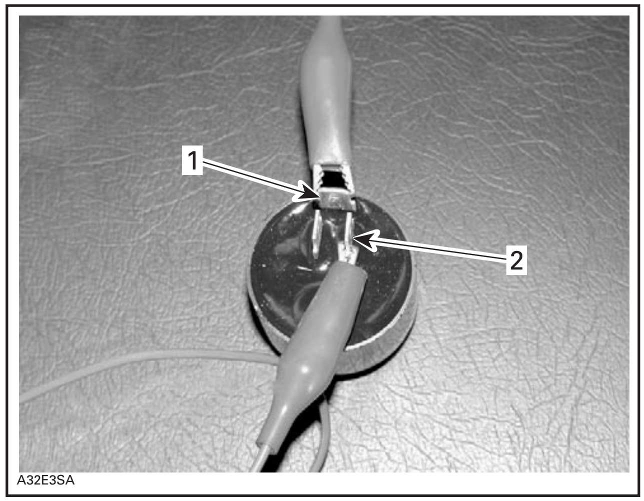


1. BEIGE/BLACK wire on positive tab
2. GREEN/RED wire on negative tab.

Using jumper wires, connect battery positive post to buzzer positive tab.

Connect battery negative post to buzzer negative tab. See next photo.

CAUTION: To avoid buzzer damage, ensure that polarity is respected.

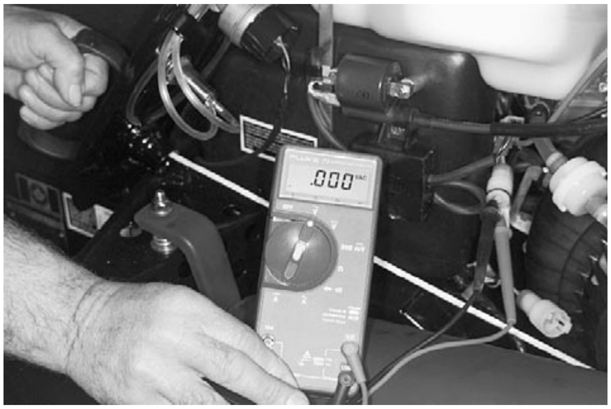


TYPICAL — 12-VOLT BATTERY PLUGGED TO BUZZER
1. Buzzer positive tab
2. Buzzer negative tab

A continuous sound should be heard. if not, replace the buzzer with a new one.

Lighting Generator Coil Voltage Testing

– Disconnect housing from engine (YELLOW wires).
– Connect multimeter probes to YELLOW wires, then place selector switch to V and scale to 0.00 Vac.
– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.



A05E0EA

TYPICAL

– Compare readings with those appearing in the LIGHTING table.

Conclusion

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the RESISTANCE column of IGNITION or LIGHTING table.

Set the multimeter as indicated.

NOTE: For the 480 W models, use B.U.D.S. software.

360 W MODEL (ignition and electrical system testing)

PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
Engine stop switch	Running insulation	BK and BK/YL	11–DA-3–F 11–DA-6–F	00.0 Ω or auto range	0.L	—	—	Engine cut-out switches must be in run position.
	Continuity in STOP position	BK and BK/YL	11–DB-3–F 11–DA-6–F	00.0 Ω or auto range	00.0 - 00.5	—	—	Engine cut-out switches must be in stop position.
DESS switch	Insulation with DESS removed	BK/WH and BK/GN	11–DA-4–F 11–DA-5–F	00.0 Ω or auto range	0.L	—	—	Tether cap must be in place.
	Continuity with DESS in run position	BK/WH and BK/GN	11–DA-4–F 11–DA-5–F	00.0 Ω or auto range	00.0 - 00.5	—	—	Tether cap must be in place.
MPEM	Ground connection	BK and negative battery terminal or body	11–DA-3–F	00.0 Ω or auto range	00.0 - 00.5	—	—	—
MPEM power (with battery)	Power from battery	RD/GY and BK	11–DA-12–F 11–DA-3–F	—	—	00.0 Vdc	Same as battery voltage	Voltage always present.
	Power from regulator	RD/BR and BK	11–DA-1–F 11–DA-3–F	—	—	00.0 Vdc	1 to 2 volts	While cranking engine.
MPEM power (without battery)	Power from regulator	RD/BU and BK	11–DA-2–F 11–DA-3–F	—	—	00.0 Vdc	3 to 5 volts	While cranking engine.
MPEM output voltage	Voltage to ignition coil	WH/BU and BK	Wires from primary of high voltage coil	—	—	00.0 Vdc	225.0 to 275.0	With tether cap in place and engine cut-out switches in run position. While cranking engine.
Trigger coil no. 1	Resistance and output	BU/YL and WH/YL	11–DE-4–F 11–DE-1–F	00.0 Ω or auto range	190 - 300	00.0 Vdc	.200 – .350	While cranking engine.
Trigger coil no. 2	Resistance and output	GN/YL and GY/YL	11–DE-3–F 11–DE-2–F	00.0 Ω or auto range	190 - 300	00.0 Vdc	.200 – .350	While cranking engine.

360 W MODEL (ignition and electrical system testing)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
High voltage coil	Primary winding resistance	WH/BU and BK	11–DC-2–F 11–DC-1–F	00.0 Ω or auto range	00.2 to 0.5	—	—	Disconnect the ignition coil from the MPEM
	Secondary winding resistance spark plug wires and cap included	Between both spark plug caps	Between both spark plug caps	00.0 Ω	14.5 k to 23.5 k	—	—	Do not attempt to remove spark plug caps from the wires.
	Secondary winding resistance spark plug wires removed	Male terminal to male terminal	On male terminals of high voltage coil	00.0 Ω	9.6 k to 14.4 k	—	—	With spark plug wires removed from high voltage coil.
	Secondary winding voltage	BK and engine	On spark plug wire insulation and on engine	—	—	00.0 Vdc	1.5 to 2.5	Do not probe into spark plug cap with spark plug wire removed from spark plug.
Start/RER switch (with battery)	Start/RER signal at MPEM	BE and BK	11–DA-7–F 11–DA-3–F	—	—	00.0 Vdc	Battery voltage	When start/RER switch is activated in all conditions.
Charging voltage	Battery voltage to switch from 5 A fuse	RD/GY and negative battery terminal	12–HG-5 and negative battery terminal	—	—	00.0 Vdc	Battery voltage	The 5 A fuse is located on the electrical config harness.
Start/RER switch (without battery)	RER signal at MPEM	BE/BK	11–DA-7–F 11–DA-3–F	—	—	00.0 Vdc	11 to 13 volts	When RER button is activated and the engine is running.
Start/RER switch (all)	Continuity from start/RER switch to MPEM	BE and BE	12–HG-8–M 11–DA-7–F	00.0 Ω or autorange	1.0 Ω	—	—	—
	Voltage supply from regulator	RD/BU and negative battery terminal	5–RR-87–F and negative battery terminal	—	—	Above battery voltage below 15 volts	00.0 Vdc	—
Charging current	Current to battery	RD and RD/WH	6–FA-A-F 6–FA-B-F	—	—	10 A scale	2–4 A	Engine @ 5000 RPM with fully charged battery. With 30 A fuse removed and ammeter in series.
Lighting generator coil	Output	YL and YL and GN	2–MO-(1, 2, 3)-F	00.0 Ω or autorange	00.0 to 00.5 3 times	00.0 Vac	3.5 to 5.5 3 times	Do the test between A and B, A and C and B and C using manual starter.
	Coil insulation	YL and engine	2–MO-(1, 2, 3)-F and engine	00.0 Ω or autorange	0.L	—	—	The term engine refers to the metal parts connected to the magneto housing.

360 W MODEL (ignition and electrical system testing)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
Relay (with battery)	Coil	WH/GN and BK	5–RC-85–F 5–RC-86–F	—	—	00.0 Vdc	10.5 to 13.5	Engine idling (1500 to 1800 RPM)
	Contacts	RD/WH and RD/BR	5–RC-87–F 5–RC-30–F	—	—	00.0 Vdc	00.0 to 0.10	Engine idling (1500 to 1800 RPM)
Relay (without battery)	Coil	WH/GN and BK	5–RC-85–F 5–RC-86–F	—	—	00.0 Vdc	10.5 to 13.6	Engine idling (1500 to 1800 RPM)
	Contacts	RD/BU and RD/BR	5–RC-87–F 5–RC-30–F	—	—	00.0 Vdc	00.0 to 0.11	Engine idling (1500 to 1800 RPM)

NOTE: If voltage is present at the coil and contact, replace the relay.

An approved automotive spark plug tester is preferred for testing the secondary winding voltage.

All cranking tests are performed with the manual starter. Faster cranking speeds may produce higher voltages.

Ignition and electric starter will not work if the Engine stop switches is in the kill position.

Charging system test should be performed if a no spark condition is encountered on this vehicle.

INSPECTION OF HEATING ELEMENTS

NOTE: All measurements must be performed at 21°C (70°F).

Throttle Lever Heating Element

Current Measurement

HIGH INTENSITY	BROWN wire	0.23 A minimum
LOW INTENSITY	BROWN /YELLOW wire	0.13 A minimum

Handlebar Grip Heating Element

Resistance Measurement

All Models except SDI

INTENSITY	WIRES	OHMS
HIGH	BLACK and ORANGE/VIOLET	13.7 to 16.7*
LOW	BLACK and ORANGE	6.8 to 8.4*

SDI Models

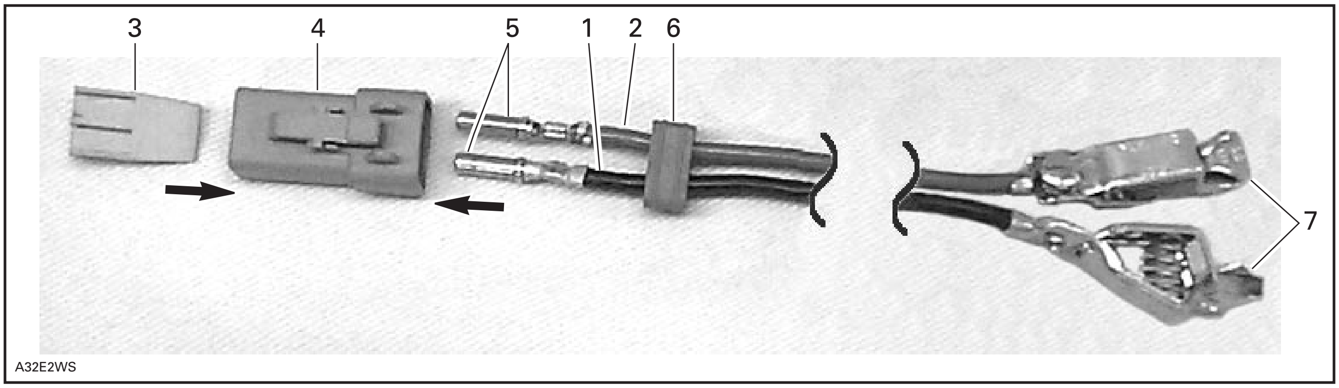
INTENSITY	WIRES	OHMS
HIGH	BLACK and ORANGE/VIOLET	17 to 23.5*
LOW	BLACK and ORANGE	8.5 to 11.8*

*When measuring resistance at terminals the actual value will be half the measurement in table. The reason for that is the elements are connected in parallel. Therefore the total resistance is half the resistance of one element.

HEADLIGHT AND ACCESSORIES SYSTEM TESTING

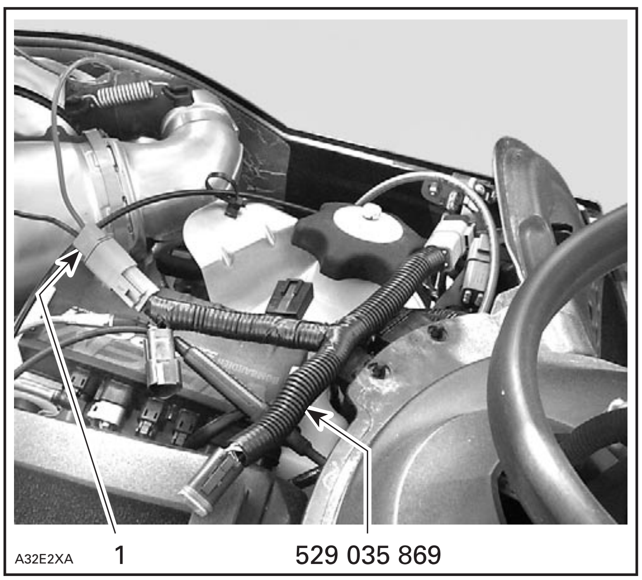
360 W Models Only

Make an homemade adaptor as shown below.



1. *Black wire in position no. 1*
2. *Red wire in position no. 2*
3. *P/N 278 001 671*
4. *P/N 278 001 673*
5. *P/N 515 175 567 (2)*
6. *Seal (included with housing)*
7. *Alligator clips*

Connect 12-Volt supply to the 2 position housing of the supply cable (P/N 529 035 869). Respect polarity by connecting 12V to RED wire and ground to BLACK wire.



1. *Homemade adaptor*

Connect supply cable (P/N 529 035 869) to diagnostic connector, located on right side of the vehicle. Now the headlight and accessories systems are supplied with 12 volts. Refer to appropriate wiring diagram in wiring diagram section to troubleshoot headlight system.

Once headlight system testing is done, disconnect supply cable from vehicle and then 12-Volt supply from the supply cable.

480 W Models (SDI engines)

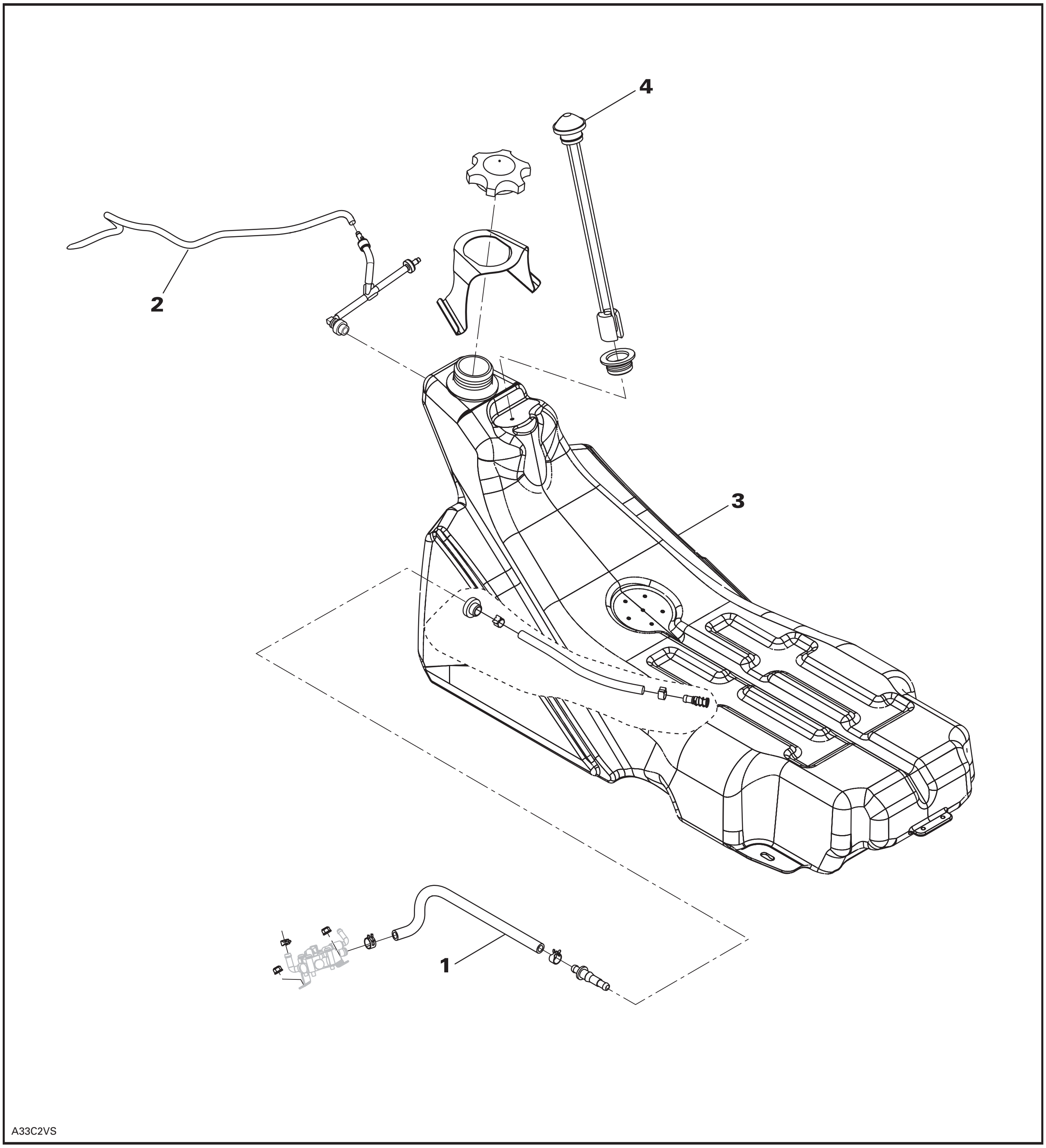
Connect VCK (P/N 529 035 981). In BUDS, click on the relay 2 (R2) button to supply headlight system with 12 volts.

To supply 12 volts in the accessories system, click on the relay 3 (R3) button.

Use the wiring diagram in WIRING DIAGRAM section to troubleshoot headlight and accessories systems.

FUEL TANK AND FUEL PUMP

All Models except SDI



FUEL FILTER

For fuel filter servicing, refer to PRESEASON PREPARATION.

FUEL TANK

Removal

Remove seat, refer to BODY.

Remove fuel tank cap.

Remove filler neck plastic nut using special tool (P/N 529 035 891).

Unclip and remove console center trim cap.

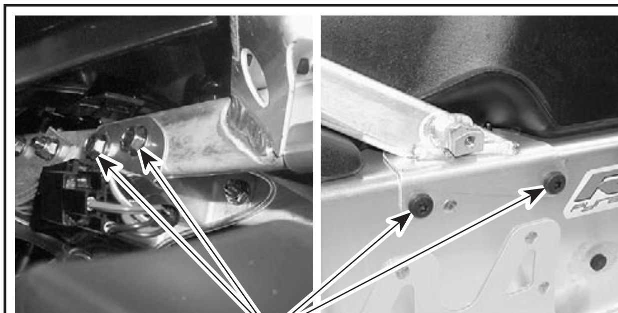
1. *Remove this cap*

Remove retaining screw on both sides of center console; this will allow lifting of console just enough to ease tank removal.

1. *Remove this screw on both sides*

Remove both sides fuel tank aluminum braces:

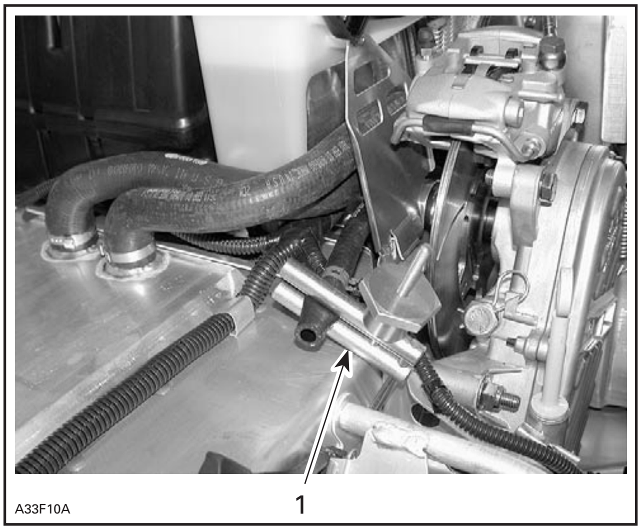
– by removing and discarding lower M8 x 20 Torx screws (2 on each side);
– and by removing upper M8 flanged hexagonal bolts (2 on each side) and discarding their nuts.



1. *Remove and discard lower Torx screws on both sides — remove upper flanged hexagonal bolts and discard their nuts on both sides*

All Models except SDI

Empty fuel tank and install a hose pincher on fuel line **no. 1** as shown in following photo.



FUEL TANK REMOVED
1. Hose pincher installed on fuel line

SDI Models

Release fuel pressure of the system. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

Empty fuel tank **no. 3**.

Install a hose pincher on fuel pump hose **no. 5** then disconnect it from fuel line **no. 1**.

Unplug fuel pump connector.

All Models

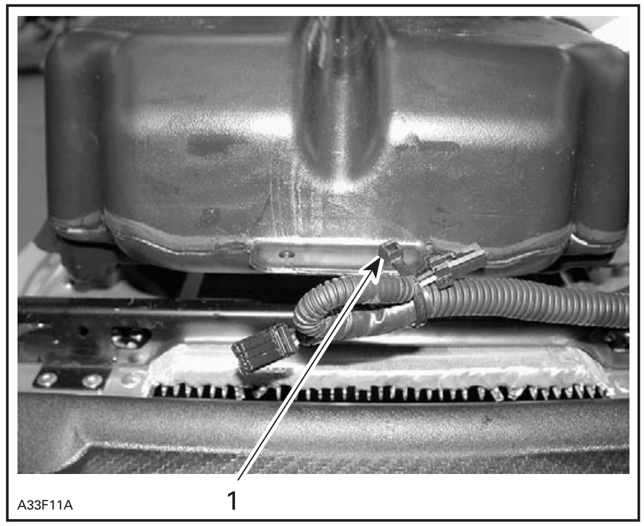
⚠ **WARNING**

Whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or (P/N 529 032 500). Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Unplug vent tube **no. 2** from tank.

Some Models

Cut locking tie holding wiring harness to fuel tank at rear.



1. Cut this locking tie

Remove fuel tank **no. 3** and set it aside.

Installation

Reinstall fuel tank and plug-in vent tube.

⚠ **WARNING**

Make sure vent tube is not kinked.

Connect fuel line and remove hose pincher.

Reinstall right and left fuel tank aluminum braces using new lower Torx screws (with Scotch Grip) and previously removed upper flanged hexagonal bolts with new M8 flanged elastic stop nuts.

Reinstall filler neck nut using special tool (P/N 529 035 891).

Reinstall fuel cap.

Reinstall center console.

Reinstall console center trim cap.

Reinstall seat.

IMPULSE/FUEL LINES SPRING CLIPS (ALL MODELS)

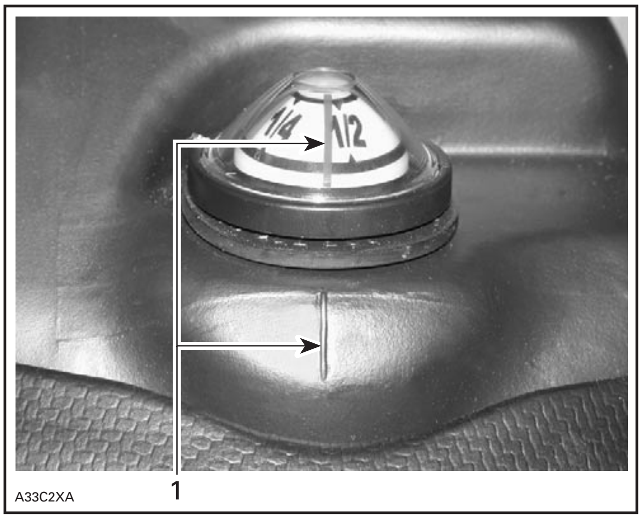
Always reposition spring clips after any repair to prevent possible leaks. If a spring clip seems loose, replace it with a new one.

FLOAT-TYPE FUEL LEVEL GAUGE

To remove gauge **no. 4** from fuel tank, pull gauge out of its grommet then remove grommet.

For reinstallation, proceed as follows:

– Install grommet halfway on gauge.
– Insert grommet in fuel tank until it bottoms.
– Firmly push gauge in grommet until it bottoms and so that its red line aligns with the line on the fuel tank.



1. Align red line with line on tank

ELECTRIC FUEL LEVEL SENSOR

Inspection

All Models except SDI

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected.

Fuse Replacement

Some Models

A 0.25 ampere fuse protects fuel level sensor circuitry. Remove seat to gain access.

FUEL LEVEL SENSOR SCREWS

All Models except SDI

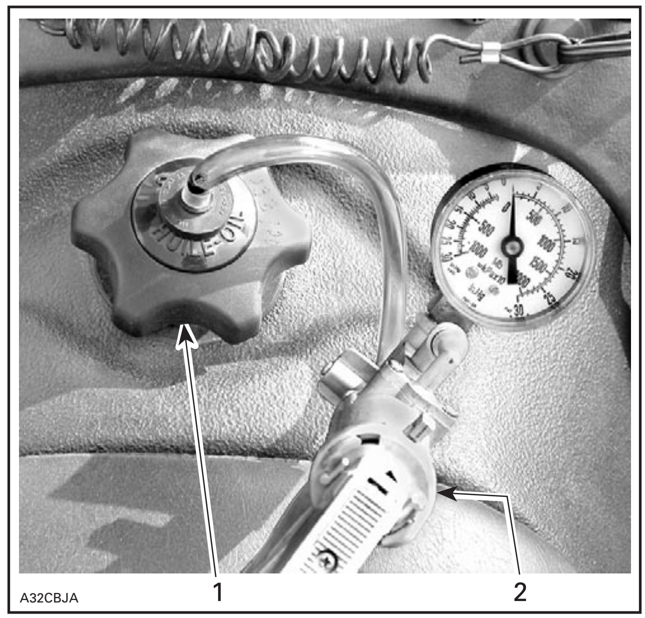
Torque fuel level sensor retaining screws to 1 N•m (8 lbf•**in**) in a criss-cross sequence and then to 2.4 N•m (21 lbf•**in**), using the same sequence.

FUEL SYSTEM PRESSURIZATION

Fill up fuel tank.

Install on fuel tank, the special cap of leak testing kit (P/N 529 033 100).

Using air pump from engine leak test kit (P/N 861 749 100), inject air into fuel tank. See next photo.



TYPICAL
1. Special cap on tank
2. Air pump

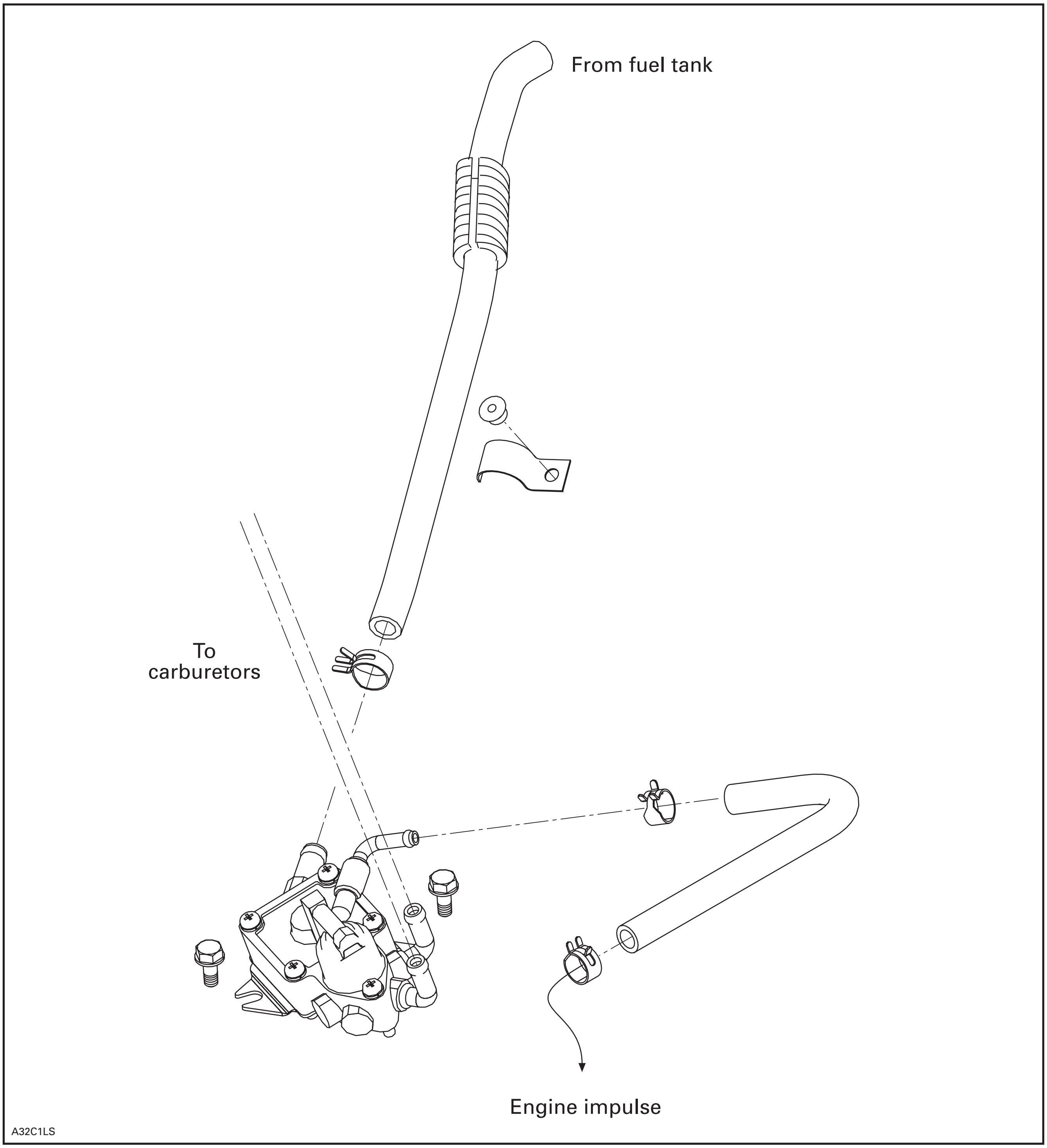
Pressurize fuel system to 21 kPa (3 PSI). The pressure must not drop during 3 minutes.

If pressure drops, locate fuel leak(s) and repair/replace leaking component(s).

To ease locating leak(s) at fuel tank vent fitting, fuel gauge or fuel cap, spray soapy water on components; bubbles will indicate leak location(s).

FUEL PUMP

All Models except SDI



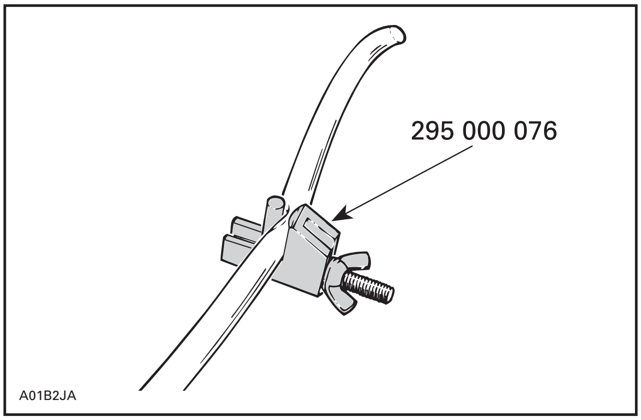
NOTE: The following instructions are not applicable on SDI models. See COMPONENT INSPECTION AND ADJUSTMENT concerning fuel pump procedure on these models.

REMOVAL

Remove air intake silencer and carburetors.

NOTE: Do not disconnect cables from carburetors.

Install a hose pincher (P/N 295 000 076) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump to chassis.

PUMP VERIFICATION

Check fuel pump valves operation as follows:

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and also under vacuum.

NOTE: Plug remaining outlet with finger while checking outlet valve.

Check impulse diaphragm and gasket on fuel pump with twin outlets as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover on so equipped models. Either apply pressure or vacuum. The diaphragm/gasket must not leak.

CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

⚠ WARNING

Solvent with low flash point such as gasoline, naphtha, benzol, etc, should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

INSTALLATION

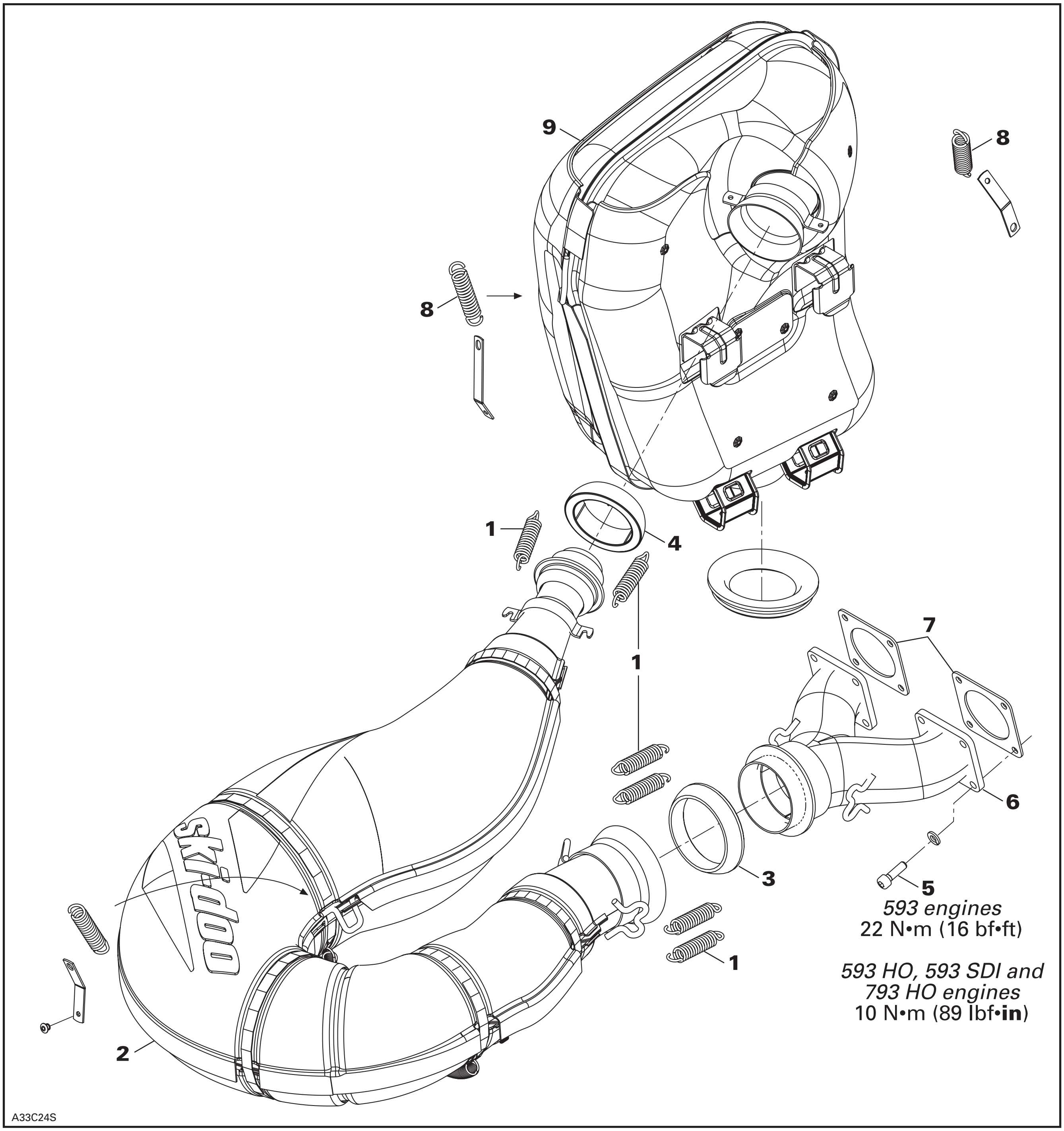
Inverse removal procedure.

⚠ WARNING

Pressure test to ensure there is no leak in fuel system.

593 HO AND 793 HO ENGINE TYPES

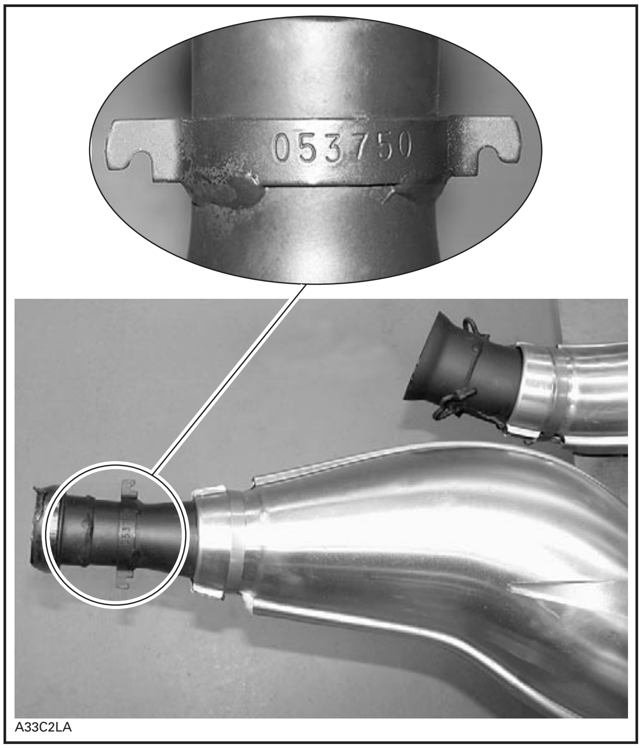
EXHAUST SYSTEM



TUNED PIPE

Identification

Each tuned pipe is identified by a number. To use the proper tuned pipe with the proper vehicle, check the number on the welded clamp at the end of tuned pipe. This number depicts the 6 last numbers of Bombardier part number.



TYPICAL

Removal

Open hood and right side panel.

Remove:

– all exhaust springs **no. 1**
– tuned pipe **no. 2**
– both exhaust gasket **no. 3** and **no. 4**.

Inspection

Check:

– tuned pipe shield for damages
– tuned pipe ends for cracks or damages.

Installation

Install doughnut shaped exhaust gasket **no. 3** with both of its notches aligned with Y-manifold protrusions.

If the gaskets are damaged, replace them.

NOTE: No RTV sealant required on doughnut shaped exhaust gaskets.

Install all exhaust springs.

MANIFOLD

Removal

Remove:

– tuned pipe **no. 2**
– doughnut shaped exhaust gasket **no. 3**
– manifold screws **no. 5**
– manifold **no. 6**
– gaskets **no. 7**.

Inspection

Check if the manifold is cracked or damaged. Replace if necessary.

Installation

Install the manifold with new gaskets.

Torque manifold screws **no. 5**.

ENGINE TYPES	TORQUE
593 HO, 593 SDI and 793 HO	10 N•m (89 lbf•**in**)

Install tuned pipe.

MUFFLER

Identification

Each muffler is identified by a number. To use the proper muffler with the proper vehicle, check the number on the welded clamp at the end of muffler. This number depicts the 6 last numbers of Bombardier part number.

A33C2MA

TYPICAL

Removal

Remove tuned pipe **no. 2**.

Remove springs **no. 8** retaining the muffler **no. 9**.

Remove the muffler.

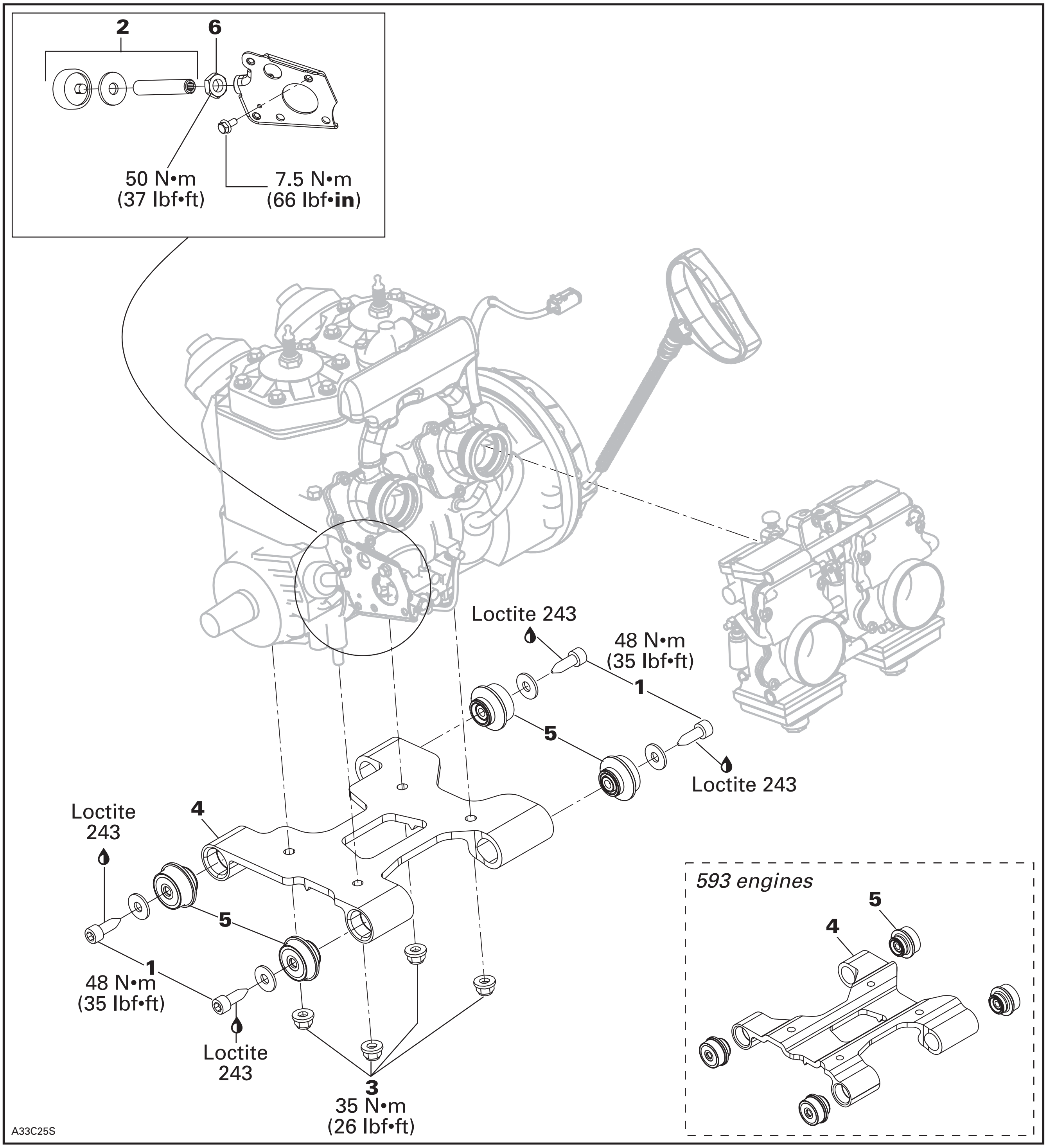
Inspection

Check the muffler for cracks or other damages.

Installation

For installation, reverse the removal procedure.

ENGINE SYSTEM



REMOVAL FROM VEHICLE

Vehicle and Engine Preparation

Place vehicle at workstation that will have access to an engine-lifting hoist. Then start with initial preparation of vehicle by doing the following.

Remove windshield.

Remove the RH side panel.

From the Front of Vehicle

Remove tuned pipe, refer to EXHAUST SYSTEM.

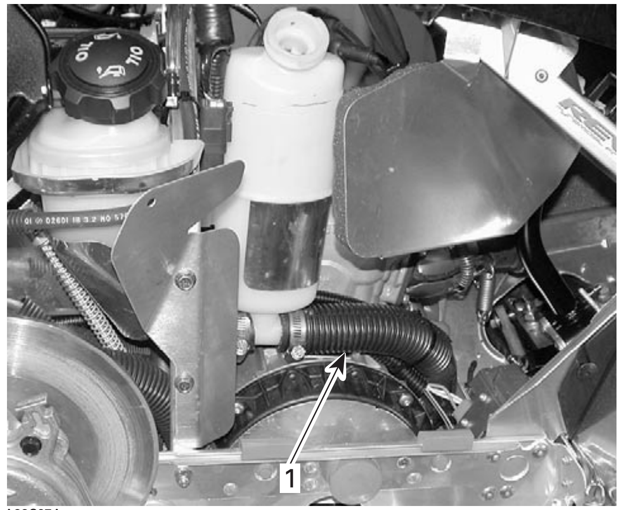
A33C26A

On right side of vehicle, do the following:

Remove muffler.

Drain coolant reservoir.

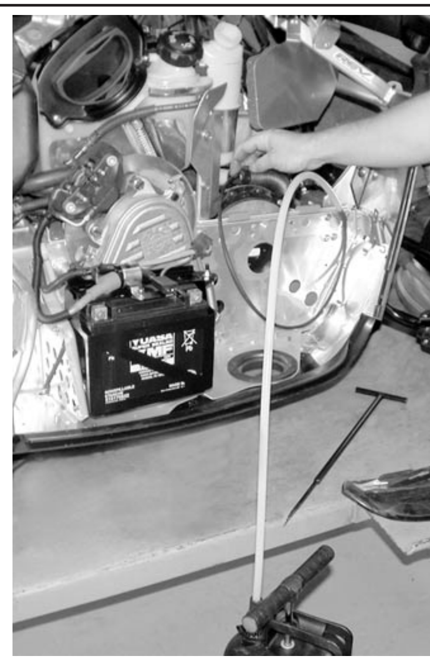
Unplug from the coolant reservoir the hose going to the engine.



A33C27A

1. Coolant hose between reservoir and engine

Using pump (P/N 529 035 880), drain maximum coolant from hose and engine.

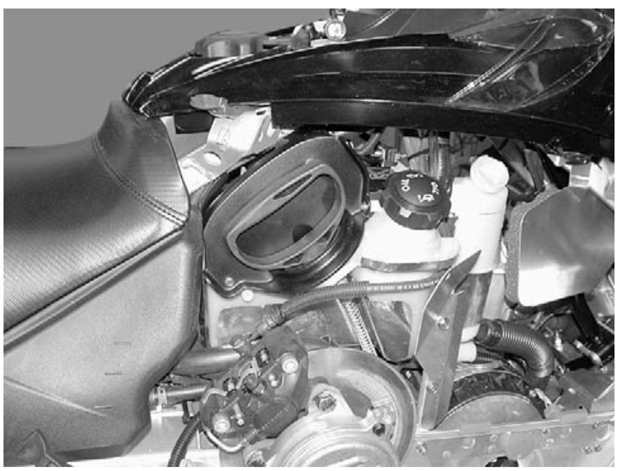


A33C28A

Unplug magneto and trigger coil connectors.


A33C29A

Remove rewind starter handle.


A33C2AA

Unplug heather carburetor hose from coolant reservoir.

Unscrew oil injection reservoir then separate coolant reservoir.

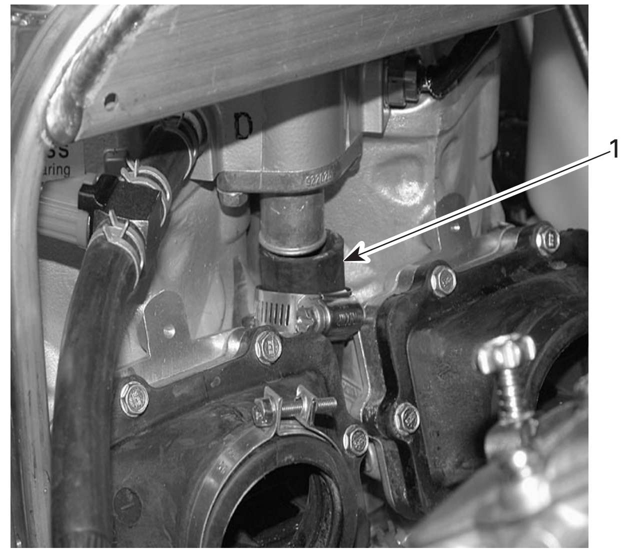
On left side of vehicle, do the following:

Remove:

- tool box
- belt guard
- belt drive
- drive pulley (refer to DRIVE PULLEY)
- air intake silencer (unplug ATS (Air Temperature Sensor) connector).

Separate carburetors or throttle body from engine.

Unplug coolant hose located between cylinder head and radiator.



A33C2BA

1. *Coolant hose between cylinder head and radiator*

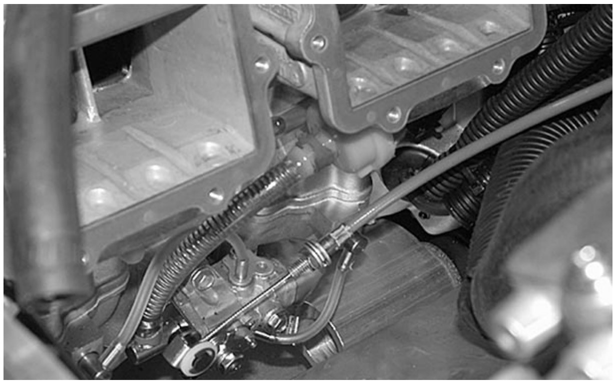
Remove reed valves with their gaskets.

A33C2CA

TYPICAL — 793 HO ENGINE TYPE SHOWN
1. *Reed valve*

Unplug magneto connector from MPEM.

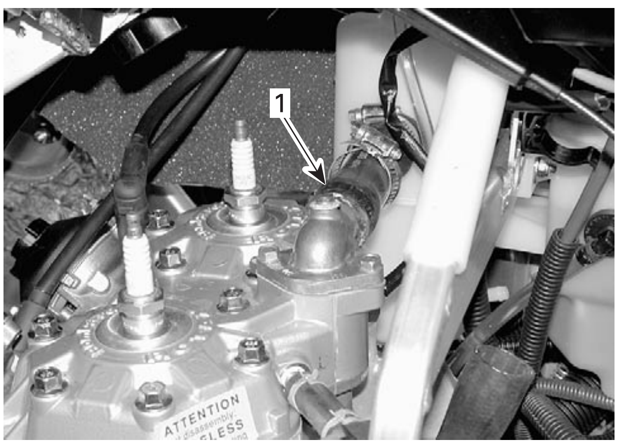
Detach oil pump cable from oil pump.



A33C2DA

Unplug spark plug cables.

Detach upper thermostat hose from thermostat housing.



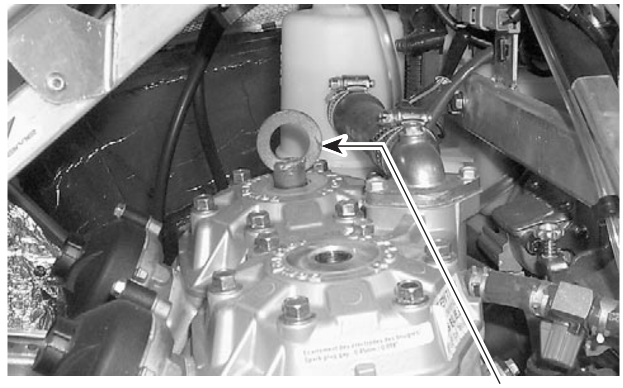
A33C2EA

1. *Remove this hose*

Disconnect temperature sensor connectors.

A33C2FA

Remove spark plugs and install spark plug lift ring (P/N 529 035 830) at the farthest spark plug hole.

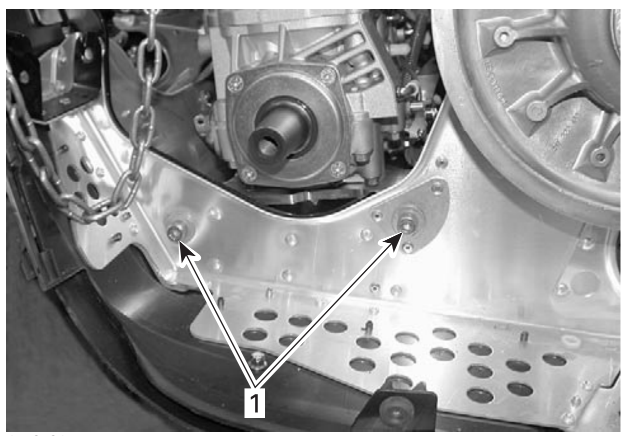


A33C18A

1. *Spark plug lift ring*

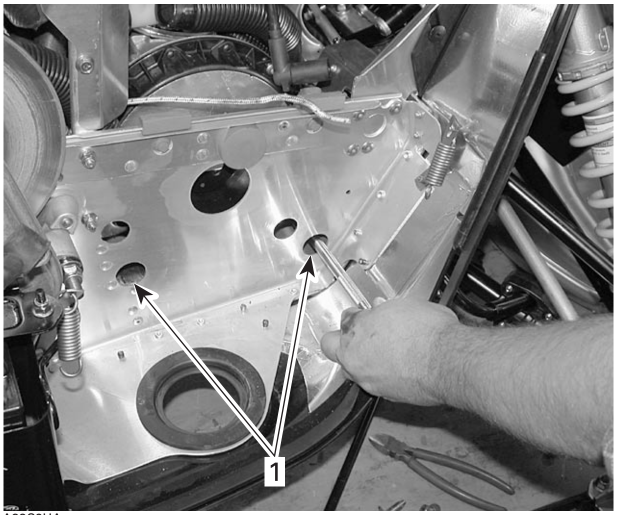
Remove RAVE valves.

Unscrew engine support bolts **no. 1**.



A33C2GA

LEFT SIDE OF VEHICLE
1. *Engine support bolts*



RIGHT SIDE OF VEHICLE
1. *Holes to reach engine support bolts*

Unscrew the engine stopper **no. 2** completely.

Lift the engine a little then unplug oil pump hoses and the crankcase vent hose.

Lift and slide out engine using engine removal hook (P/N 529 035 829).

Unscrew engine support nuts **no. 3** then separate support **no. 4** from engine.

INSPECTION

Check if engine support **no. 4** is cracked, bent or otherwise damaged. Replace if necessary.

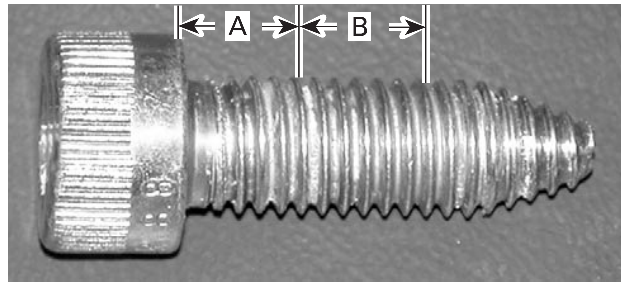
Check rubber mounts **no. 5** on engine support. Replace them if brittle, cracked or otherwise damaged.

INSTALLATION

To install engine in vehicle, reverse the removal procedure. However, pay attention to the following.

Install engine support under engine then torque engine support nuts to 35 N•m (26 lbf•ft).

Before installing engine support bolts **no. 1**, apply Loctite 243 (P/N 293 800 060) as shown in the following illustration.



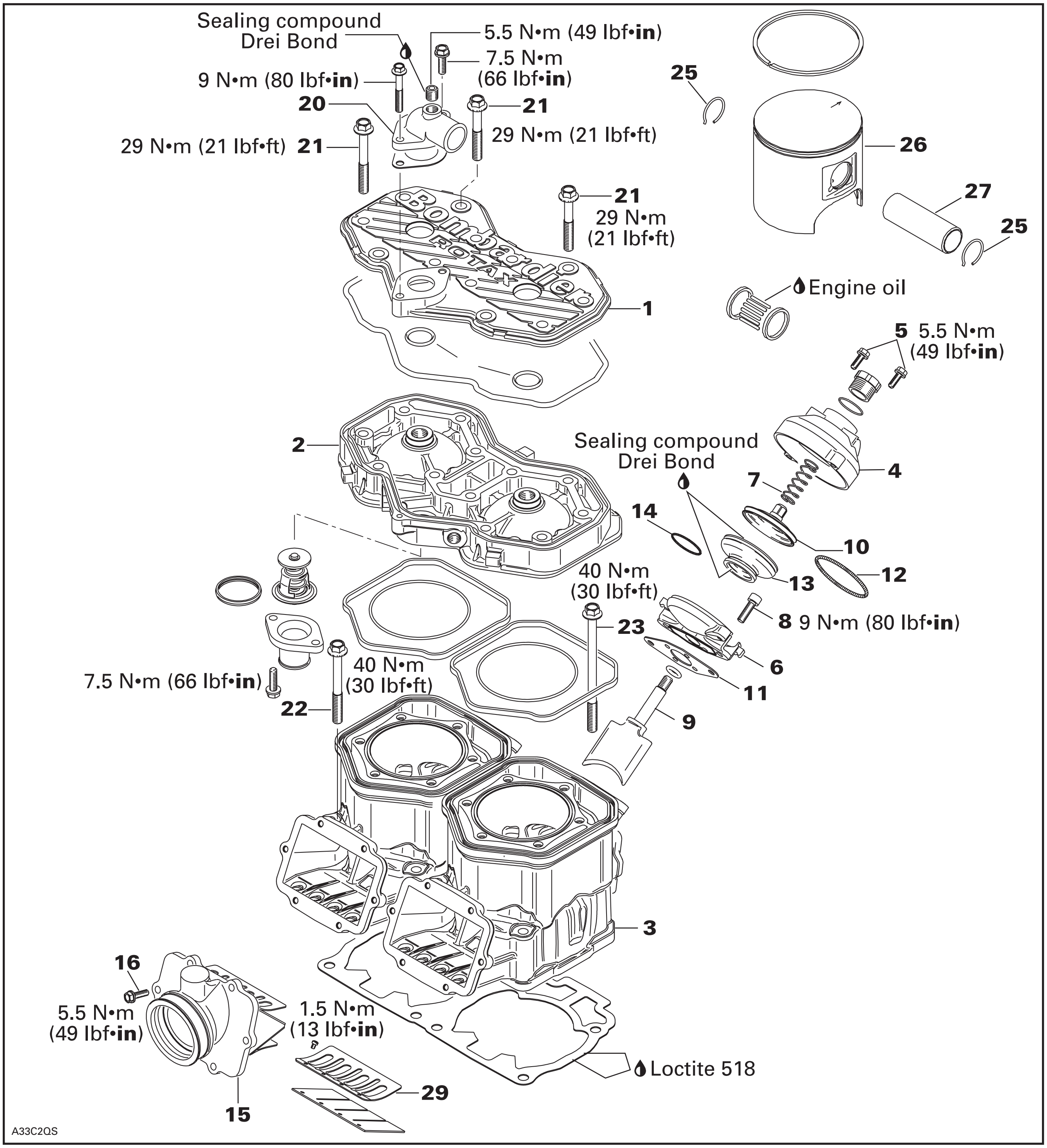
A. *Do not apply Loctite in this area, ± 10 mm (.39 in)*
B. *Loctite area, ± 8 mm (.31 in)*

Torque engine support bolts to 48 N•m (35 lbf•ft).

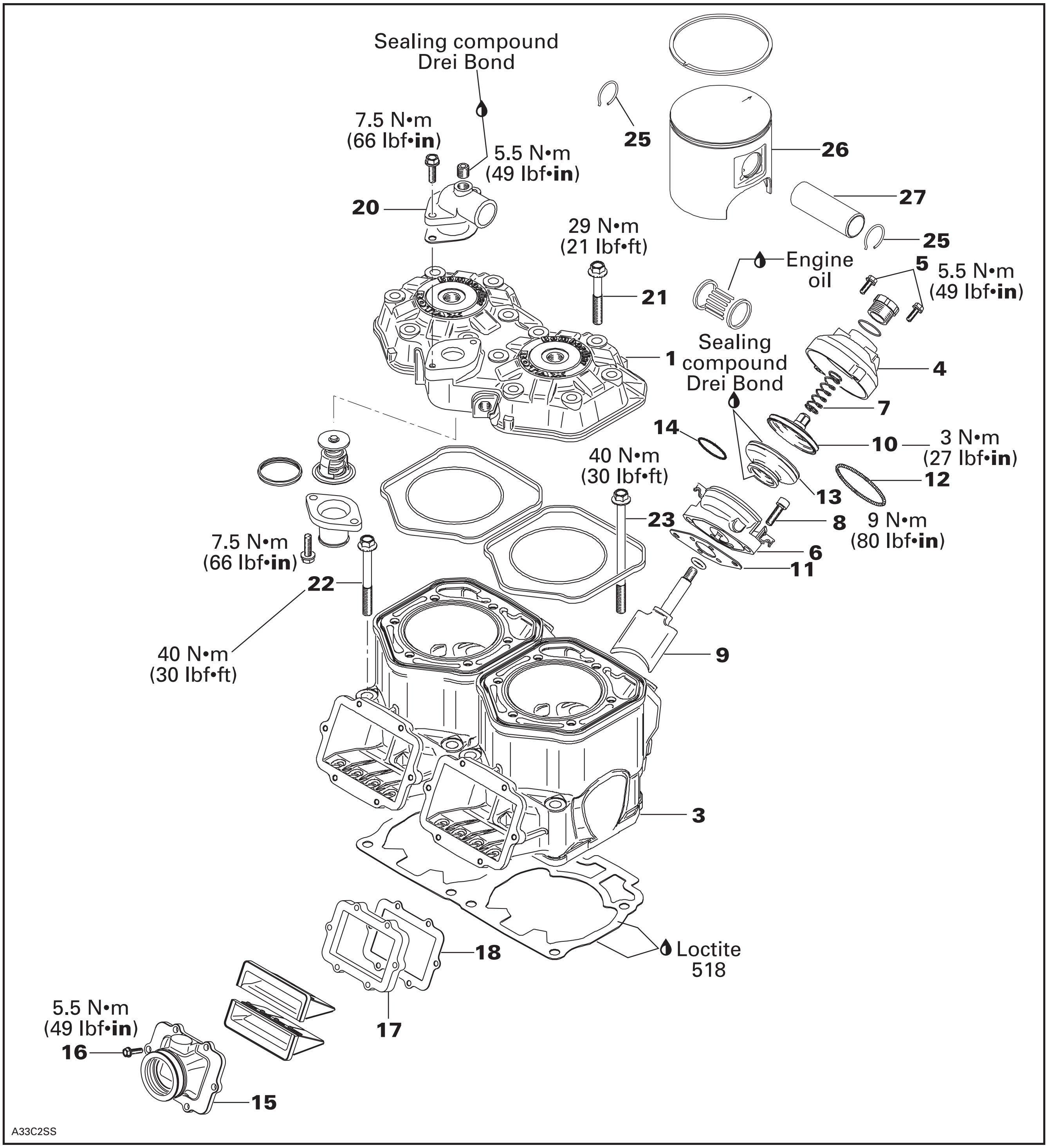
Hand torque engine stopper **no. 2** then torque its nut **no. 6** to 50 N•m (37 lbf•ft).

Reinstall all removed parts by using the appropriate component/system reinstallation procedures described in this shop.

593 HO Engine Types



793 HO Engine Types



TROUBLESHOOTING

Before completely disassembling the engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

COMPONENT REMOVAL WITH THE ENGINE INSTALLED

Most engine components can be removed with engine on vehicle such as:

- cylinder head cover no. 1
- cylinder head no. 2
- cylinder(s) no. 3
- piston(s)
- piston ring(s)
- rewind starter
- oil pump
- water pump
- magneto flywheel
- RAVE valve(s)
- reed valve(s).

CLEANING

Discard all gaskets and O-rings.

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

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

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

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

RAVE VALVE BASIC OPERATION

Maintenance

All Models

There are no wear parts anywhere in the system and there are no adjustments to be periodically checked. The only possible maintenance required would be cleaning of carbon deposits from the guillotine slide. Cleaning intervals would depend upon the user's riding style and the quality of the oil used.

Bombardier suggests annual cleaning of the valve. If a customer uses lower quality oil, than recommended, more frequent cleaning may be required.

No special solvents or cleaners are required when cleaning the valve.

NOTE: Make sure hoses are not kinked or damaged.

Boring Precaution

All Models

In its stock configuration, the RAVE valve guillotine has a minimum of 0.5 mm (.020 in) clearance to the cylinder bore measured at the center line of the cylinder. This is the minimum production clearance.

DISASSEMBLY

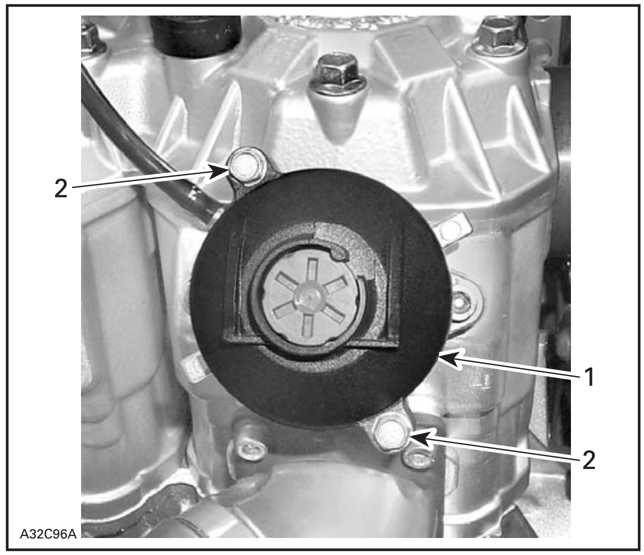
RAVE System

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

Remove RAVE valve cover **no. 4** by removing screws **no. 5**.

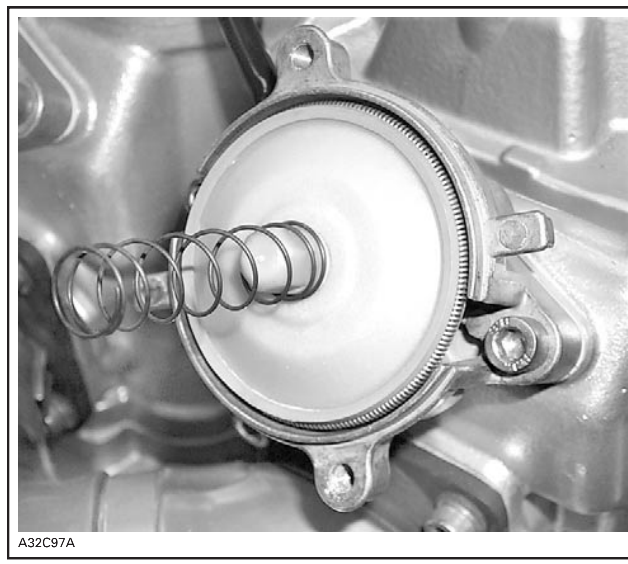
⚠ WARNING

Firmly hold cover to valve base no. 6. The compression spring no. 7 inside the valve is applying pressure against the cover.



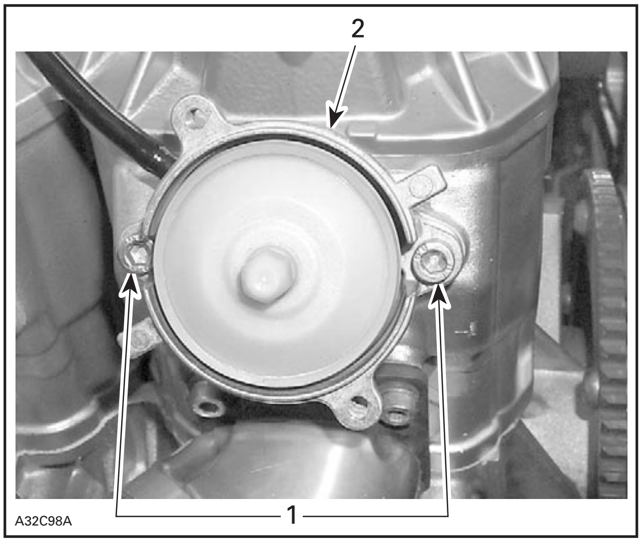
TYPICAL
1. Cover
2. Retaining screws

Remove the compression spring **no. 7**.



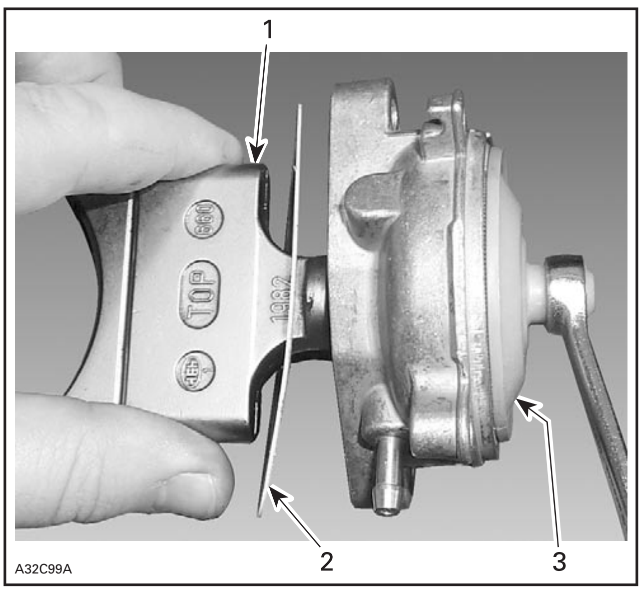
TYPICAL

Unscrew the Allen socket screw **no. 8** then remove the RAVE valve base **no. 6.**



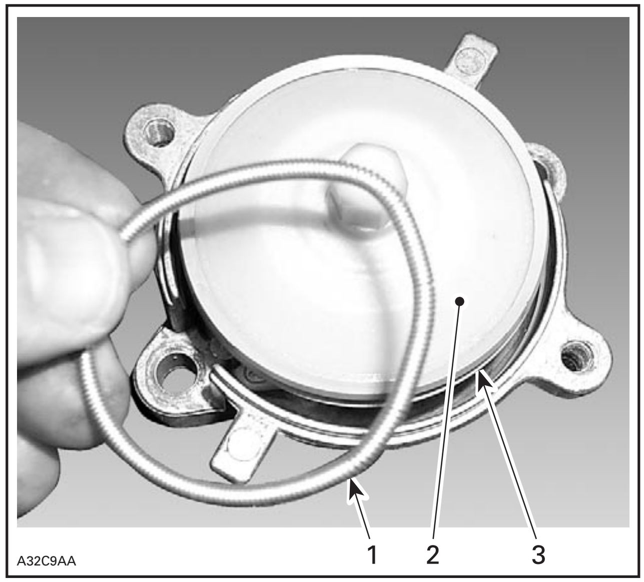
TYPICAL
1. *Allen socket screws*
2. *RAVE valve base*

Unscrew and remove the guillotine **no. 9** from the valve piston **no. 10** than remove the gasket **no. 11**.



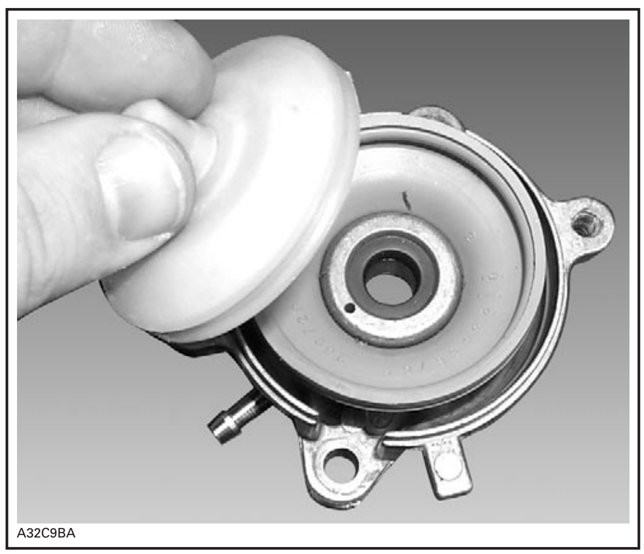
TYPICAL
1. *Guillotine*
2. *Gasket*
3. *Valve piston*

Remove spring **no. 12** retaining bellows **no. 13** to valve piston.



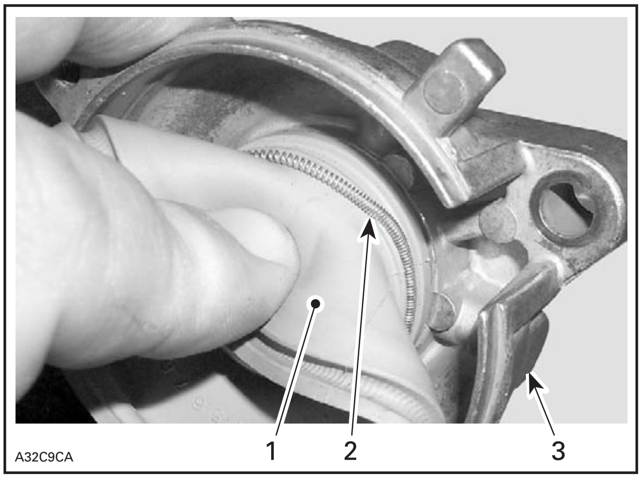
TYPICAL
1. *Spring*
2. *Valve piston*
3. *Bellows*

Remove valve piston.



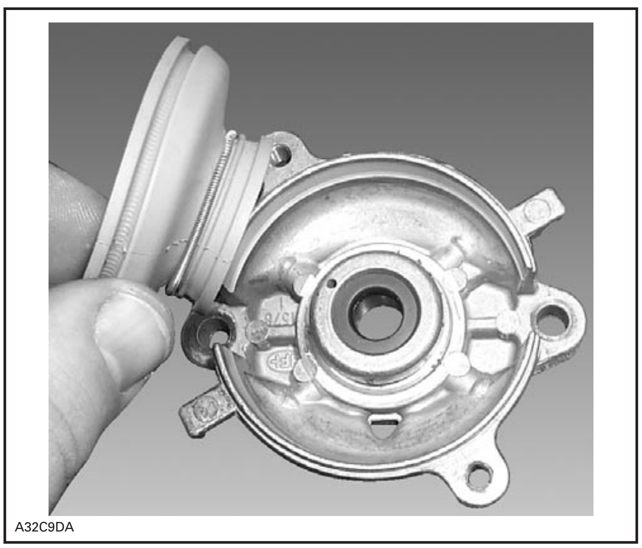
TYPICAL

Remove the small spring **no. 14** retaining bellows to valve base.



TYPICAL
1. *Bellows*
2. *Small spring*
3. *Valve base*

Remove bellows from valve base.



TYPICAL

REED Valve

593 Engine Types

Remove intake resonator on top of reed valves **no. 15**.

All Engine Types

Unscrew reed valve screws **no. 16** then remove reed valve(s).

793 HO Engine Types

Remove connecting flange **no. 17** and gasket **no. 18**.

Cylinder Head Cover

All Engine Types

Unplug spark plug cables.

793 HO Engine Types

Disconnect the temperature sensor connector.

All Engine Types

Unplug coolant hose from upper thermostat housing **no. 20**.

Unscrew all cylinder head cover screws **no. 21**.

Cylinder Head

All Engine Types except 793 HO

Remove the cylinder head cover **no. 1**.

Disconnect the temperature sensor connector.

Remove the cylinder head **no. 2**.

All Engine Types except 793 HO

Remove cylinder head **no. 2**.

793 HO Engine Types

Remove cylinder head cover **no. 1**.

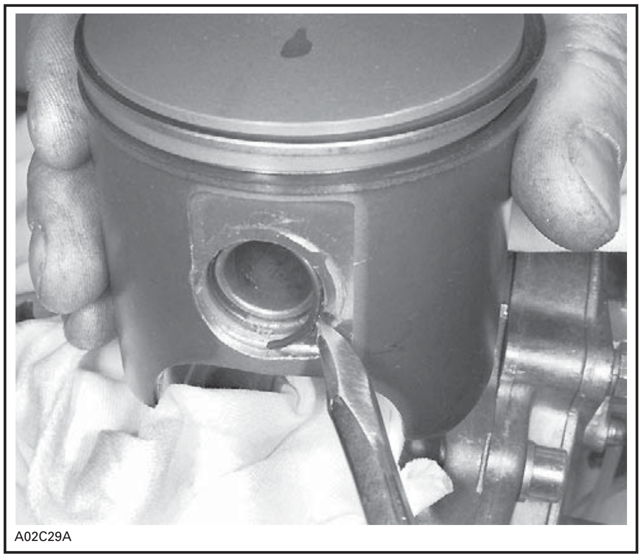
All Engine Types

Remove manifold and RAVE valves.

Unscrew cylinder screws **no. 22** and **no. 23** then remove the cylinder(s) **no. 3**.

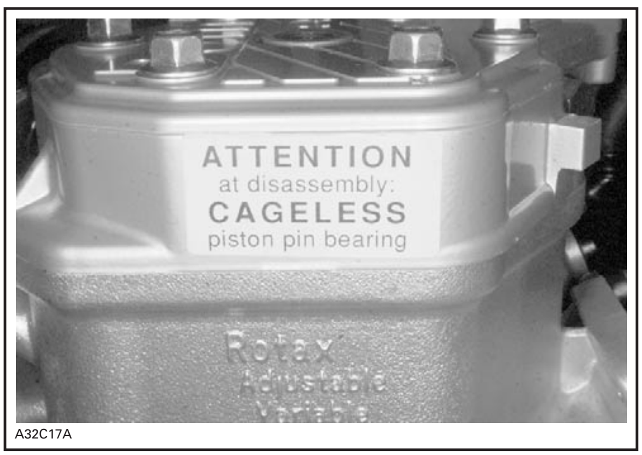
Piston

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase. Then with a pointed tool inserted in piston notch, remove both circlips **no. 25** from piston **no. 26**.



TYPICAL

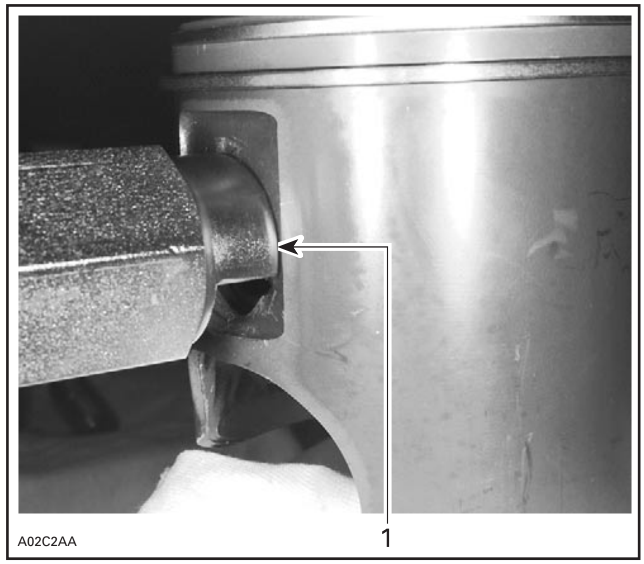
All engines are equipped with cageless piston pin bearings.



Use piston pin puller (P/N 529 035 503) along with 20 mm sleeve kit (P/N 529 035 542). Use also a locating sleeve.

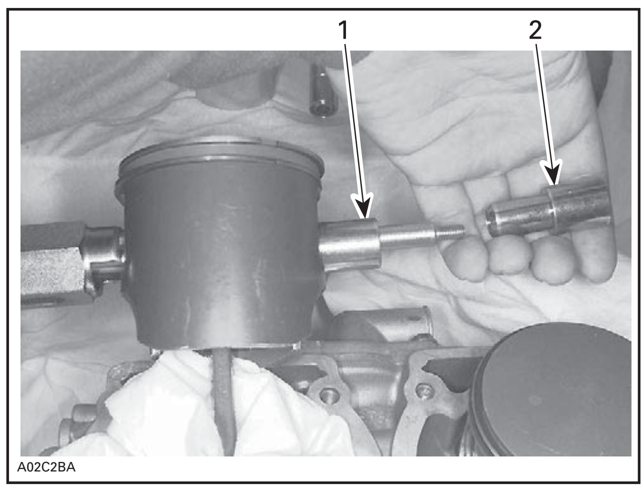
NOTE: The locating sleeve is the same that contains new cageless bearing.

Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



TYPICAL
1. *Properly seated all around*

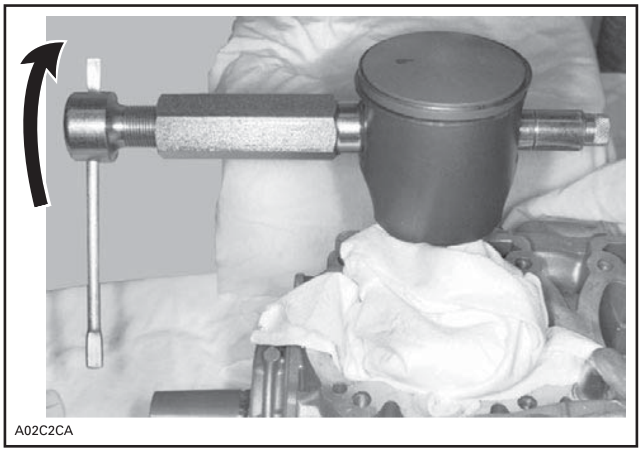
Install sleeve then shouldered sleeve over puller rod.



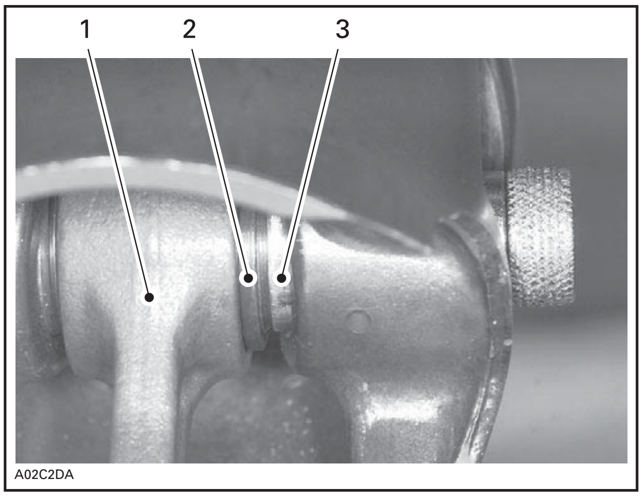
TYPICAL — INSTALLATION OF SLEEVE KIT
1. *Sleeve*
2. *Shouldered sleeve*

Screw (LH threads) extracting nut.

Pull out piston pin **no. 27** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.

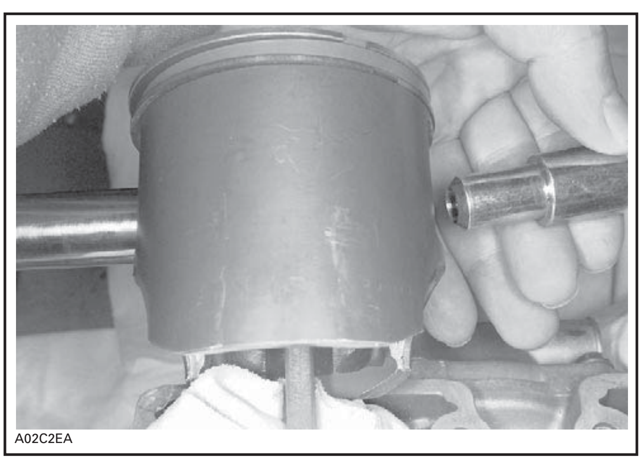


TYPICAL — PISTON PIN EXTRACTION



TYPICAL
1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

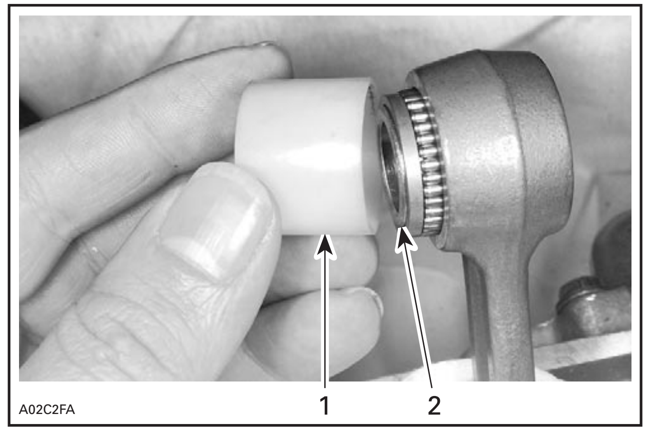
Remove puller. Pull out shouldered sleeve carefully.



TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



TYPICAL
1. *Locating sleeve*
2. *Sleeve*

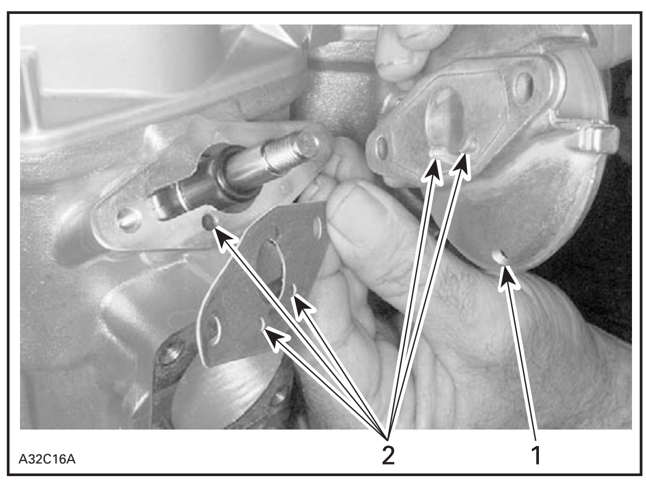
INSPECTION

Cylinder Head Cover, Cylinder Head and Cylinder

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

RAVE System

Check valve rod housing and cylinder for clogged passages.



1. *Draining hole*
2. *Passages*

NOTE: Oil dripping from draining hole indicates a loosen spring or damaged bellows.

Check for cracked, dried or perforated bellows **no. 13**.

Check if the compression springs **no. 7** are in specifications.

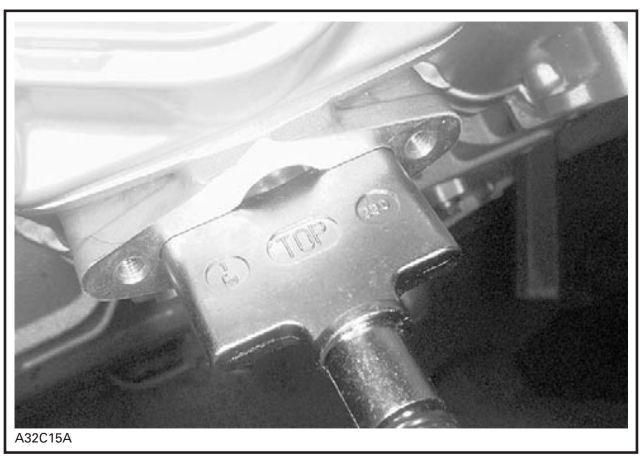
ENGINE TYPE	SPRING P/N	COLOR	WIRE DIA. mm (in)	FREE LENGTH mm (in)
593	420 239 944	Brown	0.9 (.035)	48.5 (1.91)
593 HO	420 239 944	Brown	0.9 (.035)	48.5 (1.91)
593 HO SDI	420 239 942	Black	0.8 (.031)	42.5 (1.67)
793 HO (All models except Summit)	420 239 941	Blue	0.8 (.031)	52.5 (2.07)
793 HO (All Summit)	420 239 942	Black	0.8 (.031)	42.5 (1.67)

ASSEMBLY

RAVE System

Apply sealing compound Drei Bond (P/N 420 297 906) in the groove of valve base and in the piston valve groove, then install bellows.

Install RAVE valve with its mention top as illustrated in the following photo.

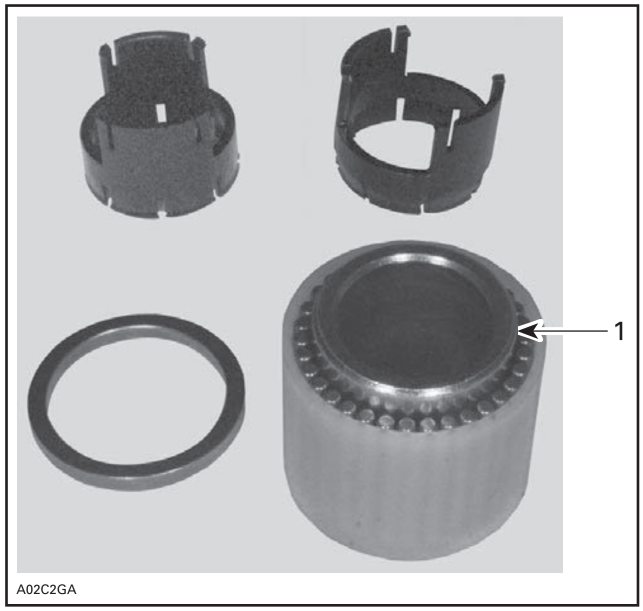


Tighten red cap screw **no. 28** to bottom.

Piston

When installing a new cageless bearing, replace half plastic cages with sleeve.

NOTE: 593, 593 HO, 593 SDI and 793 HO engine cageless bearings have 28 needles.



TYPICAL
1. Sleeve

Lubricate needle bearings and thrust washers with injection oil then install washers on each end of needles.

Insert cageless bearing into connecting rod.

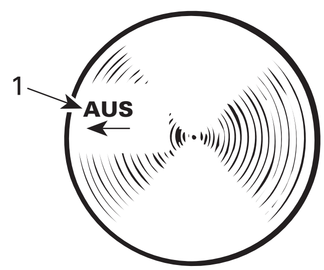
TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Heat piston using bearing heater (P/N 529 035 969).

A32CBHA

CAUTION: Piston temperature must not exceed 46°C (115°F). Never use direct flame to heat the piston and never freeze the pin.

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



A01C01A

1. *Exhaust*

Install shouldered sleeve.

A02C2IA

TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.

A02C2JA

TYPICAL

All Models

CAUTION: Always install new circlips.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use appropriate piston circlip installer.

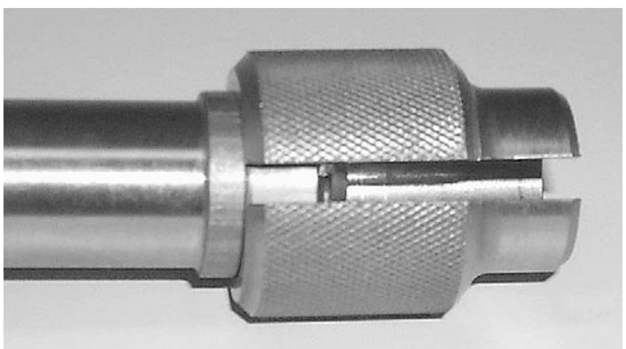
ENGINE TYPE	PISTON CIRCLIP INSTALLER (P/N)
All	529 035 686

Use circlip installer (P/N 529 035 686) to install new mono-hook circlips **no. 25**.

Insert circlip into support so that, when installed in piston groove, the tab faces upward.

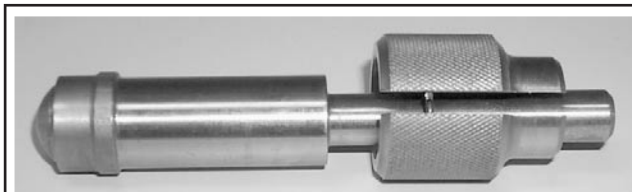
A32B0AA

With round end of pusher, position circlip perpendicularly to the support axis.

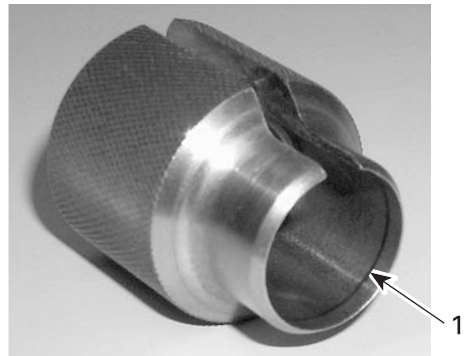


A32B0BA

With the other end of the pusher, push circlip into the support groove.



A32B0CA



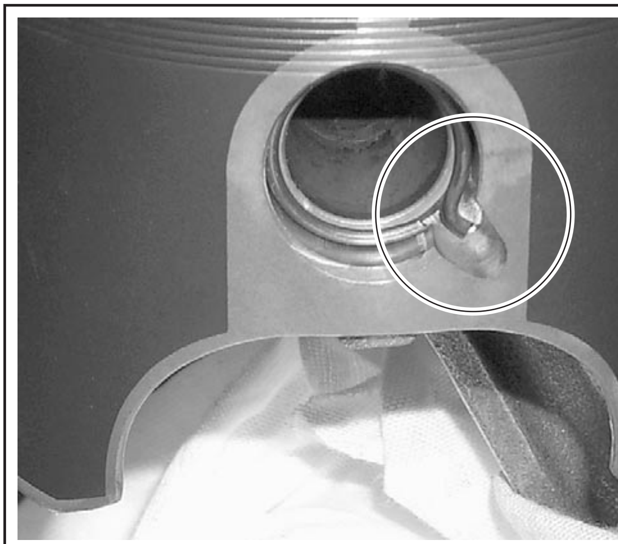
A32B0DA

1. *Groove*

A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to put circlip in place. Make sure to install new circlips with tab toward top as per following photo.



A32C4BA

TAB TOWARD TOP

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one because, on a second attempt, the circlip will lose its normal retaining capabilities.

CAUTION: Circlips must not move freely after installation; if so, replace them.

Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Cylinder Head Cover, Cylinder Head and Cylinder

Make sure parts sealing surfaces are flat. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT and look for CYLINDER HEAD WARPAGE.

Clean cylinders and crankcase mating surfaces with Loctite Chisel (P/N 413 708 500).

Coat crankcase mating surface with Loctite 518 (P/N 293 800 038). Choose the right gasket thickness according to combustion chamber volume. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT. Install it on crankcase. Coat gasket with Loctite 518.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Install cylinders. Do not tighten.

Install new rubber ring and round O-rings on each cylinder.

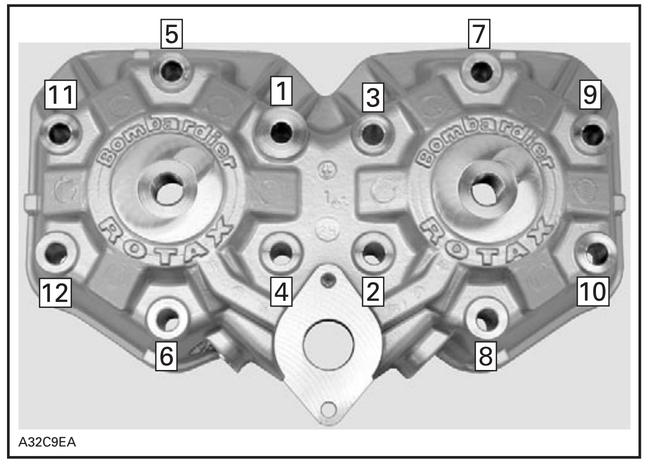
NOTE: Carefully clean screws before reinstallation, specifically under screw head.

Install exhaust manifold with gaskets. Do not tighten yet.

Torque cylinder screws in a crisscross sequence as per the following table.

M8	29 N•m (21 lbf•ft)
M10	40 N•m (29 lbf•ft)

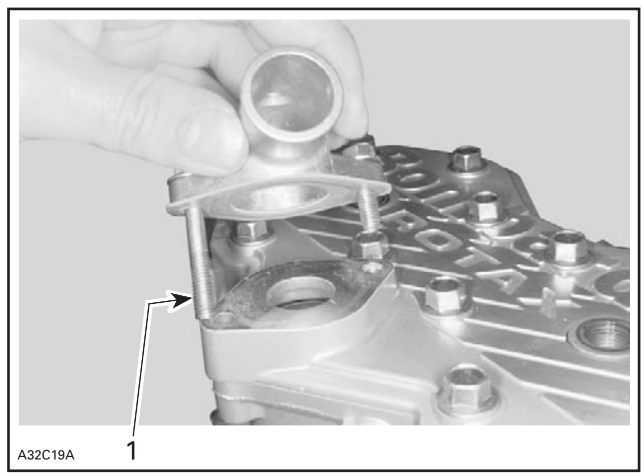
At assembly, torque cylinder head screws to 29 N•m (21 lbf•ft) in the following illustrated sequence.



TYPICAL

Tighten exhaust manifold bolts in a criss-cross sequence.

Apply Loctite 243 (P/N 293 800 060) on screws threads. Install outlet socket and tighten screws. Note position of longer screw.



1. Longer screw

Reed Valve

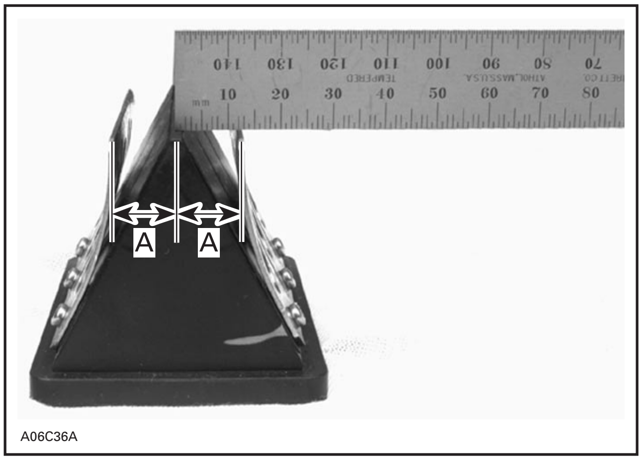
All Engine Types except 793 HO

Blades have a curved shape. Install with their curve facing reed block.

With blade stopper **no. 29** removed, check reed valve for proper tightness. There must not be any play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.

Check distance from blade stopper outer edge and distance from center of reed valve block.

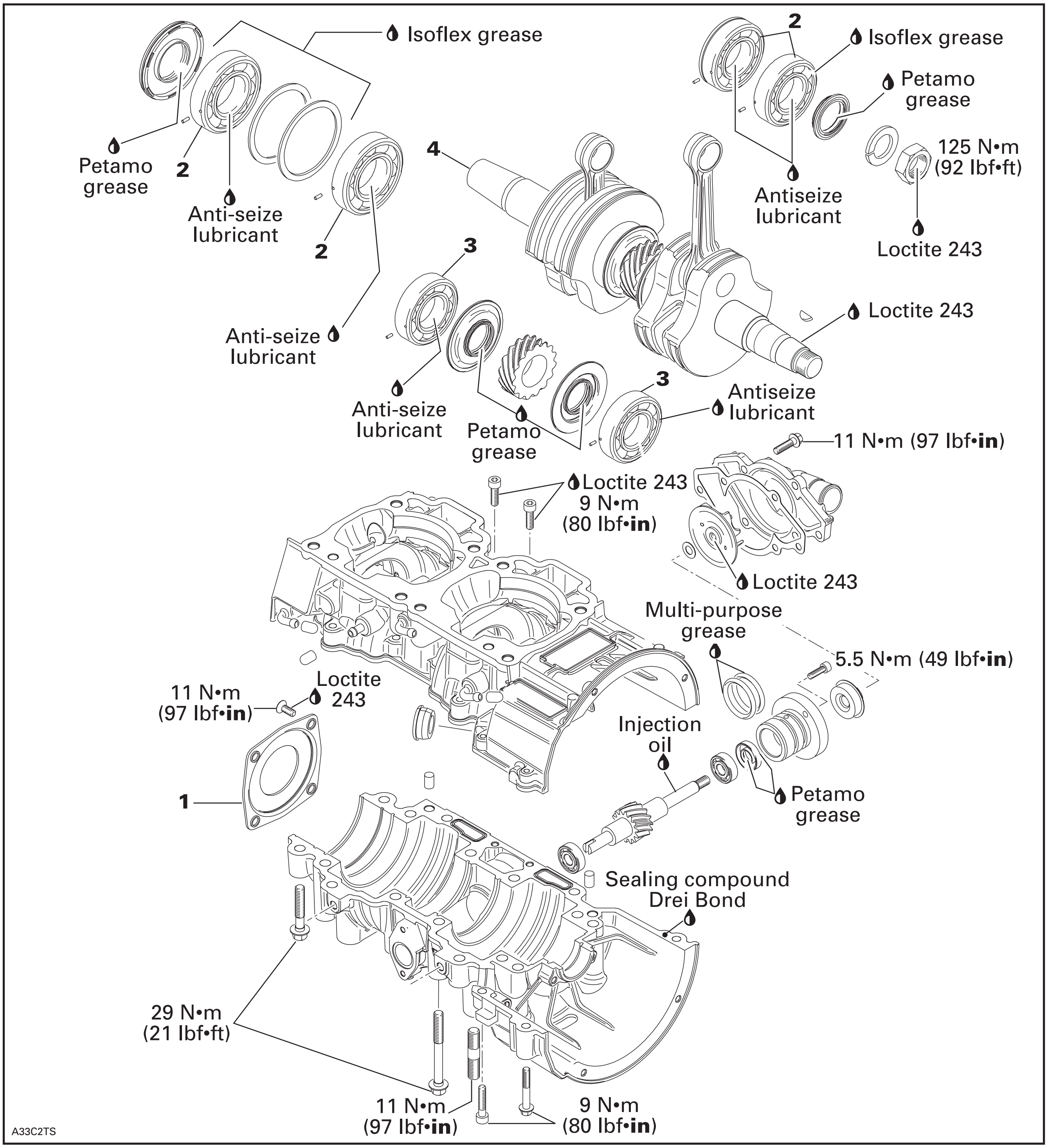


TYPICAL
A. 18.7 - 0, + 0.75 mm (.736 - 0, + .030 in)

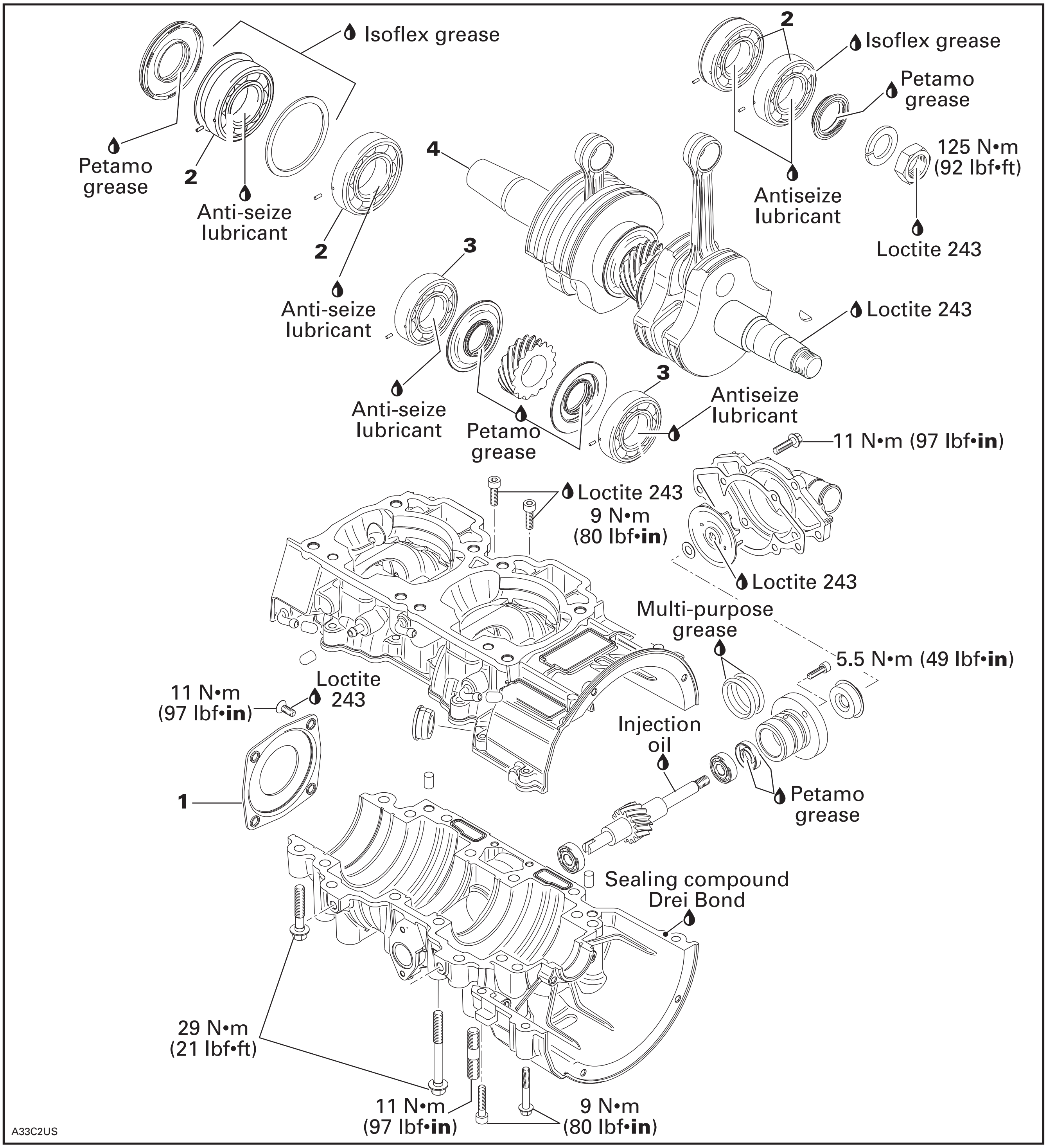
Bent blade stopper as required to obtain the proper distance.

Blade stoppers may slightly interfere with cylinder during installation. Adjusted distance will be reduced automatically upon installation.

593 HO Engine Types



793 HO Engine Types



NOTE: Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

Remove old paste gasket from crankcase mating surfaces with gasket remover (P/N 413 708 500).

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

DISASSEMBLY

General

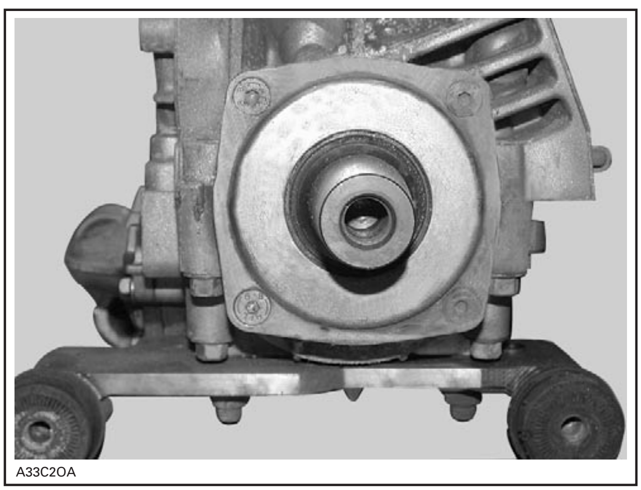
Remove cylinder head and cylinder.

Remove rewind starter.

To remove magneto, refer to CDI SYSTEM.

593 HO, 593 SDI and 793 HO Engine Types

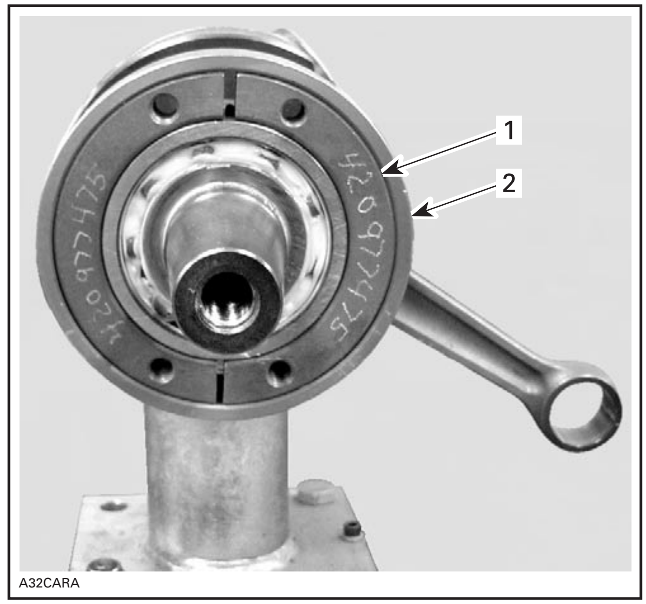
Remove oil seal cover **no. 1**.



TYPICAL

Crankshaft Bearing

To remove bearings **no. 2** and **no. 3** from crankshaft **no. 4**, install half rings (P/N 420 977 479) and puller ring (P/N 420 977 494) on the outer bearing.

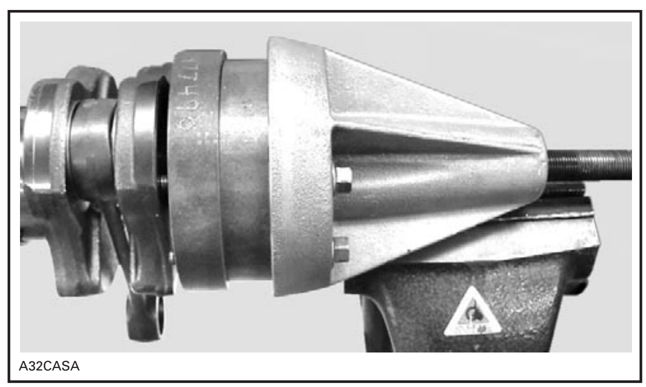


1. *Half ring*
2. *Puller ring*

NOTE: Apply grease (P/N 413 711 500) on crankshaft end in order to hold in place the crankshaft protector (P/N 420 876 552) on PTO side and (P/N 420 876 557) on MAG side.

Using screws (P/N 420 840 681), install bearing puller (P/N 420 877 635) on the half rings.

Secure the bearing puller in a vise by one of its rib.



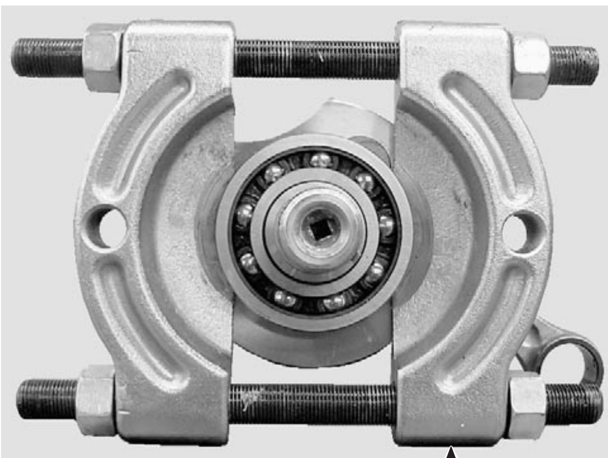
BEARING PULLER SECURED IN THE VISE

CAUTION: Never use any air impact tool for tightening the puller bolt. Lubricate the bolt with BOMBARDIER LUBE (P/N 293 600 016) to avoid damaging the threads.

Screw in the puller bolt until the bearing comes out.

Follow the same procedure for the inner bearing

NOTE: In the case of damaged bearing or less clearance between crankshaft counterbalance and the bearing or on the MAG side bearing, use a bearing separator such as Snap-On tool CJ 951 or SPX/OTC tool 1124 to facilitate the removal.



1. Bearing separator

INSPECTION

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

ASSEMBLY

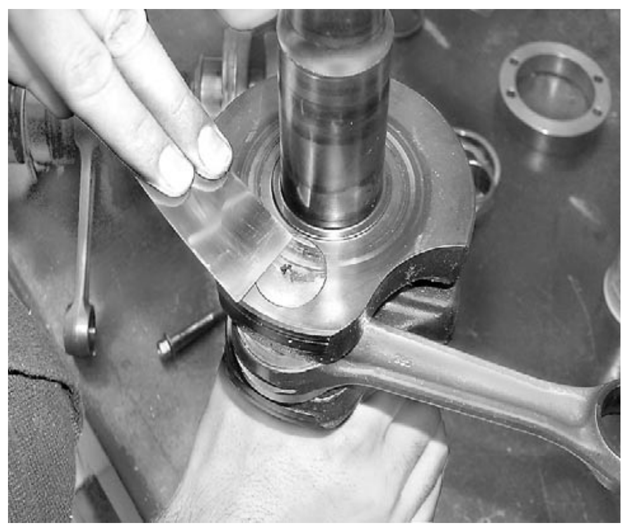
Coat lip of all seals with Petamo grease (P/N 420 899 271).

Crankshaft Bearing

CAUTION: Never reinstall a bearing that has been removed.

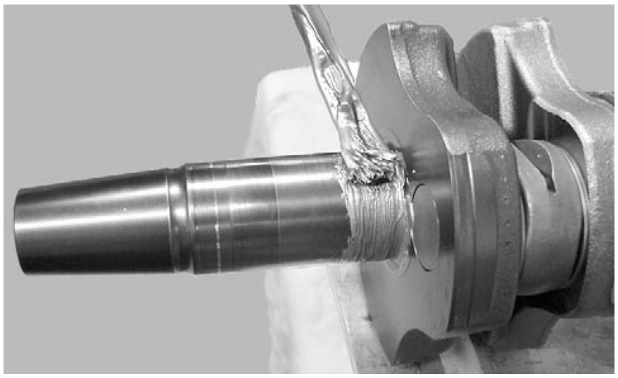
Inspect crankshaft ends for damage.

Clean crankshaft ends with sand paper no. 180 to remove possible seal marks and debris.



Remove all residue using pulley flange cleaner (P/N 413 711 809.)

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.



A32CAUA

Heat up the bearing(s) using bearing heater (P/N 529 035 969). This will expand bearings and ease installation. If required, put a suitable plate or shim to avoid the direct contact between integrated seal with the heating surface.

A32CB7A

CAUTION: Bearing(s) should not be heated to more than 80°C (176°F). Do not heat bearing(s) on direct flame, or with a heat gun or in an oil bath. Inappropriate bearing(s) heating may result in inner seals or cage failure.

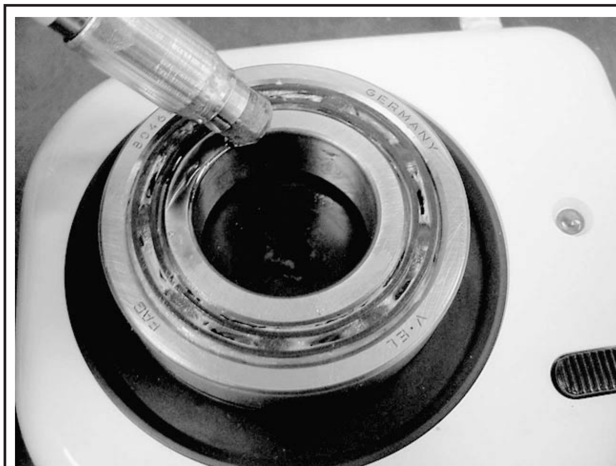
Turn bearing several times to obtain an even heating process.

NOTE: Normally it takes approximately 10 minutes to heat up a bearing so in the event of replacing bearing, it's recommended to start the bearing heating process prior to removal operation. Two bearings can be heated at the same time on one bearing heater.

A32CB8A

1. Bearings

Probe the inner race of the bearing with the temperature indicator stick (P/N 529 035 970). Stick will liquefy when the bearing reach the proper temperature



A32CB9A

⚠ WARNING

Do not touch heated bearing with bare hands. Always wear heat resisting gloves before handling the heated bearing(s).

Slide in the inner PTO bearing with the integrated seal facing crankshaft. Push bearing to end position.

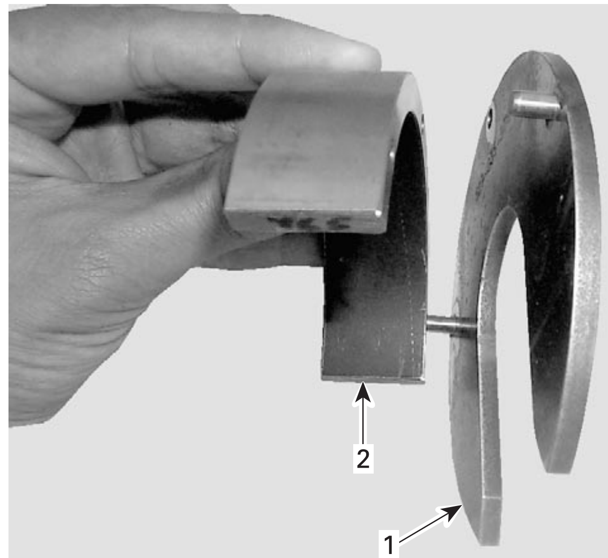
A32CAVA

NOTE: Heated bearings will slide onto the crankshaft. If required, push with a steel tube on the inner ring of the bearing. **Pay special attention to correct positioning of the drive pins and/or retaining discs.**

Install retaining discs.

Install support plate (P/N 529 035 976) with appropriate distance gauge; refer to following table.

DISTANCE GAUGE P/N	APPLICATION
529 035 966	593 engine
529 035 967	593 HO
529 035 968	593 SDI and 793 HO



A32CBCA

1. Support plate
2. Distance gauge

Install bearing locator tool.

A32CAWA

Slide in the heated outer PTO bearing onto the crankshaft until it contacts the distance gauge.

Slide-in the first MAG bearing **with the integrated seal facing crankshaft**. Push bearing to the bottom with pusher , using a rubber hammer.

A32CC4B

Slide-in the second bearing until it contacts the first one.

A32CC5B

NOTE: To prevent seal pop-out, it is recommended to use PTO seal

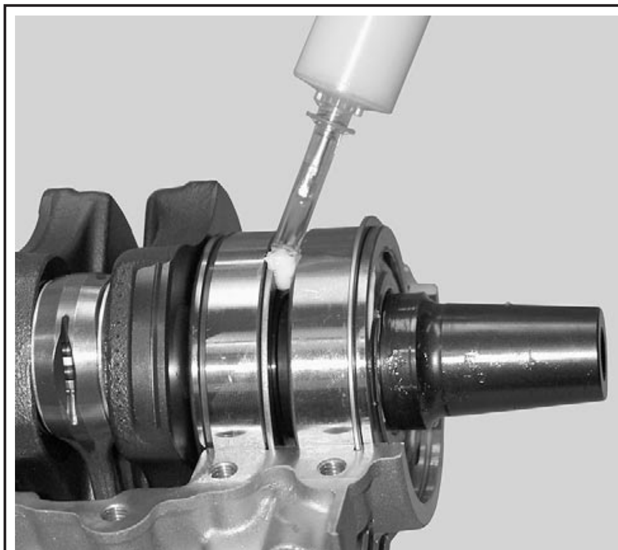
CAUTION: Use only the recommended Isoflex grease. Make sure not to push Isoflex grease between outside bearing race and half crankcase.

NOTE: The 50 g tube corresponds to 50 cc of grease.

Put 50 to 55 mL of grease in a syringe.

CAUTION: Do not exceed the recommended amount of grease

Fill inner side of PTO side bearing with Isoflex grease (about 10 mL).



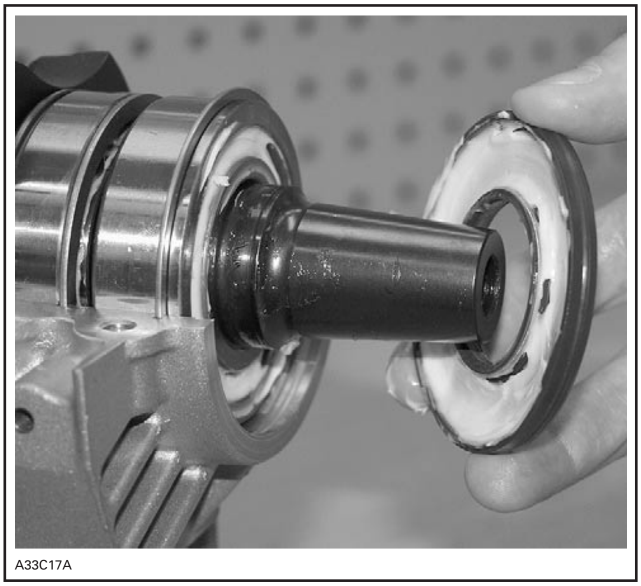
A33C15A

PTO SIDE BEARING FILLED WITH ISOFLEX GREASE

With the syringe, fill the outer ball bearing and inner side of outer seal with 40 to 45 mL of Isoflex grease.

A33C16A

BALLS COATED WITH A SEAM OF GREASE

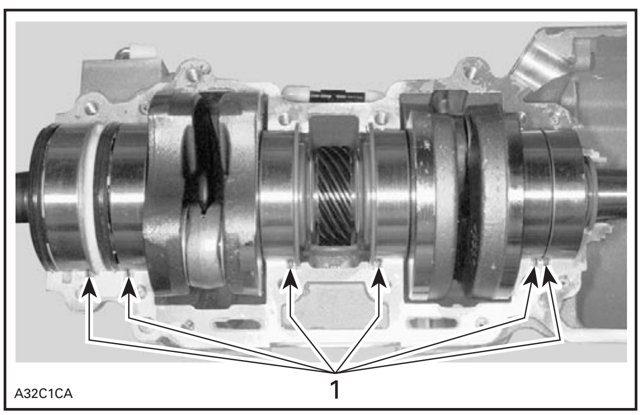


TYPICAL — FILL WITH GREASE AND SET IN PLACE

Apply 6 mL of grease to MAG side outer bearing.

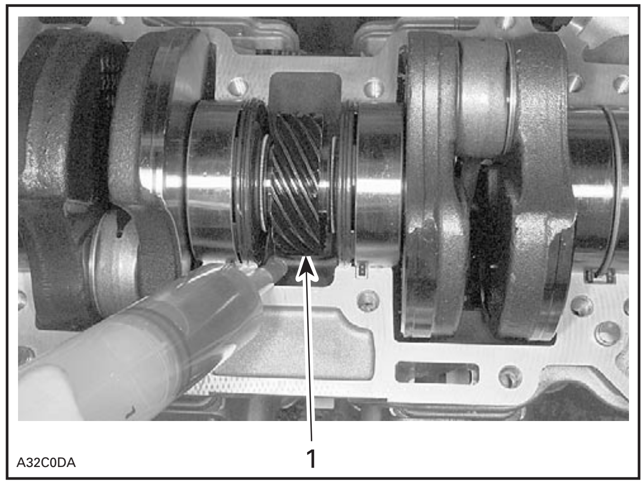
NOTE: If replaced with new bearing, do not apply grease as new bearings come with grease already applied.

At crankshaft installation, position drive pins as illustrated.



TYPICAL
1. Position pins

Pour 50 mL (2 U.S. oz) of injection oil in the pan under central gear to lubricate pump gearing as per photo.



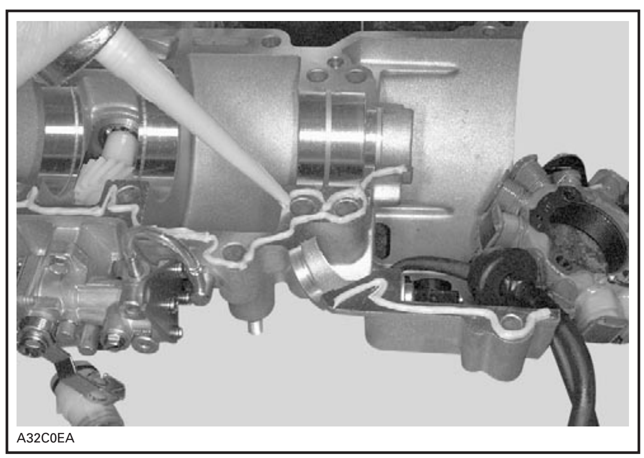
1. Oil bath

Crankcase Assembly

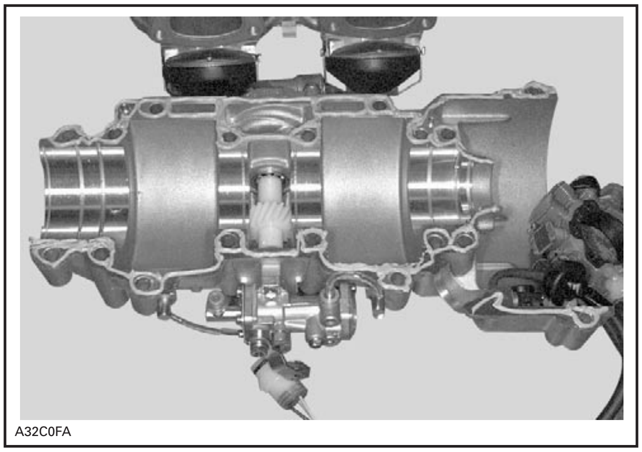
IMPORTANT: The total assembly sequence, including sealing compound spreading, screwing and torquing of bolts according to the proper sequence, must be performed within 10 minutes. Do not wait between each bolt torquing. All bolts must be torqued in a row.

Before screwing both parts of crankcase, seal it with sealing compound (P/N 420 297 906). Make sure surfaces are clean and degreased before applying sealing compound.

Spread a seam of 1.2 mm (1/16 in) maximum in diameter on surface of lower crankcase half.

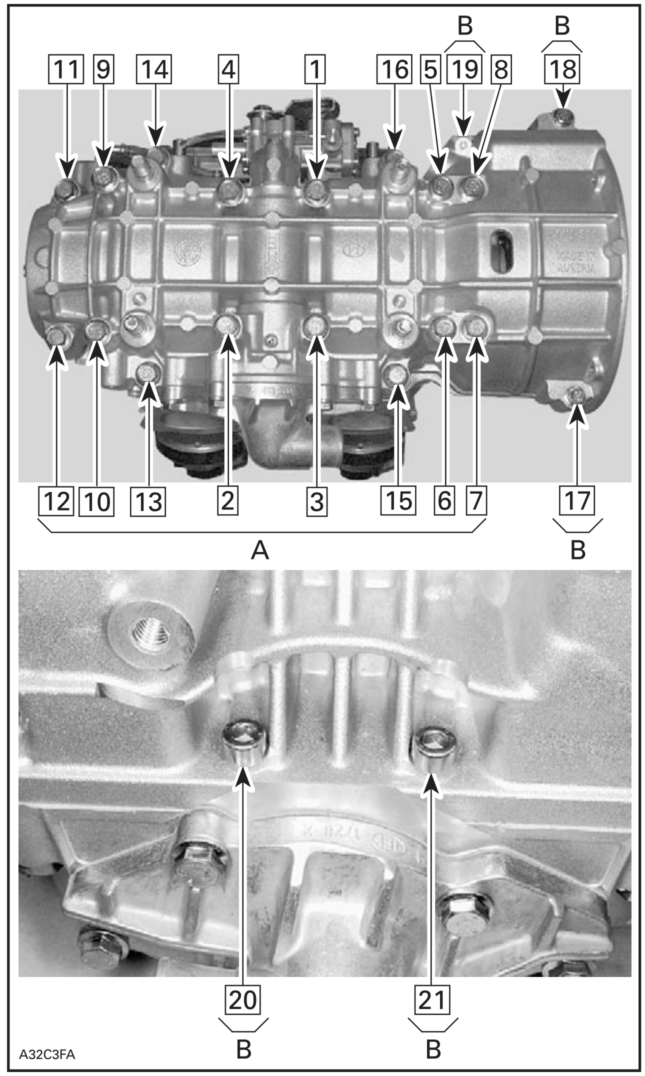


As far as possible, sealing compound must be applied in one run to avoid any risks of leakage through the crankcase.



SEAMING COMPLETED — CONTACT SURFACES COVERED AND SCREW HOLES SURROUNDED

Screw all crankcase bolts in place in the following sequence and to the appropriate torque; this must be done in two steps torquing: first, screw bolts up to 60% of the final torque (18 N•m (13.5 lbf•ft) for most of the bolts), then, tighten to the required torque (i.e. 29 N•m (21 lbf•ft)).



A. Torque bolts 1 through 16 to 29 N•m (21 lbf•ft)
*B. Torque bolts 17 through 21 to 9 N•m (80 lbf•**in**)*

593 HO and 793 HO Engine Types

Install oil seal cover.

BREAK-IN

After rebuilding an engine, always observe a break-in period as described in Operator's Guide.

ENGINE LEAK TEST AND DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for 593 and 793 types of engines.

PREPARATION

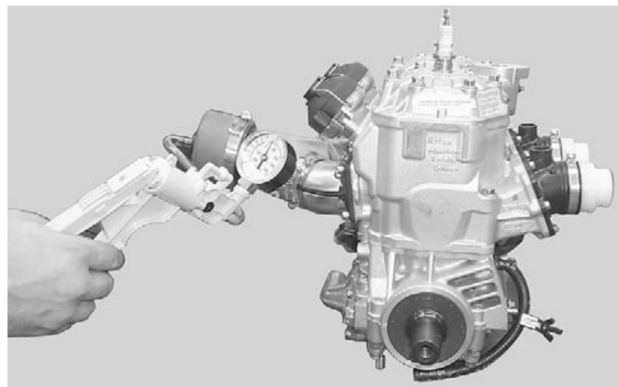
– Remove tuned pipe.
– Install plug over exhaust manifold.
– Remove carburetors/throttle body assembly (as applicable).
– Unplug fuel inlet line from fuel rail.
– Insert plugs in intake rubber boots. Tighten with existing clamps.

A33C19A

– Using a hose pincher (P/N 295 000 076), block impulse hose.
– Install air pump on exhaust plug.

NOTE: If necessary, lubricate air pump piston with mild soap.

CAUTION: Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.



A33C1AA

– Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
– Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump cylinder, all plugs and fittings.
  - If tester kit is leaking, bubbles will indicate where leak comes from.
  - If tester kit is not leaking, check engine as per following procedure.

PROCEDURE

NOTE: A flow chart has been prepared as a visual reference. See last page of this chapter.

Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

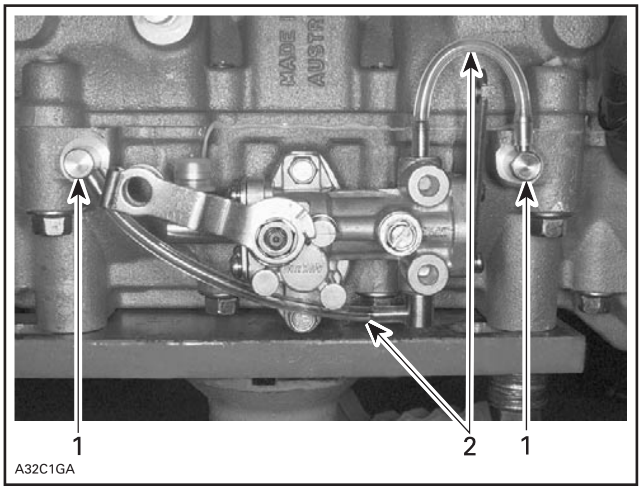
TEST PRESSURE: 34 kPa (5 PSI) for 3 minutes

- If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
- If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

Engine

Check the following:

- All jointed surfaces and screw/stud threads of engine:
  - spark plug base, insulator
  - cylinder head
  - RAVE valve bellows, piston and housing
  - cylinder crankcase halves (joint)
  - oil injection pump mounting flange (O-ring)
  - coolant pump housing
  - bleed screws/plugs
  - crankcase grease reservoir fitting.
- Small injection oil lines coming from pump.



TYPICAL
1. Injection nipples
2. Small injection oil lines

Check for air bubbles or oil column going toward pump. It indicates defective check valve in injection nipples.

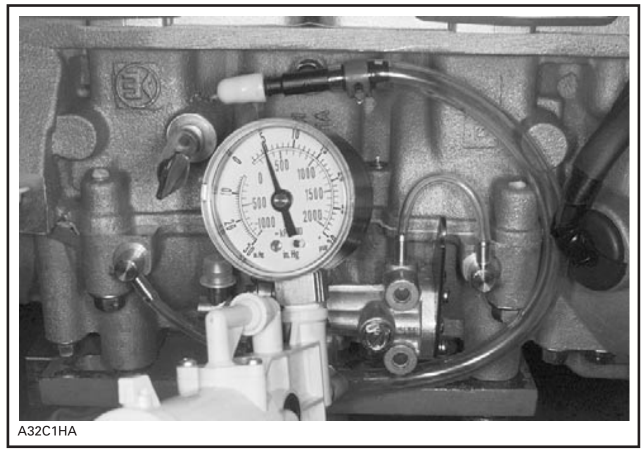
- Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.

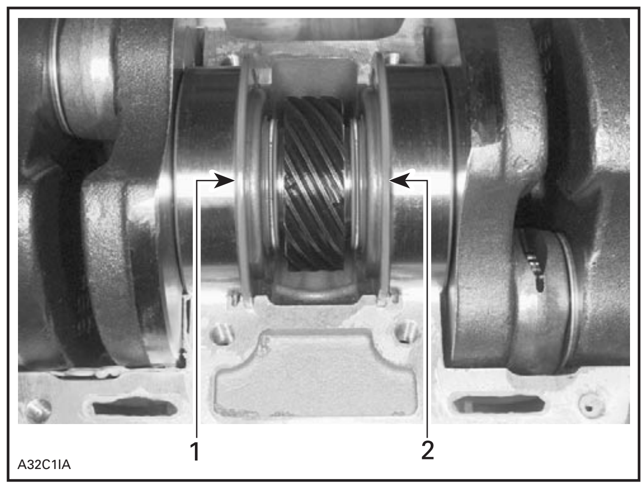
- Remove drive pulley then check crankshaft outer seal.
- Remove rewind starter and magneto system then check crankshaft outer seal.
- Check pump shaft gear oil reservoir.

Pump Shaft Oil Gear Reservoir

Install air pump on adapter and pressurize as above.

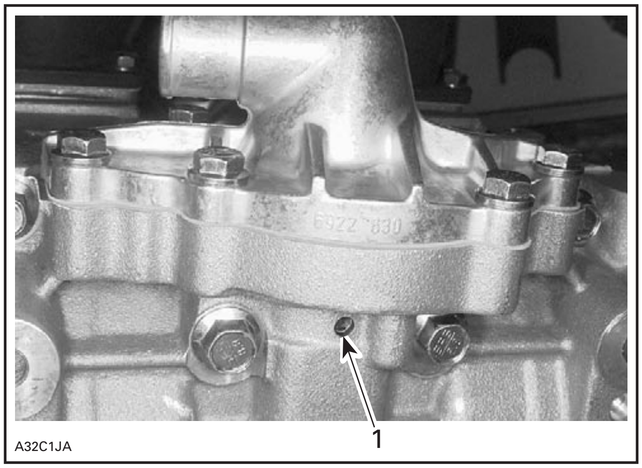


If pressure drops, it indicates a defective crankshaft inner seal.



TYPICAL — CRANKSHAFT INSTALLED IN UPPER HALF CRANKCASE
1. Crankshaft inner seal on PTO side
2. Crankshaft inner seal on MAG side

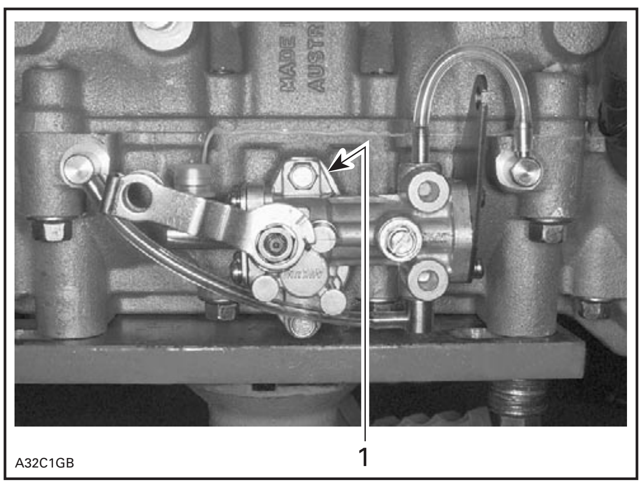
– Check weep hole below coolant pump housing with soapy water.



1. *Weep hole*

If there is a leak, it indicates that a pump shaft is defective (oil seal beside coolant ceramic seal).

– Leaks can be also on oil pump side. Check mounting area for leaks.



TYPICAL
1. *Check mounting area*

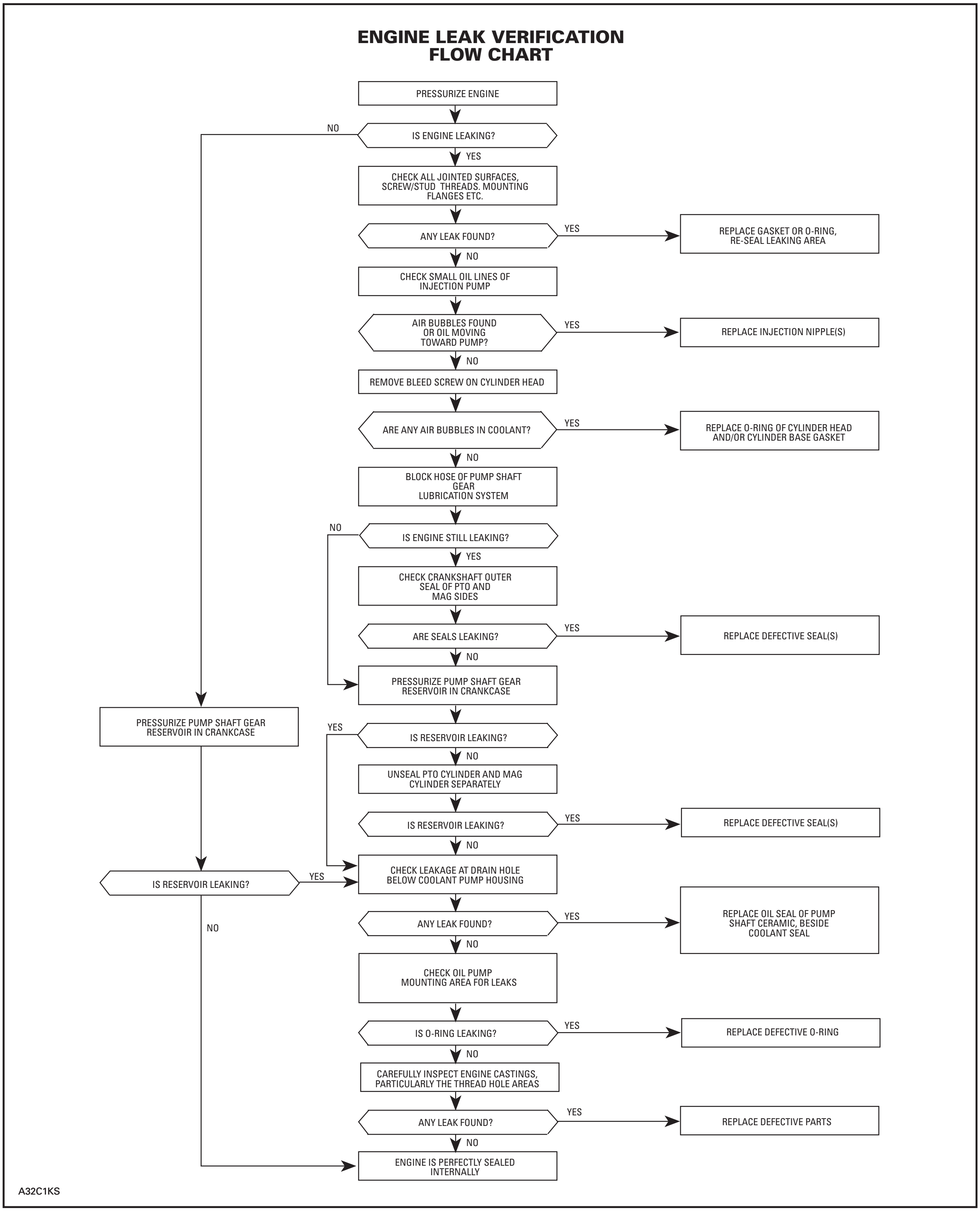
– If leak still persists, it indicates a defective casting somewhere in engine.

Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus lead to leakage.

FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

CYLINDER HEAD WARPAGE

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Check gasketed surface of the cylinder head with a straightedge and a feeler gauge.

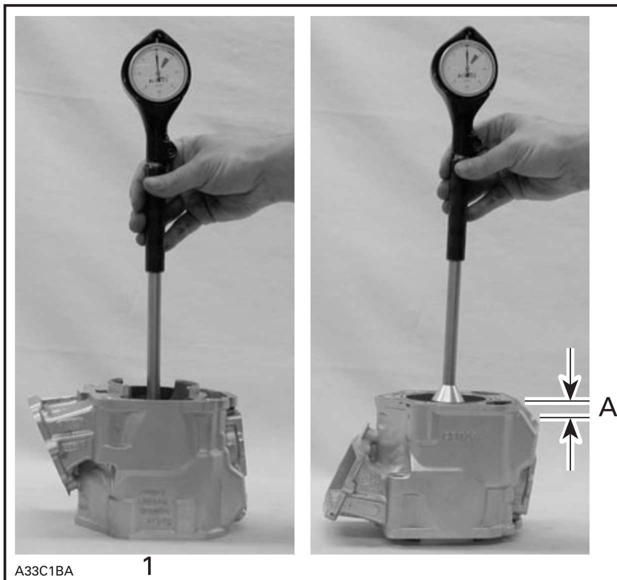
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.10 mm (.004 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but can not be rebored.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



A33C1BA

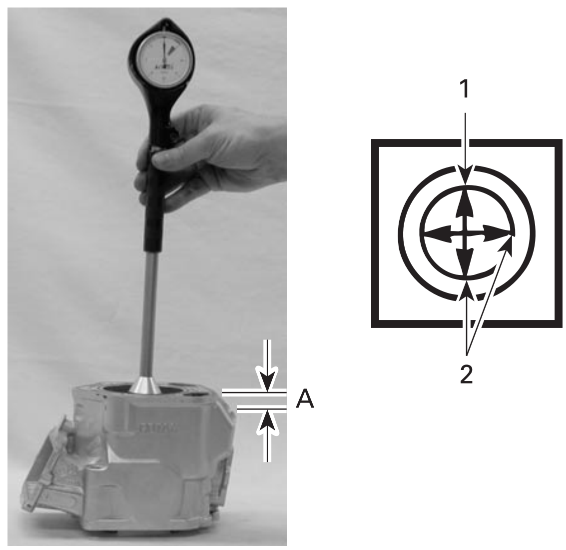
1. *Below the intake port*
A. *16 mm (5/8 in) from top*

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.08 mm (.003 in)

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but cannot be rebored.

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

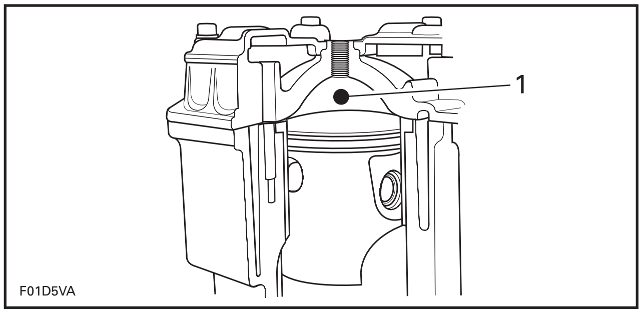


A33C1CA

1. *Piston pin position*
2. *Measures to be compared*
A. *16 mm (5/8 in)*

COMBUSTION CHAMBER VOLUME MEASUREMENT

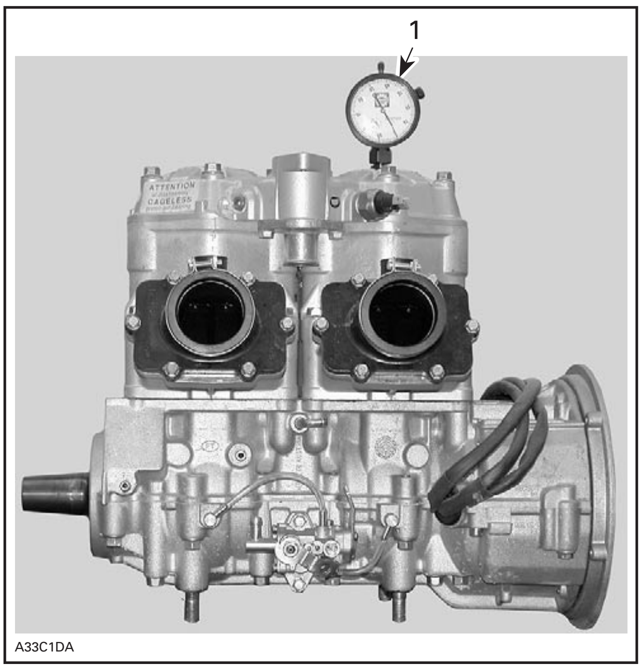
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center. It is measured with the cylinder head installed on the engine.



1. *Combustion chamber*

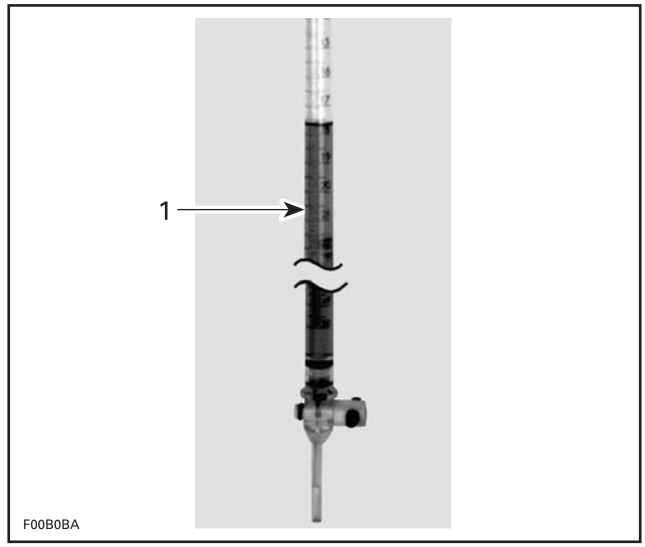
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposits and cylinder head must be leveled.

– Remove both spark plugs and bring one piston to Top Dead Center a using a TDC gauge.



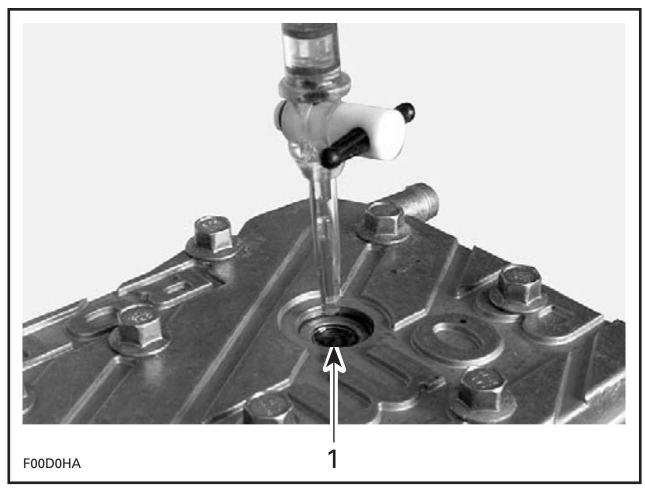
1. *Bring piston to TDC*

– Obtain a graduated burette (capacity 0 - 50 cc) and fill with an equal part (50/50) of gasoline and injection oil.



1. *Graduated burette (0 - 50 cc)*

– Open burette valve to fill its tip. Add liquid in burette until level reaches 0 cc.
– Inject the burette content through the spark plug hole until liquid touches the top spark plug hole.



1. *Top of spark plug hole*

NOTE: The liquid level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false.

– Let burette stand upward for about 10 minutes, until liquid level is stabilized.
– Read the burette scale to obtain the quantity of liquid injected in the combustion chamber.

NOTE: When the combustion chamber is filled to top of spark plug hole, it includes an amount of 2.25 cc corresponding to the spark plug well.

– Repeat the procedure for the other cylinder.

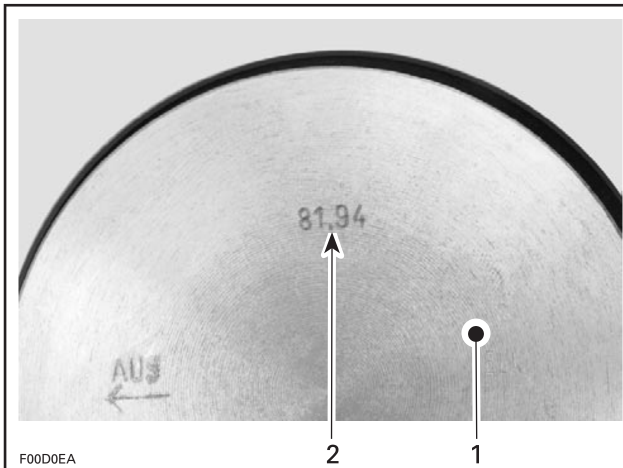
ENGINE TYPE	COMBUSTION CHAMBER VOLUME (cc) (up to top thread of spark plug hole)
593 HO/SDI	28.6 ± 1.29 - 1.43
593 HO/SDI	26.4 ± 1.2
793 HO MX Z	38.5 + 1.93
793 HO SUMMIT	34.8 + 1.74

– Install a thicker or thinner cylinder/crankcase gasket (refer to *Parts Catalogs*) in order to obtain the specified combustion chamber volume or the nearest.

ENGINE TYPE	CHANGE IN COMBUSTION CHAMBER VOLUME (cc) for every 0.1 mm (.004 in) of gasket thickness
593 HO	0.41
793 HO	0.53

USED PISTON MEASUREMENT

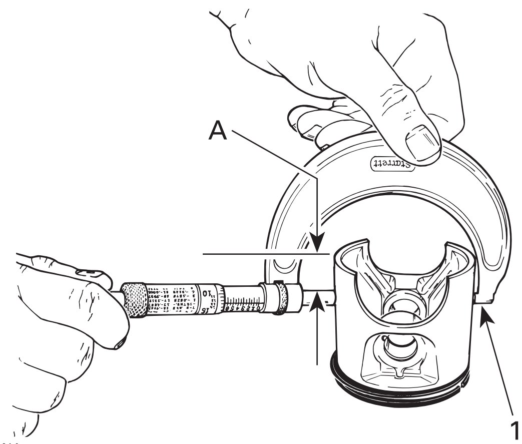
Note the measurement on the piston dome.



F00D0EA

1. *Piston dome*
2. *Piston measurement*

Using a micrometer, measure piston skirt at 15 mm (.590 in) perpendicularly (90°) to piston pin.



F01D0NA

1. *Measuring perpendicularly (90°) to piston pin axis*

A. *15 mm (.590 in)*

ENGINE TYPE	MAXIMUM PISTON SKIRT WEAR mm (in)
All	0.15 (.006)

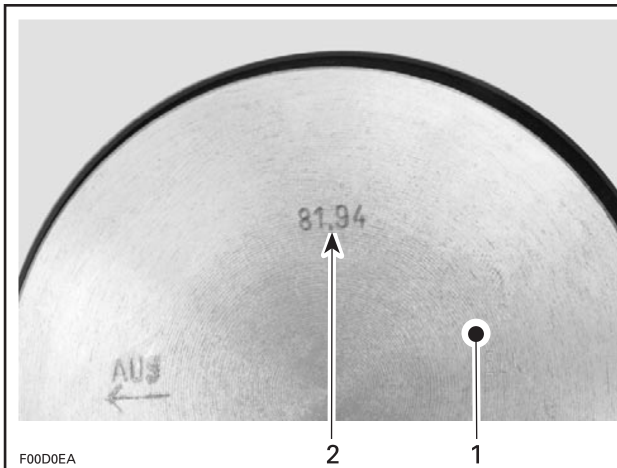
The measured dimension must not be less than 0.15 mm (.006 in) of the one scribed on piston dome. Otherwise, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

IMPORTANT: Make sure used piston is not worn more than specified. See USED PISTON MEASUREMENT above.

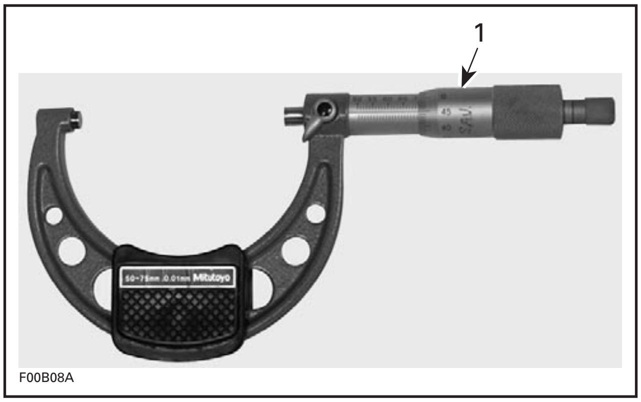
Take the measurement on the piston dome.



F00D0EA

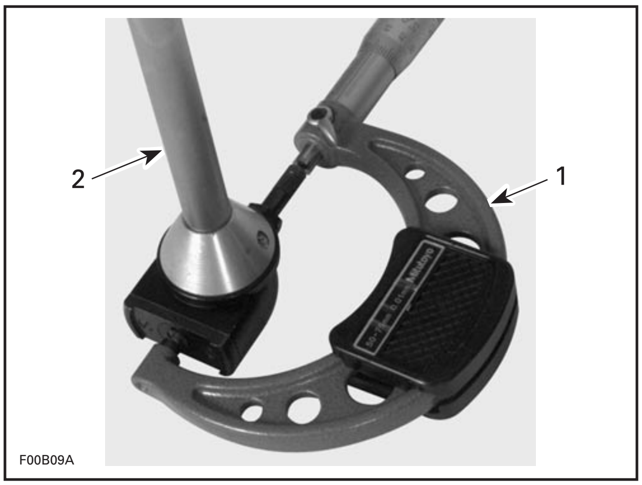
1. *Piston dome*
2. *Piston measurement*

Adjust and lock a micrometer to the specified value on the piston dome.

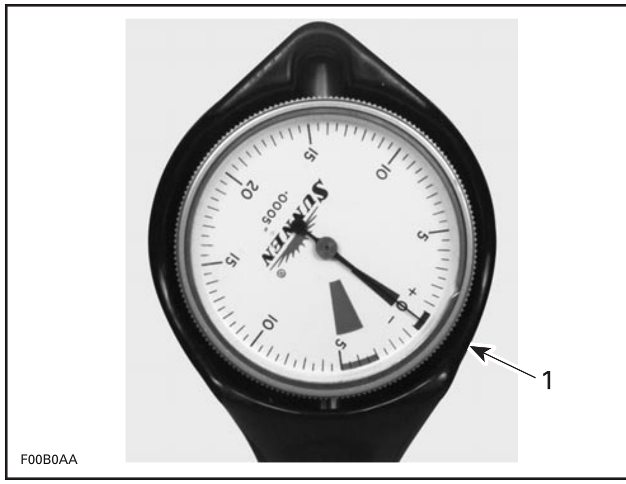


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.



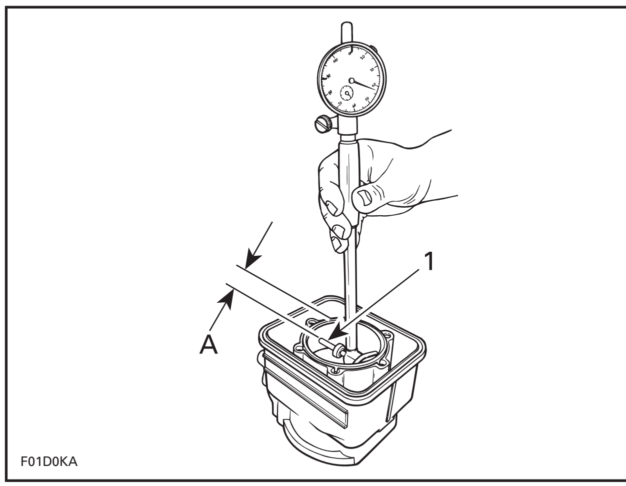
1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0 (zero)

IMPORTANT: Always remove cylinders from crankcase before measuring.

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

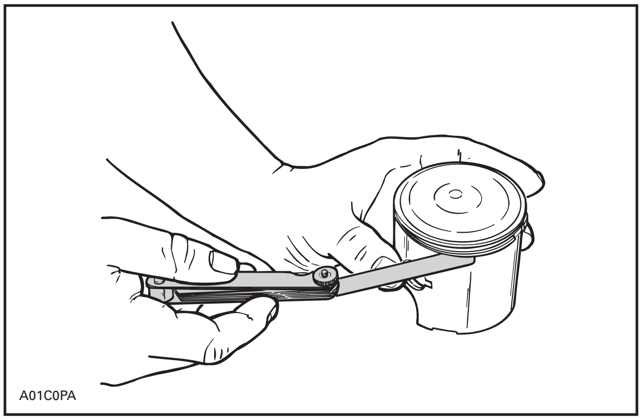
Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore and install oversize piston depending on engine type. Refer to TECHNICAL DATA.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

IMPORTANT: The total piston/cylinder clearance (actual cylinder diameter minus actual piston skirt diameter) should be within 0.30 mm (.012 in).

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between rectangular ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA.

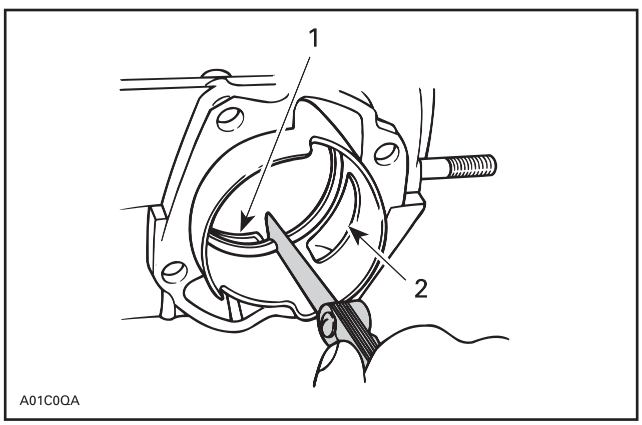


RING END GAP

Position ring half-way between transfer ports and intake port.

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

Using a feeler gauge, check ring end gap. Replace ring if gap exceeds specified tolerance. Refer to TECHNICAL DATA.



1. *Transfer port*
2. *Intake port*

CRANKSHAFT DEFLECTION

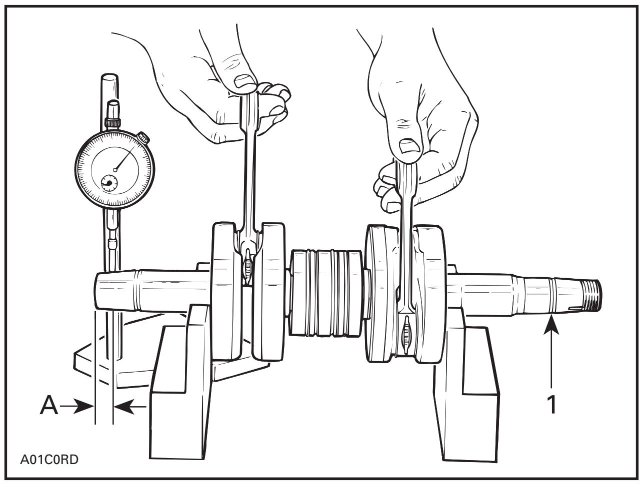
Crankshaft deflection is measured with a dial indicator.

Measuring (in crankcase)

First, check deflection with crankshaft in crankcase. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See below.

Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL
1. *Measure at mid point between the key and the first thread*
A. *3 mm (1/8 in)*

Crankshaft Deflection on PTO Side

ENGINE TYPE	MAXIMUM ON PTO SIDE mm (in)
All	0.06 (.0024)

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
593, 593 HO/SDI, 793 HO	0.05 (.002)

Crankshaft Deflection in Center of Crankshaft

ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT mm (in)
All	0.08 (.0031)

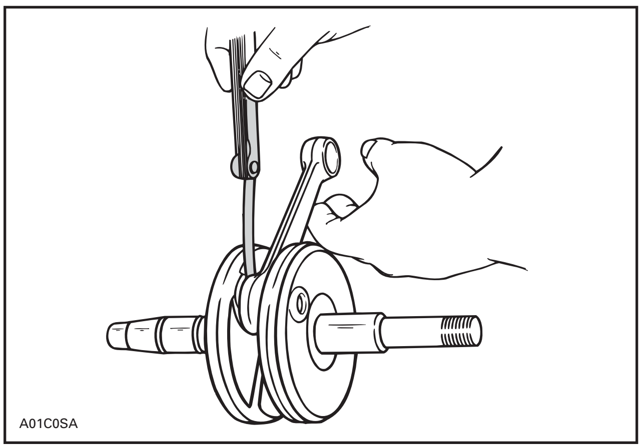
NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. — MAX.	WEAR LIMIT
593	0.39 - 0.74 mm (.015 - .029 in)	1.20 mm (.047 in)
593 HO/SDI, 693, 793 HO	0.31 - 0.67 mm (.012 - .026 in)	1.20 mm (.047 in)

Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.



TYPICAL

CRANKSHAFT END-PLAY

End-play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 529 035 607) on crankshaft end.

Remove both spark plugs.

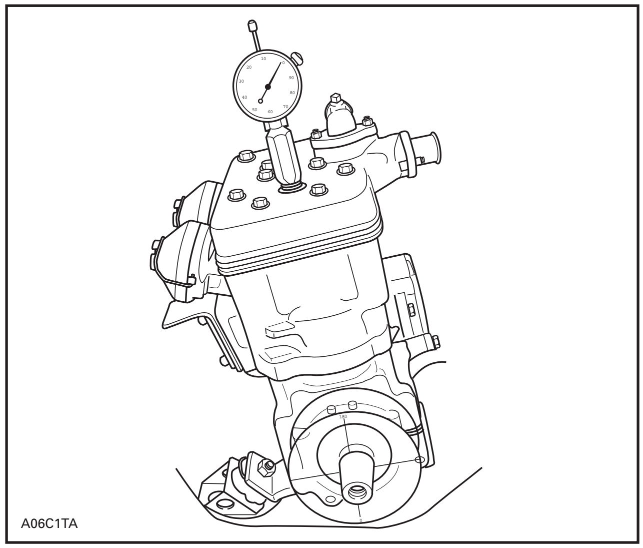
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on center cylinder.

Bring PTO piston to top dead center. Degree wheel must rotate with crankshaft.

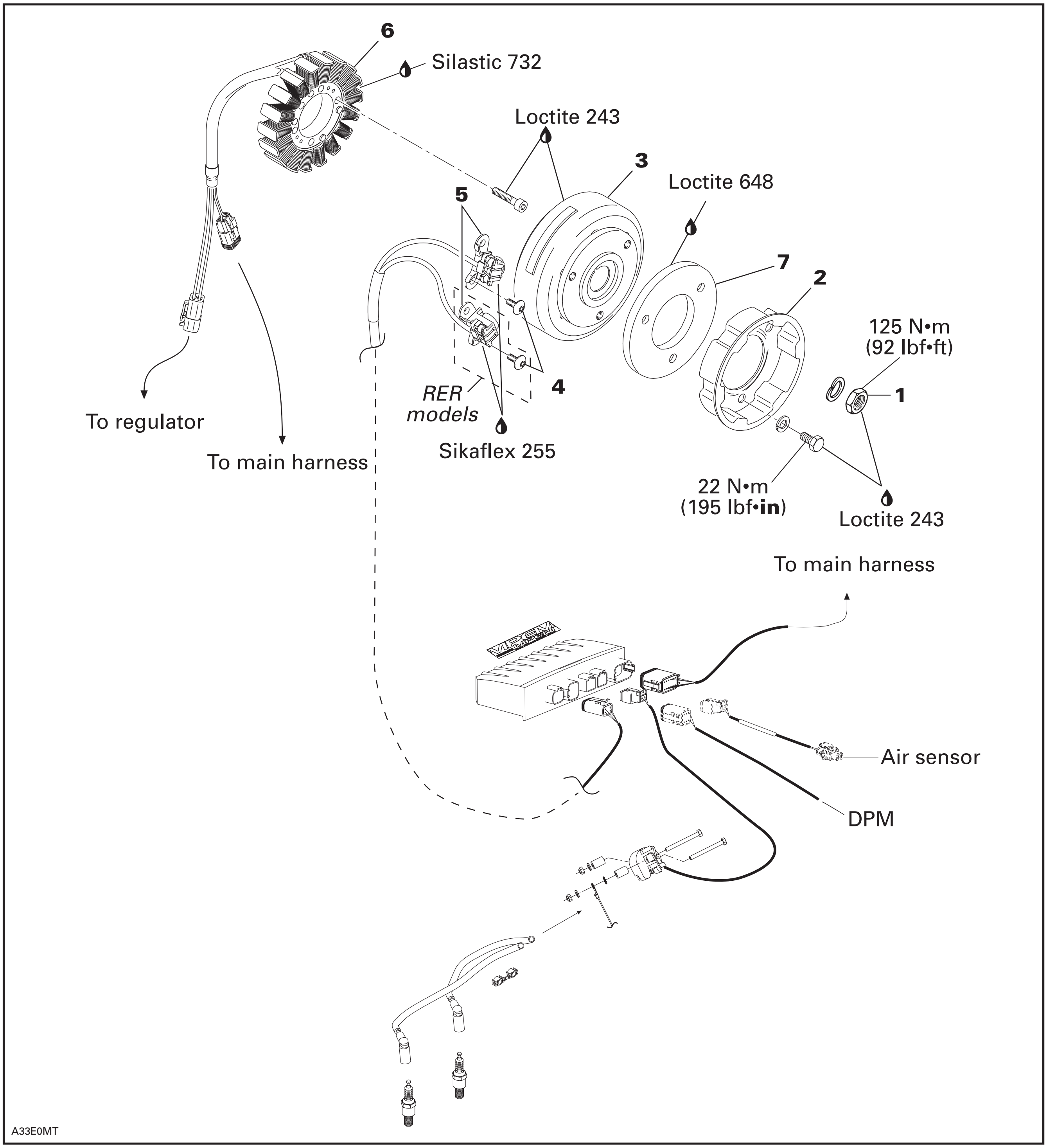


TYPICAL

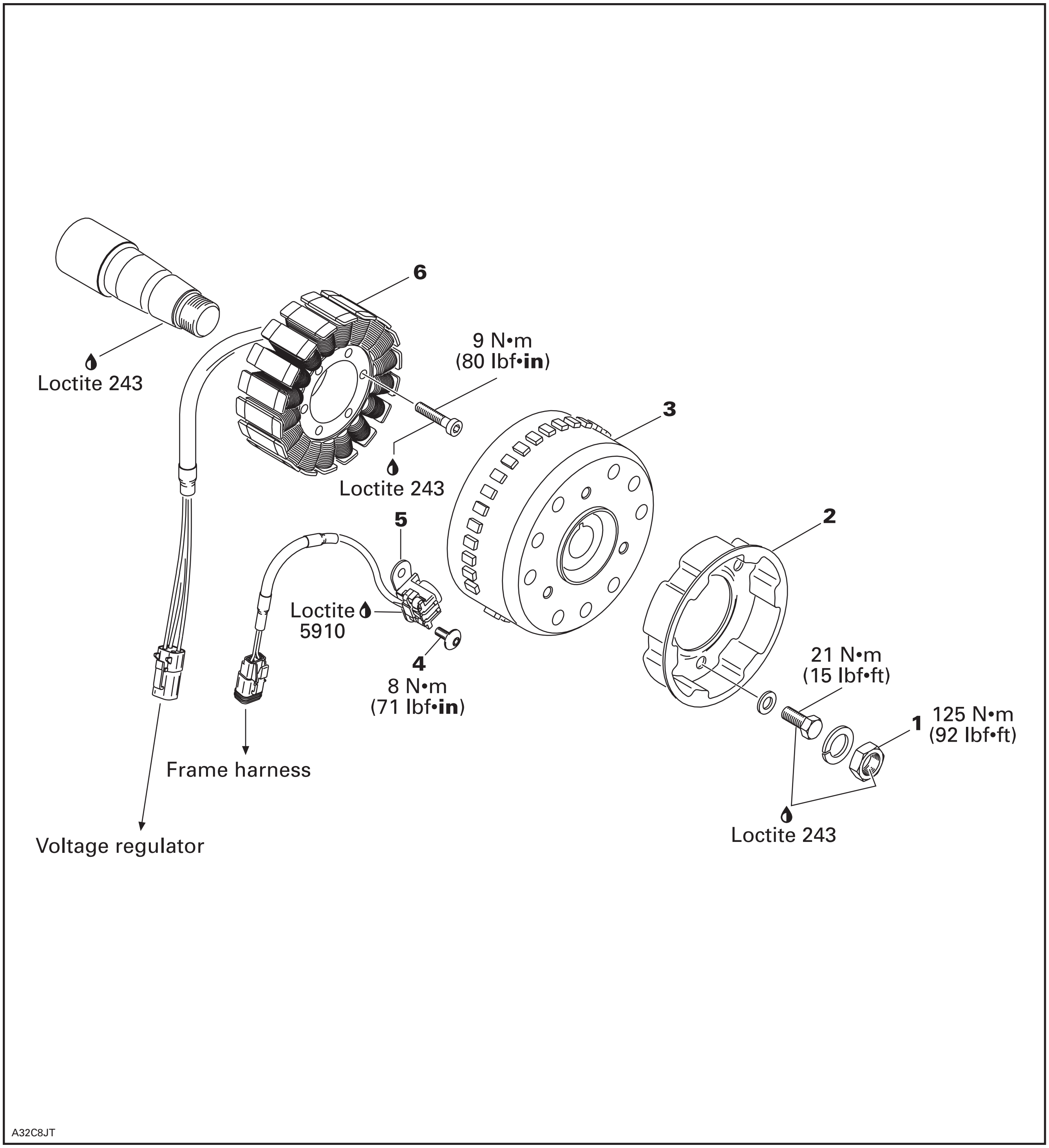
Interval between cylinders must be 180° ± 0.5.

Any other reading indicates a misaligned (twisted) crankshaft.

MAGNETO SYSTEM



480 W on REV Series



GENERAL

NOTE: The following procedures can be done without removing the engine. To facilitate magneto removal, hold drive pulley with tool (P/N 529 027 600).

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to SELF-LOCKING FASTENERS and LOCTITE APPLICATION at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

CLEANING

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

CAUTION: Clean stator and magneto flywheel using only a clean cloth.

DISASSEMBLY

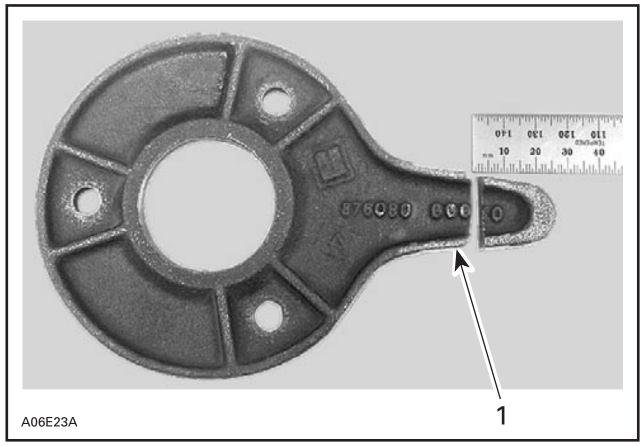
Magneto Flywheel

To gain access to magneto flywheel **no. 3** assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– rewind starter
– starting pulley **no. 2**.

To remove magneto flywheel nut **no. 1**:

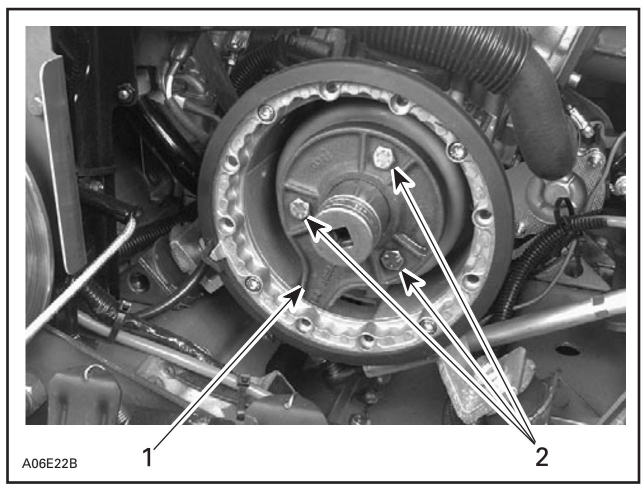
– Use magneto puller ring (P/N 420 876 080). Former puller must be modified as shown.



1. Cut by 25 mm (1 in)

– Install puller ring with its tab in magneto housing opening.

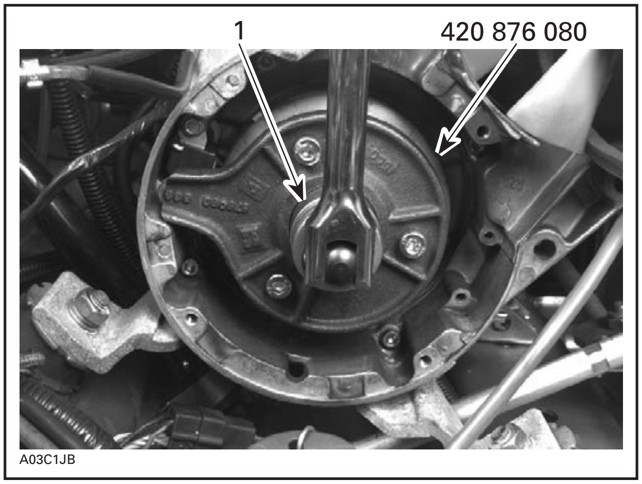
CAUTION: Use only M8 x 20 mm screws to bolt puller to magneto flywheel. When a counterweight no. 7 is installed on magneto flywheel use M8 x 30 mm screws.



TYPICAL
1. Tab in magneto housing opening
2. M8 screws

– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

NOTE: To correctly remove a threadlocked fastener, first tap on the fastener to break threadlocker bond. This will avoid thread breakage.



TYPICAL
1. 30 mm socket

To remove magneto flywheel, install crankshaft protector (P/N 420 876 557) on crankshaft end. Screw puller (P/N 529 035 547) into puller ring.

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

Stator

NOTE: Always check stator no. 6 before changing it, refer to TESTING PROCEDURE.

Remove:

– magneto flywheel no. 3
– all Allen socket screws retaining stator to magneto housing
– grommet from crankcase where trigger coil and stator wires exit magneto housing.

Unplug the trigger coil connectors and pull the wires through the grommet location.

NOTE: To pass the stator connector into the grommet location it is necessary to pass the trigger coil connector first.

Unplug the stator connector and remove the stator.

Trigger Coil

NOTE: Always check trigger coils no. 5 before changing them. Refer to OVERVIEW section.

To replace the trigger coil(s), remove the following:

– magneto flywheel no. 3
– Air intake silencer to allow an access to the trigger coil connectors (if necessary).
– Disconnect trigger coil connector housing(s).
– grommet from crankcase where trigger coil wire(s) exit(s) magneto housing.
– retaining screws no. 4.
– trigger coil(s) and carefully pull wires.

ASSEMBLY

Trigger Coil

For installation, reverse the removal procedure.

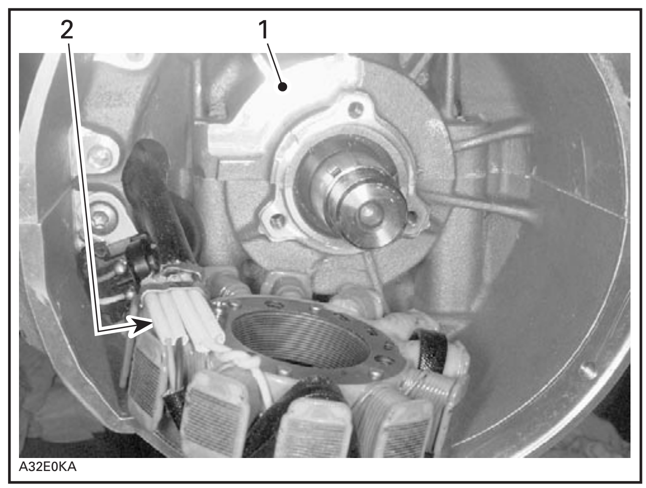
NOTE: It is important to remove the old silicon at trigger coil location then apply new silicon. Screw trigger coil then stick the trigger coil wires in the silicon.

Stator

Insert the stator connector into crankcase grommet then the trigger coil connector(s).

Install the grommet on crankcase

Position stator no. 6 so that its wire protectors are over crankcase recess.



1. Crankcase recess
2. Wire protectors

NOTE: During installation, make sure the stator harness is located on the left side.

Apply Loctite 243 on threads of stator screws then torque them to 9 N•m (80 lbf•**in**).

Reinstall all other removed parts.

Magneto Flywheel

Clean crankshaft extension (taper) and apply Loctite 243 (blue) on taper, then position Woodruff key, magneto flywheel **no. 3** and lock washer on crankshaft.

Clean magneto flywheel nut threads and apply Loctite 243 (blue) then tighten nut **no. 1** to 125 N•m (92 lbf•ft) for liquid cooled engines.

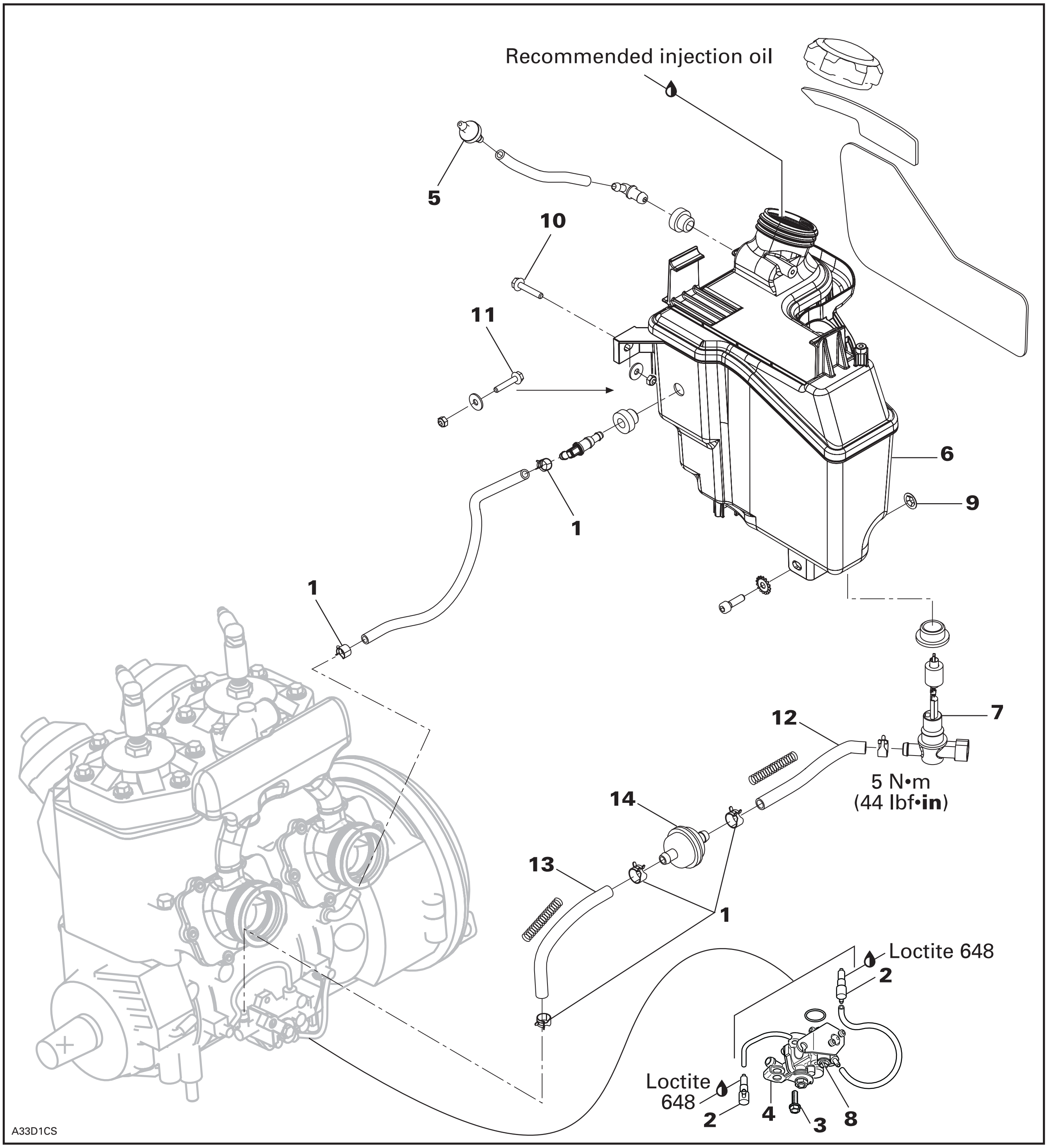
At reassembly coat all electric connections except Deutsch housings (waterproof housing) with silicone dielectric grease (P/N 293 550 004) to prevent corrosion or moisture penetration.

CAUTION: Do not use silicone «sealant», this product will corrode contacts. Do not apply silicone dielectric grease on any Deutsch waterproof housing otherwise housing seal will be damaged.

Ignition Timing

Check as described in IGNITION TIMING.

OIL INJECTION SYSTEM



GENERAL

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to SELF-LOCKING FASTENERS and LOCTITE APPLICATION at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strickly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

NOTE: The following procedures can be done without removing the engine from chassis.

OIL TYPE

MODEL	OIL TYPE
2-TEC SDI	BOMBARDIER FORMULA XP-S II synthetic injection oil (1)
All others 2-stroke engines	BOMBARDIER FORMULA XP-S II synthetic injection oil OR BOMBARDIER injection oil (2) (3)

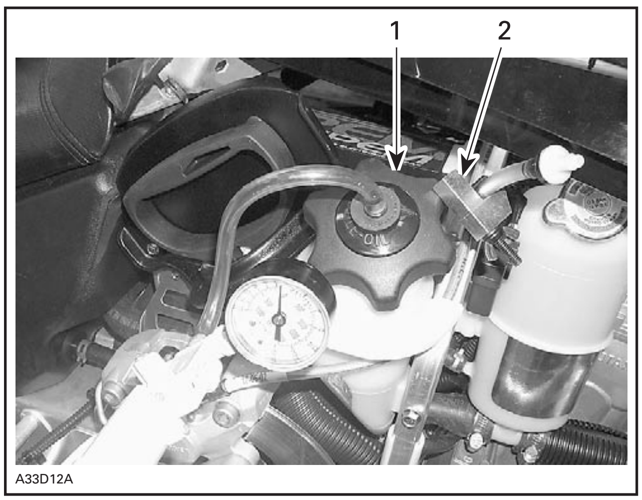
(1) **CAUTION: The BOMBARDIER Formula XP-S II synthetic injection oil is specially formulated and tested for the severe requirement of these engines. Use of any other brand two-stroke oil may void the limited warranty. Use only BOMBARDIER Formula XP-S II synthetic injection oil. There is no known equivalent on the market for the moment. If a high quality equivalent were available, it could be used.**
(2) If BOMBARDIER injection oil is not available, API TC high-quality low ash two-stroke injection oil may be used.
(3) BOMBARDIER FORMULA XP-S II synthetic injection oil and BOMBARDIER injection oil are compatible, they can be mixed together.

OIL SYSTEM LEAK TEST

The following test will indicate any leak from oil reservoir and all other component of oil system.

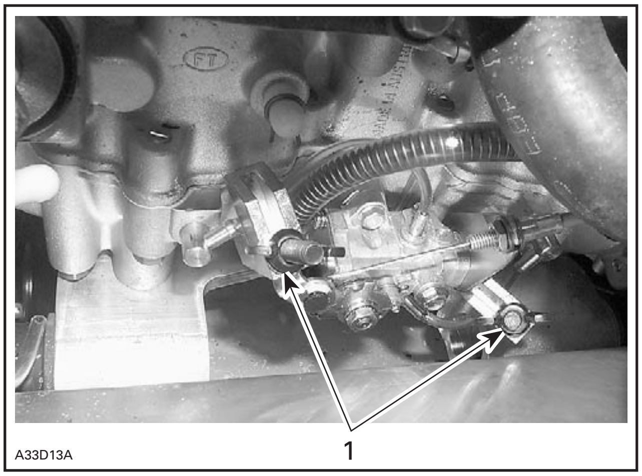
Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on oil reservoir check valve outlet hose.



1. Special cap on reservoir
2. Hose pinchers on check valve outlet hose

Remove air silencer and carburetor to gain access to the oil pump hoses.Install hose pinchers (P/N 295 000 076) on outlet hoses.



1. *Hose pinchers on outlet hoses*

Connect leak testing kit pump to special cap.

Pressurize oil system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s).

NOTE: An oil pump shaft test must be done to complete the oil system leak test. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT for the procedure.

OIL PUMP IDENTIFICATION

Pump Lever

Different engines need different pumps. See identification on lever **no. 4**.

CAUTION: Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
593, 593 HO and 593 HO SDI	02
793 HO and SDI	01

CLEANING

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

DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

Injection Oil Reservoir

Empty injection oil reservoir **no. 6** by siphoning injection oil.

Remove:

– air box
– upper screw (near reservoir cap)
– rewind starter support and grip
– hose protector support
– electronic module (MPEM)
– lower nut **no. 9**, screw **no. 10** and **no. 11**.

NOTE: Cut the ties retaining the wiring harness if necessary.

Injection Oil Level Sensor

To remove the switch, use the following procedure.

Remove injection oil reservoir, as mentioned above..

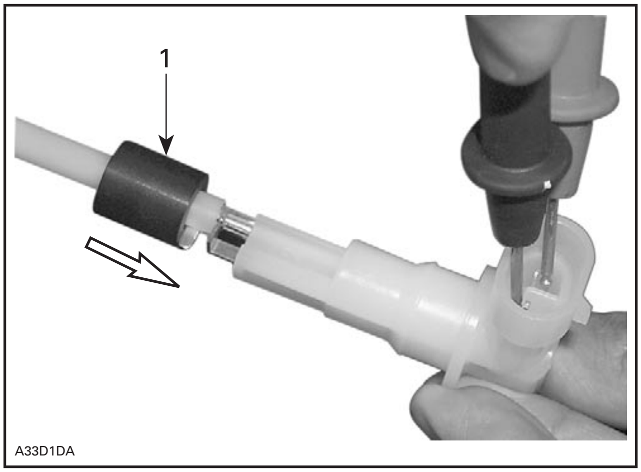
Unplug switch connector.

Pull oil level switch **no. 7** out of reservoir.

Before replacing the injection oil level sensor **no. 7**, check it according to the following procedure:

CAUTION: Do not remove or bend the reed switch protective float lock. It can damage the reed switch glass.

With the float magnet ring at the lowest position. Using an ohmmeter, probe the connector.



1. *Float magnet at the end position*

Reading below 0 ohm reflects the proper sensor function. Replace the oil level sensor if reading above 0 ohm.

Injection Oil Filter

Remove air box and carburetor or throttle body.

Siphon injection oil reservoir.

Disconnect oil filter hose **no. 12** from the reservoir **no. 6**.

Disconnect oil hoses **no. 12** and **no. 13** from the oil filter **no. 14** and remove it.

Injection Oil Pump

NOTE: Before removing the injection oil pump **no. 8**, check its operation. Refer to the end of this section.

Remove:

– air box
– carburetor or throttle body
– screw **no. 3**.

Unplug all hoses connected to oil pump **no. 4**.

NOTE: Mark hose locations for installation.

Disconnect the oil pump cable.

Check Valve

NOTE: Before removing check valve **no. 2**, check its operation. Refer to the end of this section.

Remove air box and carburetor or throttle body.

Clean check valve area to remove oil or dirt.

Heat check valve **no. 2** then pull it out of crankcase.

ASSEMBLY

NOTE: During installation, always check for spring clips **no. 1** tightness.

Injection Oil Reservoir

For installation, reverse the removal procedure.

Injection Oil Level sensor

For installation, reverse the removal procedure.

Injection Oil Filter

For installation, reverse the removal procedure.

NOTE: The filter must be installed with the arrow pointing toward the pump.

Injection Oil Pump

For installation, reverse the removal procedure. However, pay attention to the following.

Torque the screws **no. 3** to 5 N•m (44 lbf•**in**).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

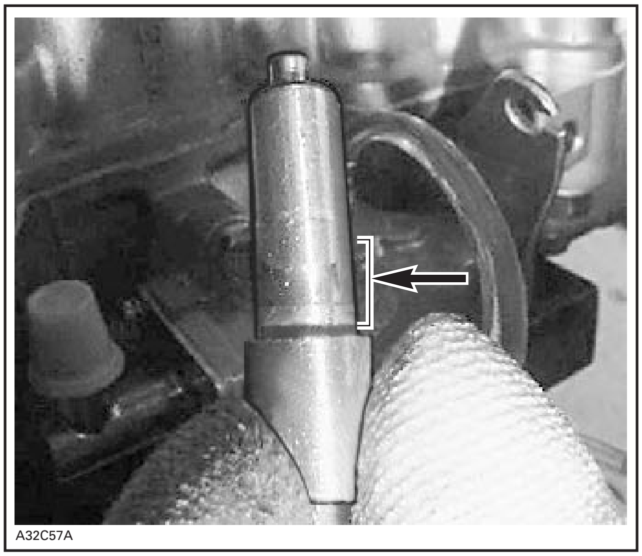
Install cable lock washer on left side of support.

Verify cable and oil pump lever operation then adjust cable.

Check Valve

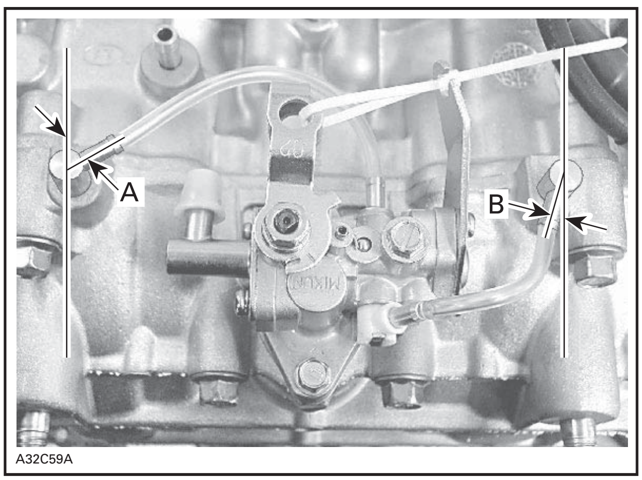
Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is ONLY in this area.

NOTE: Prior to coating it with Loctite, make sure check valve body is clean and dry. Clean from dirt or oil, if any, with pulley flange cleaner (P/N 413 711 809).



APPLY LOCTITE ON THIS AREA ONLY

Install the check valve in the correct position as described on next photos into the crankcase lower side.



TYPICAL
A. PTO side 45° ± 5° from cylinder axis to the top
B. MAG side 20° ± 5° from cylinder axis to the bottom

Punch in the check valve carefully with a plastic hammer.

Clean the crankcase from surplus of Loctite 648 with a rag.

ADJUSTMENT

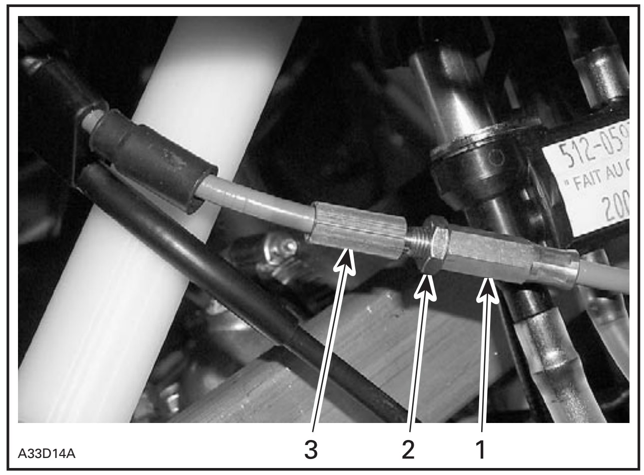
Oil Pump Cable

Prior to adjusting the pump, make sure throttle cable adjustment is completed and engine is stopped.

Stretch the adjusting cable through a maximum force of 32 N•m (7.2 lbf•ft).

NOTE: It is better to have two persons to check the cable distance. One stretching the cable and other taking measurements.

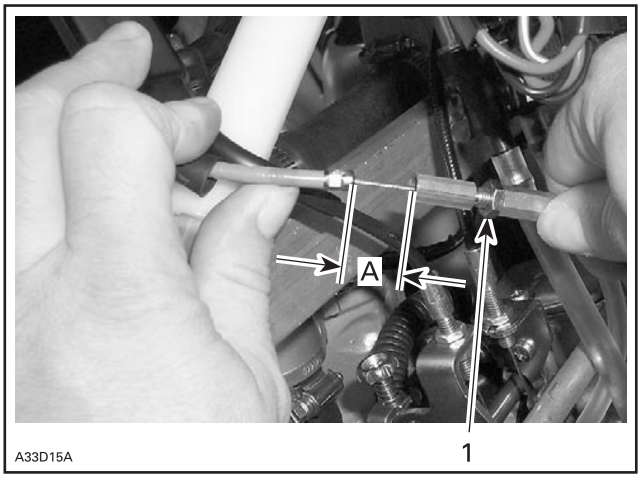
Check the visible distance of the stretched cable, while one person is stretching it and other checking the distance.



1. *Adjusting cable*
2. *Lock nut*
3. *Adjusting screw*

Refer to the following table to know the visible stretched distance of the cable.

MODELS	VISIBLE STRETCHED DISTANCE
593 , 593 HO, 593 HO SDI and 793 HO	18 ± 0.3 mm 0.71 ± 0.12 in
793 SDI	19.5 ± 0.3 mm 0.77 ± 0.12 in



TYPICAL
1. Lock nut
A. Visible stretched distance

If the visible distance is less or more than specified above, adjust the cable distance accordingly. To do so, loosen lock nut, turn adjusting screw in or out, retighten lock nut.

To Bleed Oil Lines

Bleed main oil line (between reservoir and pump) by loosening the bleeder screw no. 8 until air has escaped from the line. Add injection oil as required.

Reinstall all parts.

Bleed the small oil line between pump and engine by running engine at idle while holding the pump lever in fully open position.

NOTE: Make a J hook out of mechanical wire to lift the lever.

⚠ WARNING

No ensure not operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unplug small oil lines from pump. Start engine and stop it as soon as it fires.

Check that oil in small oil lines has been sucked up (this will be indicated by a clear section of small oil lines). Repeat the procedure until this condition is attained.

Reconnect small oil lines, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in injection nozzle. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a clockwise rotating drill rotate pump shaft. Oil must drip from outer fittings while holding lever in a fully open position. If not replace pump.

Check Valve

For all engines, check valve no. 2 is part (built-in) of injection nozzle.

To verify the check valve, proceed the same as for checking pump operation on vehicle. First unplug oil line from check valve. After restarting the engine, check that a clear section in small oil line is present. Reconnect oil line.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

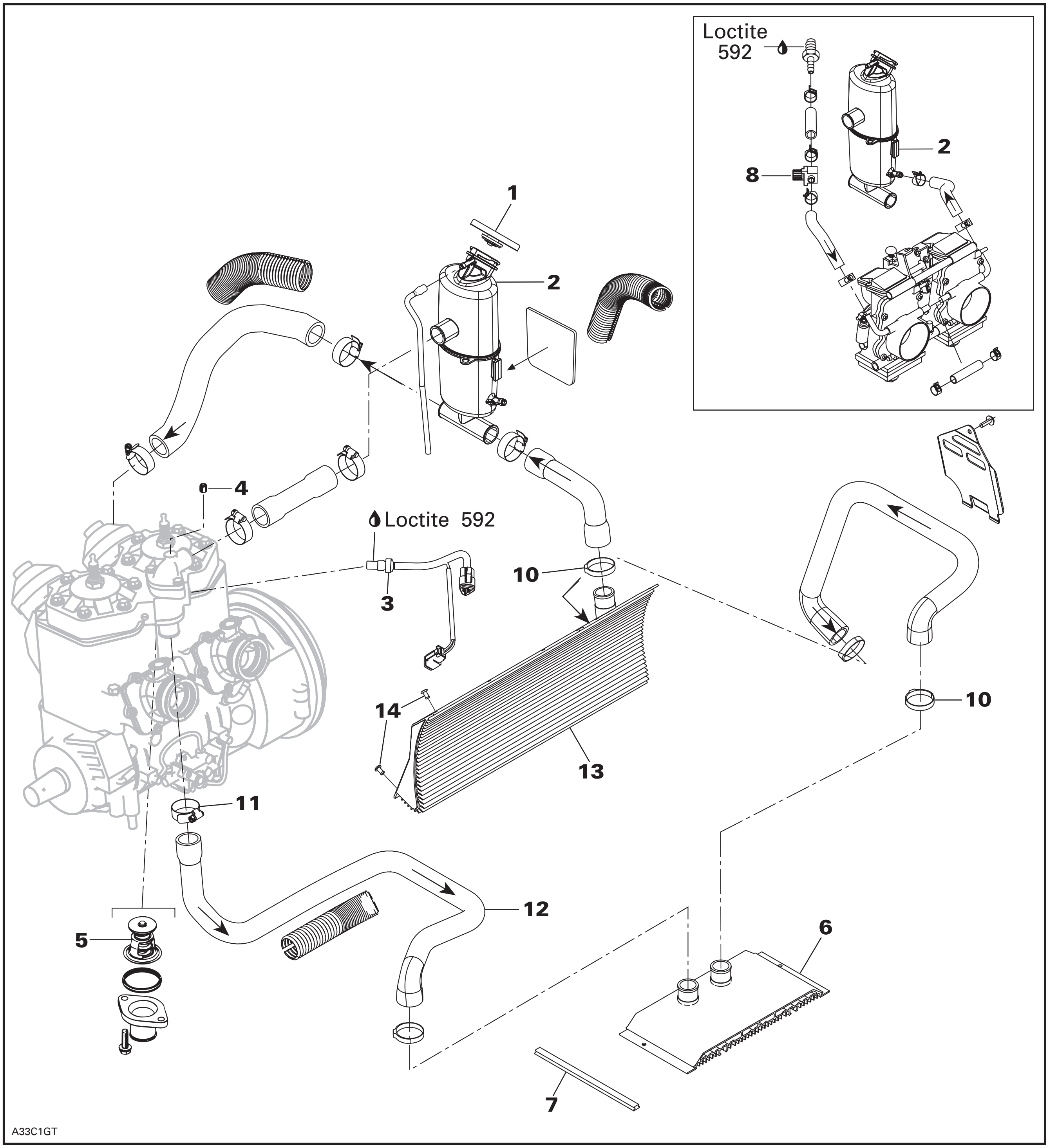
Oil Reservoir Check Valve

It allows air to get into the reservoir. To verify this one-way check valve, remove it along with the hose. Make sure that it holds pressure and that it does not let air go through.

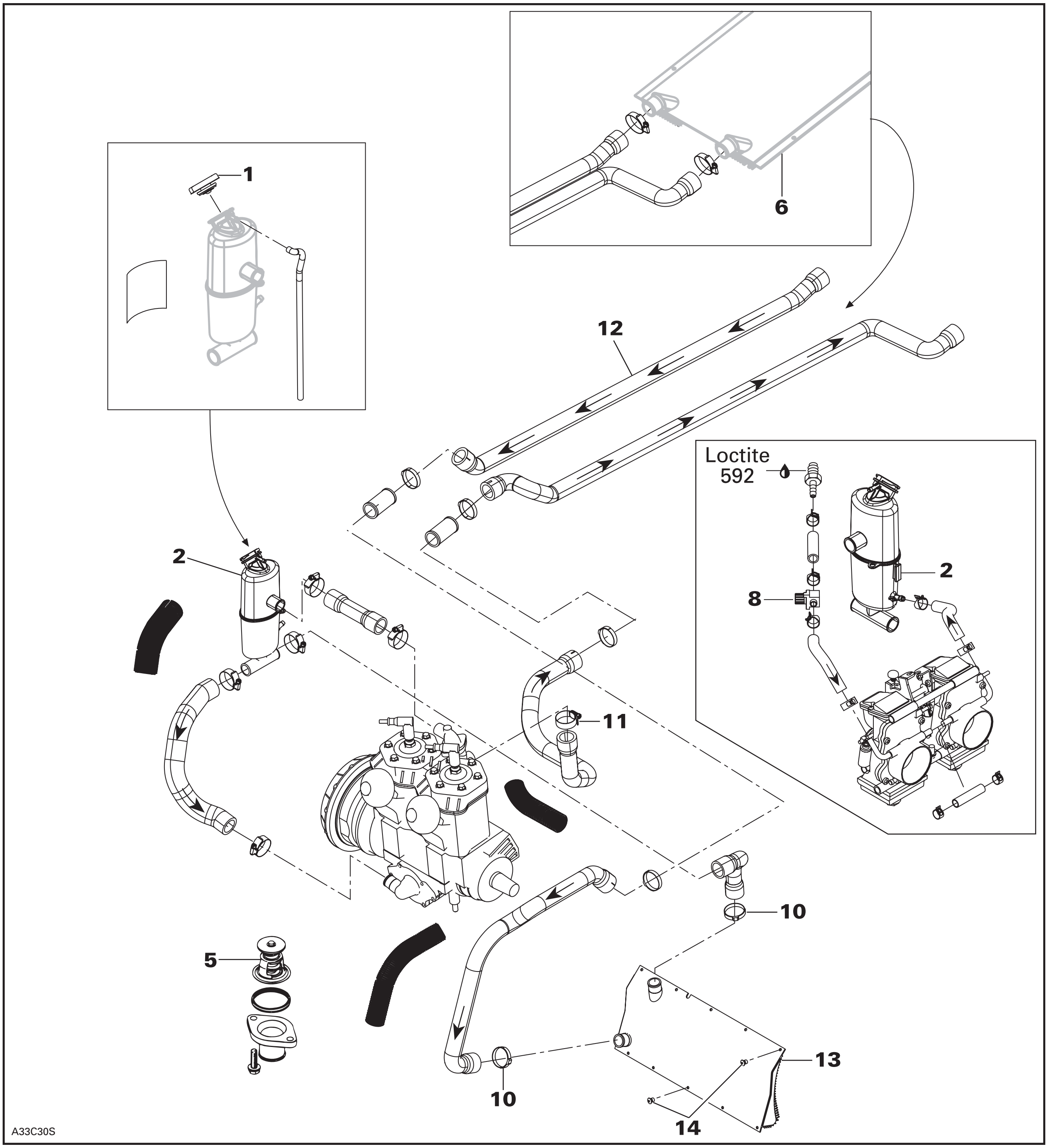
While installing this check valve make sure that the black side is towards the reservoir.

LIQUID COOLING SYSTEM

All Models except Summit



All Summit Models



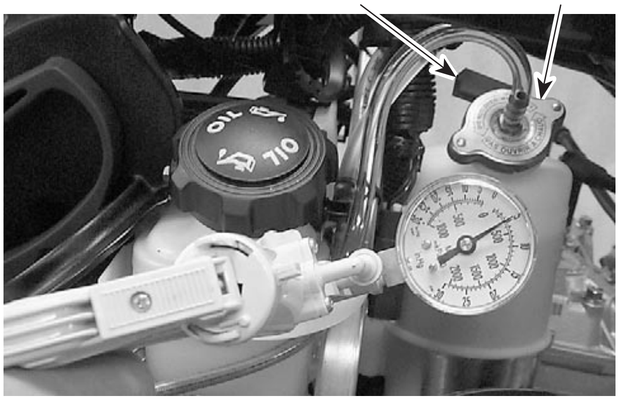
COOLING SYSTEM LEAK TEST

> ⚠ **WARNING**
>
> **To prevent burning yourself, do not remove the radiator cap if the engine is hot.**

Install special radiator cap (P/N 529 021 400) included in engine leak tester kit (P/N 861 749 100) on coolant tank. Install hose pincher (P/N 295 000 076) on overflow hose. Using pump also included in kit pressurize all system through coolant reservoir to 100 kPa (15 PSI).

Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for air bubbles.

295 000 076 529 021 400



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INSPECTION

Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

> ⚠ **WARNING**
>
> **Never drain or refill the cooling system when engine is hot.**

To drain the cooling system, siphon the coolant mixture from the coolant tank **no. 2** using the siphon tool (P/N 529 035 880). Disconnect hose at water pump to drain coolant from engine.

When the coolant level is low enough, lift the rear of vehicle to drain the radiator.

DISASSEMBLY AND ASSEMBLY

Coolant Pump

Refer to BOTTOM END section.

Sender and Plug

Apply Loctite 592 (P/N 293 800 018) thread sealant on sender **no. 3** and plug **no. 4** to avoid leaks.

Pressure Cap

Check if the cap **no. 1** pressurizes the system for 3 minutes. If not, install a new 90 kPa (13 PSI) cap (do not exceed this pressure).

Coolant Tank

For removal, drain cooling system before removing coolant tank **no. 2**.

Remove all hoses from coolant tank.

Remove injection oil reservoir retaining screws to slide down the coolant tank to disengage it from oil tank.

NOTE: It is necessary to move oil tank for an easier removal/installation of coolant tank.

Check if the tank is cracked or melted. Replace if necessary.

For installation, reverse the removal procedure.

Front Radiator

Remove all debris between radiator fins. A clean radiator is more efficient than a dirty one.

Check if the radiator fins are damaged. Replace the front radiator **no. 13** if necessary.

NOTE: A radiator with many broken fins does not work properly.

For disassembly, drain cooling system.

Remove rear suspension (refer to REAR SUSPENSION).

Using Supertanium™ bit (P/N 529 031 800), drill all rivets **no. 14** retaining front radiator to the frame or grind the rivets with a grinding disk.

Pull the radiator a little and remove the Oetiker clamps **no. 10**.

For installation, reverse the removal procedure.

Rear Radiator and Rear Radiator Protector

Refer to FRAME for rear radiator removal/installation procedures.

For cleaning and inspection refer to FRONT RADIATOR.

Radiator and Radiator Protector

Insert radiator protector **no. 7** into radiator C-rail and crimp C-rail at rear end. Refer to FRAME for radiator **no. 6** removal.

Thermostat

For disassembly of thermostat **no. 5**, drain the cooling system (see above).

Unscrew clamp **no. 11** retaining hose **no. 12** to the water outlet socket.

Remove:

– water outlet
– socket screws
– gasket thermostat.

To check thermostat, put in water and heat water. Thermostat should start to open when water temperature reaches the following degree.

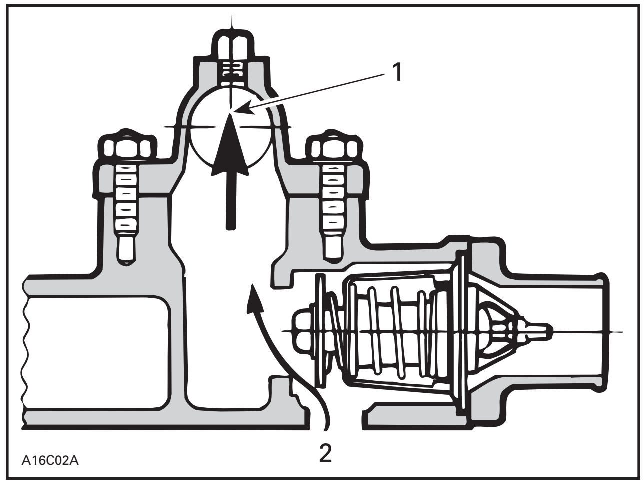
To check thermostat, put in water and heat water. Thermostat should start to open when water temperature reaches the following degree.

ENGINE	TEMPERATURE
All	42°C (108°F)

It will be almost fully open at 50°C (122°F).

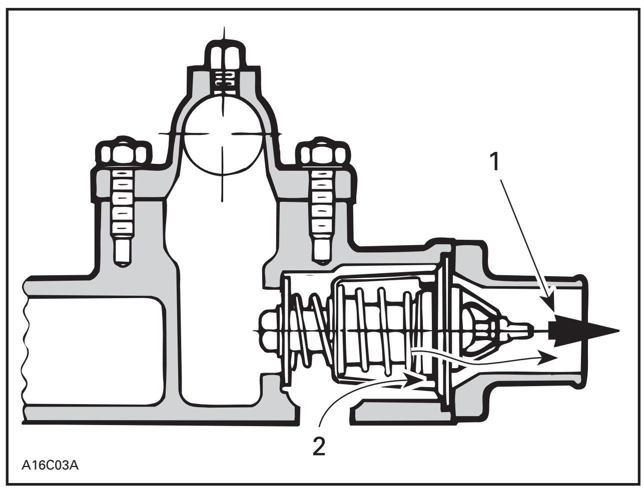
Thermostat is a double action type.

– Its function is to give faster warm up of the engine by controlling a circuit; water pump — engine — coolant tank. This is done by bypassing the radiator circuit.



TYPICAL — CLOSED THERMOSTAT, COLD ENGINE
1. *To reservoir*
2. *From cylinders*

– When the liquid is warmed enough, the thermostat opens progressively the circuit, water pump — engine — radiators — coolant tank to keep the liquid at the desired temperature. (See the diagram of the exploded view).



TYPICAL — OPEN THERMOSTAT, WARM ENGINE
1. *To radiators*
2. *From cylinders*

These 2 functions have the advantage of preventing a massive entry of cold water into the engine.

For installation, reverse the removal procedure.

COOLING SYSTEM REFILLING PROCEDURE

CAUTION: To prevent rust formation or freezing condition, always replenish the system with the Bombardier premixed coolant or with 50% antifreeze and 50% water. Pure antifreeze without water freezes (like slush ice). Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

System Capacity

Refer to TECHNICAL DATA.

Refilling Procedure

IMPORTANT: USE THE 50/50 PREMIXED COOLANT - 37°C (- 35°F) (P/N 293 600 038). Do not reinstall pressure cap.

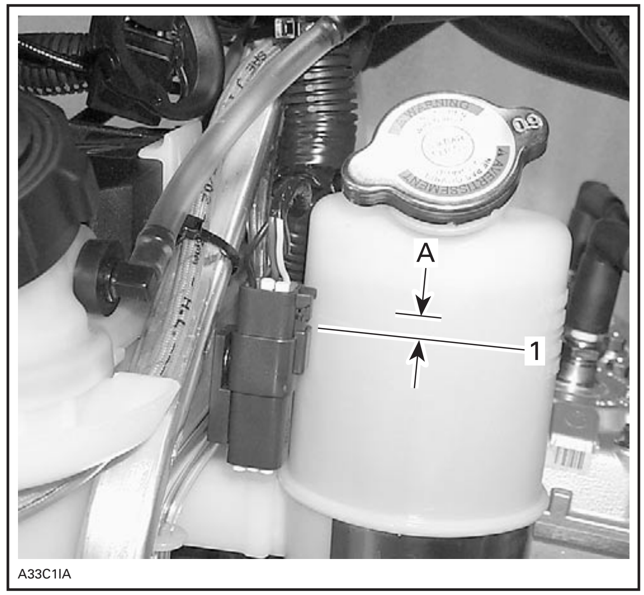
With engine cold, refill coolant tank up to COLD LEVEL line. Start engine. Refill up to line while engine is idling until rear radiators are warm to the touch (about 4 to 5 minutes). Always monitor coolant level while filling tank to avoid emptying. Install pressure cap.

Lift rear of vehicle and support it safely.

Activate throttle lever 3 - 4 times to bring engine speed to 7000 RPM.

Apply the brake.

Lower vehicle back on ground and add coolant up to 15 mm (1/2 in) above the COLD LEVEL line.



1. Cold level line
A. 15 mm (1/2 in)

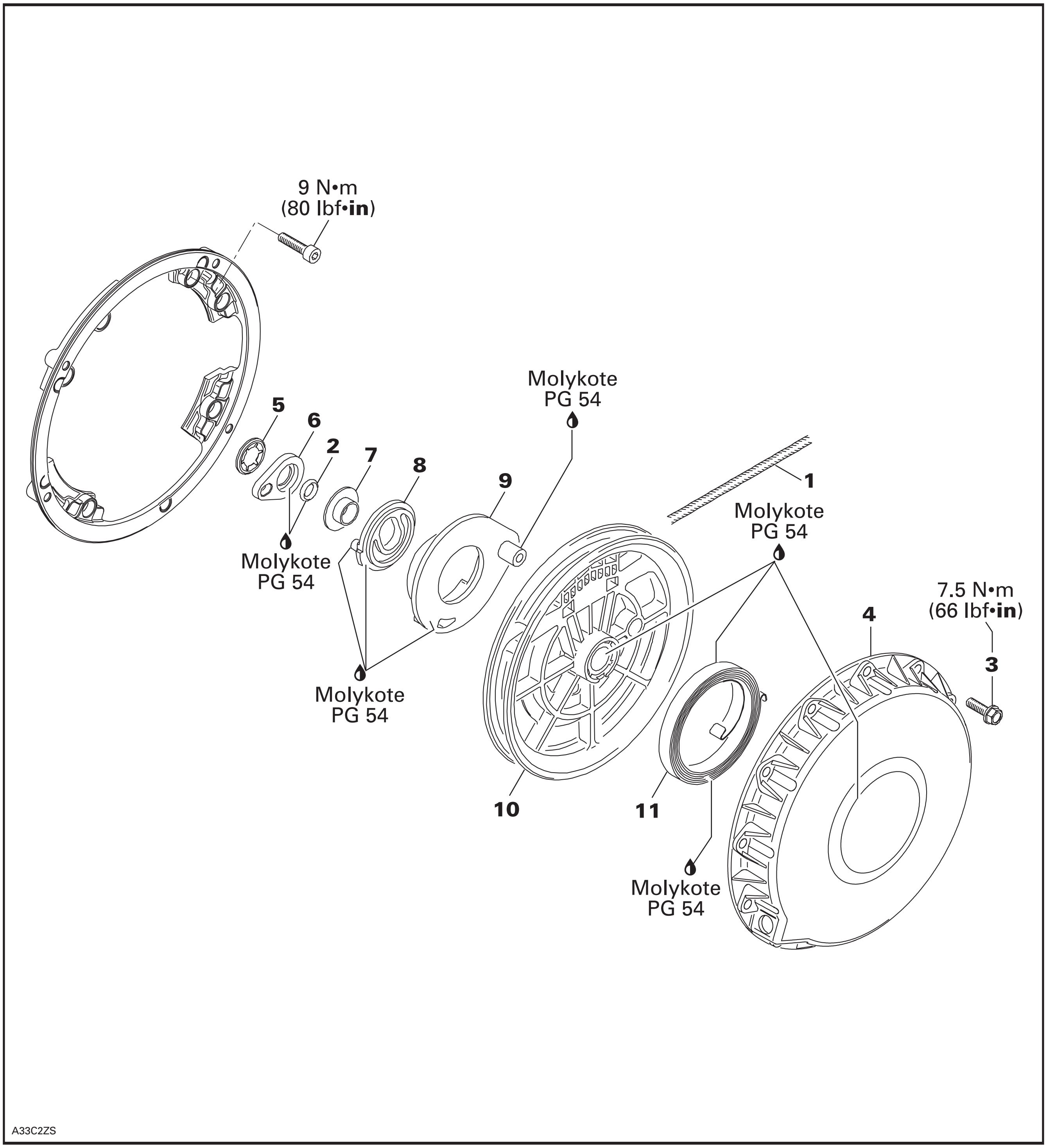
Lift front of vehicle of 60 cm (24 in) and support it safely. Let the vehicle idle for two minutes.

Put vehicle back on ground and add coolant up to 15 mm (1/2 in) over COLD LEVEL line.

When engine has completely cooled down, recheck coolant level in coolant tank and refill up to line if needed.

Check for coolant mixture freezing point. Specification is - 37°C (- 35°F). Adjust as necessary.

REWIND STARTER



INSPECTION

NOTE: Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Check if rope no. 1 is fraying, replace if so.

When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pulled. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace as required, lubricate, reassemble and recheck. Always replace O-ring no. 2 every time rewind starter is disassemble.

When releasing starter grip, it must return to its stopper and stay against it. If not, check for proper spring preload or damages. Readjust or replace as required.

When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

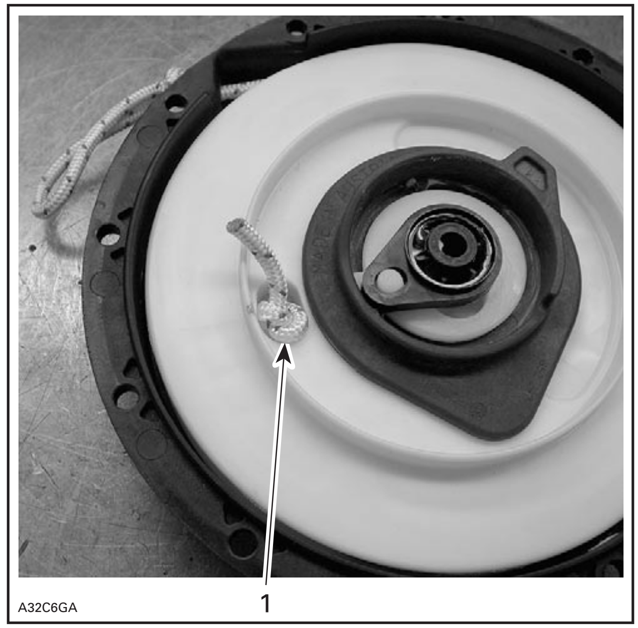
REMOVAL

Using a small screwdriver, extract rope knot from starter grip. Cut rope close to knot. Tie a knot near starter.

Remove screws no. 3 securing rewind starter housing no. 4 to engine then remove rewind starter.

ROPE REPLACEMENT

Pull out rope. Hold rewind starter in a vise. Slide rope and untie the knot. Pull out the rope completely.



1. Knot to be untied

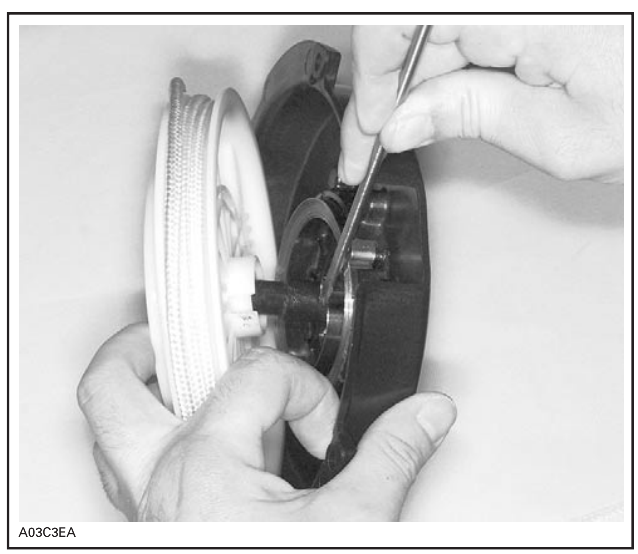
NOTE: When rope is completely pulled out, spring preload is 4-1/2 turns.

DISASSEMBLY

Undo knot previously tied at removal. Carefully let sheave unwind to release spring preload.

Remove push nut no. 5 and discard. Remove locking element no. 6, O-ring no. 2, step collar no. 7, pawl lock no. 8 and pawl no. 9.

Remove sheave no. 10 from rewind starter housing no. 4. Hold spring with a screwdriver.



Take out knot and then pull out rope **no. 1**.

ASSEMBLY

At assembly, position spring **no. 11** outer end into spring guide notch then wind the spring counter-clockwise into guide.

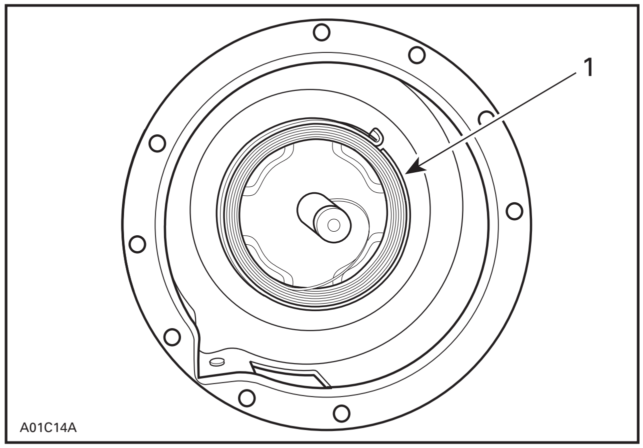
⚠ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.

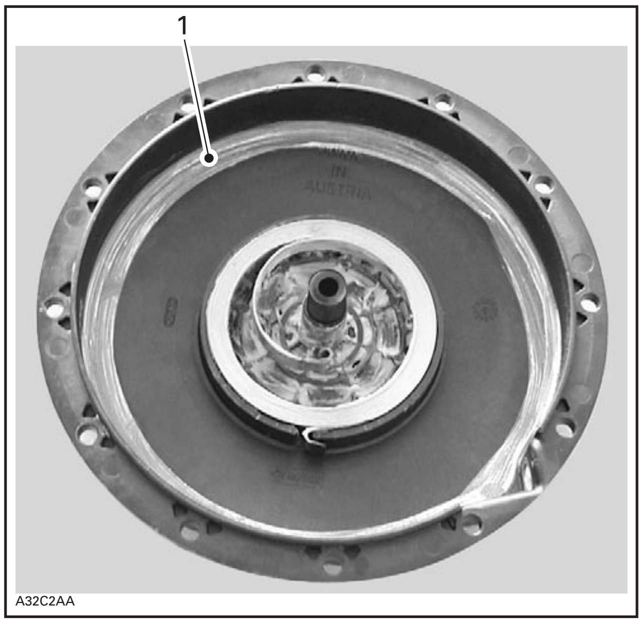
TYPICAL
1. Outer end into guide notch

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly and 1 cm (1/2 in) wide on bottom of housing with Molykote PG 54 (P/N 420 899 763).



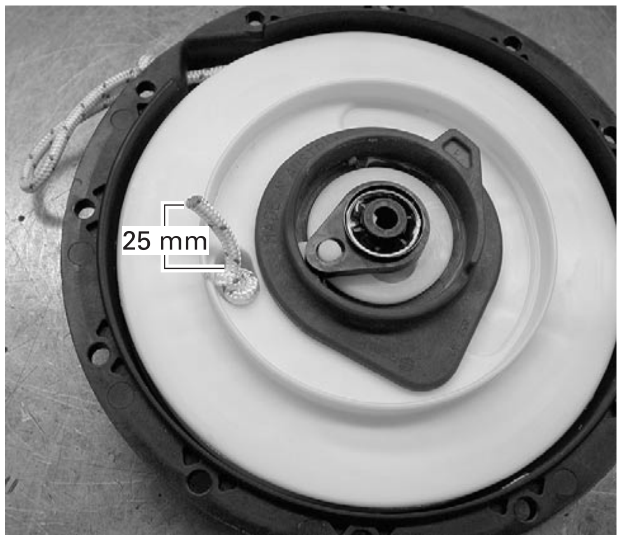
TYPICAL
1. Molykote PG 54 inside spring guide



1. Molykote PG 54 applied 1 cm (1/2 in) wide on bottom of housing

CAUTION: The use of standard multi-purpose grease could result in rewind starter malfunction.

To install rope **no. 1**, insert rope into sheave **no. 10** orifice and lock it by making a knot, leaving behind a free portion of about 25 mm in length. Fuse rope end with a lit match and insert it into sheave.



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FREE PORTION


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FREE PORTION INSERTED INTO SHEAVE

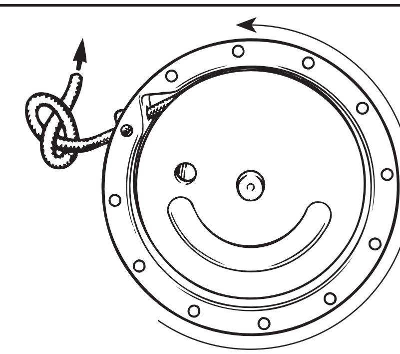
Lubricate housing post with Molykote PG 54 . Install sheave.

To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the rewind spring hook.

Rotate the sheave counterclockwise until rope end is accessible through rope exit hole. This will give 1/2 turn of preload.

Pull the rope out of the starter housing and temporarily make a knot to hold it.

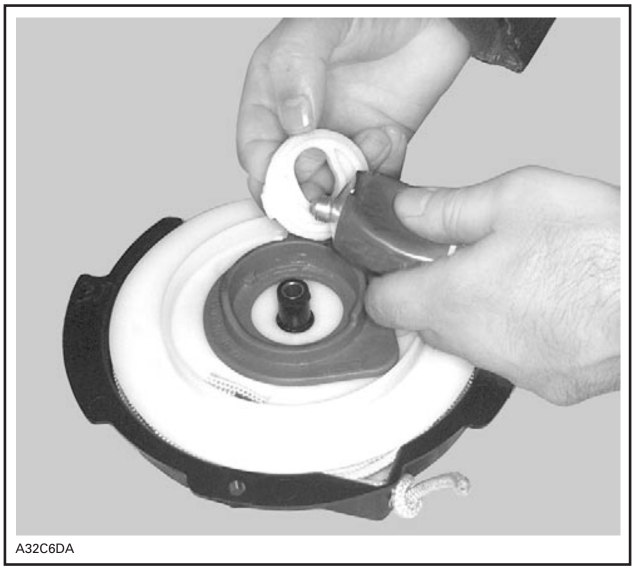

A32C6BA

TYPICAL

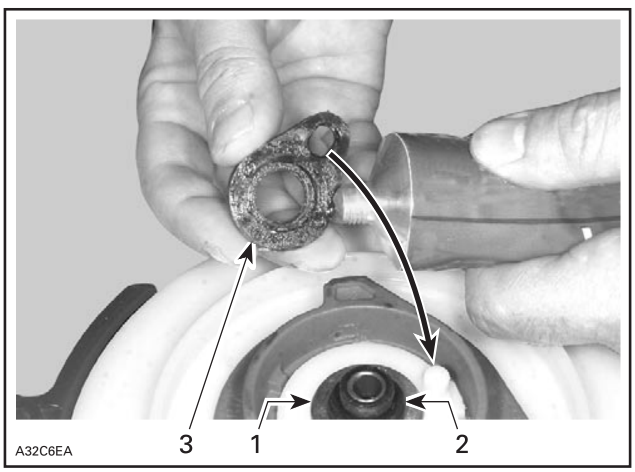
Lubricate pawl **no. 9** with Molykote PG 54 (P/N 420 899 763) then install over rope sheave.


A32C6CA

Lubricate pawl lock **no. 8** with Molykote PG 54 (P/N 420 899 763). Install over pawl.



Install step collar **no. 7** with its sleeve first. Lubricate a new O-ring **no. 2** and locking element **no. 8** with Molykote PG 54 (P/N 420 899 763). Install over pawl lock.



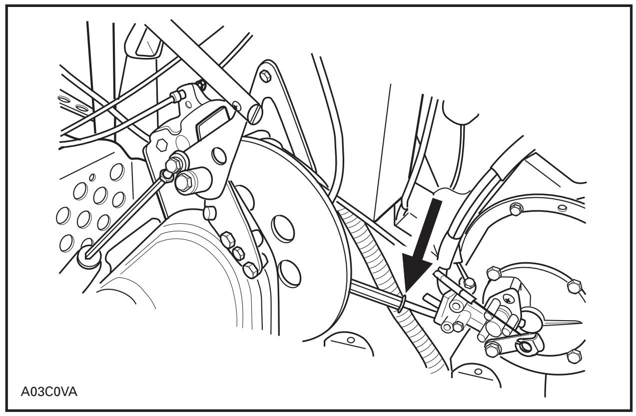
1. *Step collar*
2. *O-ring*
3. *Locking element*

Install a new push nut **no. 5**.

INSTALLATION

Fuse rope end with a lit match.

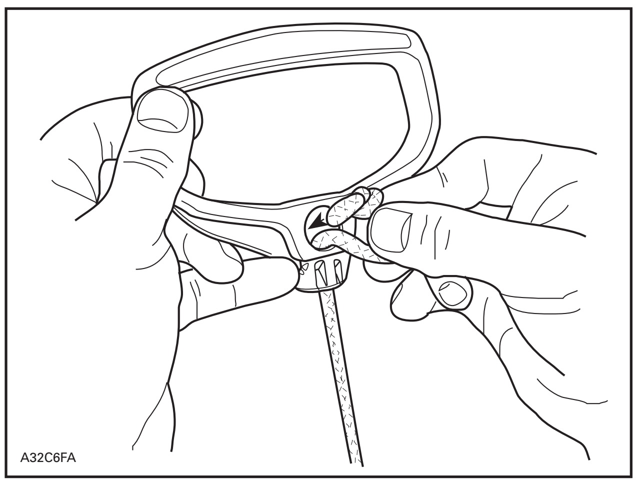
Thread starter rope **no. 1** through rope guide when applicable.



TYPICAL

Reinstall rewind starter assembly on engine.

Prior to installing starter grip on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.



TYPICAL

TABLE OF CONTENTS

BASIC FUNCTIONS OF THE SYSTEM

The TRA Clutch

We call it a clutch but that set of pulleys is a lot more than simply a clutch. Once the system reaches its low ratio speed, the clutch function ends and the pulleys become a completely automatic transmission searching for the highest gear ratio that can be pulled at the engine's given output. In the case of our TRA clutch, the pulleys will begin shifting from a 3.8:1 ratio in low gear to a .8:1 overdrive ratio in high gear. That is a lot of ratio change. A typical six-speed motorcycle gearbox, for instance, will change from a 2.38:1 ratio in low gear to a .96:1 overdrive ratio in high gear.

The ratio changing is done by opening and closing a drive and driven pulley and forcing a fixed length drive belt to turn around different diameters on each pulley. The force used to **close** the engine or drive pulley is centrifugal force. It is the job of the ramps, rollers and lever arms to convert and control the centrifugal force.

Each engine will produce its maximum horsepower at a particular RPM. Power will decrease at engine speeds on either side of the peak power RPM. The usable width of the power band will dictate where the clutch must be calibrated to keep the engine performing at its peak. In the power curve the mildly-tuned engine has its peak horsepower of 64 at 5800 RPM and has a usable power band width of 1500 RPM. The race tuned engine produces its peak of 92 horsepower at 9300 RPM, but only has a usable power band width of 400 RPM. The race engine will have to have a much more accurately calibrated clutch to be able to keep the engine running within a 400 RPM range compared to the 1500 RPM wide range of the mildly-tuned engine.

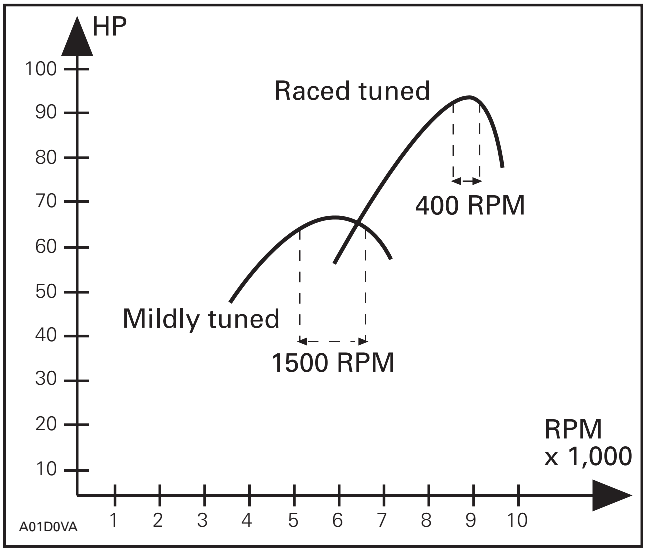
The goal of clutch calibration is to keep the engine, at full throttle at its peak horsepower RPM and, at the same time, to select the highest possible gear ratio as dictated by the load on the drive axle. The speed diagram illustrates what the goal of good clutch calibration is.

POWER CURVES MILDLY TUNED VS. RACE TUNED

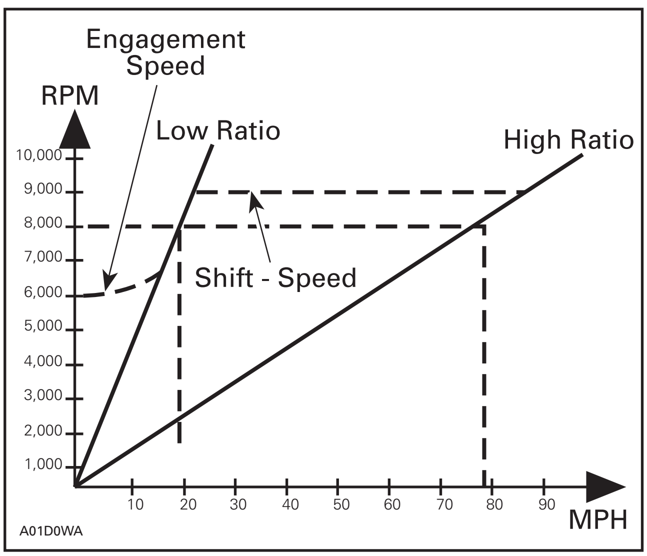
In the speed diagram, the inclined line labelled low ratio indicates the vehicle speed at each RPM when locked into the 3.8:1, low gear ratio. At 8000 RPM, the vehicle speed would be just under 20 MPH if held in this ratio. The high ratio line compares vehicle speed with engine RPM when the transmission is locked into the .8 :1 high gear. At this ratio, the vehicle speed would be just under 80 MPH when the engine is turning 8000 RPM. In calibrating the clutches, the objective will be to maintain as horizontal a line as possible between the low ratio and high ratio lines. This transition line or shift speed must be as close as possible to the engine peak horsepower RPM.

Engagement speed of the clutch is always set as **low** as possible to avoid track slippage and to prolong drive belt life. The clutch must be engaged at an RPM that is high enough, however, that the engine will be producing enough horsepower to overcome drag and allow acceleration without bogging. In the speed diagram, the acceleration period between 0 and about 20 MPH illustrates the actual clutching period of the transmission. During this time the rollers in the clutch are on the initial angles of the clutch ramps and the drive belt is actually slipping in the engine pulley as engine and vehicle speeds increase to about 9000 RPM at 25 MPH. The transmission then begins upshifting to the high ratio at a constant engine RPM. Engine speed should not increase above the calibration RPM until the high ratio is achieved. If the engine RPM exceeds the calibration RPM once the high gear position is achieved, it is an indication that the chaincase gearing is too low. If clutch calibration is accurate, engine speed should never vary more than 50 RPM from the peak power RPM. This is the optimum shift curve.

The following section will discuss each of the tunable components of both the drive and driven pulleys and provides some insight and data necessary for tuning the system.



SPEED DIAGRAM ENGINE SPEED VS. VEHICLE SPEED



EFFECTS OF THE DRIVE PULLEY LEVER ARM, ROLLER AND ROLLER PIN WEIGHT

As you have seen in the formula defining centrifugal force, the force increases directly with the weight of the components involved. If you want to increase the centrifugal force, therefore, the shift force, it is a simple matter to increase the weight of the pressure levers. If the overall RPM is too high, a heavier lever arm or roller pin could be installed. The opposite would apply if the RPM is too low.

The major factor controlling centrifugal force is engine RPM. Because the force increases with the square of this speed, you can quickly have too much force if heavy weights are used on a clutch fitted to a high RPM engine. Because of this relationship, you will find heavy weights used on low RPM, high torque engine types and much lighter weights used on the high RPM engines.

The effect of the weights will always be greater at high RPM, and at higher ratios. This is true because of the relation of the force to the square of the engine speed. Also the radius from the axis of rotation to the center of mass of the counterweights increases as the roller is allowed to move down the ramps. As this radius increases, the centrifugal force increases directly. Addition of weight will affect engagement speed very little compared to the effect the weight will have at mid-range to top speed.

Minor changes in weight are accomplished by using various weight roller pins. The effects of adding weight are illustrated in the following illustration. The three curves show the engine RPM increasing from engagement speed (4000 RPM) to about 6500 RPM which is achieved at about 30 MPH. From this point on, if calibration is accurate, there is no change in engine RPM as the vehicle speed increases. From the machine standing at rest to about 30 MPH, belt slippage and other factors are involved that allow the engine to get on the power.

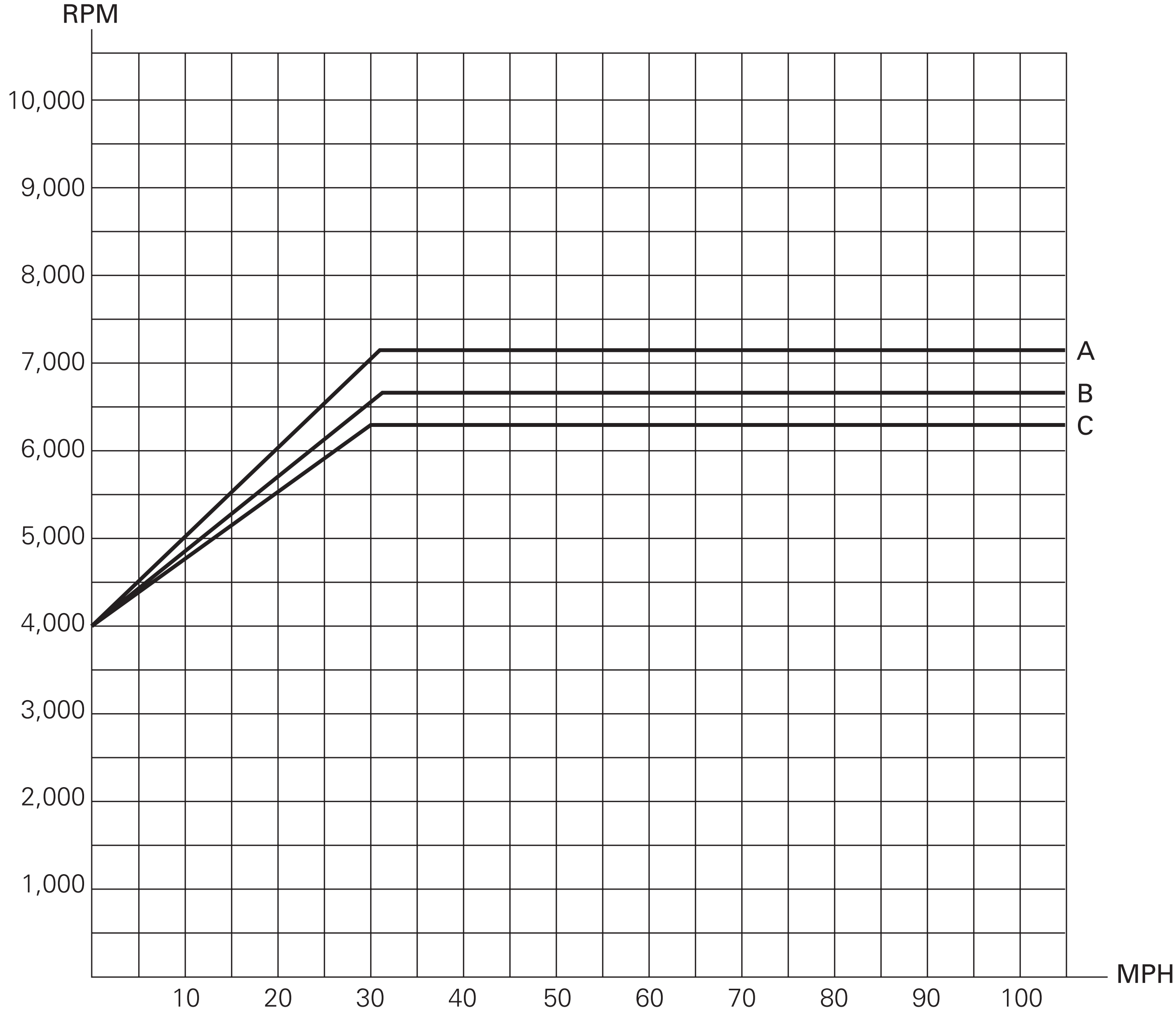
Curve A shows a clutch set up with three 10-gram type roller pins. This amount of weight will govern the engine to 7200 RPM and allow engagement of the clutch at 4000 RPM.

Curve B illustrates the effect of exchanging the three 10-gram pins for three 14-gram roller pins. The additional weight has virtually no effect on engagement speed but pulls the peak RPM of the engine down to 6800 RPM.

Curve C illustrates the effect of using three 16-gram roller pins. Again, the additional weight has little effect on the engagement RPM but further reduces the top RPM to 6400 RPM. For example, by adding 2 grams per arm for a total weight increase of 6 grams on an engine turning at around 7500 RPM, there would be about a 200 RPM decrease in full power engine speed — approximately the same effect as going 1 clicker position lower.

On a high RPM race engine it may only take a 1 gram, increase per arm to see a 200 RPM decrease in peak operating RPM.

Drive Clutch Roller Pins



A: 10 gram roller pins
B: 14 gram roller pins
C: 16 gram roller pins

The weight of the lever arms will have a similar effect on the shift RPM.

By adding or removing weight to or from the arms, we can fine tune the shift RPM to the engine power peak.

If you increase the horsepower of the engine at the same RPM, you would normally add more weight to keep the engine pulling as hard as possible and not over rev.

If you lighten the weights on the arms, you will be increasing the shifting RPM. However, your vehicle will not pull as hard, since less centrifugal force is being generated.

EFFECTS OF THE RAMP PROFILE ON THE SHIFT FORCE

The shift force is the component or part of the centrifugal force that is used to actually move the sliding half of the drive pulley. This force is applied to the sliding half at the three lever arm pivot points (following illustration item 49). The ramp profiles are used to control the size of this shift force.

As the clutch rotates around the center line of the crankshaft, the axis of rotation, centrifugal forces begin building and act on the center of mass of the lever arm, roller combination trying to pull the lever away from the axis of rotation. The center of mass of the lever arm assembly is the point where all the centrifugal force acts (following illustration item 70).

The ramp provides an angled surface for the roller to push against and the angle of the ramp at the point of contact with the roller determines how much of the centrifugal force is translated into axial force. The axial force pushes the sliding half in and the remainder of the centrifugal force is unused and absorbed by the integrity of the sliding half. A steeper ramp angle gives less shift force, while a smaller angle gives more shift force.

As you can see in following illustration, the angle of the ramp varies constantly from start to finish. The angle varies to achieve the proper axial force to transmit a given amount of torque through the drive belt at each diameter of the pulley.

As discussed before, the centrifugal force generated by the lever arm assembly increases at higher ratios. This is why the ramp profile is much steeper at the high ratio end. This reduces the shift force in order to maintain the correct load on the belt.

Remember, it is the angle of the ramp at the point of roller contact that will help determine the shift force at any given ratio. Think of the ramp profile as a hill that the roller must climb. A small angle or hill can be overcome easily thus providing a faster shift out to a higher ratio which will lower the engine RPM. If the hill is steeper (the ramp angle is larger) the roller will not be able to climb it as quickly thus staying in a lower ratio longer which will keep the engine RPM higher.

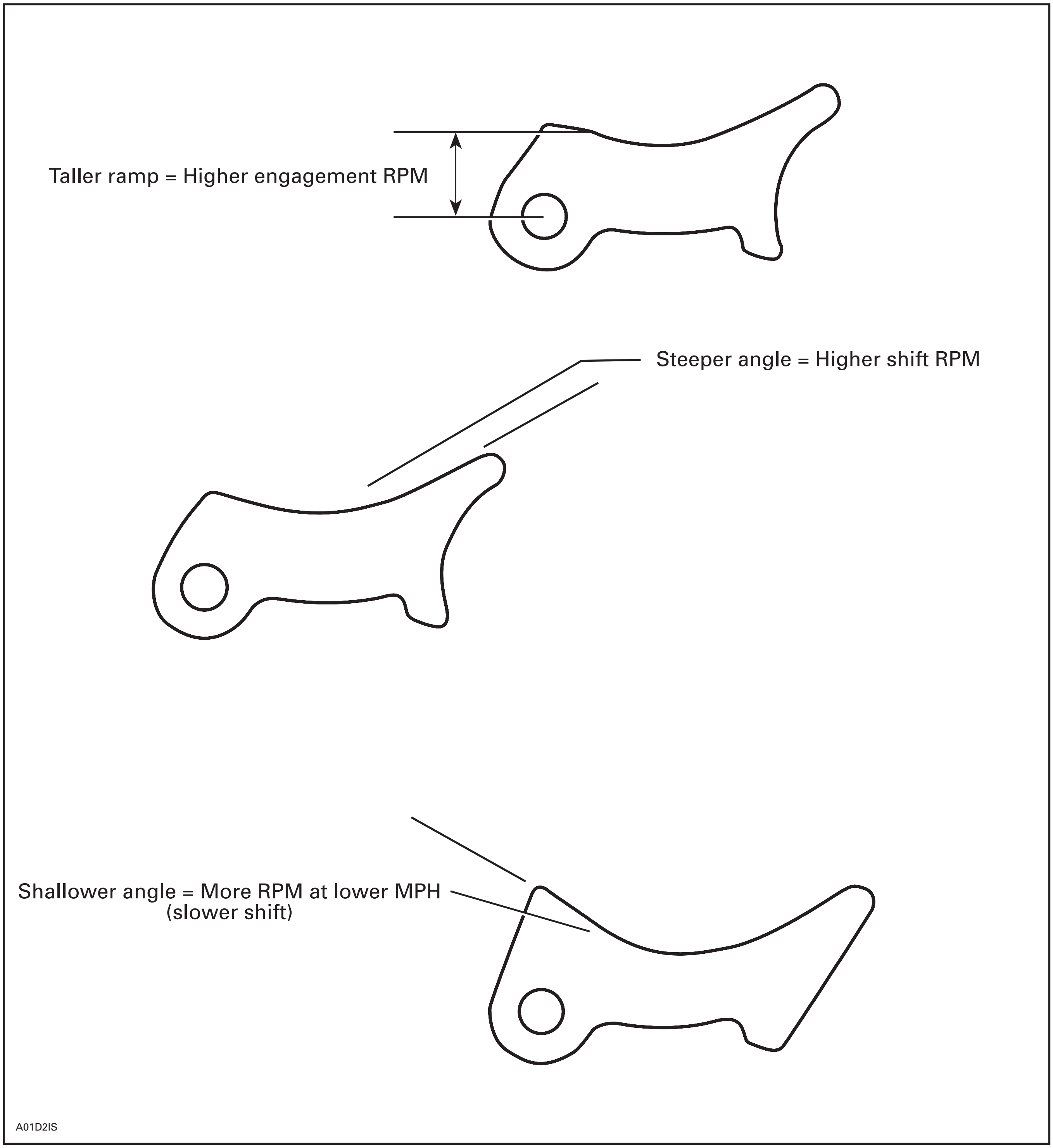
Note that at engagement and very low ratios, many ramp angles actually go downhill. These are generally used on engines with good low RPM power. Engines with narrower power bands and less low RPM power will usually have a flatter angle at engagement and low speed. A ramp with a small bump at engagement is used to raise the engagement RPM. Again, the steeper the "hill" the roller must overcome, the higher the RPM will be before the clutch shifts out. If the spring selection cannot give the desired engagement RPM, then use a ramp with a bump or grind a notch at the point where the roller sits at engagement. Of course if the shift profile was good at higher ratios, then you would want to use a ramp with only changes at the low speed area.

Also, a thicker or taller ramp will provide higher RPM than a thinner ramp with the same profile because the lever arm assembly is tucked in further by the taller ramp.

The TRA clutch allows you to fine tune the ramp profile by using the adjusters provided. The adjusters are cams which allow you to raise and lower the outer end of the ramp through six different positions. Moving the ramp end toward the lever arm makes the ramp angles steeper, thereby raising engine speed and slowing the upshift. As the ramp is adjusted away from the lever arm, the engine speed is lowered and the upshift is faster.

In clinical condition such as on a dynamometer, moving the adjusters up will result in a 150 to 200 RPM increase with each position change. Lowering the adjuster positions will result in a decrease of 150 to 200 RPM with each number. On the snowmobile, however, depending on the operating conditions, a change of one adjuster position may not show up on the tachometer, but the shift speed of the pulley will have changed. The upshift or downshift, depending on which way you moved the adjusters, will be faster and your acceleration rate and top speed will have changed. When using the TRA adjusters, the acceleration rate and speed should be checked as well as the engine RPM.

RAMP CHARACTERISTICS



EFFECTS OF THE DRIVE PULLEY SPRING

The purpose of the clutch release spring is to return the sliding half of the engine pulley and the associated moving parts to the disengaged or neutral position at low engine RPM. The spring tension is calibrated to work with the pressure levers and ramp angles to allow clutch engagement at the desired RPM. As the engine speed increases, centrifugal forces increase and eventually overcome the tension of the release spring and allow the pulley halves to contact the drive belt. As engine speed decreases, centrifugal forces decrease and the clutch spring returns the sliding half toward the neutral position.

As the clutch shifts out to a higher ratio, the spring balances the shift forces being generated by the levers and ramps.

The spring tension will affect the entire shifting sequence of the engine pulley. The effect that it has will depend upon the construction of the spring. Three things must be known about the spring to be able to predict its effect in the clutch: 1. The spring free length; 2. The spring pressure when compressed to 74 mm (2.9 in); 3. The spring pressure when compressed to 41 mm (1.6 in). These three factors are listed on the accompanying sheet.

The spring free length will give you an idea of the condition of the spring. If the spring has lost more than 6.35 mm (1/4 in) of its listed free length, the spring is fatigued or has taken too great a set. The spring should be replaced. The free length of the spring is its overall length when resting freely on a table top.

In the TRA clutch, the installed length of the clutch release spring is 74 mm (2.9 in) This is the length of the spring when the pulley is in its neutral position. The pressure that the spring applies at this length is the factor that controls the engagement speed (all other things kept constant). When the engine pulley is in its highest ratio position, the spring will be compressed to 41 mm (1.6 in). The pressure the spring applies at this length will determine the RPM required to reach high gear; again, with all other tunable factors kept constant.

As you look through the spring chart, you will see that springs are available with equal pressures at 74 mm (2.9 in), but very different pressures at 41 mm (1.6 in). You will also note varying pressures at 74 mm (2.9 in) and equal pressures at 41 mm (1.6 in). Simply by working with the spring charts, one can easily see how the shift speed (the speed with which the change from one gear ratio to the next is made) and the engagement speed can be altered.

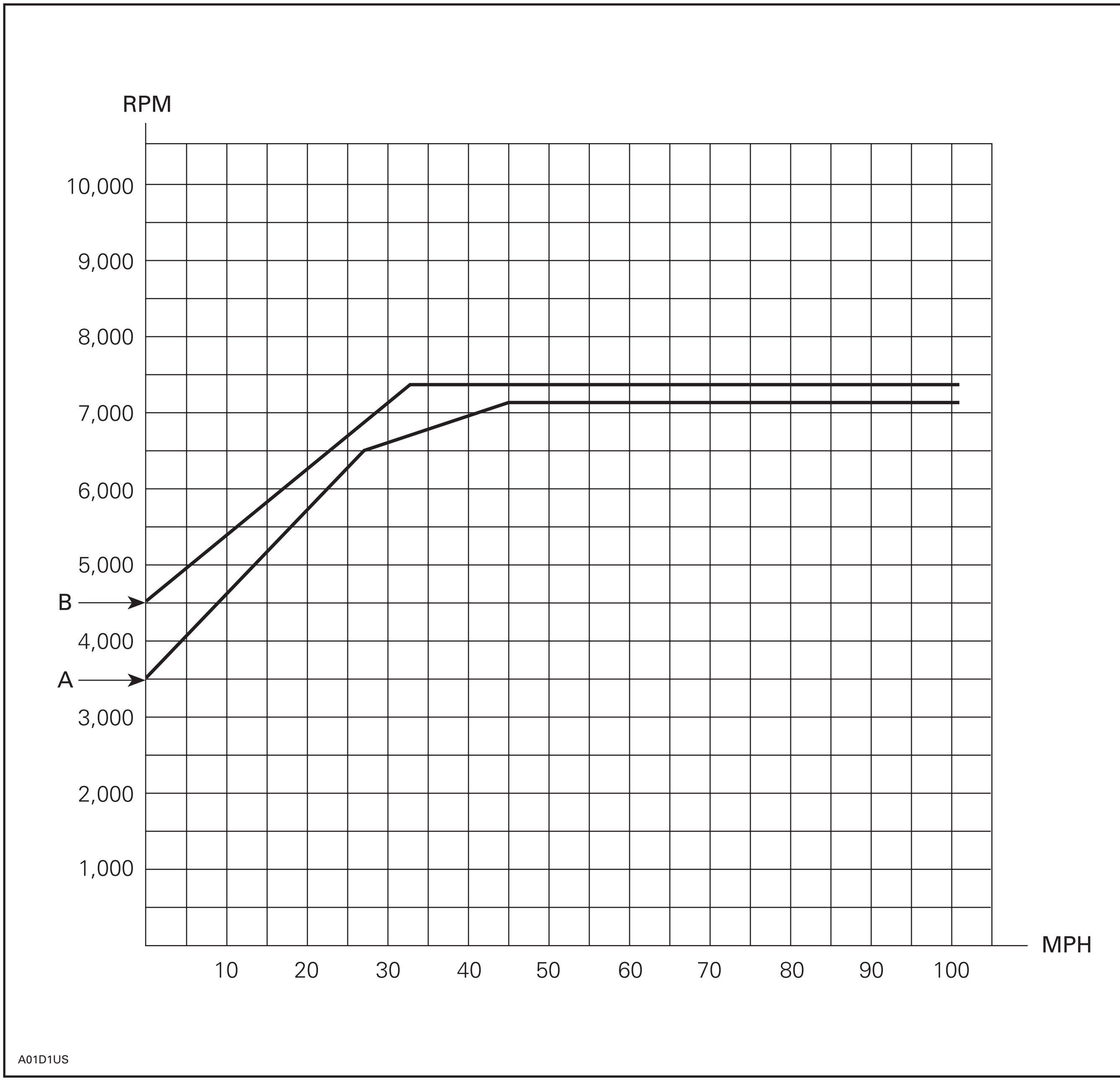
As the pressure of the spring when 74 mm (2.9 in) long is increased, the clutch engagement speed will increase. As the spring rate is increased, the engine will be required to turn more RPM to achieve a given gear ratio. Again, these facts hold true when all other tunable components are kept constant.

On chart 1, spring **A** has a pressure of 311 N (70 lb) at 74 mm (2.9 in) and a pressure of 1157 N (260 lb) when compressed to 41 mm (1.6 in). With no other changes made in the clutch, spring **B** was installed. The spring has a preload of 712 N (160 lb) at 74 mm (2.9 in) and a pressure of 1201 N (270 lb) at 41 mm (1.6 in). As the chart indicated, the engagement RPM increased 1000 RPM while the shift curve from 30 MPH up remained relatively unchanged.

Chart 2 illustrates the effect of keeping the spring preload pressure at 74 mm (2.9 in) constant and increasing the pressure at the 41 mm (1.6 in) length. In this example, spring **A** has a pressure of 311 N (70 lb) at 74 mm (2.9 in) and a pressure of 756 N (170 lb) at 41 mm (1.6 in). Spring **B** also has a pressure of 311 N (70 lb) at 74 mm (2.9 in) but increases to 1157 N (260 lb) at 41 mm (1.6 in). The projected effect of this spring change is shown on chart 2. Since the preload pressure at 74 mm (2.9 in) is equal for springs **A** and **B**, the engagement speed is not affected. At 95 MPH, however, there is a loss of RPM with spring **A** in place.

Drive Clutch Spring

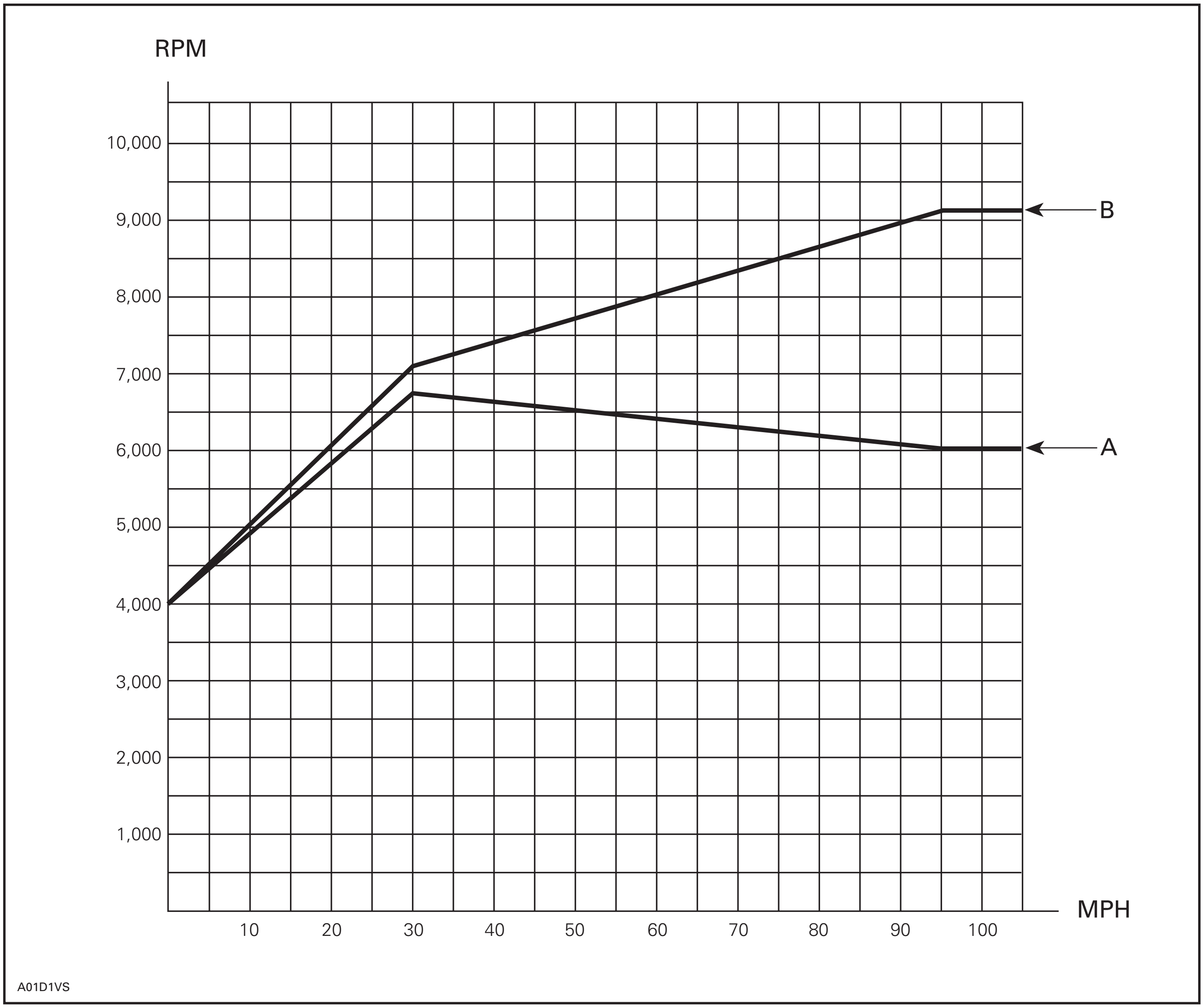
Effect at Engagement



	LOAD AT **74 mm (2.9 in)**	LOAD AT **41 mm (1.6 in)**
A	311 N (70 lb)	1157 N (260 lb)
B	712 N (160 lb)	1201 N (270 lb)

Drive Clutch Spring

Effect at Top Speed



	LOAD AT 74 mm (2.9 in)	LOAD AT 41 mm (1.6 in)
A	311 N (70 lb)	756 N (170 lb)
B	311 N (70 lb)	1157 N (260 lb)

TRA III

Some 2004 models come equipped with a TRA III style drive clutch. They include most models with the 600 and 800 cc engines. This style of clutch is the "next" generation of engineering development from Ski-Doo and will certainly be used in more models as years go on.

Visual comparisons between the TRA and TRA III styles may appear slight, but in fact, there are many differences, and when you are working with it, you need to be aware of the differences.

VSA

The TRA III has Variable Sheeve Angle (VSA). The machined angle of both sheeves varies from 12 degrees at the bottom to 14 degrees at the top. This provides better efficiency through out the entire range of shift. With the improved efficiency, belt life is also extended. The TRA III clutch must be matched with a VSA type driven clutch and belt to achieve maximum performance.

TUNING COMPONENTS

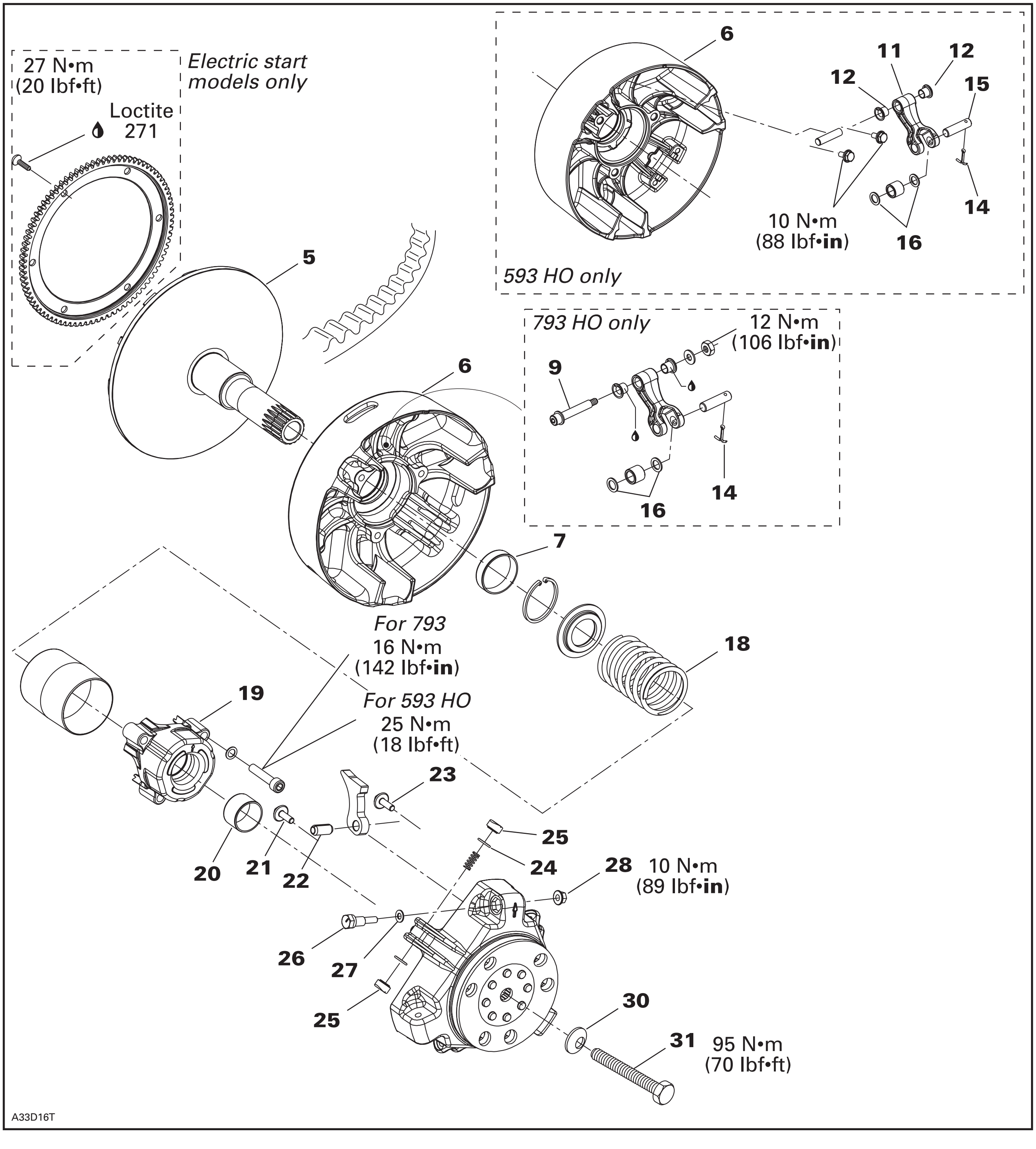
As mentioned earlier, few tuning components can be interchanged between the TRA and TRA III clutches. Springs, rollers and some pin weights can be interchanged. Short pins can be used but not the heavy long ones, as they will cause interference. Ramps and arms cannot be interchanged. At this time, only one type of arm is available through Ski-Doo, and that is the production aluminum. However, several ramps have been developed to allow you to tune your sled. Below is a list of ramps available and how they compare to a TRA ramp.

TRA III	P/N	TRA EQUIVALENT
410	417 222 596	299
411	417 222 514	299
412	417 222 515	293
414	417 222 546	300
415	417 222 548	300 less load at beginning
417	417 222 552	293 less load at beginning
419	417 222 557	414 with engagement notch

DRIVE PULLEY TRA III

All REV Series Models

NOTE: This is a lubrication free drive pulley. Always refer to appropriate parts catalog for replacement part. Most parts of TRA III are not interchangeable with those of the TRA.



GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. A service bulletin will give information about calibration according to altitude.

CAUTION: **Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.**

NOTE: TRA drive pulley stands for Total Range Adjustable drive pulley.

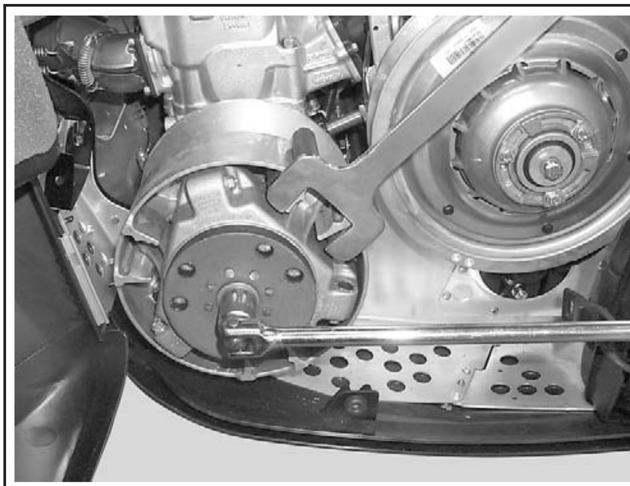
⚠ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

30,31, Conical Spring Washer and Screw

Use holder (P/N 529 035 674).



A32D1WA

Insert the tool in sliding flange tower

⚠ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 022 400) for liquid cooled models.

CAUTION: **These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.**

To Remove Drive Pulley Ass'y:

Retain drive pulley with clutch holder.

Install puller in pulley shaft then tighten.

DISASSEMBLY

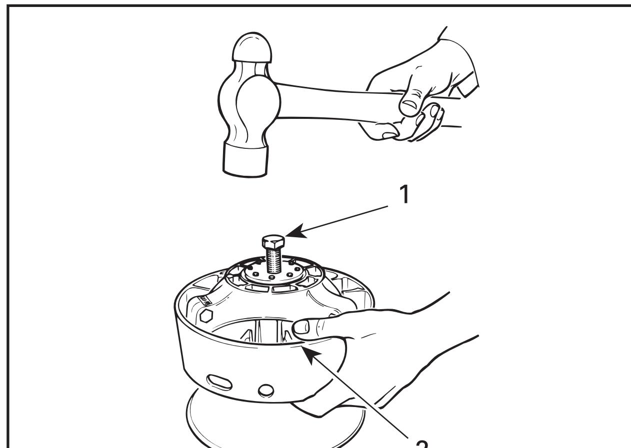
1,2, Screw and Ring Gear

CAUTION: **Retaining screws must be heated before disassembly. Do not exceed 150°C (300°F).**

5,6, Fixed and Sliding Half

CAUTION: **Do not tap on governor cup.**

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.



TYPICAL

1. *Puller*
2. *Holding sliding half*

NOTE: No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

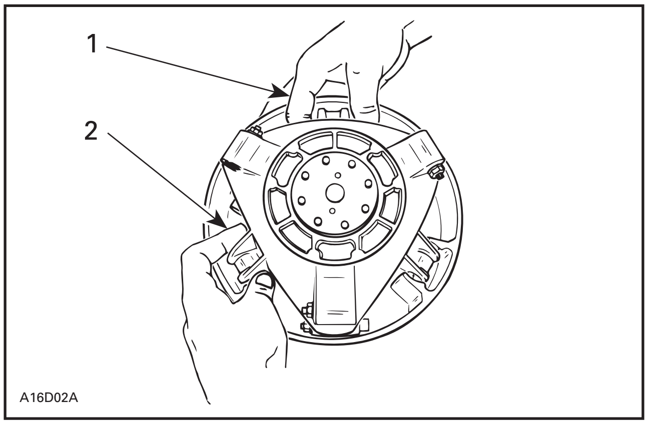
32, Cushion Drive

CAUTION: Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.

25,29, Slider Shoe and Governor Cup

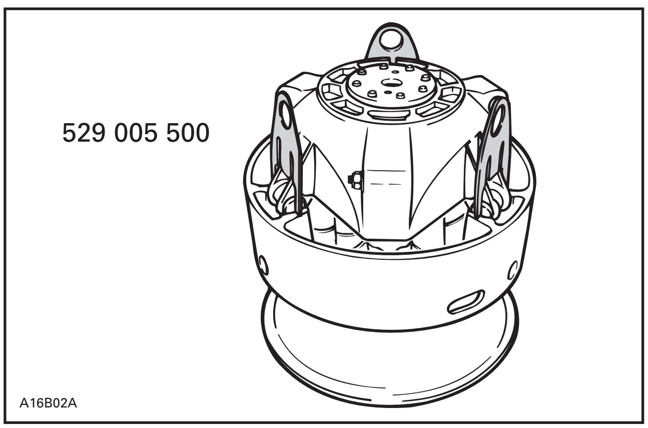
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove slider shoes. Proceed the same way for other housings lifting one at a time.



1. *Hold slider shoes*
2. *Lift one housing at a time*

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.



19, Spring Cover Ass'y

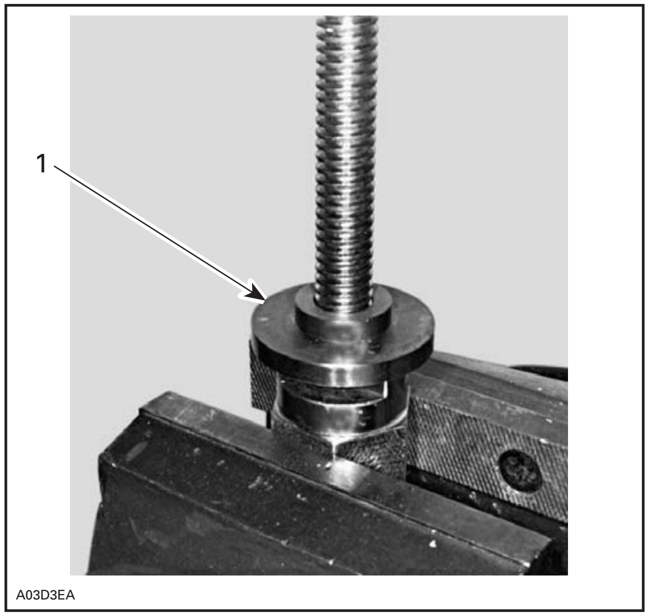
It is pushed by clutch spring pressure.

⚠ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.

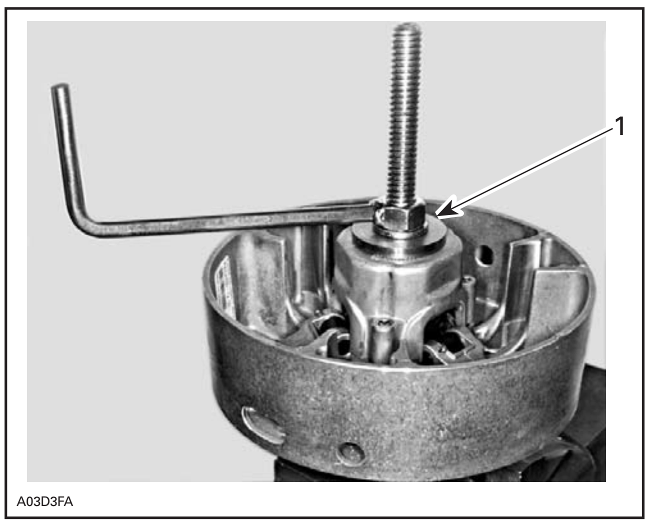
Use spring compressor (P/N 529 035 524).

Install support guide.



1. *Support guide*

Install sliding half then a second support guide. These support guides will prevent bushing damages.



1. *Support guide*

Remove 3 Allen screws retaining spring cover then unscrew compressor.

CLEANING

5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

⚠ WARNING

This procedure must be performed in a well-ventilated area.

CAUTION: Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

CAUTION: Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

CAUTION: Mounting surfaces must be free of any oil, cleaner or towel residue.

7,20, Bushing

Only use petrol base cleaner when cleaning bushings.

CAUTION: Do not use acetone to clean bushing.

INSPECTION

Drive pulley should be inspected annually.

16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

CAUTION: Ensure rollers are in good condition. Replace as required.

9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required.

24,25, O-Ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

Sliding Half Bushing Replacement

This bushing is not replacable. If worn out, replace sliding half ass'y.

Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

Mount compressor (P/N 529 035 524) in a vise.

Use tools (P/N 529 035 932 and 529 035 931) to remove old bushing.

CAUTION: Bushing must be bonded with retaining compound.

Apply retaining compound Loctite 609 outside of bushing then press it down to counterbore from outside end.

CAUTION: Insert bushing from sliding half side (inner side) of spring cover.

ASSEMBLY

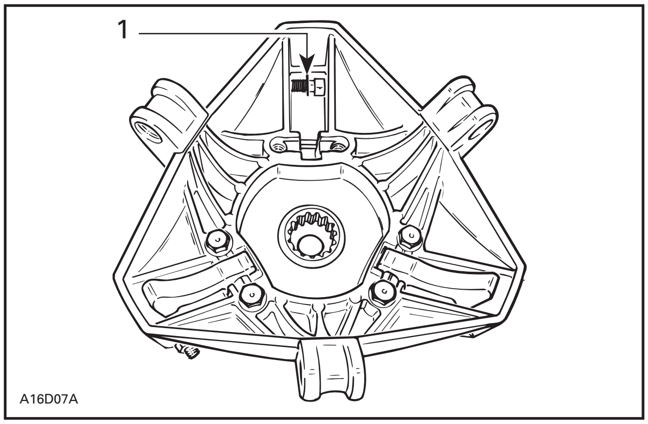
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 702 900) on threads and then torque to 27 N•m (20 lbf•ft).

26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



1. *Washer*

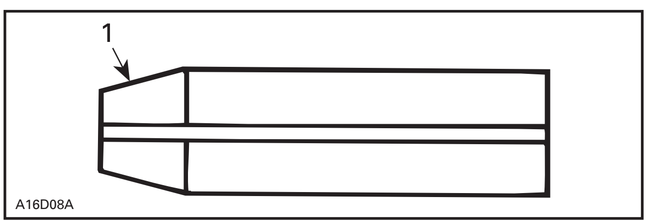
Torque locking nut to 10 N•m (89 lbf•**in**).

15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA.

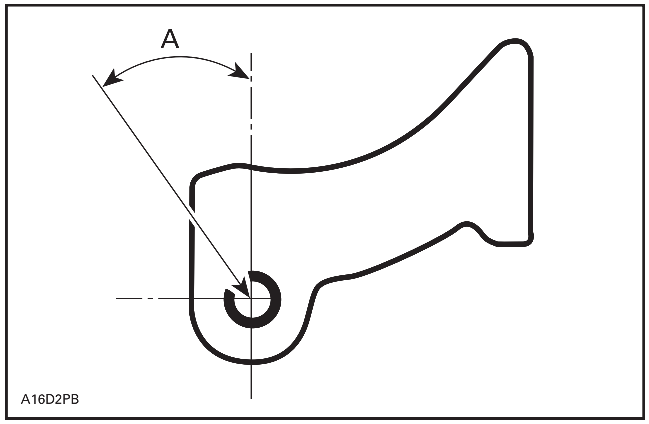
21,22,23, Screw, Dowel Tube and Ramp

Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.

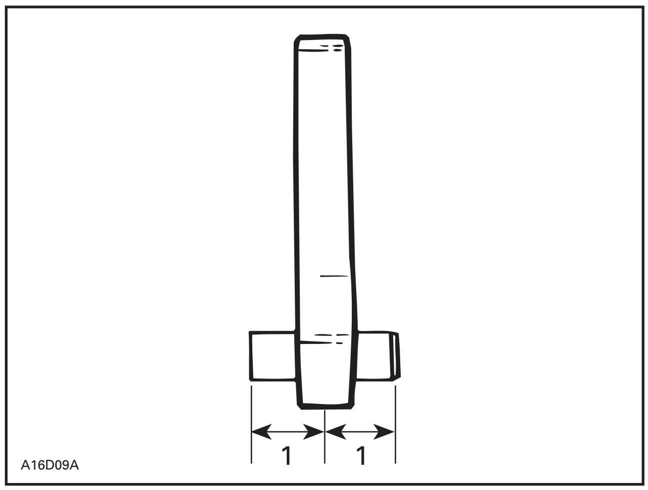


1. *Chamfered side*

Position dowel tube split at the angle A.



MODEL	ANGLE (A)
With TRA III	45 ± 3°



1. *Equal distance*

Torque screws to 10 N•m (89 lbf•**in**).

9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

NOTE: While installing lever assemblies make sure that the curved sides of the levers are outwards as shown.

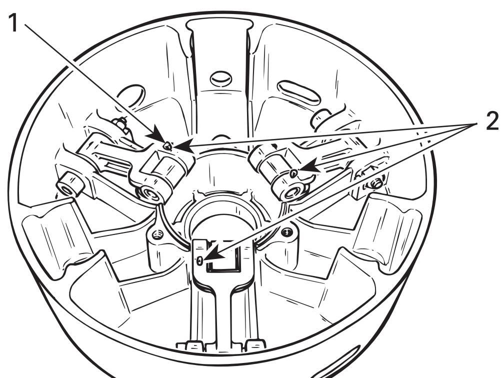

A32D1ZA

Always install lever assemblies so that cotter pins are on the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

⚠ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley misbalancing will occur because of levers difference.

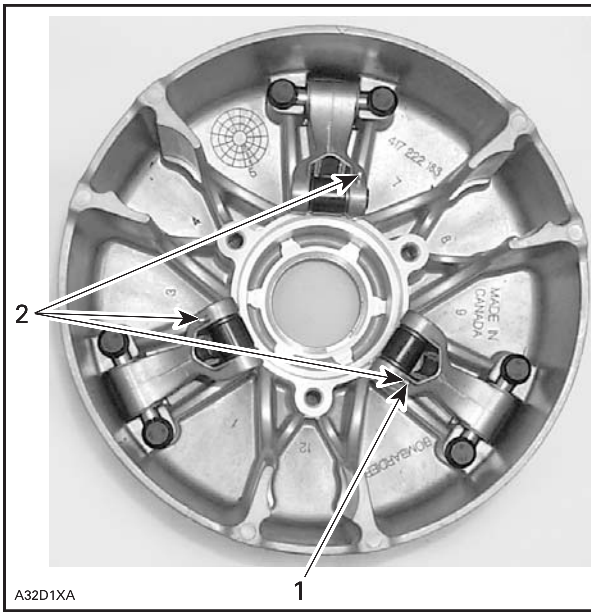
793 Engine Equipped Models Only



A16D0BA

TYPICAL
1. *Head on top*
2. *All on the same side*

593 HO Engine Equipped Models Only



A32D1XA

1. *Head on top*
2. *All on the same side*

All Models

CAUTION: Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•**in**).

CAUTION: Lever ass'y and rollers must move easily after installation.

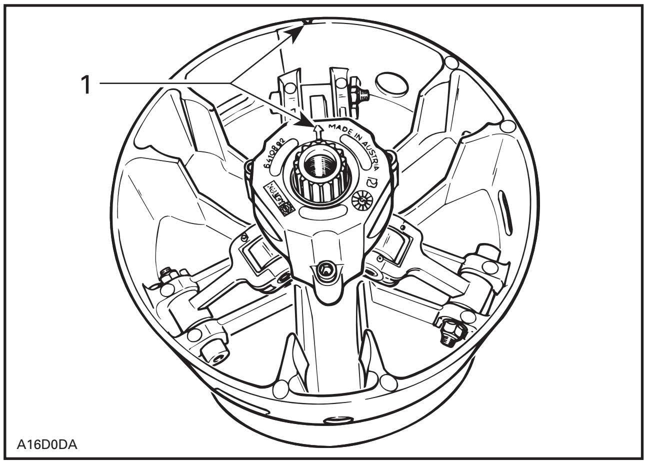
5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

793 Engine Equipped Models Only



TYPICAL
1. Align

593 HO Engine Equipped Models Only

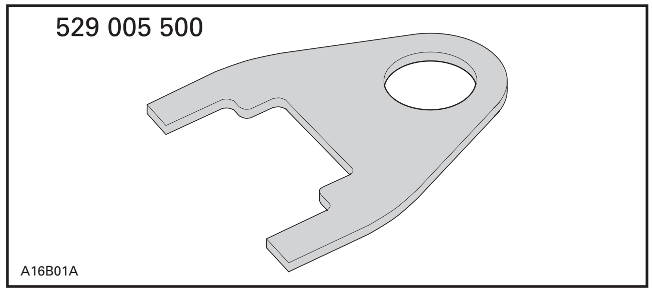
1. Align

All Models

Tighten screws to proper torque as mentioned in exploded view.

6,25,29, Sliding Half, Slider Shoe and Governor Cup

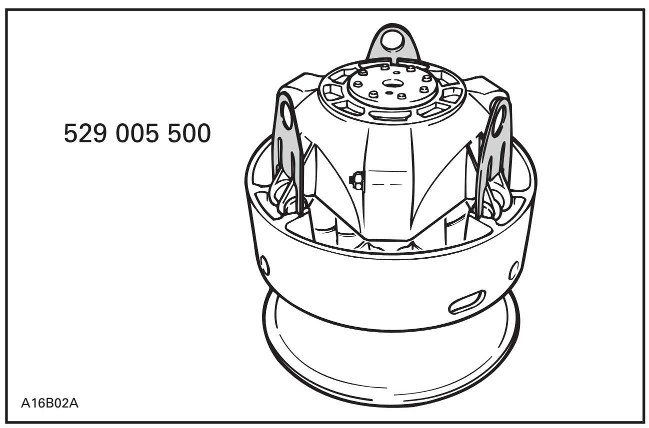
To install governor cup, use following tool:



Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

CAUTION: Make sure O-rings are installed on slider shoes and that grooves are positioned vertically.

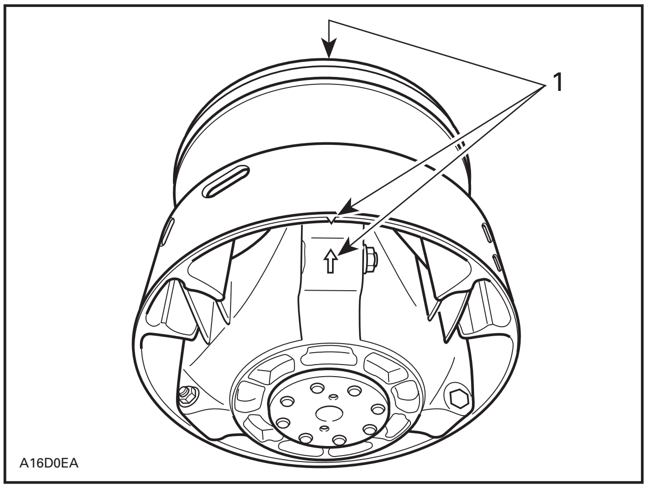
Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



TYPICAL

Make sure to align governor cup arrow with sliding half and fixed half mark.

NOTE: If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.



TYPICAL
1. Align

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

CAUTION: Make sure splines of both parts are fully engaged.

INSTALLATION

⚠ WARNING

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

⚠ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

Drive Pulley Ass'y

The following installation procedure must be strictly adhered to.

Install drive pulley on crankshaft extension.

Install a new conical spring washer with its concave side towards drive pulley then install screw.

⚠ WARNING

Never substitute conical spring washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use holder. See removal procedure.

Torque screw to 80 to 100 N•m (59 to 74 lbf•ft).

Install drive belt and guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

⚠ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Retorque screw to 90 to 100 N•m (66 to 74 lbf•ft).

⚠ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

DRIVE PULLEY ADJUSTMENT

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA.

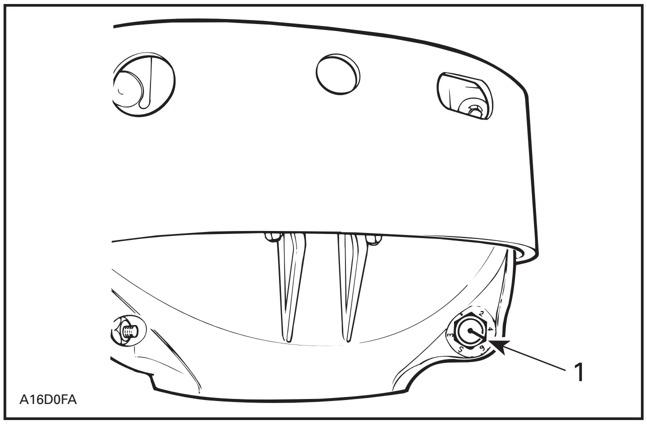
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

26,28,29, Calibration Screw, Locking Nut and Governor Cup

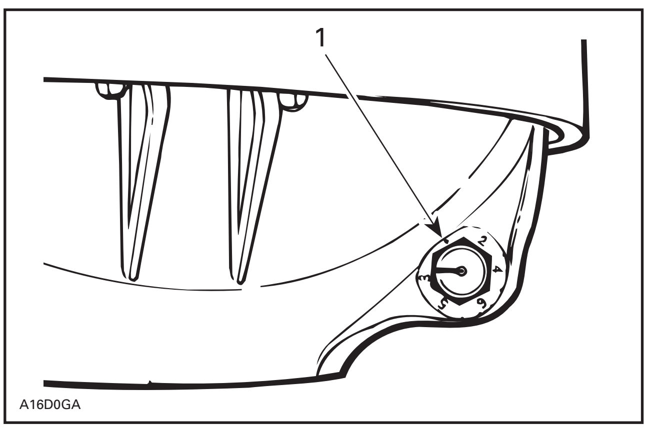
Calibration screw has a notch on top of its head.



1. *Notch*

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA for original setting.



1. *Position 1 (not numbered)*

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

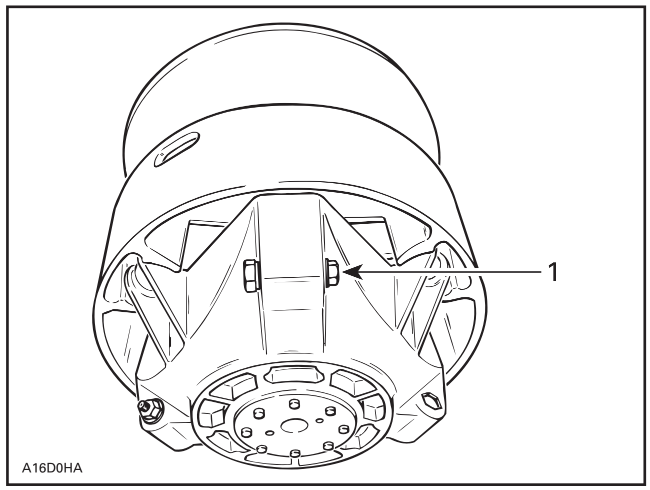
Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

To Adjust:

Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

CAUTION: Do not completely remove calibration screw otherwise its inside washer will fall off.

CAUTION: Always adjust all 3 calibration screws and make sure they are all set at the same number.



TYPICAL

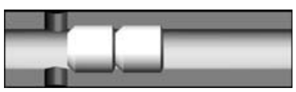
1. *Loosen just enough to permit rotating of calibration screw*

KIT P/N 486 400 003 TRA III WEIGHT SET-UP FOR PIN

From 12.4 to 22.15 grams

PART DESCRIPTION	PART NUMBER	WEIGHT (G)	KIT QTY
Pin 35.75 mm	417 222 595	12.4	3
Slug 14 mm	486 400 004	5.044	3
Slug 23 mm	486 400 005	8.287	3
Set screw 6 mm	206 260 699	0.73	9
Set screw 12 mm	206 261 299	1.68	3
Set screw 16 mm	206 261 699	2.35	3
Set screw 20 mm	206 262 099	3.02	3
Set screw 25 mm	206 262 599	3.81	3

13.86 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	2

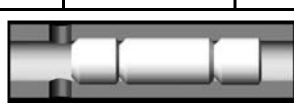


A32D3A4

14.81 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Set screw 12 mm	206 261 299	1.68	1

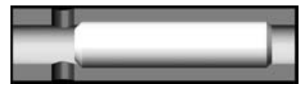
A32D3B4

15.54 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	2
Set screw 12 mm	206 261 299	1.68	1



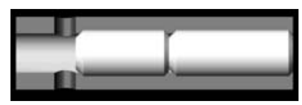
A32D3C4

16.21 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 25 mm	206 262 599	3.81	1



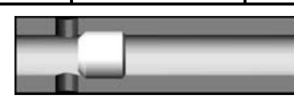
A32D3D4

16.43 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 16 mm	206 261 699	2.35	1
Set screw 12 mm	206 261 299	1.68	1



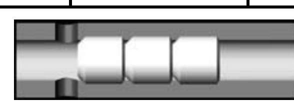
A32D3E4

13.13 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6mm	206 260 699	0.73	1



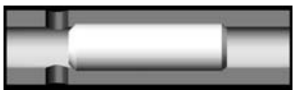
A32D3F4

14.59 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6mm	206 260 699	0.73	3



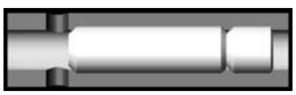
A32D3G4

15.42 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 20 mm	206 262 099	3.02	1



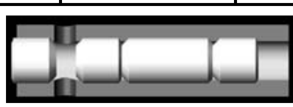
A32D3H4

16.15 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 20 mm	206 262 099	3.02	1
Set screw 6 mm	206 260 699	0.73	1



A32D3I4

16.27 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	3
Set screw 12 mm	206 261 299	1.68	1

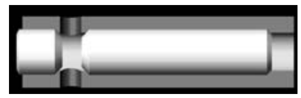


A32D3J4

16.88 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 20 mm	206 262 099	3.02	1
Set screw 6 mm	206 260 699	0.73	2

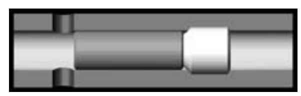
A32D3K4

16.94 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 25 mm	206 262 599	3.81	1
Set screw 6 mm	206 260 699	0.73	1



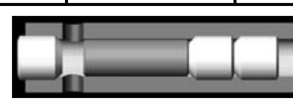
A32D3L4

18.17 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Slug 14 mm	486 400 004	5.044	1



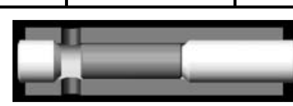
A32D3M4

19.63 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	3
Slug 14 mm	486 400 004	5.044	1



A32D3N4

20.52 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Set screw 16 mm	206 261 699	2.35	1
Slug 14 mm	486 400 004	5.044	1



A32D3O4

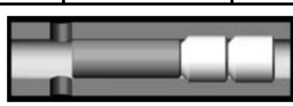
22.15 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	2
Slug 23 mm	486 400 005	8.287	1

A32D3P4

17.16 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Set screw 16 mm	206 261 699	2.35	1
Set screw 12 mm	206 261 299	1.68	1

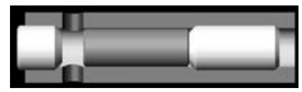
A32D3Q4

18.90 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	2
Slug 14 mm	486 400 004	5.044	1



A32D3R4

19.85 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Set screw 12 mm	206 261 299	1.68	1
Slug 14 mm	486 400 004	5.044	1

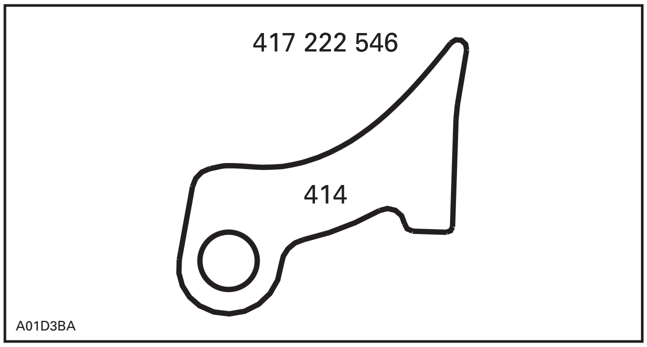


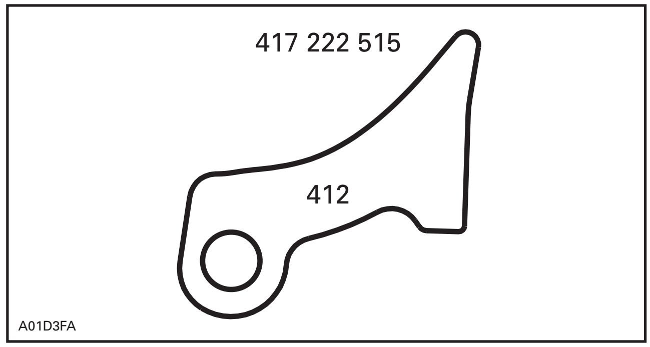
A32D3S4

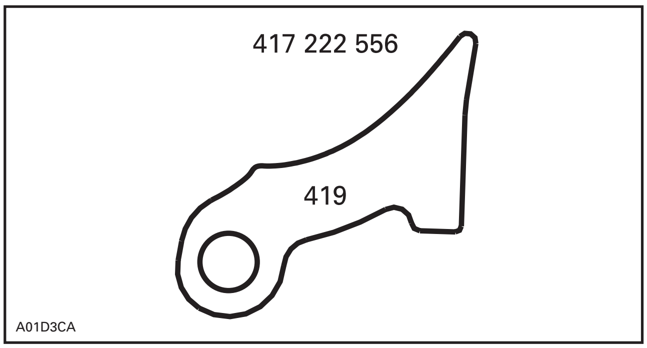
21.42 GRAMS SET-UP			
PART DESCRIPTION	PART NUMBER	WEIGHT (G)	QTY
Pin 35.75 mm	417 222 595	12.4	1
Set screw 6 mm	206 260 699	0.73	1
Slug 23 mm	486 400 005	8.287	1

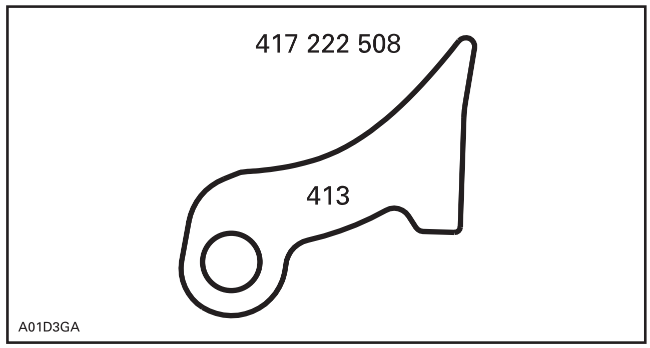
A32D3T4

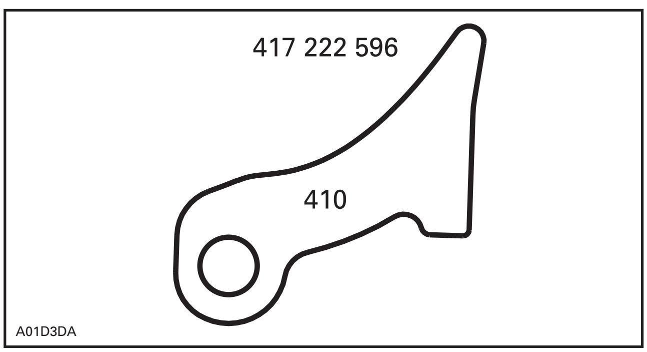
TRA III RAMP PROFILES

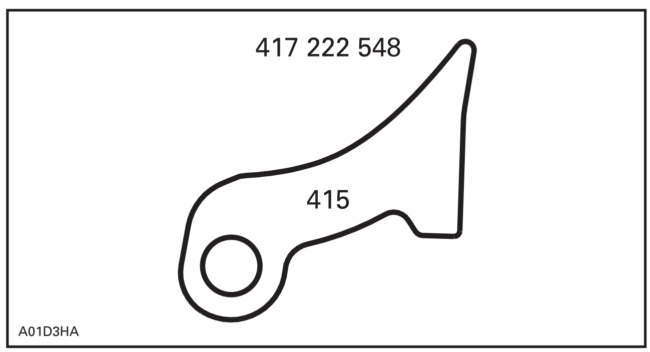


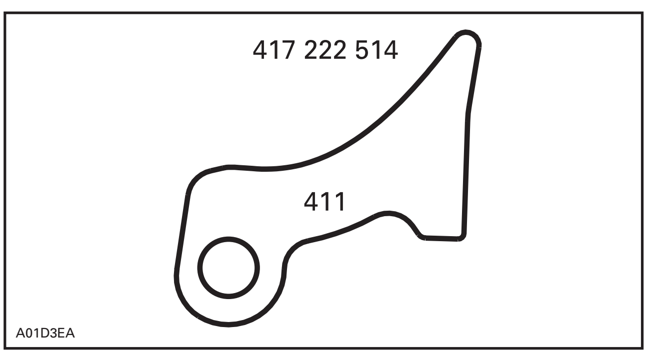


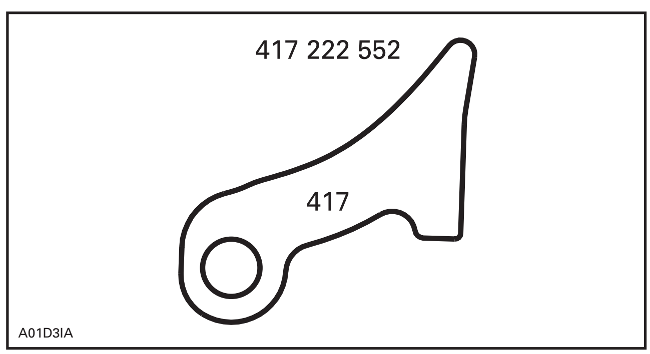


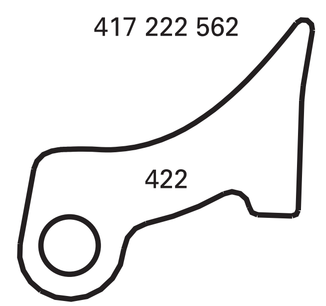




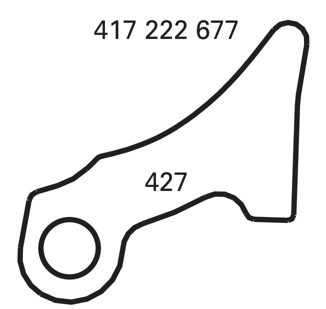








A01D3JA



A01D3KA

TRA SPRINGS CHART

FORCE @ POUNDS ± 5% 74 mm - 41 mm 2.9 in - 1.6 in	P/N BOMBARDIER	COLOR CODE	WIRE DIA.		FREE LENGTH	
			mm	in	mm	in
70 - 170	414 689 800	RED - RED	5.26 5.00	0.207 0.197	99	3.9
70 - 200	415 015 200	RED - ORANGE	5.26	0.207	94	3.7
70 - 230	414 817 500	RED - YELLOW	5.54	0.218	89	3.5
70 - 260	414 689 200	RED - GREEN	5.94	0.234	88	3.5
70 - 290	414 691 500	RED - BLUE	5.94	0.234	86	3.4
70 - 320	414 701 000	RED - PURPLE	6.35	0.250	85	3.3
100 - 170	414 993 000	YELLOW - RED	4.88	0.192	128	5.0
100 - 200	414 689 700	YELLOW - ORANGE	5.26	0.207	110	4.3
100 - 230	414 748 600	YELLOW - YELLOW	5.54 5.41	0.218 0.213	102	4.0
100 - 260	414 742 100	YELLOW - GREEN	5.72 5.94	0.225 0.234	96	3.8
100 - 290	414 818 000	YELLOW - BLUE	5.94	0.234	97	3.8
100 - 320	414 678 400	YELLOW - PURPLE	6.35 6.17	0.250 0.243	93	3.7
130 - 200	414 639 000	BLUE - ORANGE	4.88 5.00	0.192 0.197	145	5.7
130 - 230	414 689 500	BLUE - YELLOW	5.26	0.207	125	4.9
130 - 260	414 817 700	BLUE - GREEN	5.54	0.218	109	4.3
130 - 290	414 689 400	BLUE - BLUE	5.94	0.234	104	4.1
130 - 320	414 817 800	BLUE - PURPLE	6.17 5.94	0.243 0.234	98	3.9
130 - 350	414 916 300	BLUE - PINK	6.35 6.17	0.250 0.243	96	3.8
150 - 240	414 605 600	WHITE	5.26	0.207	135	5.3
160 - 230	415 015 300	PURPLE - YELLOW	4.88	0.192	158	6.2
160 - 260	415 015 400	PURPLE - GREEN	5.26	0.207	133	5.2
160 - 270	414 605 500	YELLOW	5.26 5.54	0.207 0.218	130	5.1
160 - 290	415 034 900	PURPLE - BLUE	5.54 5.72	0.218 0.225	120	4.7

FORCE @ POUNDS ± 5% 74 mm - 41 mm 2.9 in - 1.6 in	P/N BOMBARDIER	COLOR CODE	WIRE DIA.		FREE LENGTH	
			mm	in	mm	in
160 - 320	414 817 900	PURPLE - PURPLE	5.72 5.94	0.225 0.234	111	4.4
160 - 350	414 949 500	PURPLE - PINK	5.94 6.17	0.234 0.243	105	4.1
185 - 410	415 019 500	"ALL" BLACK	6.35	0.250	105	4.1
200 - 290	414 768 200	GREEN - BLUE	5.26	0.207	156	6.1
200 - 320	414 762 800	GREEN - PURPLE	5.54 5.72	0.218 0.225	135	5.3
200 - 350	414 756 900	GREEN - PINK	5.72	0.225	126	5.0
200 - 380	414 222 371	GREEN - WHITE	5.94	0.234		
230 - 350	415 074 800	PINK - PINK	5.54	0.218	143	5.6
230 - 380	414 991 400	PINK - WHITE (OLD) RED - WHITE	5.94 5.72	0.234 0.225	128 134	5.0 5.3
230 - 390	415 019 600	GREEN	5.94	0.234	126	5.0
230 - 410	415 019 700	RED	5.94	0.234	120	4.7
240 - 430	415 019 800	BLUE	5.94	0.234	120	4.7
250 - 380	417 222 004	WHITE - WHITE (OLD) GREEN - WHITE	5.72	0.225	140	5.5
250 - 460	415 019 900	PINK	6.17	0.243	116	4.6
260 - 420	417 222 164	WHITE - SILVER (OLD) ORANGE	5.94	0.234	135	5.3
280 - 420	415 020 100	GREEN - GREEN	5.72	0.225	146	5.7
280 - 460	415 020 200	RED - RED	6.17	0.243	132	5.2
280 - 510	415 020 300	BLUE - BLUE	6.35	0.250	121	4.8
310 - 460	415 020 400	PINK - PINK	5.94	0.234	148	5.8
310 - 510	415 020 500	ORANGE - ORANGE (OR) GOLD - GOLD	6.17	0.243	132	5.2

Part numbers with a 486 prefix must be ordered from the Valcourt Race Dept. All others must be ordered from your local Ski-Doo dealer.

EFFECTS OF THE DRIVEN PULLEY SPRING

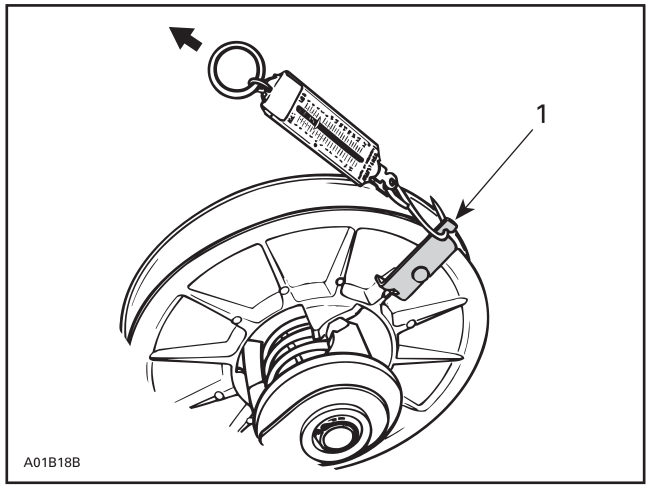
The driven pulley spring is needed to keep the plastic slider buttons in contact with the cam and to provide enough side force on the belt in the low gear position to allow initial acceleration while the torque rises to a point where the torque sensing cam begins to take over. At full load, the driven pulley spring has much less effect on the driven pulley shifting sequence than does the cam, especially at low shift ratios. At the part throttle loads at low ratios, the spring has the main effect on the shift characteristics of driven pulley.

Increases in the driven pulley spring preload will bring the engine speed up before the pulley starts shifting and will help backshift the clutch quicker. Decreasing the preload will allow a faster upshift but a slower backshift thus lowering the engine RPM.

NOTE: Control of the engine speed is done by calibrating the engine pulley not by adjusting the driven pulley spring preload. An attempt to lower the engine RPM by decreasing the spring preload in the driven pulley will result in belt slippage on acceleration. An attempt to increase engine RPM by increasing the preload will result in excessive drive belt wear and decreased efficiency in the transmission.

The driven pulley spring preload is listed in the basic specifications for all our machines. This preload tension will vary from 4 kg (9 lb) to 7.5 kg (17 lb) on models equipped with the TRA clutch.

The preload figure given in our specifications is quoted in kg (lb) of force for each machine, not in inch-pounds or foot-pounds of torque. A figure given in units of torque would require multiplying the radius of the pulley by the pull recorded on the scale. Our figures are quoted for each pulley size and it is only necessary to record the pull of the spring by attaching a scale to the rim of the pulley. The scale must be positioned at 90° to the radius of the pulley. Holding the fixed half of the pulley still, pull until the sliding half just begins to rotate. At this point, read the scale.



TYPICAL
1. Spring scale hook (P/N 529 030 900)

To change the spring tension, relocate the spring end in the sliding pulley half or reposition the spring end in the cam.

There are six holes available on a Formula cam. They are numbered 1-6. Most Formula driven pulleys have three adjustment holes in the sliding half. They are lettered A, B, C. When adjusting driven pulley tension, always refer to the tension in kg (lb) — not B-6 or A-5 hole positions for accuracy and repeatability. Moving the spring from one numbered hole to a hole adjacent will change the preload by 1.35-1.8 kg (3-4 lb). Remember, use the number and letters as references — measure the tension for accuracy. By using various combinations, the preload is adjustable from 5 to 35 pounds (depending on spring type).

The charts below will give an approximate reference for each spring position. It will vary with different springs and cam angles.

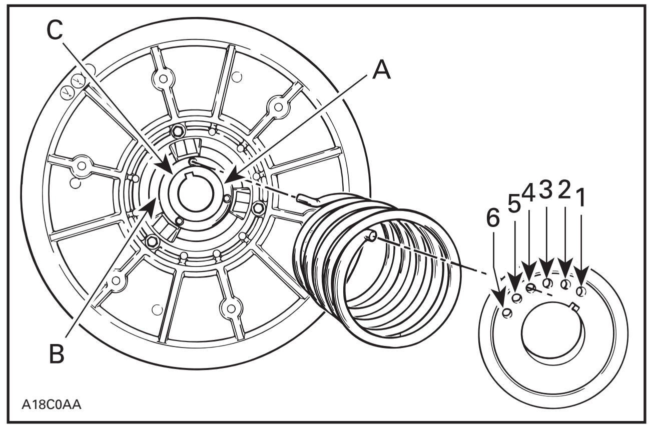
FORMULA DRIVEN CLUTCH PRELOAD

WHITE SPRING/LBS			
POSITION	A	B	C
1	26	29	24
2	21	23	20
3	16	19	15
4	11	14	10
5	7	10	6
6	3	5	1

BEIGE SPRING/LBS			
POSITION	A	B	C
1	14	16	12
2	9	11	7
3	4	6	2
4	28	30	26
5	23	25	21
6	18.5	20.5	16.5

Our procedure is as follows:

- Remove the drive belt and lock the parking brake.
- Using a reliable fish scale and our spring scale hook (P/N 529 030 900) pull perpendicular to the rim of the pulley until the moveable sheave begins to open. Record the reading on the fishscale.
- Next while the pulley is still being pulled open, relax the tension on the fish scale until the moveable pulley begins to close, record the reading.
- **Next add the two readings together and divide by two. This is the number we use as our reference.**
- Recording **only the pull** reading and this will definitely allow the driven pulley tension to be too low. This low tension will lead to a noticeable drop in peak RPM and a loss of top speed.



Letters and numbers shown in illustration are actual letters and numbers embossed on parts

NOTE: Always recheck torsional pre-load after adjusting.

By experimenting with them, you may find a more efficient combination of minimum side pressure yet adequate back shifting for your particular racing application.

COLOR	WIRE DIAMETER	PART NUMBER
BEIGE	.207 in	414 558 900
WHITE	.207 in	504 152 070
YL/BK	—	486 104 000

Part numbers with a 486 prefix must be ordered from the Valcourt Race Dept. All others must be ordered from your local Ski-Doo dealer.

HPV 27 VSA CLUTCH SPRINGS

PART NUMBER	COLOR	FREE LENGTH (MM)	WIRE DIA. (MM)	LOAD @ 61 MM	LOAD @ 35.2 MM
417 126 687	BLACK	88.8	6.17	700 N (157 lb)	1350 N (303 lb)
417 126 686	RED	81.6	6.35	600 N (135 lb)	1350 N (303 lb)
417 126 688	GREEN	98.5	5.94	800 N (180 lb)	1350 N (303 lb)
417 126 689	BLUE	130.5	5.25	700 N (157 lb)	950 N (214 lb)
414 978 300	VIOLET	N/A	N/A	1000 N (225 lb)	1350 N (303 lb)

EFFECTS OF THE DRIVEN PULLEY CAM

The purpose of the driven pulley cam is to sense the torque requirements of the drive axle and feed a portion of the engine torque, which has been applied to the driven pulley, back to the sliding half of the pulley. It is this side force that signals the downshift and provides side thrust to give traction to the drive belt.

The cam is acting like a screw pushing against the sliding half of the pulley. A large cam angle will act like a coarse thread while a small cam angle will act similar to a fine thread. The smaller the cam angle, the greater the side force on the sliding half of the pulley and the slower the upshift will be. This will result in higher engine RPM.

A larger cam angle will allow the pulley to upshift at a lower engine speed. Less side force will be exerted on the sliding half of the pulley and the pulley will upshift more rapidly.

On downshift, a smaller cam angle will backshift more easily and, again, tend to keep the engine RPM higher. A larger cam angle will be harder to downshift and will load the engine and reduce the RPM.

If all other variables in the pulleys are kept constant, a cam change with a smaller angle will result in a slower upshift and a faster downshift. Engine RPM will remain higher. A change to a cam with a larger angle will result in a faster upshift and the downshift will be slower. Engine RPM will be lower.

Remember the drive pulley signals or controls the upshift of the transmission while the driven pulley signals the downshift largely because of the effect of the cam.

The standard factory cam will probably work well for most **woods** type cross-countries, while a smaller angled cam may prove to be better for high speed lake cross-countries.

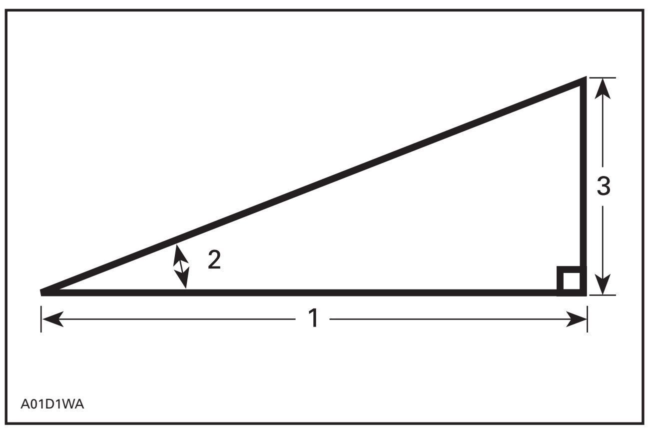
Top speed and low ET's are drag racers' and radar runners' most important concerns. Because backshifting is not at all important in these races, most racers experiment with larger cam angles for the fastest possible upshift.

Multi-angle cams are sometimes used by racers needing a good holeshot. They generally work best on vehicles where no track spin is encountered. As a vehicle idles on the starting line, the exhaust temperature cools thus slightly lowering the optimum HP RPM of the engine. Because of this, a steeper (larger) angle cam can be used to upshift more quickly, and lower the RPM to work with the cooler exhaust. As the exhaust heats up, the optimum HP RPM increases. A multi-angle cam reduces to a shallower (smaller) angle as the clutch shift out and the RPM is increased to match the **hot** HP curve of the engine. This phenomena is more pronounced on engines with narrower powerbands.

Oval and snowcross racers need the best of both worlds. A good holeshot is critical but backshifting must be quick in order to have good response out of the corners. They may have to change cam angles depending on what type of track layout is encountered.

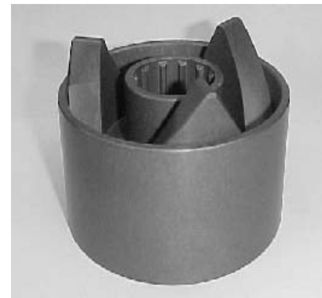
Driven pulley cams are helices. A helix is measured in lead. Lead is the distance a point moves along the axis of rotation in one revolution of the helix. (Screw threads are a helix).

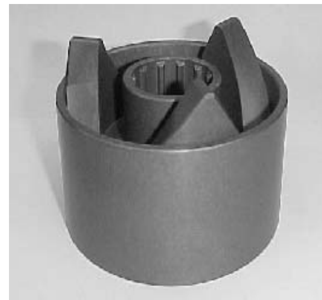
The helix angle is computed from the lead and the circumference of the helix.



1. *Circumference (C)*
2. *Helix angle A*
3. *Lead (L)*

DRIVEN CLUTCH CAMS

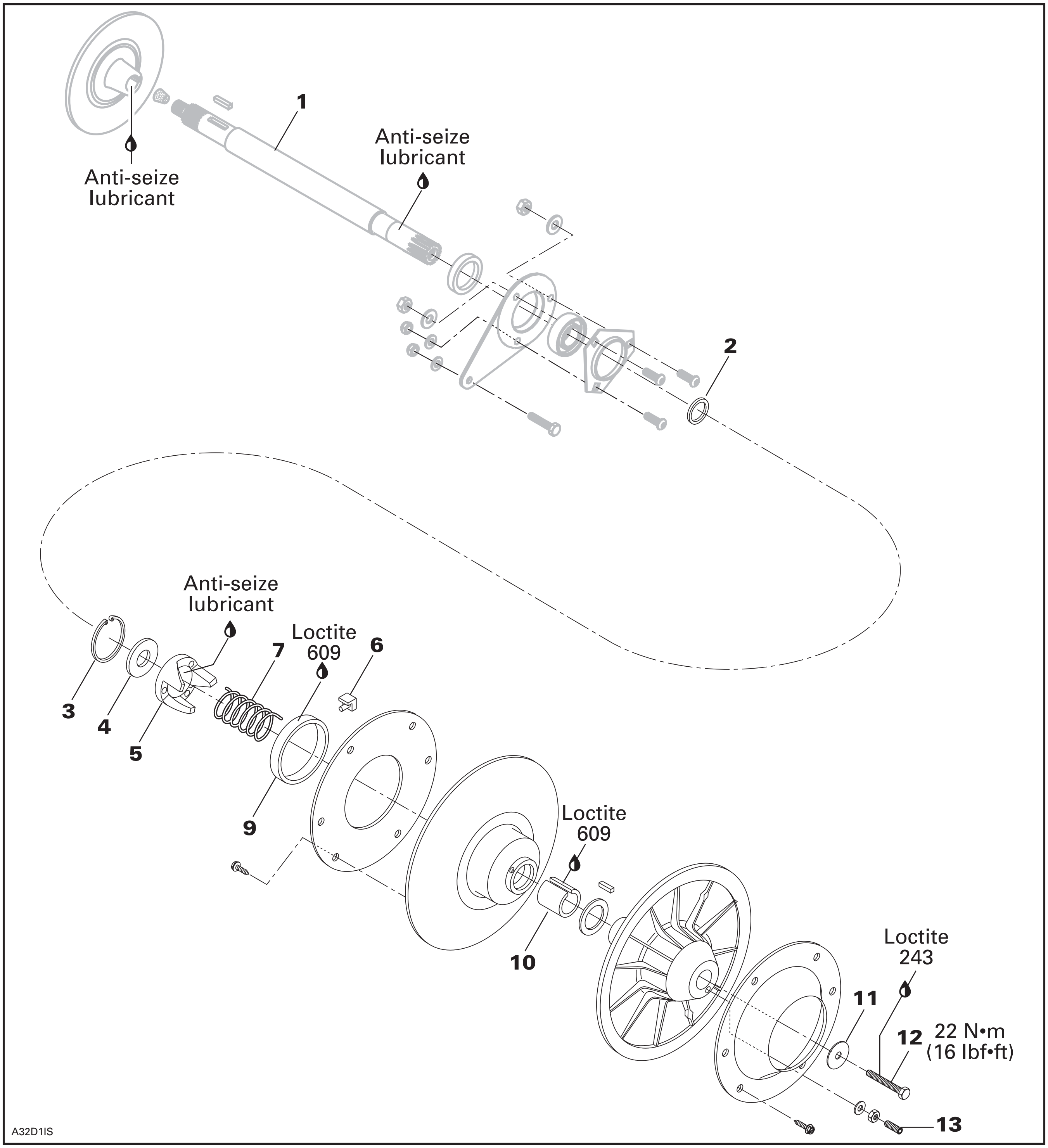
							
FORMULA - STD		**FORMULA RER & VSA**			**HPV 27 & VSA**		
PART NUMBER	ANGLE	PART NUMBER	TYPE	ANGLE	PART NUMBER	TYPE	ANGLE
860 424 800	40	417 126 715	RER	44 Alu.	417 126 445	VSA	44 Anod.
860 424 900	42	417 126 683	RER	47 Alu.	417 126 577	VSA	47 Anod.
860 425 000	44	417 126 716	RER	50 Alu.	417 126 724	VSA	47-40 Anod.
860 425 100	47	417 126 685	RER	48-44 Alu.	417 126 385	VSA	47-44 Anod.
860 425 200	50	417 126 680	RER	50-47 Alu.	417 126 721	VSA	50-40 Anod.
860 425 300	53	417 126 747	RER	44 Anod.	417 126 580	VSA	50-47 Anod.
860 427 600	56-50	417 126 748	RER	47 Anod.			
860 427 500	56-47	417 126 749	RER	50 Anod.	417 126 740	27	53-50 Anod.
860 427 400	56-44	417 126 750	RER	48-44 Anod.	417 126 741	27	53-47 Anod.
860 427 300	53-50	417 126 751	RER	50-47 Anod.	417 126 722	27	50-40
860 427 200	53-47				417 126 725	27	47-40
860 427 100	53-44	417 126 718	VSA	44 Anod.	417 126 674	27	44-40
860 427 000	53-42	417 126 707	VSA	47 Anod.	417 126 742	27	40-44
860 426 900	53-40	417 126 719	VSA	48-44 Anod.	417 126 743	27	44-47
860 426 800	50-47	417 126 704	VSA	50 Anod.	417 126 744	27	47-50
860 426 700	50-44	417 126 720	VSA	50-47 Anod.			
860 426 600	50-42						
860 426 500	50-40						
860 426 400	50-37						
860 426 300	47-44						
860 426 200	47-42						
860 426 100	47-40						
860 426 000	47-37						

							
FORMULA - STD		**FORMULA RER & VSA**			**HPV 27 & VSA**		
PART NUMBER	ANGLE	PART NUMBER	TYPE	ANGLE	PART NUMBER	TYPE	ANGLE
860 425 900	44-40						
860 425 800	44-37						
860 425 600	42-37						
860 425 500	40-44						
860 425 400	40-37						
All cams have been anodized coated. The standard Formula cam can be used in place of a Formula RER or VSA cam, providing the reverse function has been disabled.		The Formula RER and VSA cams are interchangeable. The difference between the two types is the number of holes drilled for spring tension and bearing surface. RER and VSA cams may be used in place of standard Formula cams also.			The HPV 27 and VSA cams are interchangeable. The difference between the two types is the number of holes drilled for spring tension adjustment. These cams are not interchangeable with Formula style cams.		

Alu.: Aluminum
Anod.: Anodized

DRIVEN PULLEY

FORMULA VSA



REMOVAL

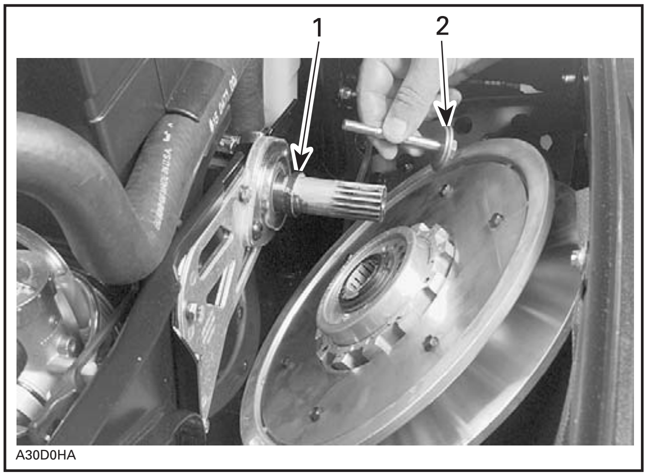
Remove guard and drive belt from vehicle.

Remove cap screw **no. 12** and shouldered washer **no. 11** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to lose spacer **no. 2**.

NOTE: Make sure that the smaller diameter spacer is against the bearing to avoid damage to the bearing seal.



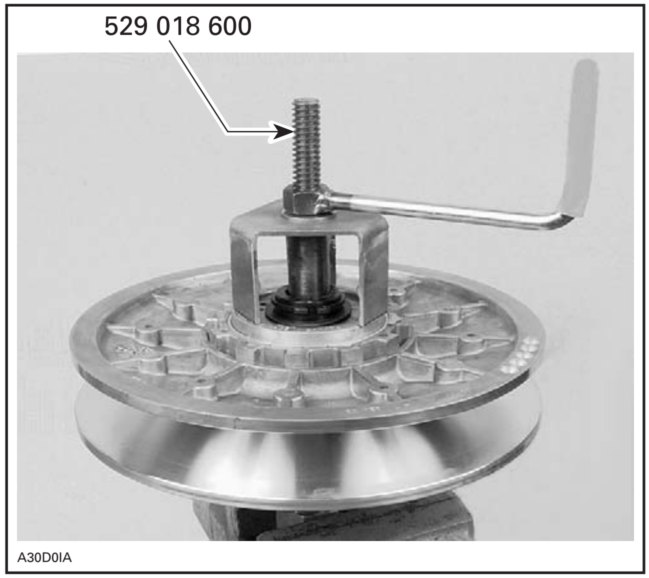
TYPICAL
1. *Spacer*
2. *Shoulder on this side*

1, Countershaft

Should countershaft **no. 1** removal be required, refer to BRAKE then look for COUNTERSHAFT AND BRAKE DISC REMOVAL.

DISASSEMBLY

Use spring compressor (P/N 529 018 600).



Remove snap ring **no. 3** and washer **no. 4** to disassemble the cam and the 2 pulley halves.

⚠ WARNING

Driven pulley cam is spring and/or torsion loaded, use above mentioned tool.

CLEANING

9, Large Bushing

During break-in period (about 10 hours of use), bushing teflon moves toward cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

Pulley Half Cleaning

Use Pulley Flange Cleaner (P/N 413 711 809).

INSPECTION

9,10, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.

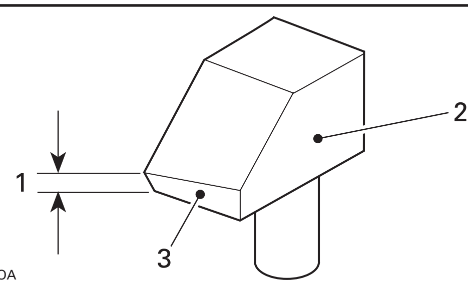
A03D1OA

Replace bushing(s) if worn more than specified.

DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Large bushing	89.15 (3.510)

6, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge thickness of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



A15D0OA

1. *Measure thickness of slope base here*
2. *Sliding pulley side*
3. *Slope base*

ASSEMBLY

6, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

5, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

1, Countershaft

CAUTION: Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC AND COUNTERSHAFT BEARING ADJUSTMENT.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

12, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

ADJUSTMENT

7, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-Load

To check spring pre-load adjustment, use spring scale hook (P/N 529 006 500) and a spring scale.

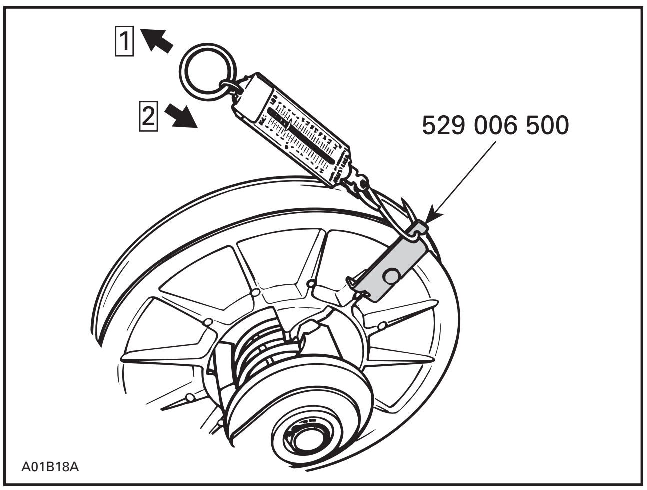
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold spring scale at this position. Slowly release tension from spring scale and take 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\begin{matrix}\text{1}^{\text{st}}\text{ measurement} \\ \text{(when opening)}\end{matrix} + \begin{matrix}\text{2}^{\text{nd}}\text{ measurement} \\ \text{(when closing)}\end{matrix}}{2} = \text{Spring pre-load}$$

$$\text{Example: } \frac{\begin{matrix}\text{3.8 kg (8.4 lb)} \\ \text{(when opening)}\end{matrix} + \begin{matrix}\text{3.4 kg (7.5 lb)} \\ \text{(when closing)}\end{matrix}}{2} = \begin{matrix}\text{3.6 kg (8 lb)} \\ \text{Actual spring} \\ \text{pre-load}\end{matrix}$$

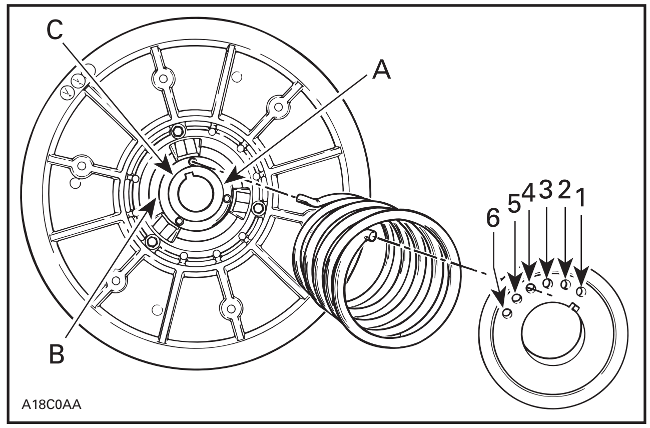


TYPICAL

Step 1: 1st measurement
Step 2: 2nd measurement

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA.

NOTE: If spring pre-load can not be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B and C).



TYPICAL

Letters and numbers shown in illustration are actual letters and numbers embossed on parts

NOTE: Always recheck torsional pre-load after adjusting.

Pulley Alignment and Drive Belt Height

Refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT to perform adjustments.

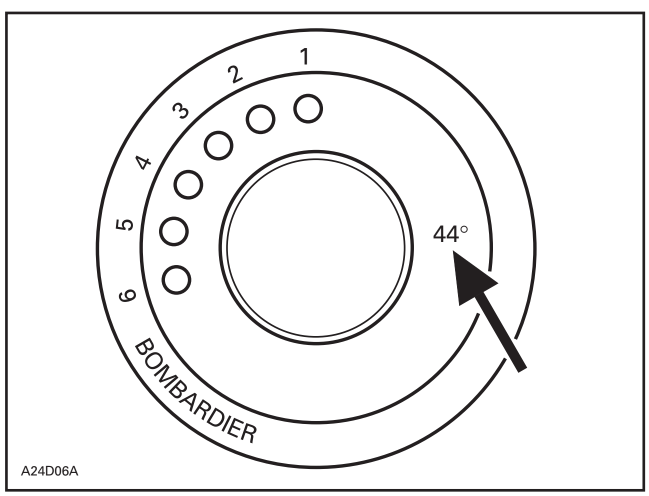
Drive belt height is adjusted by turning Allen screws **no. 13** equally and accordingly.

CAUTION: Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

5, Cam

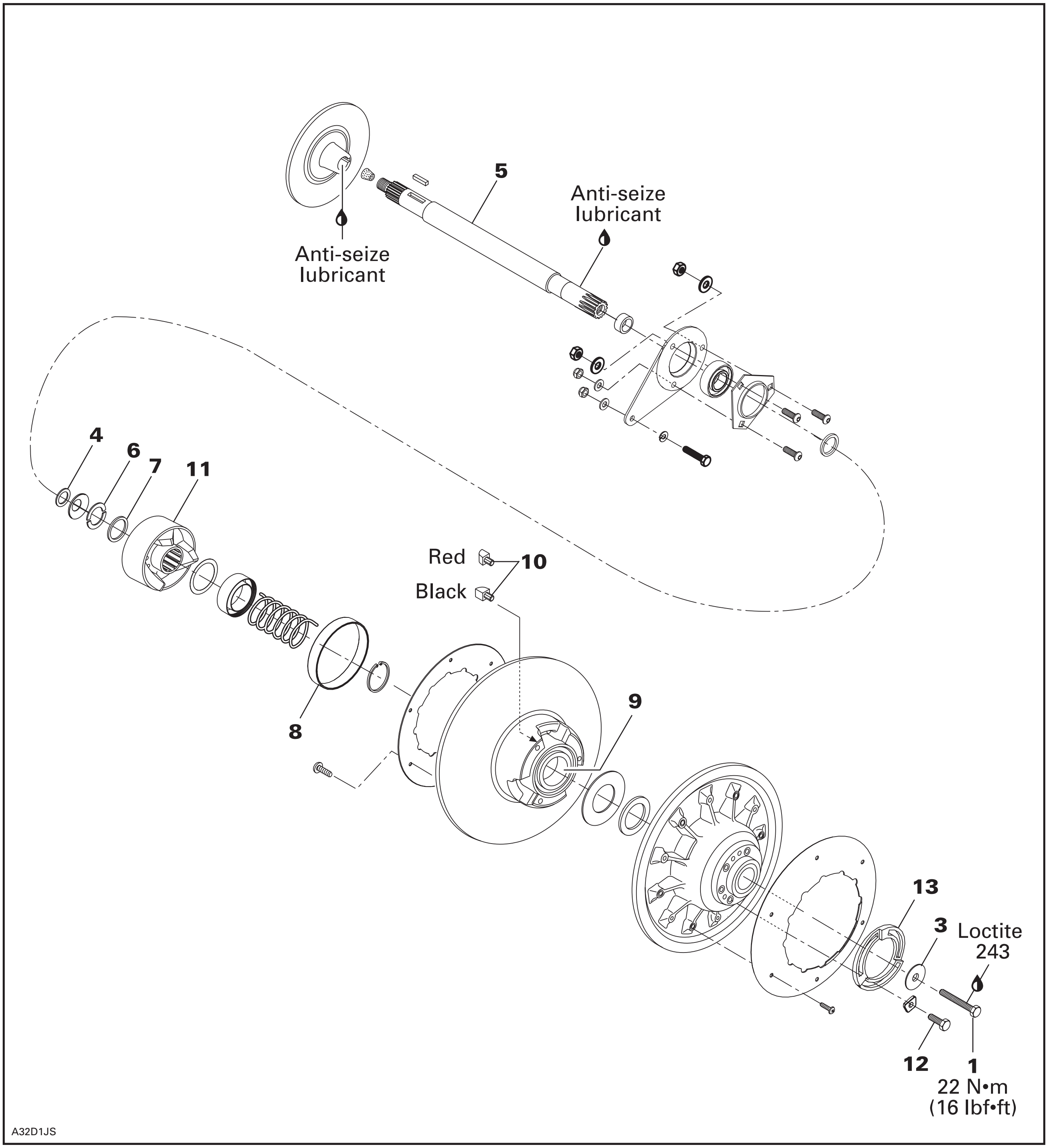
Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.



NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

HPV27 VSA


5
Anti-seize
lubricant
Anti-seize
lubricant
4
6
7
11
Red
10
Black
8
9
13
3
Loctite
243
12
1
22 N•m
(16 lbf•ft)
A32D1JS

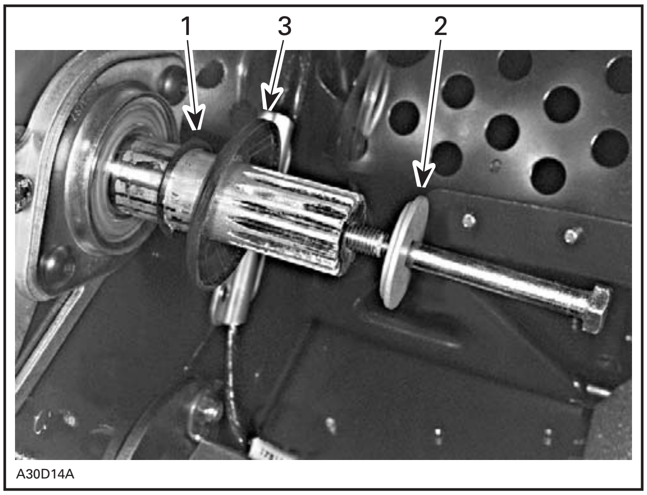
REMOVAL

Remove guard and drive belt from vehicle.

Remove cap screw **no. 1** and shouldered washer **no. 13** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation.

Take care not to lose spacer **no. 4**.



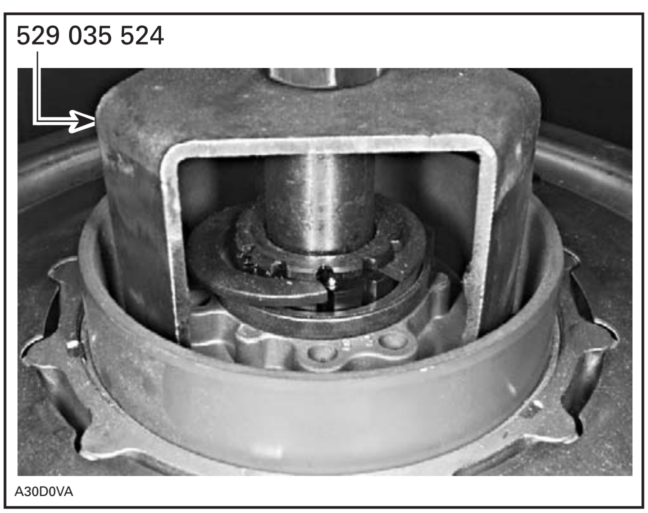
1. *Spacer*
2. *Shoulder on this side*
3. *Concave side facing driven pulley*

5, Countershaft

Should countershaft **no. 5** removal be required, refer to BRAKE then look for COUNTERSHAFT AND BRAKE DISC REMOVAL.

DISASSEMBLY

Use spring compressor (P/N 529 035 524).



Remove half keys **no. 6** and washer **no. 7** to disassemble the cam and the 2 pulley halves.

⚠ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

CLEANING

8,9, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

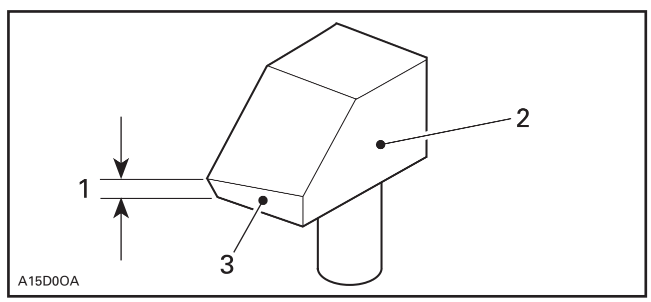
Pulley Half Cleaning

Use pulley flange cleaner (P/N 413 711 809).

INSPECTION

10, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge thickness of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



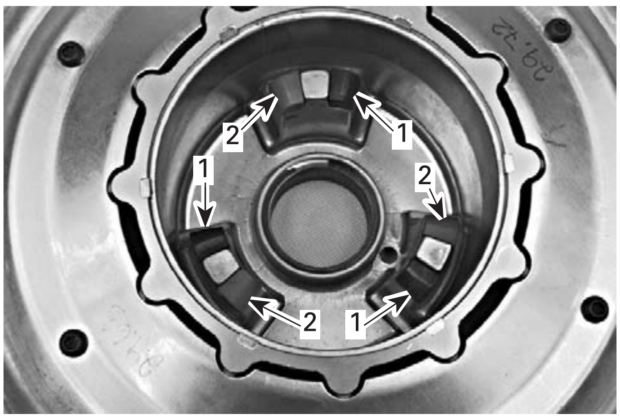
1. *Measure thickness of slope base here*
2. *Sliding pulley side*
3. *Slope base*

ASSEMBLY

10, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. RED slider shoes are being used for reverse and BLACK ones for forward.



A30D0WA

1. *BLACK slider shoe*
2. *RED slider shoe*

12, Screws

These screws are machined at there end. With the adjustment ring steel to position 0 (zero), screw ends are flush with inner side of fixed pulley half when tighten.

CAUTION: If any of these screws is not flush with inner side of sliding pulley, bushings will worn unequally.

Assemble driven pulley components by reversing the disassembly procedure.

11, Cam

Coat cam interior with anti-seize lubricant.

INSTALLATION

5, Countershaft

CAUTION: Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC and COUNTERSHAFT BEARING ADJUSTMENT.

Reinstall the pulley on the countershaft by reversing the removal procedure.

Driven pulley end-play is 0 (zero).

1, Pulley Retaining Screw

Torque to 22 N•m (16 lbf•ft).

ADJUSTMENT

Pulley Alignment and Drive Belt Height

Refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT to perform adjustments.

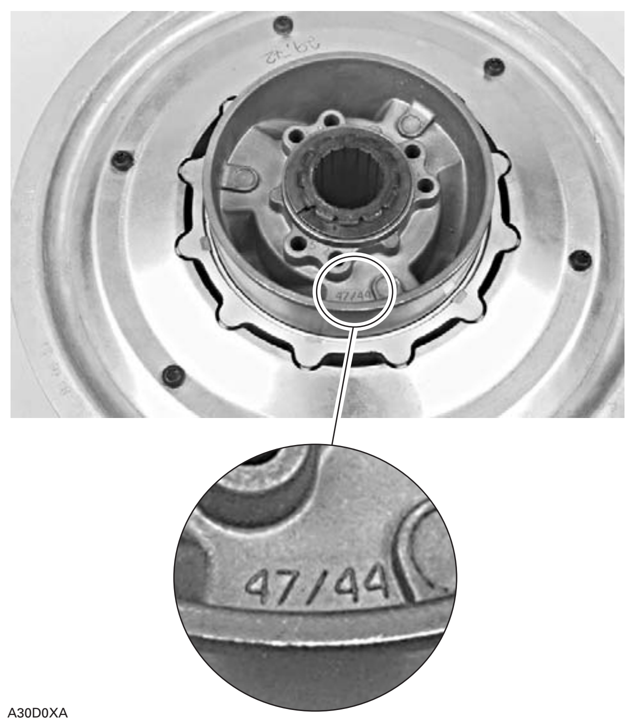
Loosen screws **no. 12**, turn adjustment ring **no. 13** then retighten screws to adjust drive belt height.

CAUTION: Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

11, Cam

Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.

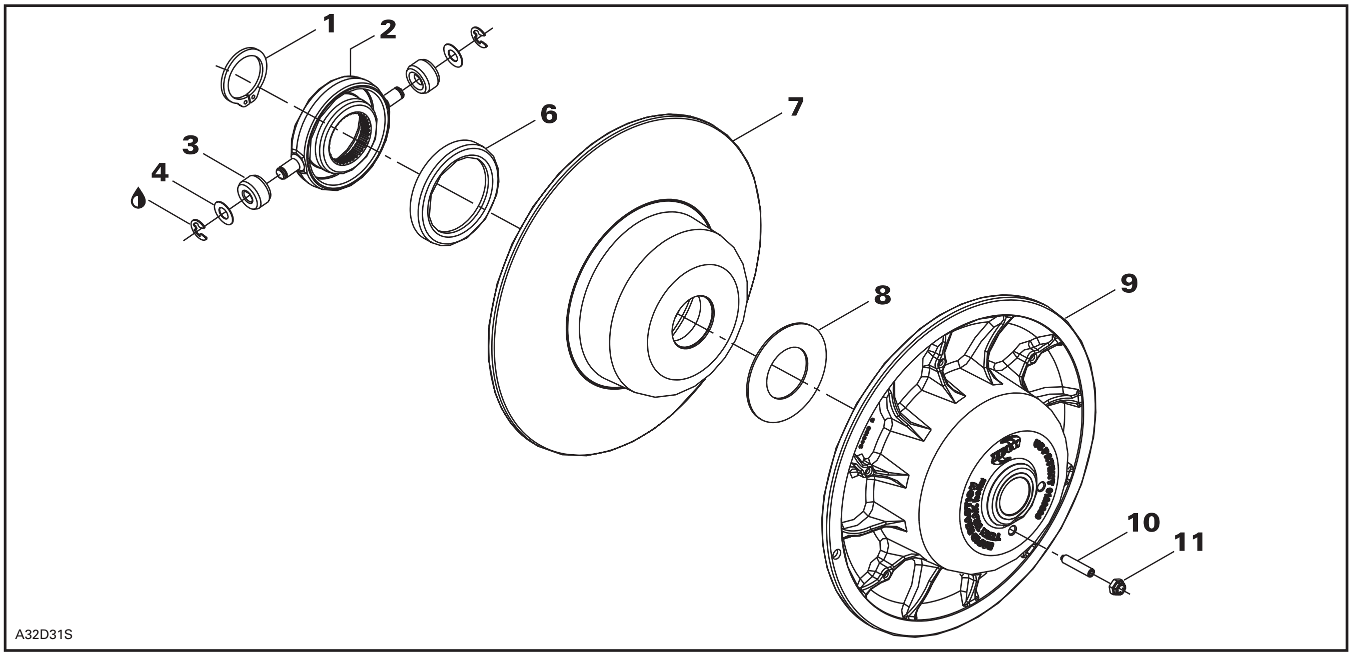


A30D0XA

NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

TEAM PERFORMANCE DRIVEN CLUTCH

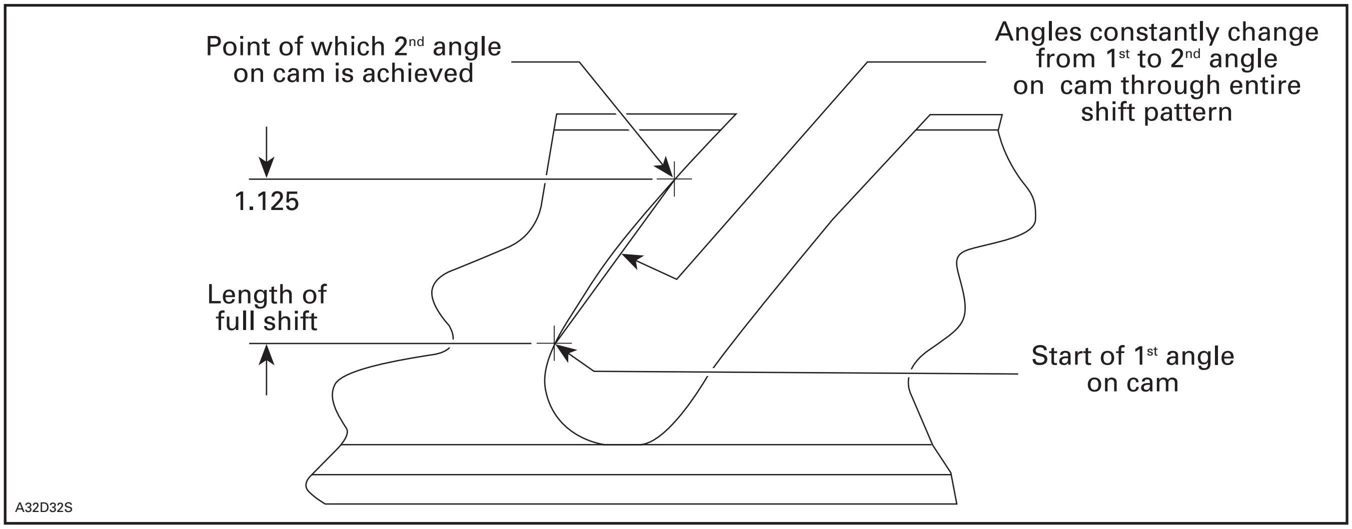
(All TEAM Performance Clutch Parts must be ordered from the Valcourt Race Dept. or Ski Doo Parts Support Truck)

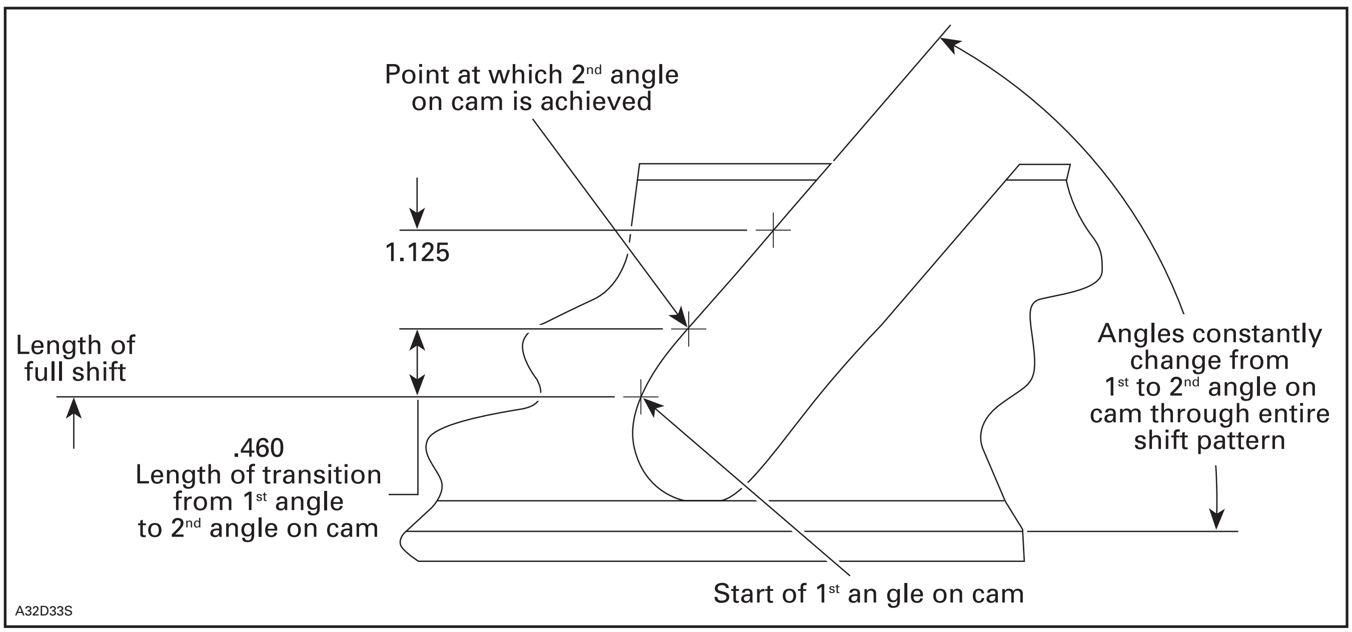


ITEM NO.	PART NUMBER	QUANTITY	DESCRIPTION	SERVICEABLE
1	130032	1	Ring, Retaining Basic Ext. 1.500	Yes
2	285275	1	Spider, 38T 10.75 Mach.	No
3	460079	2	Roller, Clutch	Yes
4	150151	2	Washer, Thrust	Yes
5	130059	2	Ring, Retaining E-Ring Ext. .375	Yes
6	430063	1	Washer, Thrust	Yes
7	410488	1	Subassembly Moveable Sheave	Bushing Only
8	150175	1	Spacer	Yes
9	410489	1	Subassembly Stationary Sheave	No
10	105100	1	Screw, Set Hex SKT ¼-20 x 1.25	Yes
11	110003	1	Nut, ¼-20 UNC Flexlock	Yes

The two pictures shown below are showing how the helix angles are called out and how they are measured. The first picture shown is a full progressive stamped as "F" on a helix (example 54-40- F). The second picture refers to a partial or .46 as most of our helix's are called out (example 58-44.46. During the transition zone the angle is constantly changing.

The angle will remain constant once the shift pattern passes through the transition zone.





SPRINGS

The springs used in the TEAM Performance Driven Clutch are measured differently because of the use of a compression spring instead of a torsion spring. The first number on our spring which is measured at 2.2" is the starting rate where the secondary will begin to open. The second measurement of 1.1" is the final compression achieved at full shift.

Examples: 140-200 spring vs. 100-200 (The 140-200 spring has a higher starting compression than 100-200 spring, better throttle response than the 100-200, same ending compression meaning the overall RPM's should run the same with 100-200 spring.)

The higher you go with the ending compression load, the higher your RPM's will be. For every 20 lbs. of spring added to the final compression load you will have to go up two degrees in helix angle. If you take away 20 lbs. of ending compression you will have to go down two degrees in helix angle.

It is not recommended to shim any springs to achieve extra RPM's. If the sled you are tuning is low on RPM's, weight should be removed from the primary clutch or helix angle should be dropped to achieve correct and consistent RPM's.

Improper springs, drive clutch ramp, weight or helix combination can result in excessive clutch heat. If the helix is matched properly with the spring, drive clutch ramp and weight combination, the result should be a fast, efficient, cool running clutch setup.

Relationship Between Drive Clutch Ramps, Weight, And Spring In Maintaining Operating RPM

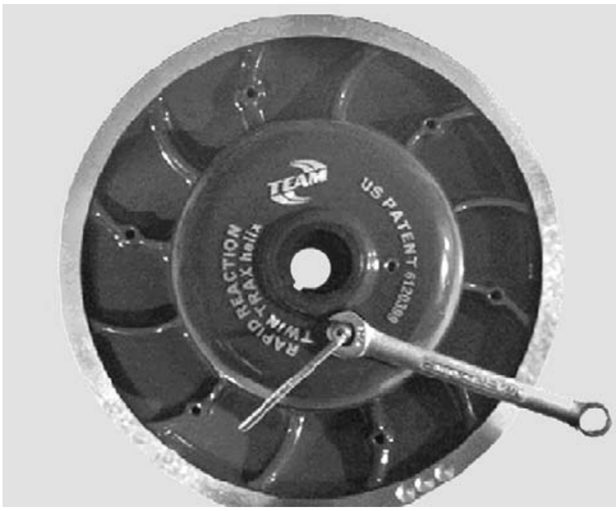
The drive clutch is a RPM sensing unit designed to transfer the maximum amount of horsepower from the engine to the ground. This is accomplished by ramps, weight and a spring inside the unit which react to the centrifugal force from the engine RPM. The spring, ramps and weight work in combination. In a properly set up clutch, the maximum desired operating RPM will be reached immediately after clutch engagement, under full throttle conditions. To gain optimum power this RPM should be maintained. As centrifugal force pushes the weight against the ramps, the movable sheave will force the belt to climb up the drive clutch sheave and increase vehicle speed. If the weight is too light, the ramp too steep, or the spring rate too high, the engine will over rev and the clutches won't be able to shift all the way out. If the weight is too heavy, the ramp too shallow or the spring is too light, the engine RPM will be low. The result of either condition will be dramatic loss of horsepower and torque.

ADJUSTING BELT DEFLECTION ON THE TEAM ROLLER SECONDARY

1. To adjust the sheaves, loosen the 7/16" jam nut on the belt width adjuster.
2. Using a 1/8" Allen wrench (PN 920001), adjust the threaded set screw as needed.

NOTE: Turn the set screw in (clockwise) to increase the distance between the sheaves and out (counter-clockwise) to decrease the distance.

3. Tighten the jam nut after the belt adjustment has been made. See arrow.



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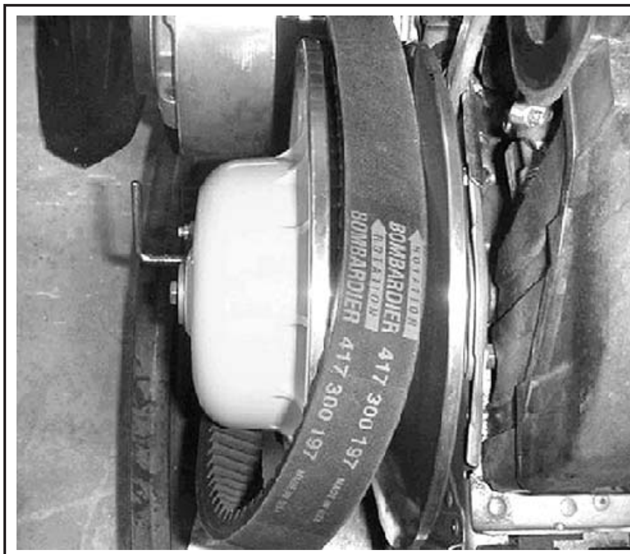
BELT REMOVAL ON TEAM ROLLER SECONDARY

1. Thread the belt installation tool (PN 930002) into the open hole next to the belt width adjuster bolt.
2. Thread the tool into the hole until the sheaves separate enough to remove the drive belt.

(If the tool turns hard, rotate the moveable back and forth to ensure that the roller is not locked in the ER notch.)



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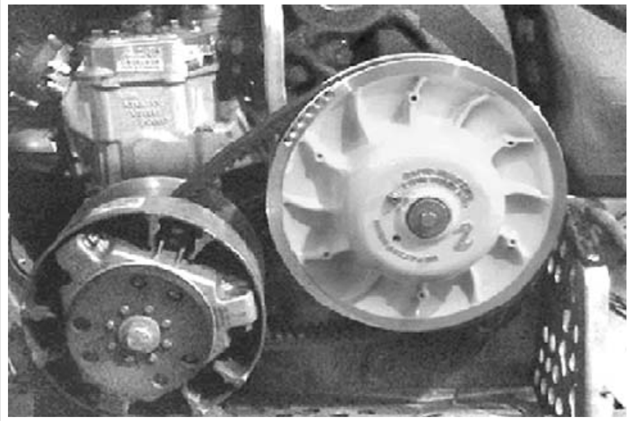
Too Much Belt Deflection

If the belt is too long or the center distance is too short, the initial starting ratio will be too high, resulting in performance loss. This is due to the belt rising too high in the drive clutch sheaves upon engagement. (Belt riding below top of sheave.)



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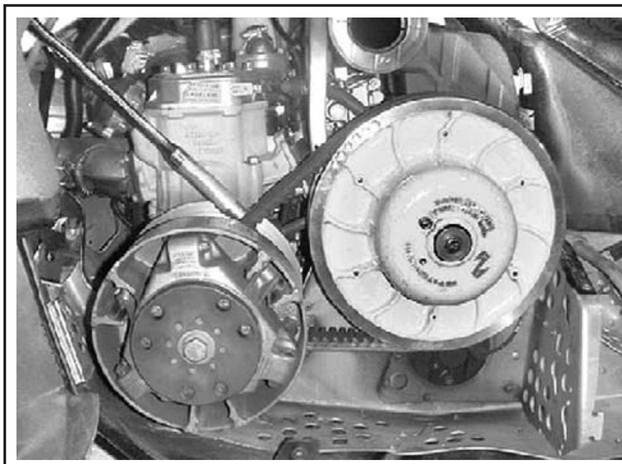
Not Enough Belt Deflection (belt too tight)

If the drive belt is too short or the center distance is too long, the ratio will again be incorrect. In addition, the machine may creep when the engine idles, causing damage to the internal face of the drive belt.



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MEASURING BELT DEFLECTION

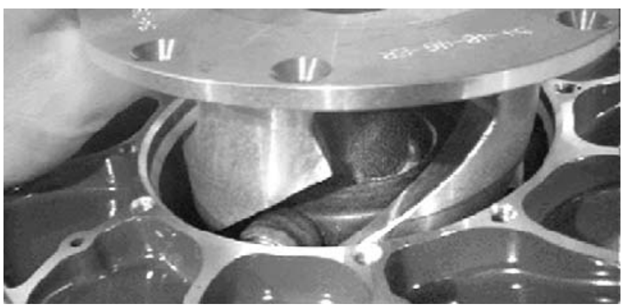
IMPORTANT NOTE: Do not apply excessive pressure to force belt into driven sheaves. This will result in an improper measurement. If belt deflection cannot be adjusted within specification using methods below, inspect center distance and compare to specifications.

1. Measure belt deflection with both clutches at rest and in their full neutral position.
2. Place a straight edge on the belt and apply downward pressure while measuring at the point shown.

Belt Deflection - 1-1/4 in (3.2 cm).

TEAM SECONDARY CLUTCH MAINTENANCE/ADJUSTMENT

1. Remove clutch from vehicle.
2. Remove the screws that hold the helix in place, (Torx Wrench PN 920002).
3. Pull and twist upward to remove helix from the clutch. Note: If changing helix angles move the helix 90 degrees to the desired combination and reinstall holding screws.


A32D37A

1. Place the compression tool (PN 930001) through the clutch shaft and twist handle down to compress spring.


A32D38A

2. Once you have tension on the spider assembly, remove the snap ring.
3. Back off the compression tool and remove the spider assembly.
4. Note the location of the skip tooth on the spider assembly for installation. The skip tooth is marked with an X on the spider that should match the skip tooth found on the clutch shaft. The X should also line up with the machined dimple found on the moveable sheave.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1. Inspect spring rate at proper load heights with spring compression scale (all TPS secondary springs measured at load heights of 2.2" and 1.1"). If spring rate measures less than 10% at specified load heights it should be replaced.
2. Inspect roller assembly for unusual wear or damage (flatspots or dia. less then .925).
3. Inspect shaft for nicks or burrs.
4. Measure ID of moveable bushing, clearance to shaft should not exceed .010". If this condition exists replace bushing. Part No. 180165.
5. With air hose or clean dry rag wipe or blow all components free of all loose contaminants.

Reassemble In Reverse Order

* **Make sure that the "X" on the spider and the 1/8" dia. drilled dimple on the moveable sheave are aligned prior to installing the helix. This ensures proper balance!!!**

INSTALLATION

1. Install proper number of spacer washers on jackshaft between clutch and jackshaft bearing.
2. Inspect Jackshaft Bearing
3. Excessive vibration or abnormal drive belt wear can be caused by a worn bearing or jackshaft on the driven clutch side. To inspect bearing fit, watch the bearing area closely as you try to force the jackshaft up and down. If movement is detected, disassemble to determine which parts are worn. Replace the jackshaft if the new bearing is loose on the shaft. The bearing should be greased at 1000 mile (1600km) intervals and before storage.

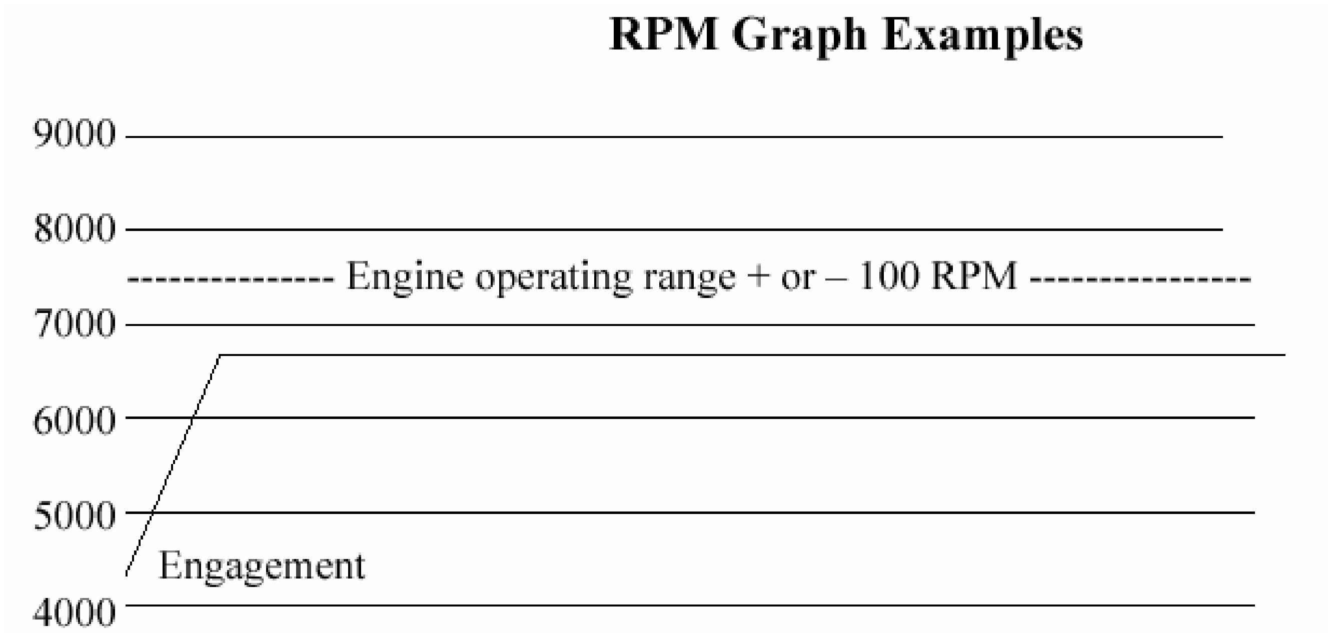
NOTE: Spacer washers between driven clutch and jackshaft bearing set the offset.

1. Lightly grease jackshaft keyway or spline. With square key in place slide clutch onto jackshaft.
2. Install spacer, bolt and washer to hold driven clutch in place.
3. See belt installation instructions.

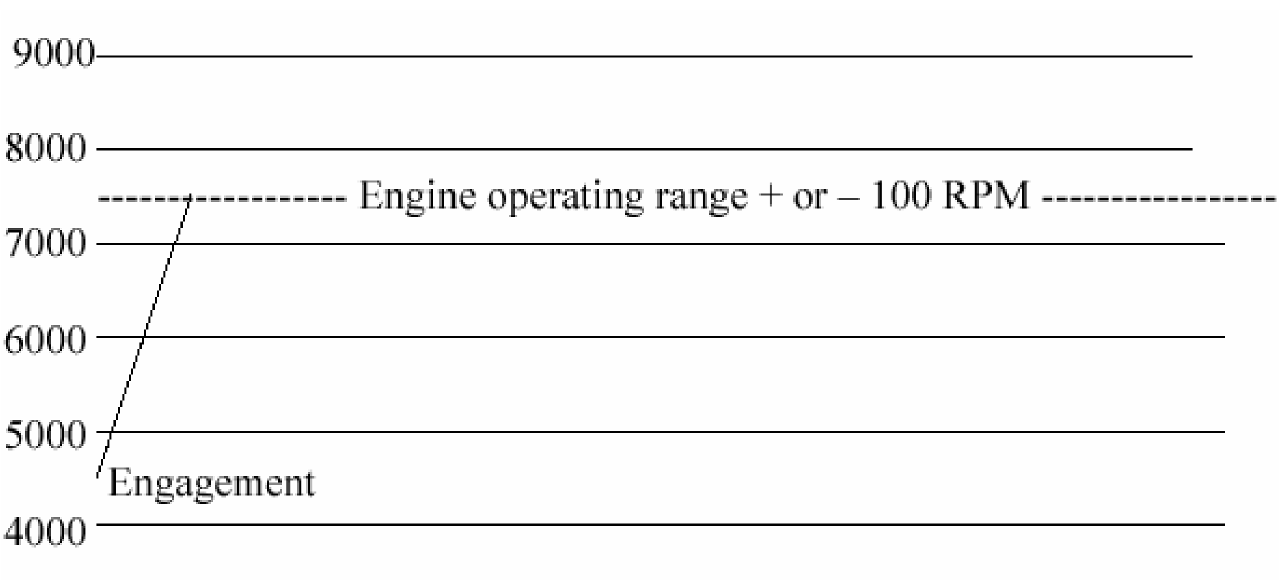
TROUBLESHOOTING

1. Always make sure to use the OEM belt that is specified for your sled. Using the incorrect belt can result in RPM fluctuation. **It is very important when tuning to ensure the proper belt width, compound, and length.** This is one of the most common causes of poor performance.
2. Verify ramps, weights and spring in the drive clutch are correct first. If performance problems still exist, look to the secondary.
3. Helix angle selection. Starting angle will effect how fast the clutch opens from a dead stop. Ex. (70-44.46, a 70° starting angle will shift extremely fast). If the sled will not pull RPM until farther out in the shift pattern this angle may be too steep. The second number, (as in example 44°) will affect the shift rate from approximately 1/3 of the shift on. If there is a problem with the helix, this is normally the culprit. If your engine is over reving and the sled is not going anywhere, the angle is probably too shallow. If you can't achieve desired RPM or the sled goes flat towards top end, the angle is very likely too steep.
4. Secondary springs can also affect the RPM and shift rate. It is best to start with a lower rate spring and move up from there. Stiff springs can cure some problems and create others at the same time. Heat can be one of the biggest problems when running stiff springs. Heat will rob performance extremely fast. The lighter the spring you can run and still achieve the results you want the better. Spring rate will also affect back shifting. For most flat land applications start with a 140-200 spring, mountain setups 140-240.
5. Under racing conditions, clutches should be taken apart often and wiped clean of any foreign material. Make sure not to use any solvents or lubricants on bushings or rollers during this process. At this time it is recommended that the spring is measured for correct operating loads.
6. Alignment has a huge role on performance and belt life. Make sure to use the proper clutch alignment tool.

7. When inspecting the rest of the clutching components the primary clutch should be checked for four things:
   - "Worn out rollers and bushings
   - "Flat spots on ramps
   - "Worn out buttons in the clutch towers
   - "Worn out bushing on moveable clutch sheave and clutch cover



If the weights are too heavy, or spring rate too low, the engine RPM will be low and the drive clutch will up-shift too fast, keeping the engine out of its power band.



If the clutching setup is calibrated properly, the engine should hold consistent RPM's, during up-shift and back-shift.

TEAM INDUSTRIES DRIVEN CLUTCH PARTS

(All TEAM Ind. Clutch Parts must be ordered from the Valcourt Race Dept. or the Ski Doo Parts Support Truck)

SPRINGS

PART NUMBER	RATE LBS	COLOR
210180	100-150	Red/Yellow
210179	125-175	Red/Silver
210181	140-200	Red/Blue
210178	100-200	Red/White
210177	120-220	Red/Green
210176	140-240	Red/Black
210184	140-260	Red/Pink
210182	155-222	Black/Red
210183	120-200	Blue/Black
210186	140-220	Black/Green
210185	160-260	Black/White
210190	180-260	Black/Lt. Blue
210193	160-240	Black/Violet
(All springs are Left Hand wound)		

DELRIN WASHER

PART NUMBER
930650

HELIX

PART NUMBER	TWIN TRAX ANGLE
420400	60-38-46 60-36-46
420401	56-40-46 56-38-46
420403	60-44-46 60-42-46
420402	70-40-46 70-38-46
420404	66-40-46 66-38-46
420405	54-38-46-E 54-40-46-E
420406	54-40-46-E 54-42-46-E
420407	58-38-46-E 58-40-46-E
420408	58-42-46-E 58-44-46-E
420409	64-40-46-E 64-44-46-E
420410	68-40-46-E 68-44-46-E
420411	74-40-46-E 74-44-46-E
420412	70-44-46-E 70-42-46-E
420422	70-46-46 70-44-46
420423	34 STRT 36 STRT
420424	60-44-46-E
420425	60-46-46-E
420426	62-48-46-E
420427	62-44-46-E
420428	62-40-46-E
420429	58-40-46-E
420430	58-42-F 62-44-F
420433	54-42-36-E
420434	36 STRT-E 38 STRT-E
420435	42 STRT-E 38 STRT-E
420436	54-44-46-E 44 STRT-E
420437	54-44-46 44 STRT
420438	56-38-46 56-40-46
420439	56-38-46-E 56-40-46-E
420440	36 STRT 38 STRT
420451	50-42-46 50-44-46
420452	50-42-46-E 50-44-46-E
420453	42 STRT 44 STRT
420454	42 RS 44 RS
420478	42 STR ER 44 STR ER

HELIX

PART NUMBER	TWIN TRAX ANGLE
420500	70-48-36 66-44-46
420501	42-36-F 50-36-46
420502	52-38-F 58-38-46
420503	52-36-F 58-36-46
420504	48-40-F 56-40-46
420505	52-36-46 52-32-46
420506	50-36-F 56-36-46
420507	48-34-F 56-34-46
420508	46-42-F 52-42-46
420509	52-40-F 58-40-46
420510	52-36-46 50-34-46
420512	54-38-46 54-36-46
420513	49-40-46 49-38-46
420514	54-40-46 54-38-46
420515	58-40-46 58-38-46
420516	54-44-46 54-42-46
420517	58-44-46 58-42-46
420518	60-40-46 60-38-46
420519	60-48-46 58-44-46
420520	54-36-46 54-34-46
420521	74-48-46 70-48-46
420522	74-44-46 74-40-46
420523	70-44-46 70-40-46
420524	66-48-46 66-40-46
420525	62-44-46 62-40-46
420526	58-44-46 58-40-46
420527	72-44-46 72-40-46
420528	68-44-46 68-40-46
420529	64-44-46 64-40-46
420530	58-44-46-E
420531	46-34-F 48-34-F
420532	64-48-46 54-44-F
420533	66-44-56 54-42-F
420534	68-44-46 54-42-F
420535	54-34-46 64-42-46
420536	54-34-46 48-34-F
420537	66-44-56 66-44-46
420538	66-44-46 66-40-46

HELIX

PART NUMBER	TWIN TRAX ANGLE
420539	68-44-46 52-42-F
420540	70-48-46 54-44-F
420541	58-42-46-E
420542	62-42-46-E
420543	62-46-46-E
420545	54-40-46 54-42-46
420546	58-40-46 58-42-46
420547	52-42-F 66-42-46
420548	54-40-46 64-42-46
420549	54-44-F 68-44-46
420551	70-50-46 72-52-46
420552	70-46-46 72-48-46
420554	52-40-46-4 52-40-46-2
420561	66-44-46 70-44-46
420562	38 STRT 42 STRT
420563	40 STRT 44 STRT
420564	42 STRT 46 STRT
420565	44 STRT 48 STRT
420566	46 STRT 50 STRT
420567	48 STRT 52 STRT
420568	50 STRT 54 STRT
420569	52-42-F 52-40-F
420570	50-40-F 48-38-F
420571	54-42-F 54-44-F
420572	56-44-F 56-46-F
420573	70-44-46 70-42-46
420574	70-48-46 72-44-46

PULLEY DISTANCE AND ALIGNMENT

GENERAL

Both pulley distance and pulley alignment must be checked out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

CAUTION: Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

⚠ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All Pulley Alignment Specifications Refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys**.

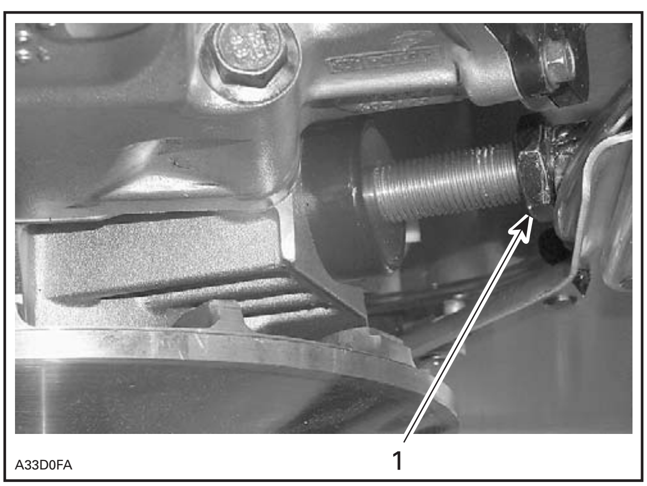
Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar**.

Z = Pulley distance is not adjustable on the REV Series models.

GENERAL PROCEDURE

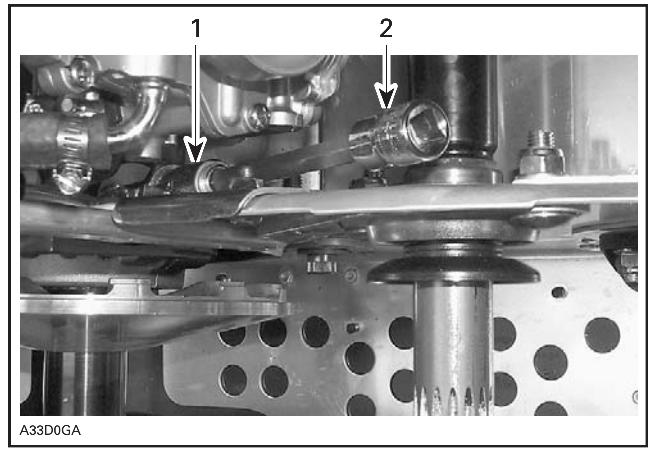
Remove guard, drive belt, driven pulley and air silencer.

Loosen lock nut.



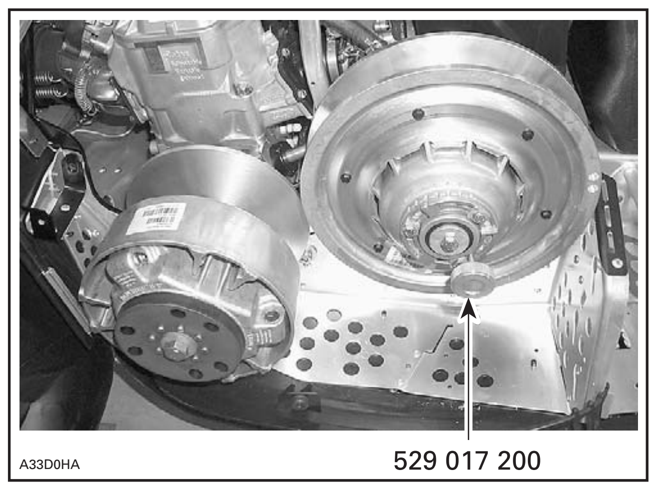
1. *Lock nut*

Untighten torque rod using a long hexagonal key.



1. *Torque rod*
2. *Hexagonal key*

Install driven pulley. By using driven pulley opening tool (P/N 529 017 200) push the sliding half to open the driven pulley.



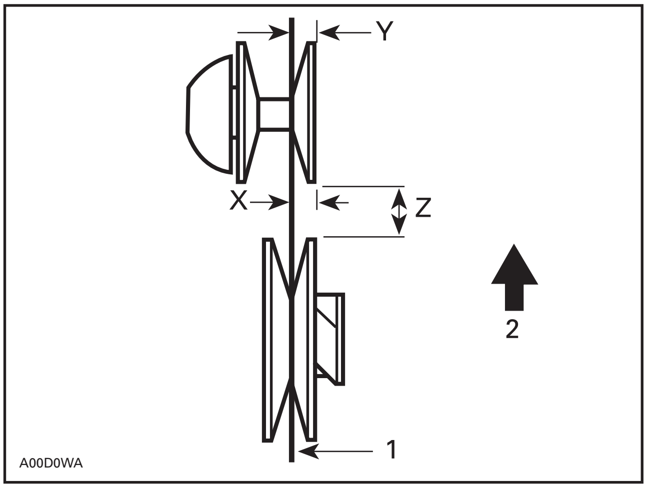
DRIVEN PULLEY OPENING TOOL

Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment bar into the opened driven pulley.

Measuring Procedure

Using Straight Bar

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge).



TYPICAL
1. *Straight bar*
2. *Front of vehicle*

The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

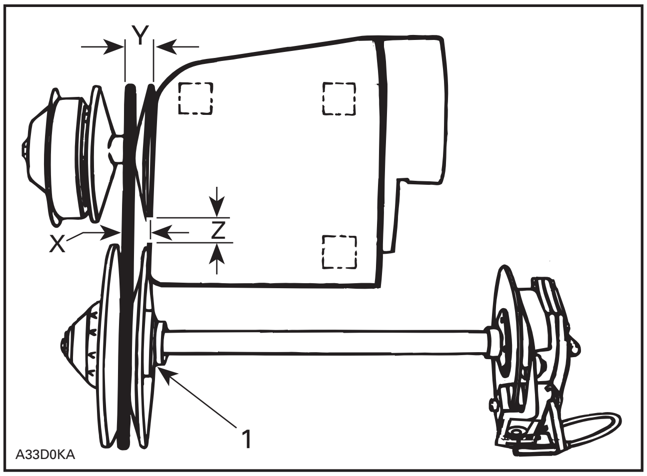
Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT to adjust drive belt deflection.

CAUTION: This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

MODEL	PULLEY DISTANCE	OFFSET		ALIGNMENT BAR P/N
	Z	X	Y-X	
	±0.50 mm (.020 in)	±0.50 mm (.020 in)	±0.50 mm (.020 in)	
ALL REV SERIES MODELS WITH FORMULA VSA	19.0 (0.748)	37.0 (1.456)	1.5 (0.060)	529 026 700
ALL REV SERIES MODELS WITH HPV 27 VSA	20.0 (0.787)	37.0 (1.456)	1.5 (0.060)	529 035 831
2004 440 REV MODELS	20.0 (0.787)	40.0 (?..)	1.5 (0.060)	529 035 831



TYPICAL
1. Contact

ALIGNMENT BAR IN PULLEYS

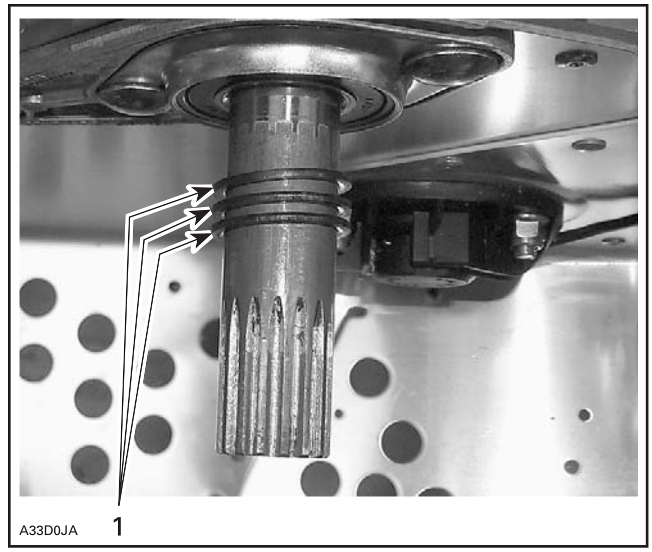
NOTE: Prior to performing pulley adjustment, loosen torque rod and lock nut as mentioned above in the GENERAL PROCEDURE subsection.

Pulley Distance Adjustment Method

Pulley distance adjustment cannot be done on REV series models.

Pulley Alignment Method

Remove pulley and add or remove spacer(s) as required to obtain the specified alignment.



1. Spacers

NOTE: After alignment hand tighten torque rod so it slightly contacts engine crankcase. Do not over tighten, it will disalign pulleys.

DRIVE BELTS

The drive belt is the critical link in transmitting power from one clutch to the other. The changes in belt technology and materials have allowed us to take for granted the kind of reliability and efficiency that not many years ago we all only dreamed about.

One of the more important changes in drive belts has been the introduction of Kevlar® Fiber B to replace fiberglass or polyester cord in the tensile layer of modern drive belts. This material is much stronger, more flexible, and allows a better adhesive bond with the various rubber compounds used to build a drive belt.

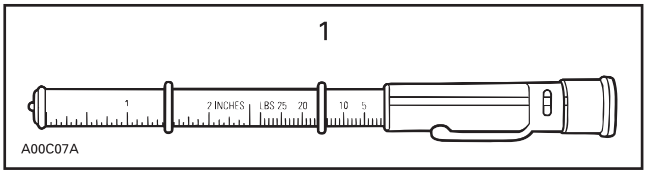
Another important change in drive belts is the increase in width. The extra width allows us to add more Kevlar cords in the tensile layer for strength with today's high output sleds.

Use only the specific Bombardier drive belt listed for your application. The drive belt is a calibrated part of the transmission system. Different belts with different compounds or angles will change how your transmission shifts.

Drive belts can vary ±6 mm (1/4 in) length from belt to belt. Because of this manufacturing tolerance, we recommend measuring your drive belts and marking their length on the outer cover. Try to use only belts that are the same length while racing to keep your clutch set up as consistent as possible.

Always break in a new belt by running it easy for 10-15 miles. Vary the vehicle speed and throttle setting without going over 2/3 throttle. It is also a good idea to mark the direction of rotation on the belt. Once the belt has been used, always run it in the same direction.

Be careful not to bend sharply or coil up these new hard compound drive belts since they are much more prone to cracking in cold weather than earlier belts.



1. Use Ski-Doo tool (P/N 414 348 200)

Proper belt deflection and alignment are extremely important. Included is a page on proper alignment procedures and deflection measurement methods for your use.

Do not forget about the torque limiter rod on most models. This bolt is located between the jackshaft and the engine on the left side. It should be lightly snugged **after** the proper alignment and center to center distances have been set.

NOTE: Do not overtighten, it will misalign pulleys.

Proper deflection, setup, alignment, and break-in will help insure maximum performance and longevity from the drive belt.

DRIVE BELT

APPLICATION CHART

MODEL	PART NUMBER	MINIMUM WIDTH (wear limit) mm (in)
2005 440 REV	417 300 288	34.70 (1.366)
2004 440 REV	417 300 253	34.70 (1.366)
All 593 HO engine equipped models	417 300 197	33.35 (1.313)
All 793 HO engine equipped models	417 300 166	34.70 (1.366)
Drag Race Belt	417 300 230	34.70 (1.366)

INSPECTION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check drive belt width. Replace the drive belt if width is under minimum recommended width (see table above).

CHECKING NEUTRAL FUNCTION

⚠ WARNING

Always check neutral function when servicing.

Apply parking brake. Vehicle must be on the ground and on a plane level surface. No one should be in front of vehicle.

Attach vehicle tether cord to your clothing. Stand aside of vehicle, then start engine.

⚠ WARNING

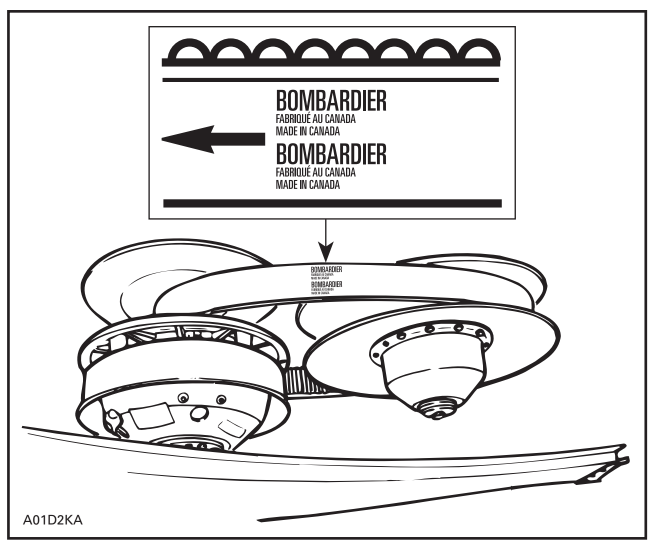
Do not sit on vehicle.

Release parking brake. Vehicle must not creep when engine is idling. Otherwise, make sure that:

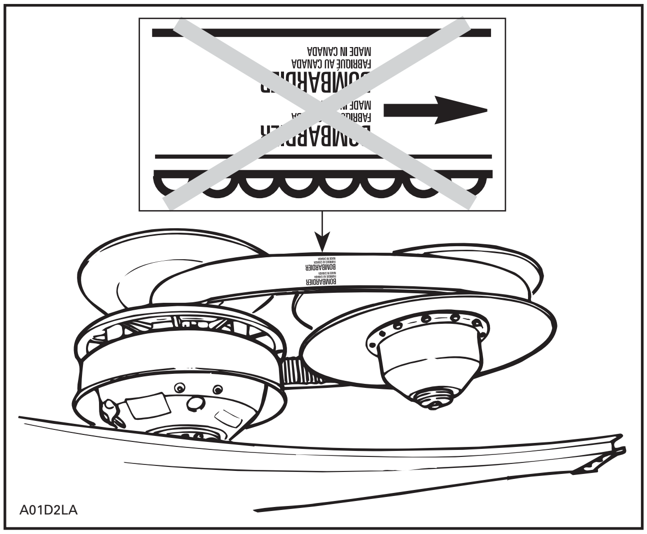
– idle speed is as specified
– proper belt is installed
– pulley center-to-center is as specified
– belt deflection is as specified.

ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



CORRECT



INCORRECT

NOTE: For used drive belt, mark and reinstall in the same position.

DRIVE BELT HEIGHT MEASUREMENT AND ADJUSTMENT

Measurement

NOTE: The drive belt height measurement must be performed each time a new drive belt is installed.

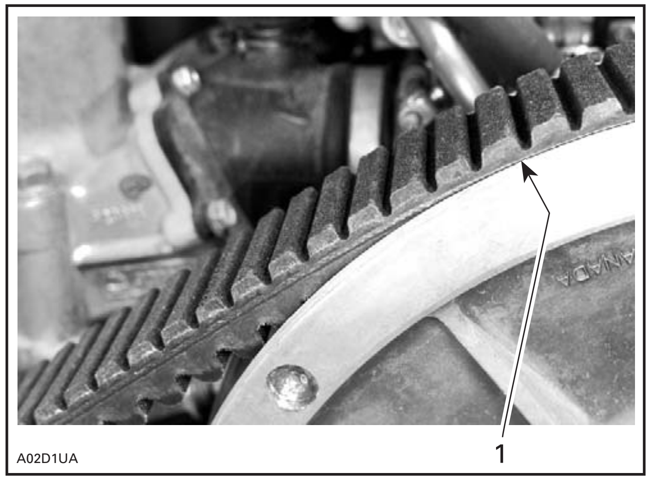
NOTE: To obtain an accurate drive belt height measurement, it is suggested to allow a break-in period of 50 km (30 m).

Before checking the belt height, ensure that a good-condition proper belt (refer to the *Application Chart*) is installed.

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt height must be adjusted according to specifications shown in the accompanying chart.

MODEL	BELT HEIGHT
All models	Top edge of drive belt cord should be flush with driven pulley edge



1. *Flush*

Adjustment

Before adjusting the belt height, ensure that a good-condition proper belt (refer to the *Application Chart*) is installed.

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT.

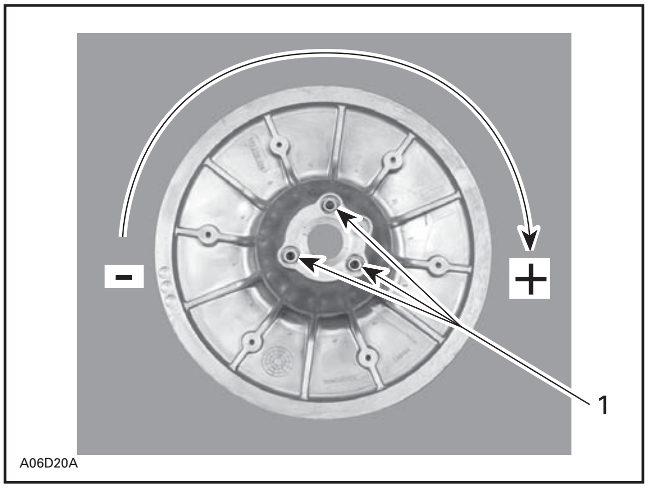
Models Equipped with Formula VSA Type Driven Pulley

Adjust drive belt height using Allen screws, as shown.

To lower belt in driven pulley: turn Allen screws clockwise.

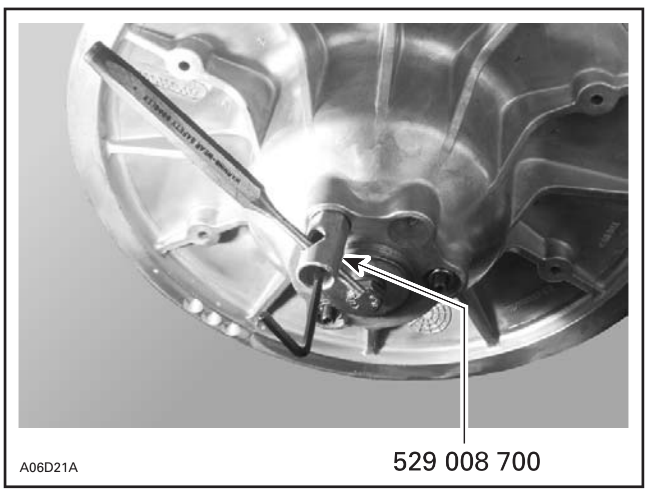
To raise belt in driven pulley: turn Allen screws counterclockwise.

NOTE: Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check height, repeat as required.



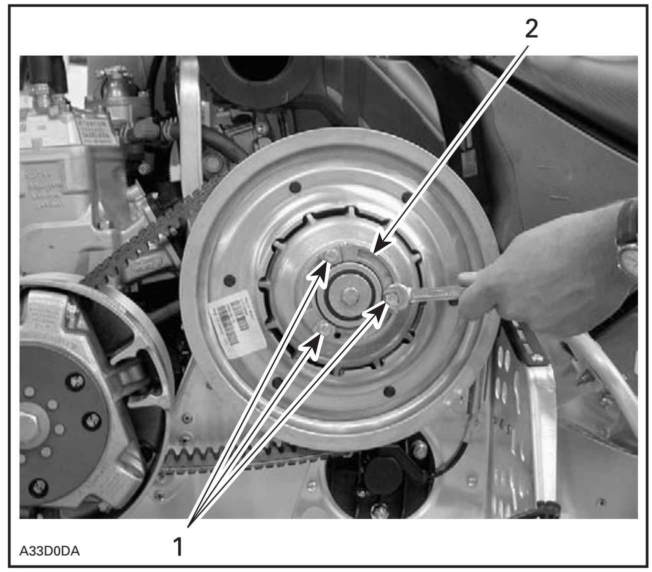
TYPICAL
1. *Allen screws with jam nuts*

Allen screws must be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).



TYPICAL

Models Equipped with HPV27 VSA Type Driven Pulley

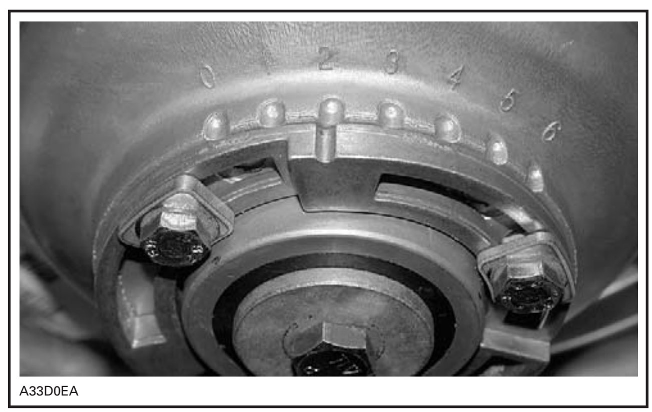


1. *Screws*
2. *Adjustment ring*

Loosen screws and turn adjustment ring as follows:

To lower belt in driven pulley: turn adjustment ring counterclockwise and tighten the screws.

To raise belt in driven pulley: turn ring clockwise and tighten the adjustment screws.



DRIVEN PULLEY NOTCHES

Turn the adjustment ring up to one notch, tighten the screws, then rotate driven pulley to allow drive belt to settle in pulley. Check height, if required the adjustment ring can be turned up to 1/4 or 1/2 the notch. Check height, repeat as required.

NOTE: Notches are there on the driven pulley for reference purpose only and the desired adjustment can be attained at any point.

DRIVE BELT DEFLECTION MEASUREMENT (reference only)

NOTE: The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE: To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 m).

Before checking the belt deflection, ensure vehicle has the proper belt (refer to the *Application Chart*).

Adjust pulley distance and alignment. Refer to PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

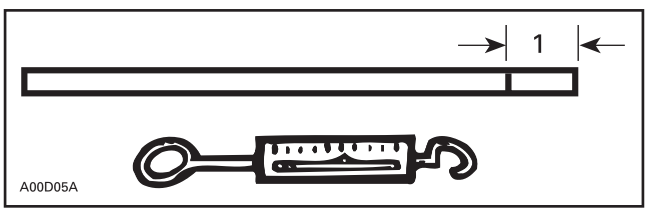
MODEL	DEFLECTION† mm (in)	FORCE kg (lb)
All models	32 ±5 (1.260 ±.197)	11.5 (25)

† FOR REFERENCE ONLY

To Check Tension

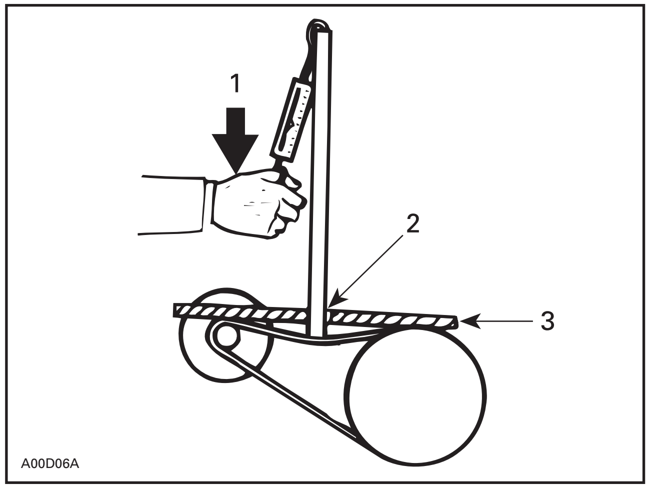
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method



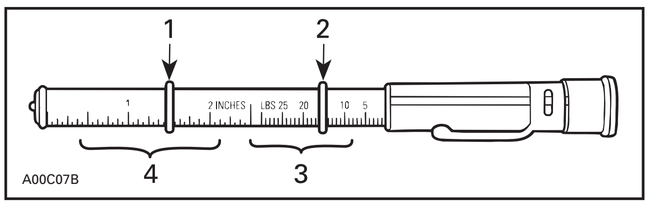
1. *Mark specified deflection*

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



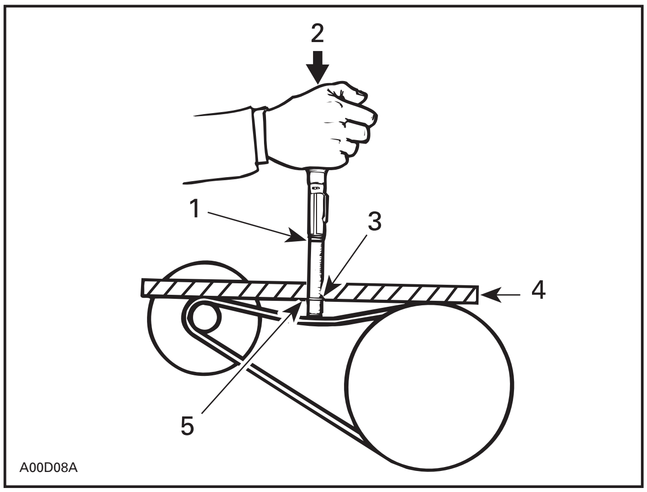
1. *Force*
2. *Read deflection here*
3. *Reference rule*

Or use the belt tension tester (P/N 414 348 200).



1. *Lower O-ring*
2. *Upper O-ring*
3. *Force (read down)*
4. *Deflection (read up)*

1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to 0 (zero) on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.



1. *Upper O-ring — force*
2. *Force*
3. *Lower O-ring — deflection*
4. *Reference rule*
5. *Deflection*

CHAINCASE GEARING

Contrary to popular belief, small gear changes do not directly affect top speed as long as the clutches are functioning properly. Gearing one or two teeth taller on the top will not generally make the vehicle any faster on top end unless the clutches are fully shifted out and the engine is starting to overrev.

With the TRA clutch, we have about 20 percent more shift ratio available compared to other designs. Because of this, we have been able to lower the gearing in our chaincase considerably. Yet, we still have the same overall top gear ratio because of the 0.8:1 top ratio of the TRA clutch.

This gives us better belt life by allowing our clutches to **slip** for a shorter period of time at engagement. It also provides more torque to the drive axle for acceleration.

Most snowmobiles are geared on the **high** side from the factory. They are usually geared for 8 -16 km/h (5-10 MPH) more than they would reach in average conditions. Because of this, the belt does not seem to go all the way to the top of the drive clutch. This is a normal situation. Snowmobiles run under widely varying conditions. If all snowmobiles were geared to attain a full shift under average conditions and then the vehicle were run on a perfectly smooth frozen surface, it would easily shift out to its geared top speed. Since the drag is so low under these conditions, the engine would begin to over-rev, eventually lose power, possibly damage the engine, and you will not achieve top speed.

There are other factors involved here also. As clutches shift through their range, the efficiency with which they transmit power decreases as the clutch ratio exceeds about 1.5:1. Efficiency also drops as belt speed (RPM) increases. For optimum chaincase performance ensure that you use the synthetic chaincase oil.

Because newer clutch designs shift beyond a 1:1 ratio, belt speed increases dramatically and the diameter that the belt follows around the driven pulley decreases considerably. This wastes energy and efficiency as the belt is being bent around a smaller diameter and centrifugal force is trying to pull the belt into a circular path instead of following the pulleys.

This is why for years manufacturers kept their clutch ratios around 1:1 to keep belt speeds down.

Now with the advent of larger displacement, high torque, lower RPM engines, we can use overdrive transmissions and still keep our belt speeds within reason.

As we mentioned, as belt speeds go up, efficiency drops. This is one reason many radar runners gear extremely high sometimes even approaching 1:1 in the chaincase. They have found through diligent testing that they can achieve a higher top speed without shifting their clutches all the way out because of a decrease in belt speed which means an increase in transmission efficiency. That is their bottom line.

For oval racing, the small benefit you may achieve in top end speed would probably be lost by the loss of acceleration on the start and out of the corners on a tight oval circuit.

This holds true for cross-country and snow crossers also. Top speed is not as important as quick acceleration out of the corners and ditches.

You can easily check your gearing selection by marking your drive clutch with a black marker with straight lines from bottom to top on the belt surfaces of the clutch. Go out and ride your sled under your normal conditions and stop to see how far the belt has rubbed the marker off the clutch surfaces. If it has shifted the belt all the way to the top, you may be able to pull one or two more teeth on the top sprocket. Experiment!

If it is down about 1/2 in or more from the top, you could consider trying a one tooth smaller top gear depending upon your type of racing.

The best combination of gearing for speed and acceleration you can achieve is far more important than shifting the belt **all the way to the top** of the clutches.

The following formula can be used to calculate the theoretical top speed of your Ski-Doo. The formula assumes the transmission is shifted out to its top gear ratio. Make sure you use the correct track pitch and transmission ratio for your machine.

TRA clutch top ratio = .83

Pitch of internal drive track = 2.52 in

Number of teeth on internal drive sprocket = 9

NOTE: Some Summit and long track models use 10 tooth drive sprockets.

$$\text{top speed in MPH} = \frac{\text{engine RPM}}{\text{clutch ratio}} \times \frac{\text{teeth, top sprocket}}{\text{teeth, bottom sprocket}} \times \frac{(\text{pitch of track} \times \text{No. of teeth on drive sprocket})}{12} \times \frac{60}{5280}$$

A little known fact that can seriously impair a racer's performance is the misconception that the factory stated peak horsepower RPM or the peak power point you find on a dyno is the correct figure to clutch your race sled to.

Generally, this is not the case. The figures that are printed by the factory are determined on a dynamometer in clinical test conditions.

MXZ GEAR RATIO VS SPEED

ENGINE RPM = 8400 1 - 1 CLUTCH RATIO 9 TOOTH 10 TOOTH

TOP	BOTTOM	RATIO	CHAIN	MPH	MPH
27	43	1,59	76	113	126
26	43	1,65	76	109	121
25	43	1,72	76	105	117
24	43	1,79	74	101	112
23	43	1,87	74	96	107
22	43	1,95	74	92	103
21	43	2,05	74	88	98
20	43	2,15	74	84	93
19	43	2,26	72	80	89
27	44	1,63	76	111	123
26	44	1,69	76	107	118
25	44	1,76	76	103	114
24	44	1,83	76	98	109
23	44	1,91	74	94	105
22	44	2,00	74	90	100
21	44	2,10	74	86	96
20	44	2,20	74	82	91
19	44	2,32	74	78	87
27	45	1,67	78	108	120
26	45	1,73	76	104	116
25	45	1,80	76	100	111

MXZ GEAR RATIO VS SPEED

ENGINE RPM = 8400 1 - 1 CLUTCH RATIO 9 TOOTH 10 TOOTH

TOP	BOTTOM	RATIO	CHAIN	MPH	MPH
24	45	1,88	76	96	107
23	45	1,96	76	92	102
22	45	2,05	76	88	98
21	45	2,14	74	84	94
20	45	2,25	74	80	89
19	45	2,37	74	76	85
27	46	1,70	78	106	118
26	46	1,77	78	102	113
25	46	1,84	76	98	109
24	46	1,92	76	94	105
23	46	2,00	76	90	100
22	46	2,09	76	86	96
21	46	2,19	76	82	92
20	46	2,30	74	78	87
19	46	2,42	74	75	83
27	47	1,74	78	104	115
26	47	1,81	78	100	111
25	47	1,88	78	96	107
24	47	1,96	78	92	102
23	47	2,04	76	88	98
22	47	2,14	76	84	94
21	47	2,24	76	81	90
20	47	2,35	76	77	85
19	47	2,47	74	73	81

100 engine RPM change, equals approx. 1 mph change.

CHAINCASE GEARS AND CHAINS

	13 WIDE		
# OF TEETH	STEEL	POWDER	ALUMINUM
TOP			
19	504 152 030	504 152 031	
20	486 070 700	504 152 328	
21	504 151 500	504 096 200	
22	504 083 500	504 091 100	
23	504 085 400	504 091 000	
24	504 139 700	504 090 900	
25		504 084 300	
26		504 085 300	
27		504 148 400	
BOTTOM			
40		504 089 000	
41			
42			
43		504 148 500	486 104 600
44		504 085 500	
45	504 152 379		486 104 700
45	504 152 518	clutch gear	
46			
47			486 104 800

	15 WIDE		
# OF TEETH	STEEL	POWDER	ALUMINUM
TOP			
19	486 092 600		
20	504 151 911		
21	504 152 044	504 151 913	
22	486 074 600	504 151 914	
23	486 093 000		
24		504 151 930	
25			
26		504 151 931	
27		504 148 900	
BOTTOM			
42			
43		504 148 700	486 400 006
44			
45			486 400 007
46			
47			

CHAIN	13 LINK	15 LINK
78 PITCH	-	486 130 094
76 PITCH	504 151 856	504 152 431
74 PITCH	504 151 857	504 151 932
72 PITCH	504 151 830	504 152 429
70 PITCH	504 152 032	504 152 428

All 486 parts must be ordered from the Valcourt Race Dept. or the Ski Doo Parts Support Truck

TRANSMISSION CALIBRATION PROCEDURE

1. A new vehicle should be broken-in before fine tuning the transmission. 200 — 300 miles will allow things like bearings and the track to loosen-up. This will allow the sled to roll much freer which may slightly change the clutch calibration.
2. Set up the chassis configuration (lowering, weight transfer, traction).
3. Adjust the carburetor calibration to match the condition of the day.
4. Pick the chain case ratio.
5. Define the driven pulley calibration. Stock is a good starting point. Drag racers may consider trying a larger cam angle. Use multi-angle cams only for fine tuning after working with the drive clutch.
6. Choose the drive belt (compound, length, width).
7. Define the TRA calibration.
   - Start with the stock ramp in position #3.
   - For most forms of racing, a higher engagement RPM can be utilized. The better the traction, the higher the engagement that can be used. Most stock grass drag rules limit engagement to 5500 RPM. That's 5500 RPM on the technical inspector's tachometer and it may not agree with your dash tachometer. If in doubt, get the tech. man to verify your engagement. The easiest way to raise engagement is to use a spring with a higher start load and a similar finish load. Remember, the stiffer spring at start will also affect the shift curve at 0 to 1/2 ratio.
   - If the stiffer spring slowed down the shift at low ratios, try more roller pin weight. The pin weight will not change engagement much but will shift faster. Utilize the threaded roller pins to achieve pin weights in between the hollow steel and solid steel pin.
   - Fine tune the shift curve by trying different adjuster positions. Use the lowest adjuster number that still allows you to maintain RPM.
   - Pin weight and ramp angle are interrelated, but can be varied to achieve certain results. A 16.5 gram pin and the adjuster set in #5 may produce the same full throttle RPM as a 14.5 gram pin with the adjuster set in #3, but the lighter pin will be revving higher at part throttle setting at low ratios. This may work better for snowcross or woods racing whereas the heavier pin may be better in a drag race. Some ramp profiles will achieve better top speed with the adjusters set in lower numbers (1-4). If you are in position 5 or 6, try a slightly lighter pin weight (1.5 to 2 grams) and lower the adjuster position.

NOTE: Never use adjuster position #6 with the FZ ramp. The tip of the ramp may touch the lever arm.

   - If your shift curve is perfect but the engagement is too low, a flat or notch can be ground in the ramp right where the roller sits at neutral position. This is a touchy procedure and should only be attempted as a last resort. Be prepared to scrap some ramps during the learning procedure.
8. The best way to test clutching is with a set of timing lights or side by side comparison with a similar vehicle. Leave one machine as a base line reference while tuning the test vehicle. Don't change things on both vehicles at the same time or you won't know if you are gaining or losing. Also, only change one parameter at time on your test vehicle so you know exactly what results from the change.
9. For drag racers, try running the engine down to several hundred RPM below the stated power peak. When the exhaust is cold, the peak power RPM drops. How much lower depends on the engine type, exhaust type, jetting and underhood temperature. Summer and fall grass draggers should especially try lower RPM.
10. This is where the winners become winners. Test, test, test and then go test some more.
11. KEEP DETAILED NOTES OF ALL YOUR TESTINGS!!! No matter how good you think your memory is, after you test your hundredth combination, things can get overwhelming.

TRANSMISSION TUNING TEST SHEET

DATE: VEHICLE: SHEET NO.: ___________

TEST SITE: TEMPERATURE: SURFACE COND.: ______

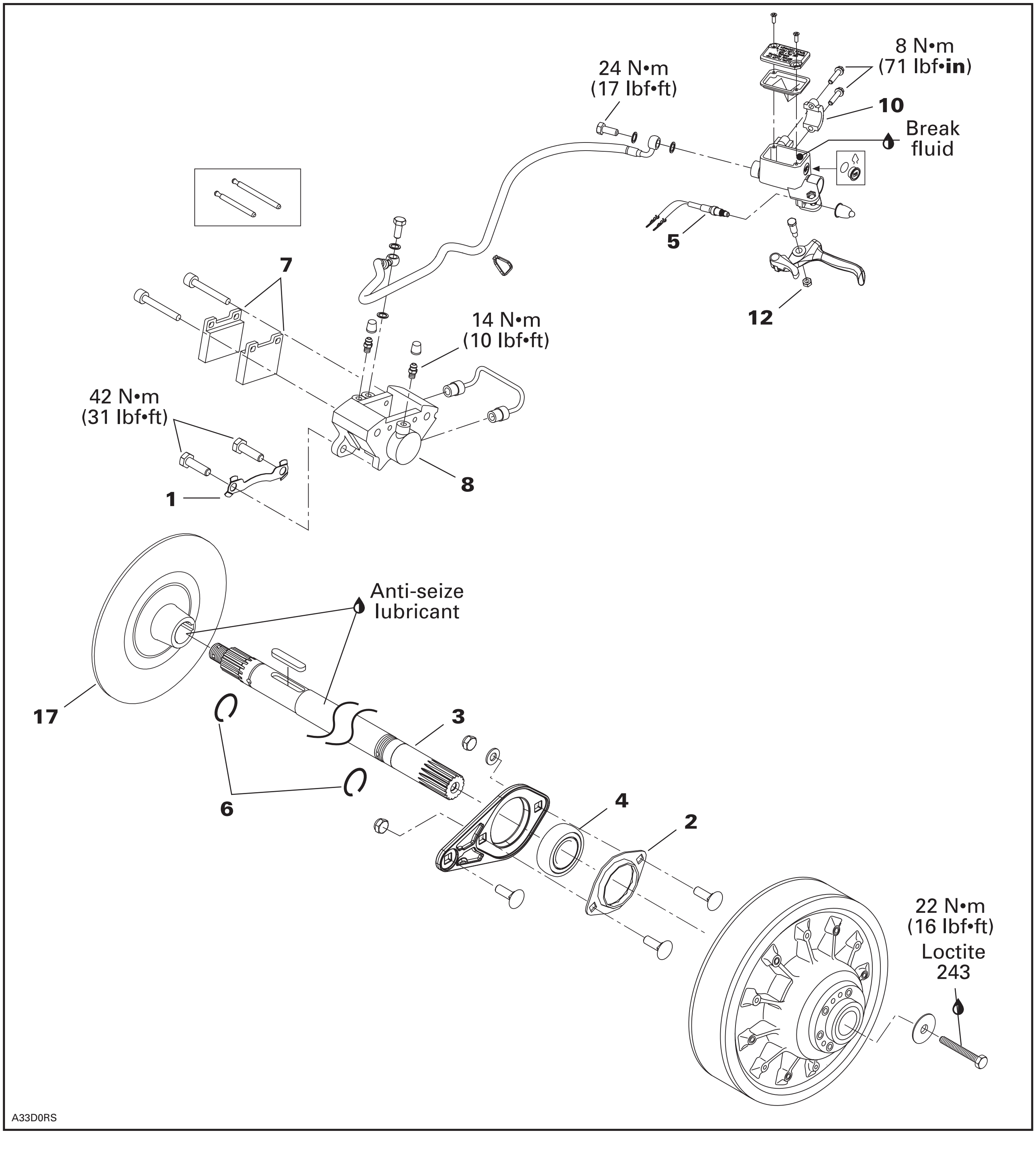
		TEST 1	TEST 2	TEST 3	TEST 4	TEST 5
	Cam angle					
	Spring color code					
	Spring preload, lb					
	Spring position ex.: (A-4)					
	Chaincase gearing					
	Lever arm and pin type					
	Weight each assembly					
	Ramp identification					
	No. of set screws added (if used)					
	Spring color code/tension					
	TRA adjuster position					
	Belt part number					
	Width					
	Length					
	Engagement RPM					
	Shift RPM					
	Top speed					
	Time for run/measured distance					
	Variation min./max.					
	Special notes					

RACERS LOG

VEHICLE:		DATE:		SHEET NUMBER:
LOCATION:		SURFACE CONDITIONS:		
TEMPERATURE:		BAROMETRIC PRESSURE:		HUMIDITY:
CARBURETOR SIZE:		FUEL:		C.R.A.D.:
	PTO	MAG	Carburetion notes:	
Main jet				
Needle jet				
Jet needle				
E-clip position				
Slide cut-away				
Pilot jet				
Drive pulley			Clutching notes:	
Lever arm/pin type				
Pin weight				
Ramp identification				
TRA adjuster position				
Spring identification				
Spring pressure @ engagement				
Spring pressure @ full shift				
Engagement RPM				
Shift RPM				
Drive belt identification				
Driven pulley				
Cam identification				
Spring identification				
Spring preload and location				
Chaincase gearing				
	LH	RH	Chassis notes:	
Inches of carbide/ski				
Camber				
Front spring identification				
Ride height				
Center spring identification				
Limiter adjustment				
Rear spring identification				
Ride height				
Stud quantity and type				

BRAKE

HYDRAULIC BRAKE



BRAKE FLUID TYPE

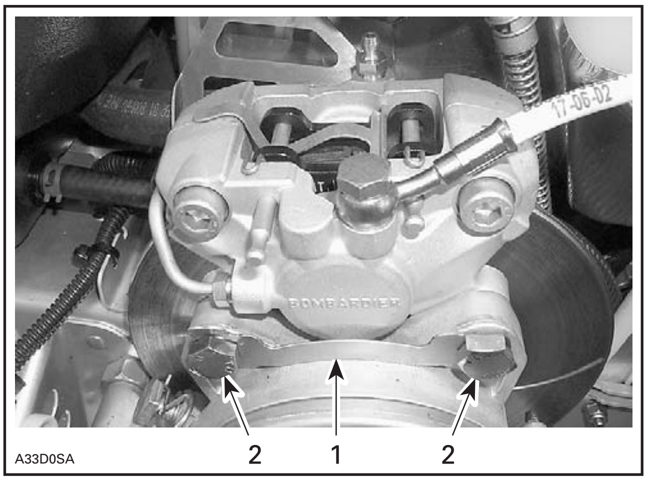
Use recommended brake fluid SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062).

CALIPER

Removal

Caliper **no. 8** can be removed as follows:

– Unscrew 2 screws and remove locking tab **no. 1**.



1. Locking tab
2. Screws

– Pull out caliper from the brake disc.

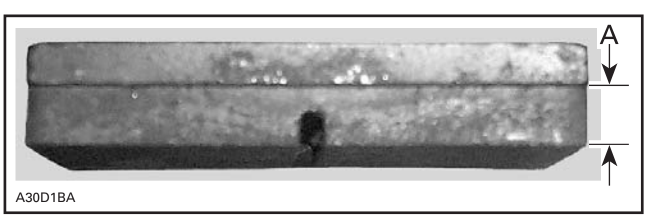
Installation

– Install caliper on the brake disc.
– Install locking tab.

BRAKE PADS REPLACEMENT

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less.

CAUTION: Brake pads must always be replaced in pairs.

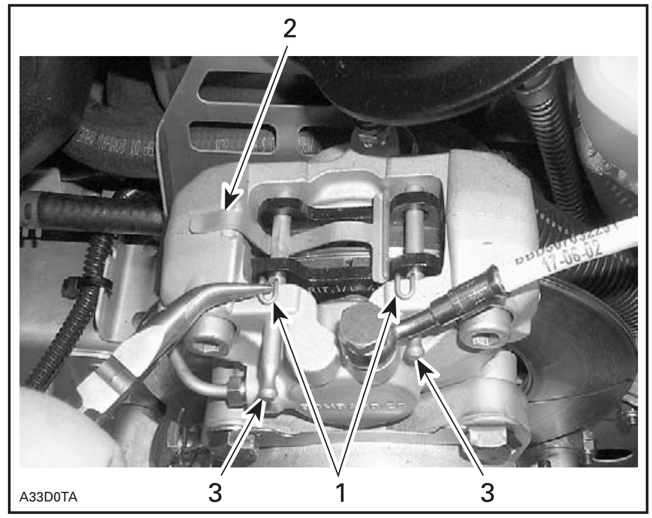


A. 1 mm (1/32 in) minimum

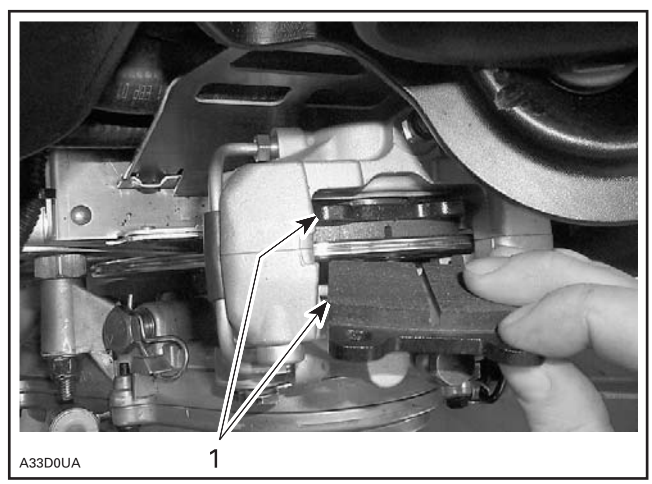
Removal

Brake pads removal procedure is as follows:

– Remove 2 retainers from the pins.
– Pull out 2 pins which releases the spring.
– Remove the brake pads.



1. Retainer
2. Spring
3. Pin



1. Brake pad

Installation

– Install new brake pads.
– Install spring and push 2 pins to lock the brake pads.
– Install 2 retainers in the pin holes.

To install brake, reverse removal procedure pay attention to the following.

⚠ WARNING

Avoid getting oil on brake pads.

Each time a new caliper or new brake pads are installed, proceed with the following:

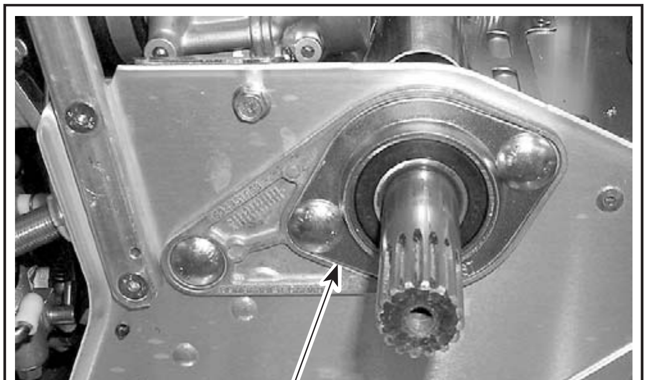
– With caliper not bolted to chaincase, apply brake few times until both new pads are touching each other.
– Push back pads and repeat above step.
– Push back pads then fasten caliper to chaincase.
– Proceed with bleeding as described in this subsection.

REMOVAL

BRAKE DISC REMOVAL

Brake disc can be removed without removing chaincase. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Loosen the carburetor.
– Unbolt bearing support **no. 2** from chassis.
– Unscrew caliper from chaincase.



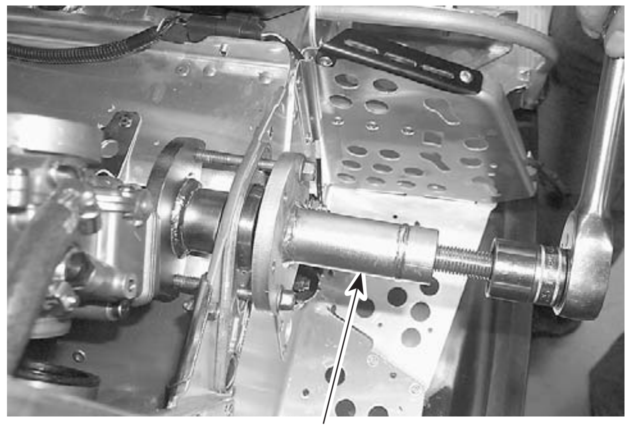
A33D0VA 1

1. *Bearing support*

– Open chaincase and remove upper sprocket.
– Pull countershaft **no. 3** toward driven pulley side to free from chaincase and disc.
– Remove disc.

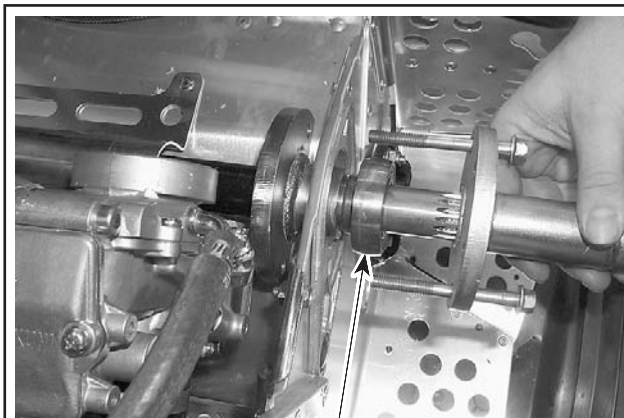
COUNTERSHAFT BEARING REMOVAL

Unbolt bearing support **no. 2**. Install screws on the remover (P/N 529 035 699).



A33D0WA 529 035 699

Install remover (P/N 529 035 699) on countershaft for complete bearing removal.



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1. *Bearing*

COUNTERSHAFT REMOVAL

Proceed the same as for brake disc and countershaft bearing removal and then remove the countershaft.

DISASSEMBLY

7, Brake Pad

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

CAUTION: Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

INSPECTION

7, Brake Pad

CAUTION: Brake pads must always be replaced in pairs.

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less. Refer to the photo in BRAKE PADS REPLACEMENT.

17, Brake Disc

Check for scoring, cracking or bending, replace as required.

CAUTION: Brake disc should never be machined.

INSTALLATION

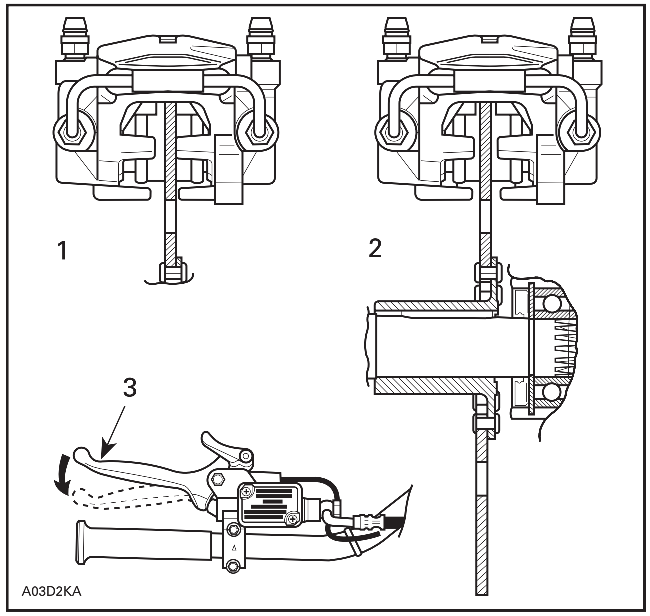
Apply anti-seize lubricant (P/N 293 800 070) on shaft.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

7, Brake Pad

After brake pads installation, brake disc must be centered in caliper. Apply brake then check for proper brake disc positioning.

Push on appropriate caliper piston in order to move pad inward allowing proper brake disc positioning.



1. Brake disc not centered
2. Brake disc centered
3. Apply brake before checking

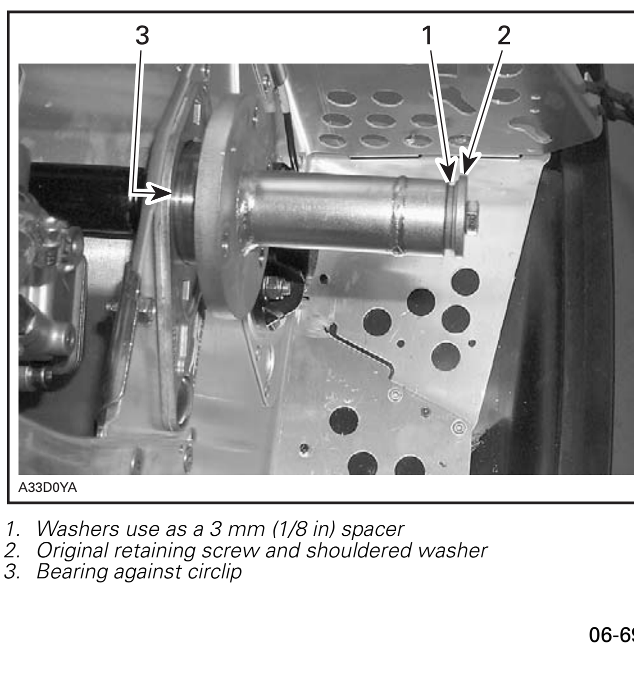
Apply brake then recheck.

Countershaft Bearing Adjustment

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing **no. 4** using proper tool.

To install bearing on countershaft, use remover (P/N 529 030 100) and some flat washers of 3 mm (1/8 in) total thickness. Using original retaining screw and shouldered washer tighten until bearing rests against circlip.



1. Washers use as a 3 mm (1/8 in) spacer
2. Original retaining screw and shouldered washer
3. Bearing against circlip

Ensure that countershaft is properly aligned, then tighten 3 retaining screws.

NOTE: A misaligned countershaft will result in difficulty to center the bearing in its support.

Torque castellated nut of upper sprocket to 45 to 75 N•m (33 to 55 lbf•ft).

Close chaincase referring to CHAINCASE.

5,12, Brake Cable and Nut

Insert brake cable into upper hole in brake lever and caliper. Install nut and tighten until a few threads exceed.

⚠ WARNING

At least 3 threads must exceed the elastic stop nut.

ADJUSTMENT

Brake

Bleed brake system as follows:

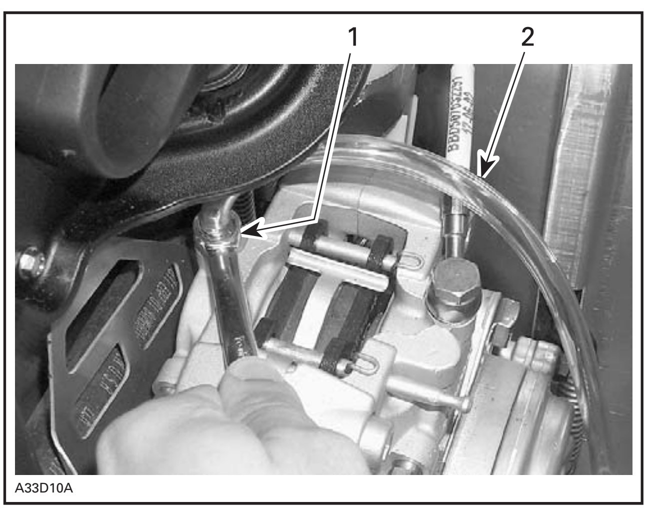
Keep sufficient SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid in reservoir at all times.

CAUTION: Use only SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid.

Install a hose on bleeder. Route this hose to a container. Open bleeder.

Pump brake lever until no air escapes from hose.

Close bleeder.



1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

5, Brake Light Switch

There is no adjustment on these models. Check that switch is securely installed.

BLEEDING

Change brake fluid often.

Bleed brake system as follows:

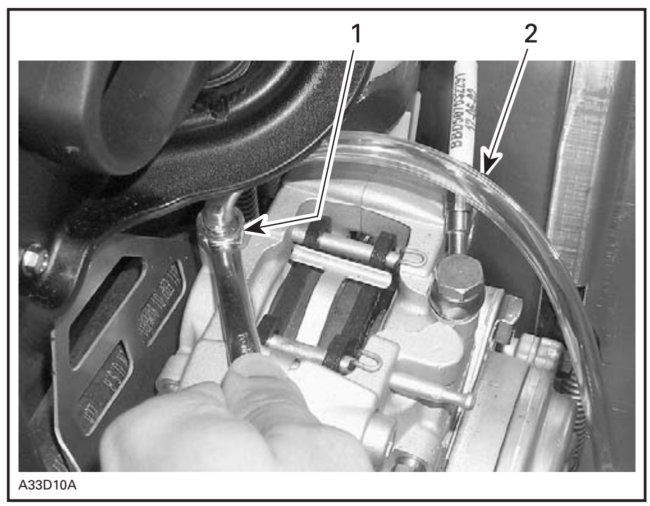
Keep sufficient SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) 4 brake fluid in reservoir at all times.

CAUTION: Use only SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062) brake fluid.

Install a clear hose on bleeder. Route this hose to a container. Open bleeder.

Pump brake lever until no air escapes from hose.

Close bleeder.

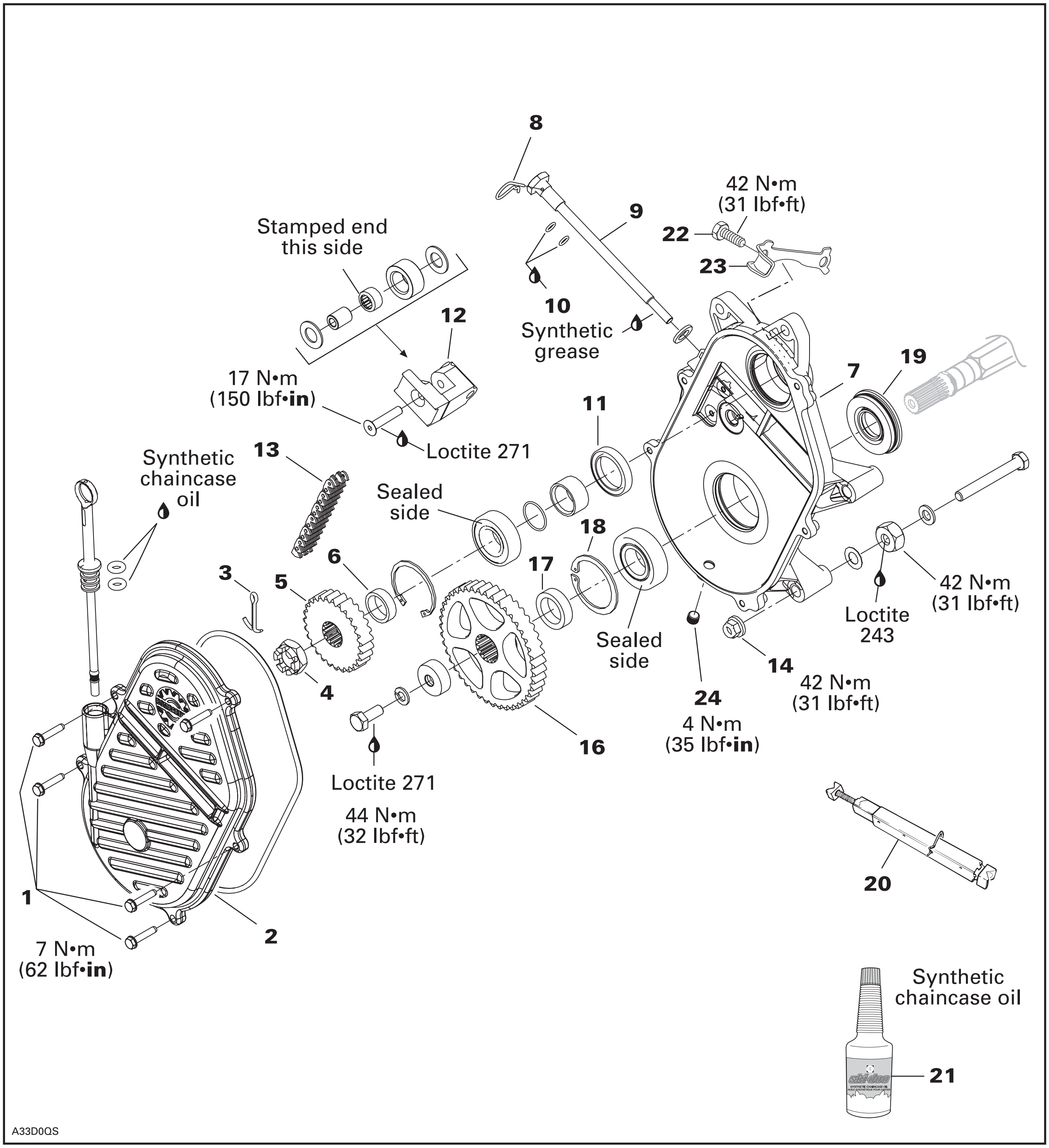


1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

⚠ WARNING

Avoid getting oil on brake pads. Do not lubricate or apply antirust or antifreeze solution in brake cable.

CHAINCASE



8
9
42 N•m
(31 lbf•ft)
22
23
Stamped end
this side
10
Synthetic
grease
12
7
19
17 N•m
(150 lbf•in)
11
Loctite 271
Synthetic
chaincase
oil
13
Sealed
side
18
6
3
5
17
42 N•m
(31 lbf•ft)
Loctite
243
Sealed
side
4
14
42 N•m
(31 lbf•ft)
24
4 N•m
(35 lbf•in)
16
Loctite 271
44 N•m
(32 lbf•ft)
20
1
2
7 N•m
(62 lbf•in)
Synthetic
chaincase oil
21
A33D0QS

REMOVAL AND DISASSEMBLY

To remove chaincase proceed as follows.

Remove hair pin **no. 8**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing drain plug **no. 24**.

Remove 5 screws **no. 1**

3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

Apply parking brake.

Remove cotter pin **no. 3** and nut **no. 4** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

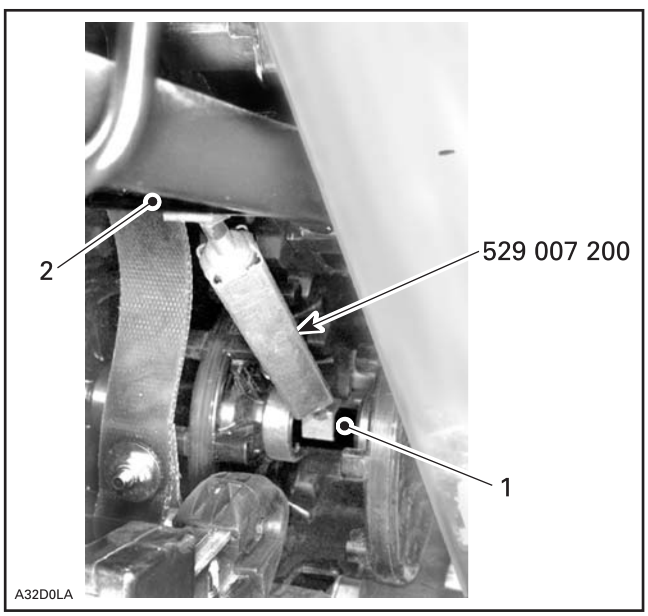
NOTE: Should countershaft removal be required, refer to BRAKE then look for COUNTERSHAFT REMOVAL.

Release parking brake.

Remove 3 nuts **no. 14**.

Unfold locking tab **no. 23** then remove caliper retaining screws **no. 22**.

Release track tension, use drive axle holder **no. 20** (P/N 529 007 200).

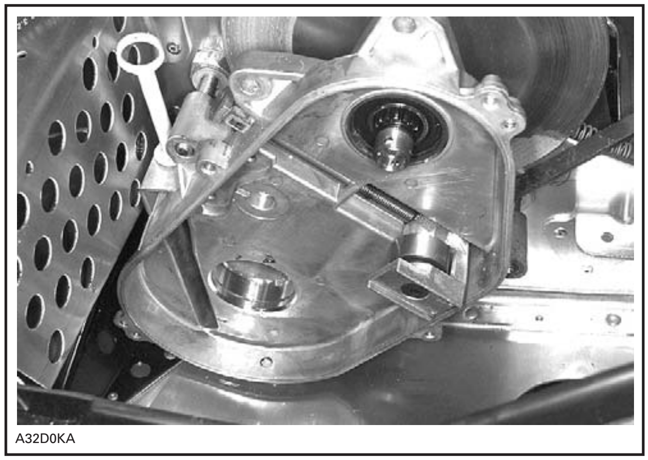


TYPICAL
3. Drive axle
4. Suspension front arm upper axle

Pry out drive axle oil seal **no. 19** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large prybars inserted between chaincase housing **no. 7** and frame, pry complete assembly from vehicle.



TYPICAL — CHAINCASE HOUSING REMOVAL

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

⚠ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

CAUTION: Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

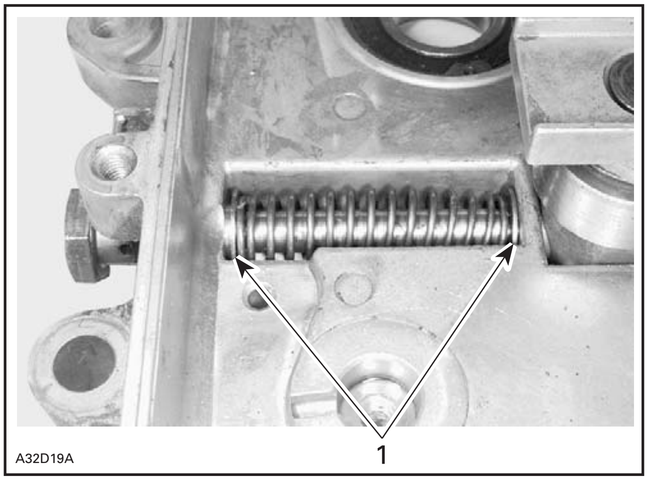
NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

INSTALLATION AND ASSEMBLY

Reverse removal and disassembly procedure and pay attention to the following. Replace oil seals, gaskets O-rings and drain plug.

25, Hardened Washer

Make sure to install a hardened washer on each end of spring.



1. Hardened washers

11, Oil Seal

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

NOTE: Should installation procedure for countershaft be required, refer to BRAKE.

5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover. Sprocket hub faces toward chaincase.

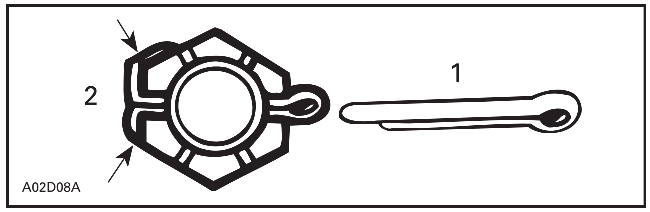
4, Upper Sprocket Castellated Nut

Torque to 45 to 75 N•m (33 to 55 lbf•ft).

Install new cotter pin in the position shown.

CAUTION: When removing a cotter pin always replace with a new one.

CAUTION: Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

18, Circlip

CAUTION: It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

DRIVE CHAIN ADJUSTMENT

NOTE: Brake disc key must be in good condition before checking if chain is loose.

10, O-Ring

Replace O-ring **no. 10** on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3 - 5 mm (1/8 - 13/64 in) free-play when measured at the outer circumference of the brake disc.

CAUTION: Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

⚠ WARNING

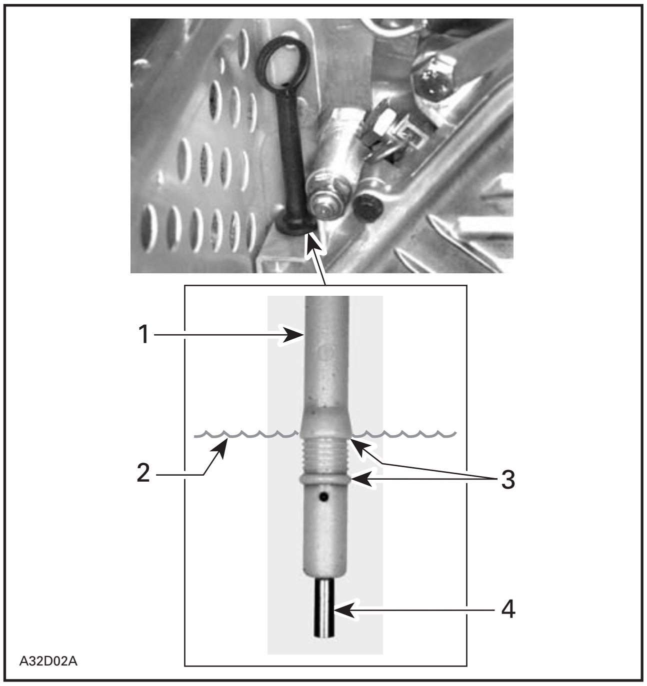
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

21, Chaincase Oil

Pour 250 mL (8.5 U.S. oz) of synthetic chaincase oil (P/N 413 803 300) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 U.S. oz).

Check oil level with the dipstick then add if required. Remove metal particles from magnet.



TYPICAL
1. *Dipstick*
2. *Oil level*
3. *Level between marks*
4. *Magnet*

NOTE: Chaincase must be in its proper position when checking oil level.

ADJUSTMENT

Pulley Alignment

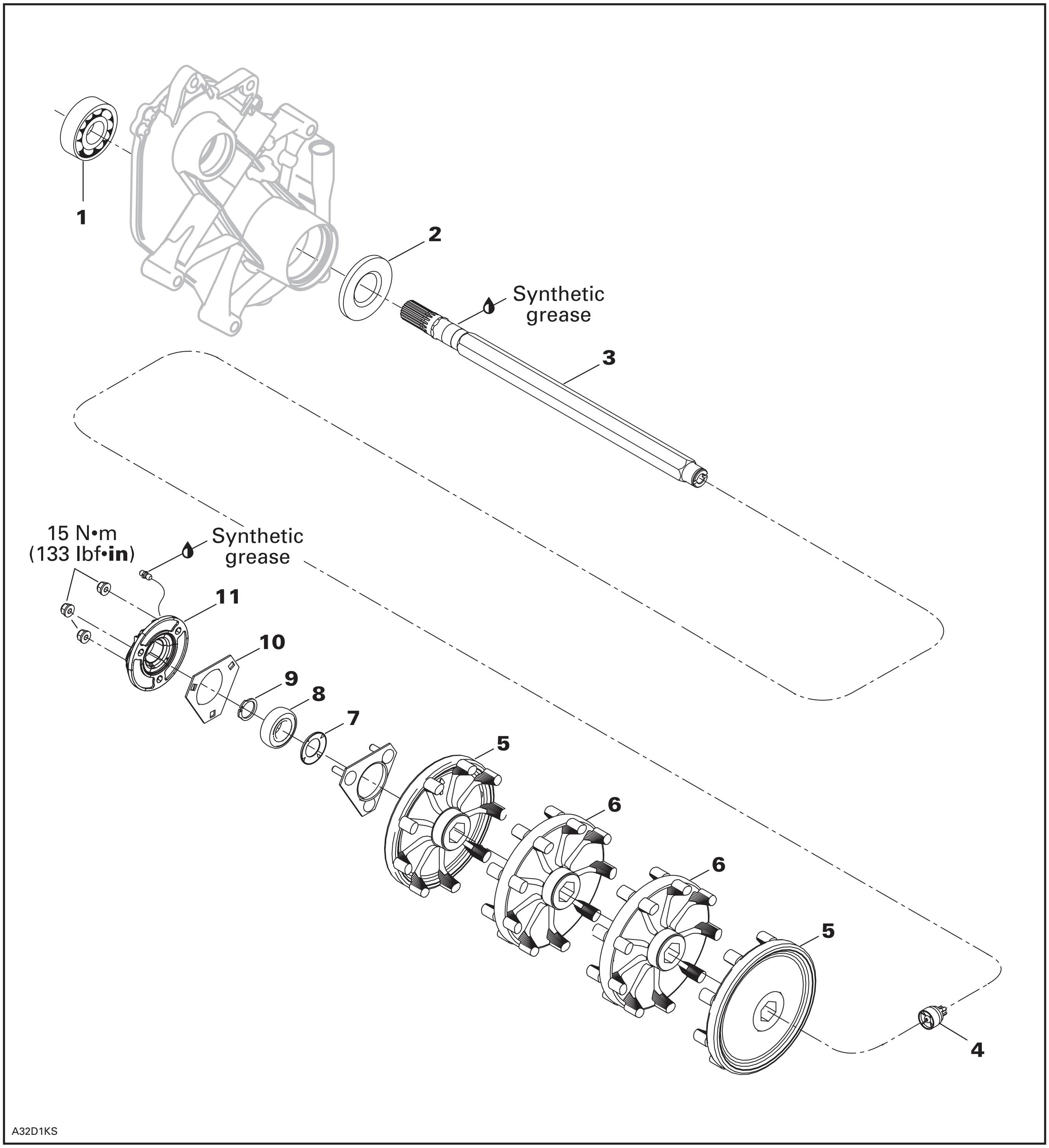
Refer to PULLEY DISTANCE AND ALIGNMENT.

Track Tension and Alignment

Refer to TRACK.

DRIVE AXLE

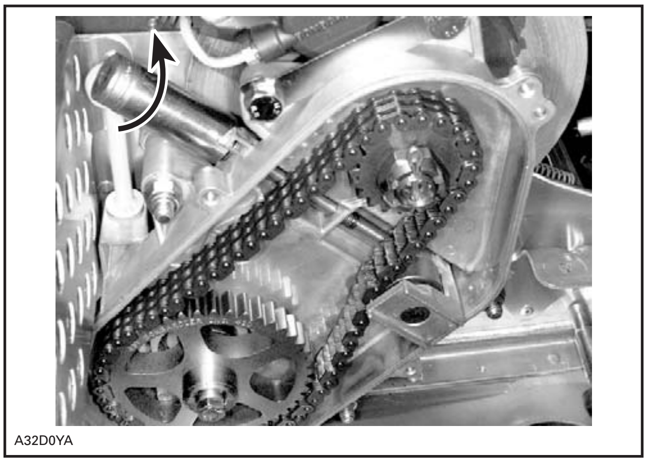
REV Series Models



REMOVAL

Remove battery (if so equipped) to gain access, refer to BATTERY section.

Drain oil from chaincase. Remove chaincase cover. Release drive chain tension.

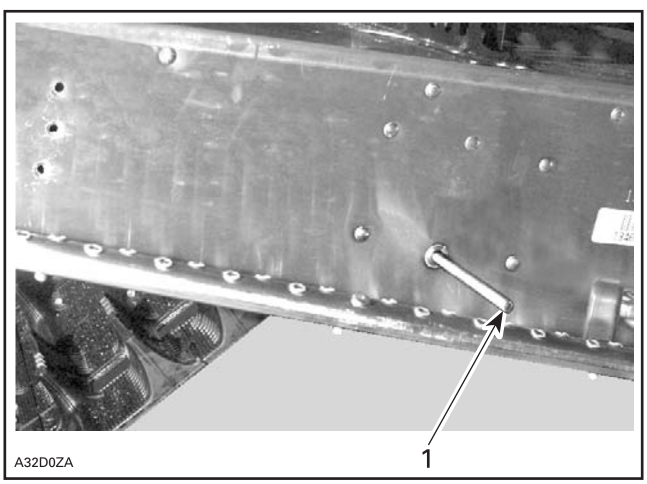


TYPICAL

Raise and block rear of vehicle off the ground.

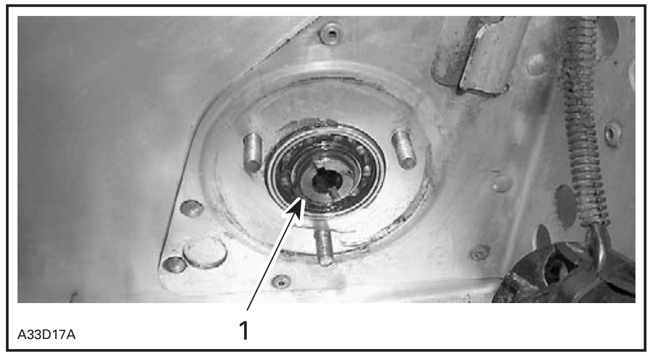
Remove suspension. Refer to proper subsection.

Track can be held in tunnel using a rod in place of center idler wheel axle.



1. *Rod*

Remove speed sensor **no. 11**, outer flange **no. 10** and circlip **no. 9** from left side.



1. *Circlip*

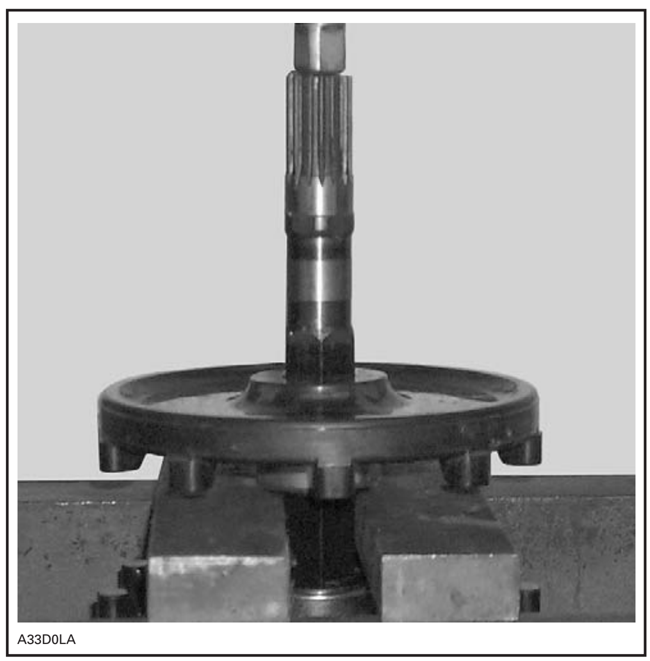
Apply parking brake.

Remove chain and sprockets then circlip from right side.

Release drive axle sprocket from track and at the same time, push the drive axle **no. 3** toward the right side. Drive axle bearing **no. 1** in chaincase or gearbox will fall off.

5,6, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.

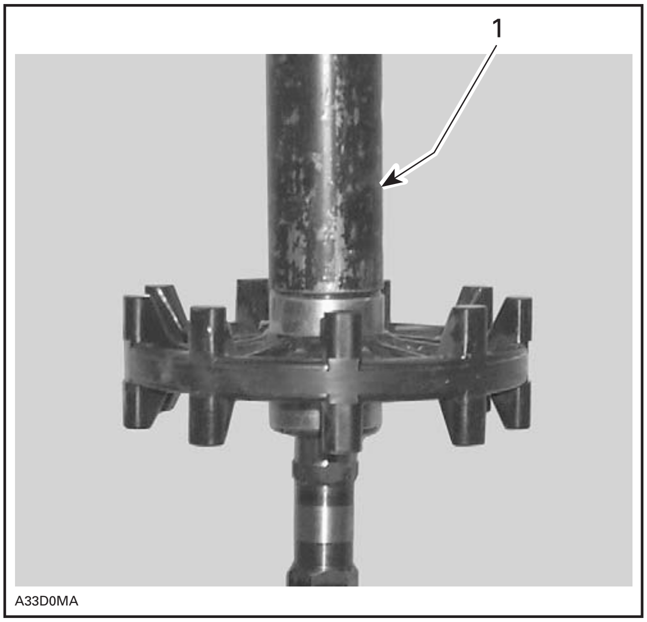


SUPPORT SPROCKET NEAR HUB

ASSEMBLY

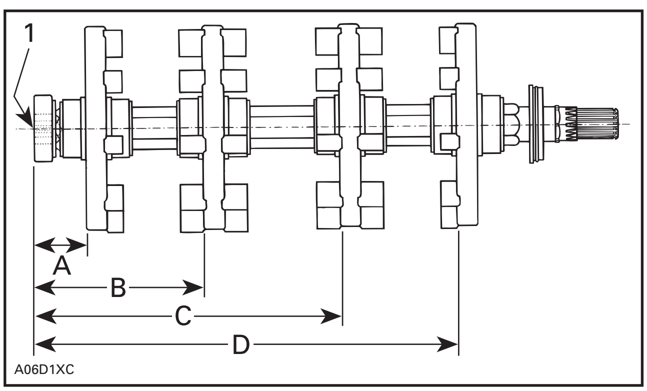
3,5,6, Drive Axle and Sprocket

To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.



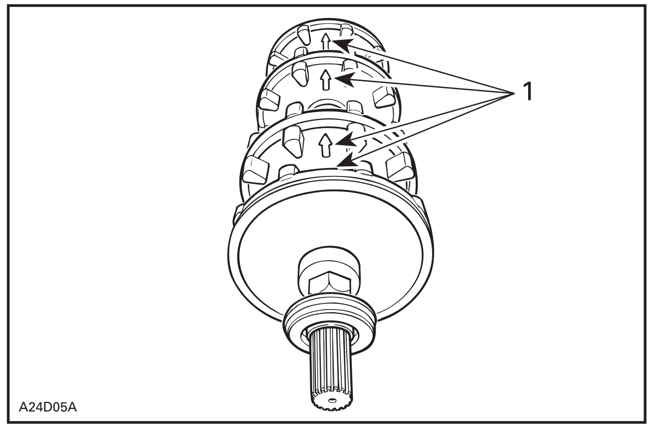
1. Pipe

REV Series



1. Measure from end of drive axle
A. 48.5 mm (1.909 in)
B. 151.0 mm (5.944 in)
C. 274.0 mm (10.787 in)
D. 376.5 mm (14.822 in)

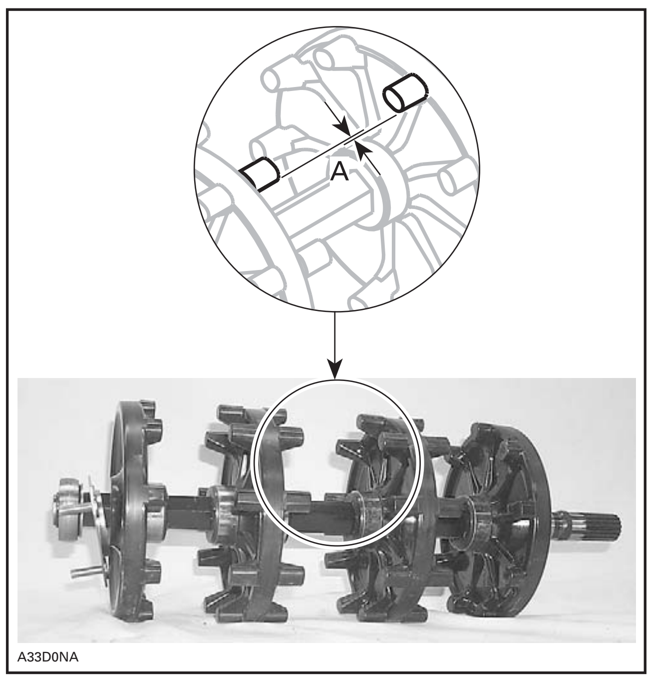
Ensure to align indexing marks of each sprocket when assembling.



TYPICAL
1. Indexing marks aligned

The maximum desynchronization for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket tooth and surface.



A. 1.5 mm (1/16 in) MAXIMUM

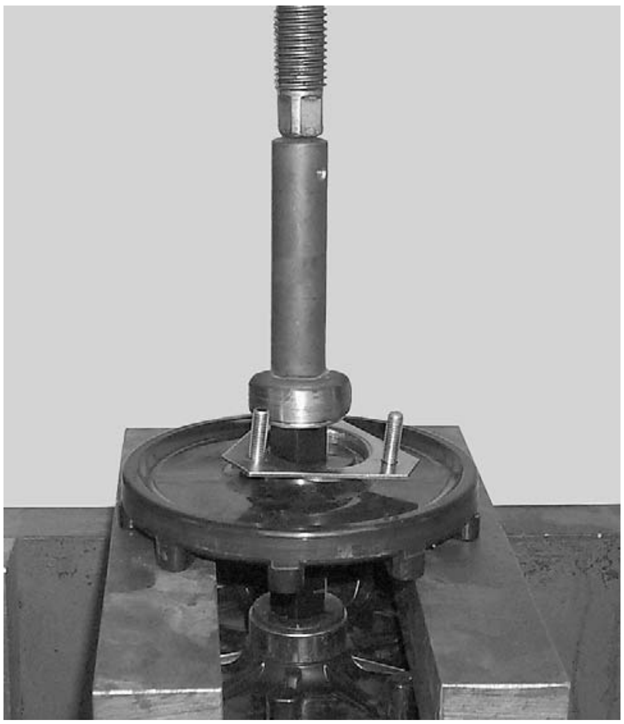
CAUTION: The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

7, Bearing Protector

At assembly, flat side of bearing protector must be against bearing.

8, Bearing

Always push bearing by inner race.



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The bearing **no. 8** must have its shield facing the sprocket.

The bearing **no. 1** must have its shield facing right side (cover).

LUBRICATION

Lubricate end housing bearing with synthetic grease (P/N 413 711 500).

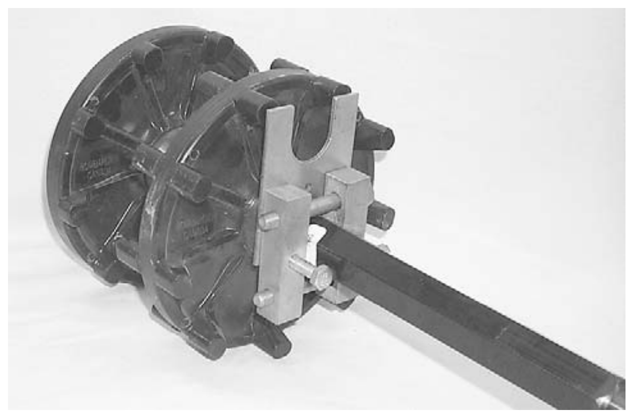
ADJUSTMENT

Sprocket/Track Alignment

CAUTION: Do not temper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit lugs without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 725 700).



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TYPICAL

TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA.

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear
– broken rods
– broken or missing track cleats.

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 028 700). Use narrow-cleat installer (P/N 529 008 500).

⚠ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Remove the following parts:

– driven pulley
– speedometer cable
– end bearing housing
– chaincase or gearbox cover
– sprockets and chain
– rear suspension
– drive axle seal
– drive axle
– track.

INSTALLATION

Reverse the removal procedure.

NOTE: When installing the track, respect rotation direction indicated by an arrow on track thread.

Check sprocket/track alignment as described in DRIVE AXLE.

ADJUSTMENT

Track Tension and Alignment

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

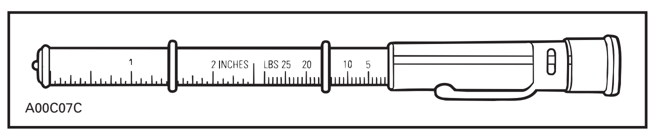
Track Tension

NOTE: Ride the snowmobile in snow about 15 to 20 minutes prior to adjusting track tension.

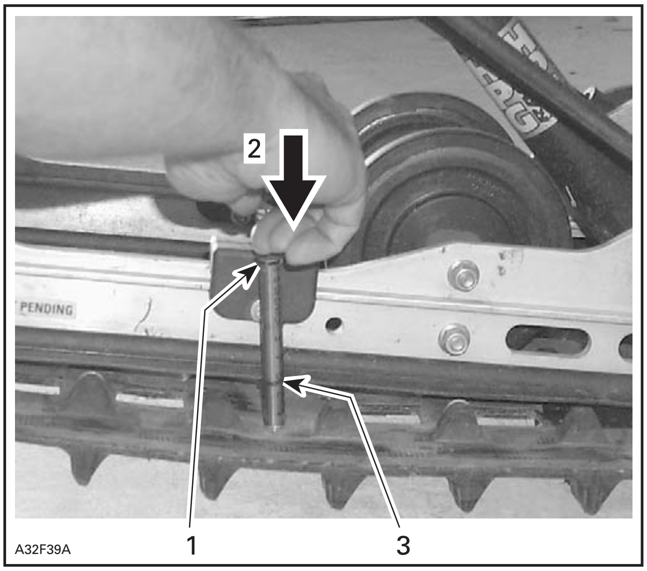
Lift snowmobile by a rope, chain or lift strap that has been secured into holes provided for that purpose, one on each side of tunnel rear.

Allow the rear suspension to fully extend and check gap half-way between front and rear idler wheels. Measure between slider shoe bottom and inside of track. The gap should be as given in SPECIFICATIONS. If the track tension is too loose, track will have a tendency to thump.

NOTE: A belt tension tester (P/N 414 348 200) may be used to measure deflection as well as force applied.



BELT TENSION TESTER



1. Top tool O-ring positioned at 7.3 kg (16 lb)
2. Push on top portion of tool until it contacts the top O-ring
3. Measured track deflection

CAUTION: Too much tension will result in power loss and excessive stresses on suspension components.

To adjust tension:

– Loosen one of the rear idler wheel retaining screws.
– Loosen the lock nut on the adjustment screw.
– Turn adjustment screws to adjust.

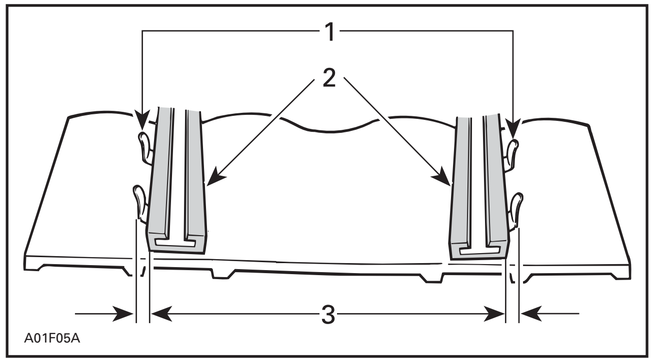
Alignment

⚠ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle. Never rotate at high speed.

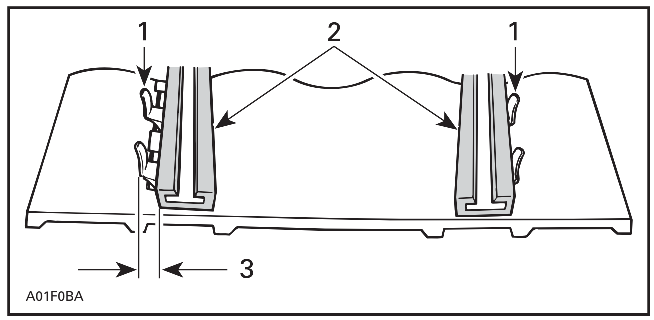
Start the engine and accelerate slightly so that track barely turns. This must be done in a short period of time (1 to 2 minutes)

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.



1. Guides
2. Slider shoes
3. Equal distance

To correct, stop engine, loosen rear wheel screws, then tighten the adjustment screw on side where the slider shoe is the farthest from the track insert guides.



1. Guides
2. Slider shoes
3. Tighten on this side

Restart engine, rotate track **slowly** and recheck alignment. If the satisfactory alignment is achieved, then tighten the idler wheel retaining screws to 48 N•m (35 lbf•ft).

Track Cleat

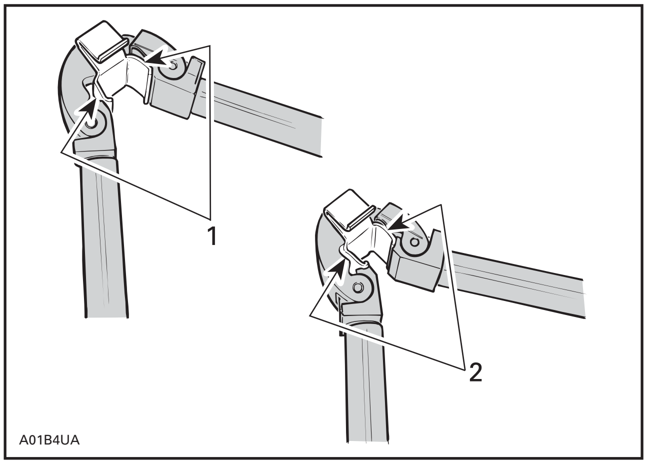
Removal

– Raise rear of vehicle off the ground and lift snowguard and snow deflector then hand rotate track to expose a cleat to be replaced.
– Using track cleat remover (P/N 529 028 700) for all models.

Installation

– Place new cleat in position on the track and using narrow track cleat installer (P/N 529 008 500) bend cleat then push tabs into rubber.

– Re-open installer, then position cleat tabs on open end of tool and squeeze tabs until they are indented in rubber.



TYPICAL

1. *First step*
2. *Second step (to push tabs into rubber)*

TABLE OF CONTENTS

2005 MX Z X 440 LC REV

The following areas provide a brief overview and improvements to the new 440-race sled. For detailed information, you will be instructed to consult other sections in this manual

ENGINE

The 05 440 MX Z X REV utilizes the 453 engine. This style of engine has proven itself to be very reliable, durable, and powerful for sno cross racing. One important note is the engine requires 104-octane premixed fuel for racing. Operating at higher altitudes will allow you to use lower octane fuel. Example: At 6000 ft. you can safely use 100-octane fuel. The gas to oil mix ratio is 33 to 1, and must be adhered to or engine damage may occur. The type of oil recommended is Formula XP-S. While there is no oil injection system, there is still a need for lubrication to the water pump shaft at the center of the crankcase. To provide lubrication, there is a small oil bottle with a single oil line that runs down to a fitting on the center of the crankcase. Make sure the bottle is always at least half-full using Formula XP-S oil. When the machine is new, you may have to add oil to the bottle quite often. This is normal and is due to the system "heat purging" all the air out of the oil cavity in the case. For detailed information regarding specifications, refer to Section 5 of this manual.

IGNITION SYSTEM

The MX Z X 440 LC REV comes equipped with a 290-watt ignition system. This system is unique as it contains 3 different and separate programmable timing curves. The three curves are identified simply as A, B, and C. To best explain the operation of the 3 curves, let's start with curve C. Curve C is programmed to create high temperatures in the exhaust pipe when the Holeshot button is pushed. The proper operation of the Holeshot button will be discussed later. Curve B is programmed for racing, using 104-octane fuel, and whenever the Holeshot button is NOT pushed, the engine runs on this curve. Curve A is referred to as the default curve and is used primarily when trail riding using 91-octane fuel. To utilize curve A, you simply disconnect the Holeshot button wires from the 6-pin connector under the dash. It is important to note, DO NOT use curves B or C when using 91-octane fuel or when trail riding, as it may cause engine damage.

HOLESHOT BUTTON

As stated above, the Holeshot button determines which ignition curve, B or C, the motor uses. Again, curve C is used to create high temperatures in the exhaust pipe for maximum engine horsepower, and curve B is the race curve. Proper operation of the Holeshot button is as follows; Start engine, slowly press throttle until 5500 engine RPM is achieved, press the Holeshot button. Using the throttle, maintain 5500 RPM or a RPM before clutch engagement. The longer you are able to hold the button in, the higher the pipe temperature, and greater your holeshot performance will be. The rule of thumb is, whenever the sled is not moving, use the button. Rapid acceleration or deceleration of engine RPM with the button pressed will cause the engine to backfire and may cause engine damage. Testing the system well before your first race will allow you to become familiar with the proper operation and get you in the habit of using it.

DRIVETRAIN

This is the area where most of the improvements for this year were made. The clutching system will use the TRA III drive and TEAM Ind. Twin Trax driven clutches. After extensive testing, an updated clutch calibration has been finalized. Refer to the specification area of this section or Section 11 for setup information. A new drive belt (pt # 417 300 288) has also been added. The biggest improvement has been in the chaincase area with a reinforced chaincase and a new bottom gear. The bottom gear is a 45 tooth "clutch" design, which reduces the stress load to the chain, case, and gears, there by increasing durability.

TRACK & TRACTION

The track used on the 2005 MX Z X 440 REV is similar to past years but with some improvements. The lug pattern and height are the same as the 2004 MX Z X 440 REV with the lug height being 1¾" on the outside belts and 15/8" on the inside belt. Lug profile uses a "cupped" design to ensure maximum traction. Major improvements involve the increased number of track clips installed. For this year, there are clips placed on every bar instead of every 3rd bar as in the past. This increases track efficiency and reduces torsional load on the drive sprockets and shaft. ISR rules prohibit an optional track in the stock 440 class this year. Track changes may be done in the Mod Classes, the recommended track is similar to the stock 440 track except it uses 1 ¾" lug all the way across. The recommended track part number is 504 152 168.

Most aftermarket traction companies offer products specifically for this type of track. Contact the traction companies for recommended traction products and patterns to suit your needs.

SC-4 REAR SUSPENSION

This suspension has been tested the past 2 seasons in the Open Mod sleds with outstanding results and further refined to come standard in the 440. The SC-4 suspension has been specifically designed for the REV style chassis. Refer to Section 4 of this manual for details.

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER		CDN / U.S. : BM5A (1.75" TRACK)		
ENGINE				
Engine manufacturer		Rotax		
Engine type no.		453		
Lubrication type		Premix		
Number of cylinders		2		
Bore	mm in	65.00		2.559
Stroke	mm in	65.80		2.591
Displacement	cc in^3	436.70		26.649
Piston, Stamp Diameter	mm .in	64.88		2.554
1st piston ring shape type		Semi-trapez		
Reed valve	(YES/NO)	YES		
Reed valve part number		420 924 810		
RAVE system	(YES/NO)	YES		
Spring part number		420 239 948		
Spring color		Gray		
Spring wire diameter	mm in	1.00		0.039
Spring free length	mm in	38.00		1.496
COOLING				
Cooling system type		Liquid		
Thermostat opening temp.	°C °F	42		107.60
Cap opening pressure	kPa PSI	90		13.05
ENGINE				
Piston ring end gap				
New, min.	mm in	0.400		0.0157
New, max.	mm in	0.550		0.0217
Wear limit	mm in	1.000		0.0394
Ring/piston groove clearance				
New, min.	mm in	0.040		0.0016
New, max.	mm in	0.080		0.0031
Wear limit	mm in	0.200		0.0079
Piston/cylinder clearance				
New, min.	mm in	0.100	**± 0.016**	0.0039
Wear limit	mm in	0.200		0.0079
Cylinder taper				
New, max.	mm in	0.050		0.0020
Wear limit	mm in	0.100		0.0039
Cylinder out of round				
New, max.	mm in	0.010		0.0004
Wear limit	mm in	0.080		0.0031
Crankshaft Deflection				
(MAG side)	mm in	0.050		0.0020
(center)	mm in	0.080		0.0031
(PTO side)	mm in	0.060		0.0024
Crankshaft end play				
New, min.	mm in	0.100		0.0039
New, max.	mm in	0.300		0.0118

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW	
MODEL NUMBER		CDN / U.S. : BM5A (1.75” TRACK)	
ENGINE (SUITE)			
Con. rod big end axial clearance			
New, min.	mm in	0.390	0.0154
New, max.	mm in	0.737	0.0290
Wear limit	mm in	1.200	0.0472
Con. rod/piston pin clearance			
New, min.	mm in	0.003	0.0001
New, max.	mm in	0.012	0.0005
Wear limit	mm in	0.015	0.0006
Con. rod/crankpin clearance			
New, min.	mm in	0.024	0.0009
New, max.	mm in	0.038	0.0015
Wear limit	mm in	0.050	0.0020
CARBURETOR			
Carburetor manufacturer		Mikuni	
Carburetor quantity x type		2 x TMX 34mm (Primer)	
		PTO	**MAG**
Identification number		TMX34-29	TMX34-29
Carburetor part number		403 138 765	### ### ###
Jet needle		6EN29-61	6EN29-61
Clip position no.		3	3
Needle jet		Q-6	Q-6
Throttle slide cut-away		4.0	4.0
Needle valve and seat		1.5	1.5
Idle throttle slide position	mm ± 0.1	1.8	1.8
	in ± 0.004	0.071	0.071
Main jet		400	400
Pilot Jet		25.0	25.0
Idle air/mixture screw adj.	Ref	1.0	1.0
Cable/throttle slide adjustment		At full throttle opening, cut-away lower edge must be equal or 1.0 (0.04) lower than of the venturi bore on engine side.	
Calibration engine speed	± 100 RPM	8400	
Engagement engine speed	± 100 RPM	5400	
Idle engine speed RPM	± 200	1600	

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW				
MODEL NUMBER		CDN / U.S. : BM5A (1.75" TRACK)				
ENGINE ELECTRICAL SYSTEM						
Ignition system manufacturer		Denso Corporation				
Ignition system type		C.D.I.				
Ig. timing BTDC (Dynamic)	mm in	3.00	0.1181	at 3500 RPM		
Stroboscopic timing		22		at 3500 RPM		
Lighting system type		Magneto - Generator				
Lighting sys. output (AC)	W @6000 RPM	290				
Nominal voltage output	V	12				
Generator coil (low speed)	Ohm	17.5 - 42.5				
Generator coil (high speed)	Ohm	2.4 - 5.8				
Lighting coil	Ohm	0.1 - 0.4				
Pick-up (trigger) coil	Ohm	190 - 300				
High tension coil (pri.)	Ohm	0.3 - 0.7				
High tension coil (sec.)	KOhm	8 - 16				
Coils / Magneto ring gap						
MIN	mm in	0.700		0.0276		
MAX	mm in	1.850		0.0728		
Pick-up coil / Magneto ring gap						
MIN	mm in	0.550		0.0217		
MAX	mm in	1.450		0.0571		
Spark plug manufacturer		NGK				
Spark plug model no.		BR9ES				
Electrodes gap	mm in	0.450	**± 0.05**	0.0177		
EXHAUST SYSTEM						
Exhaust system type		Single-tuned pipe to baffle muffler				
ASSEMBLY SPECIFICATIONS						
Crankcase nuts/screws M6	N•m lbf•ft	9.0	**± 1.0**	6.6	**± 0,7**	
Crankcase nuts/screws M8	N•m lbf•ft	29.0	**± 1.0**	21.4	**± 0,7**	
Crankcase/engine sup. studs	N•m lbf•ft	11.0	**± 1.0**	8.1	**± 2,9**	
Crankcase/engine sup. nuts	N•m lbf•ft	35.0	**± 4.0**	25.8	**± 0,7**	
Cylinder head nuts / screws	N•m lbf•ft	29.0	**± 1.0**	21.4	**± 0,7**	
Water pump screws	N•m lbf•ft	5.5	**± 1.0**	4.1	**± 3,5**	
Magneto ring nut	N•m lbf•ft	125.0	**± 5.0**	92.2	**± 0,4**	
Exhaust manifold screws	N•m lbf•ft	21.5	**± 0.5**	15.9	**± 0,7**	
Intake manifold screws	N•m lbf•ft	5.5	**± 1.0**	4.1	**± 0,7**	
Magneto flywheel screws	N•m lbf•ft	21.0	**± 1.0**	15.5		
Drive pulley retaining screw	N•m lbf•ft	95.0		70.068		
Shouldered pin nuts	N•m lbf•ft	10.0		7.376		
Ramp retaining screw	N•m lbf•ft	10.0		7.376		
Spring cover screws	N•m lbf•ft	13.0		9.588		
Nut of calibration bolt	N•m lbf•ft	10.0		7.376		
Steering arm/ski leg bolt	N•m lbf•ft	25.0		18.439		
Ball joints	N•m lbf•ft	53.0		39.091		
M. length unengaged threads	mm in	15.0		0.591		
Handlebar bolts	N•m lbf•ft	26.0		19.177		
ADDITIONAL INFORMATION		*Drive pulley retaining screw: Torque 80 to 100 N•m (59-74 lbf•ft), 5 "accel./brake" cycles, Torque 90 to 100 N•m (66-74 lbf•ft).				

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW			
MODEL NUMBER		CDN / U.S. : BM5A (1.75" TRACK)			
POWER TRAIN (Drive Clutch)					
Drive pulley manufacturer		CVTECH-IBC INC			
Drive pulley type		Cushion drive T.R.A. 3 Light			
Drive pulley part number		417 222 741			
Drive pulley diameter	mm in	205.00		8.071	
Ramp identification		435			
Ramp quantity		3			
Ramp part number		417 222 814			
Cup identification		Light-cushion drive			
Cup part number		417 222 622			
Pressure lever part number		417 222 671			
Roller quantity		3			
Roller part number		417 003 900			
Roller pin type		Thread Pin Ass'y			
Roller pin part number		417 222 820			
Drive pulley spring part number	mm in	417 222 004			
Spring stripes colors		White / White			
Drive pulley spring length		137,44		5.411	
Calibration screw position no.		5			
Engagement speed	± 100 RPM	5400			
POWER TRAIN (Driven Clutch)					
Driven pulley type		Team Rapid Reaction			
Driven pulley part number		417 126 938			
Driven pulley diameter	mm in	273.00		10.748	
Driven pulley spring part number		Team # 210190			
Driven pulley spring color		Black/Light Blue			
Driven pulley spring rate	kg ± 0.7	82-118			
	lb ± 1.5	180-260			
Driven pulley cam angle	deg.	42°			
Cam part number		N/A			
Pulleys center distance	mm in	257.50		10.138	
"Z" distance	mm in	16.50		0.650	
(Without torque rod preload)					
"X" offset	mm in	40.00	± 0.5	1.575	± 0.020
"Y-X" difference	mm in	0.86		0.034	
DRIVE TRAIN					
Drive belt part number		414 300 288			
Drive belt width	mm in	37.30		1.469	
Drive belt outside perimeter	mm in	1117.00		43.976	
Wear limit	mm in	34.90		1.374	
Drive belt def. (+/-.197")	mm in	32.00		1.260	
Drive belt adjustment force	kg lbf	11.34		24.912	
Small sprocket number of teeth		21			
Small sprocket part number		504 152 044			
Large sprocket number of teeth		45			
Large sprocket part number		504 152 518			
Gear ratio		2.14			
Chain type		Silent			
Chain part number		504 151 932			
Chain pitch	mm in	9.525		0.375	
Chain, number of links		74 - 15			
Drive sprocket pitch diameter	mm in	181.6		7.150	
Drive sprocket number of teeth		9			

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER		CDN / U.S. : BM5A (1.75” TRACK)		
FRONT SUSPENSION				
Front suspension type		R.A.S. A-Arm		
Front suspension travel	mm in	242.00		9.5
Sway bar type		Link type sway bar		
Front susp. shock abs.(qty&type)		2 High-Pressure gas (H.P.G.Racing Clicker)		
Shock absorber part number		505 070 952 RH		505 070 953 LH
Standard spring part number		505 071 677		
REAR SUSPENSION				
Rear suspension type		SC 4 121		
Rear suspension flat travel	mm in	369.00		14.5
Rear suspension max. travel	mm in	369.00		14.5
Wheels quantity & diameter	mm in	8 x 141 mm (5.55") 4 x 180 mm (7.09")		
Stroke limiter type		Stopper strap		
Stroke limiter standard position		4 / 1		
Front arm shock abs. qty & type		1 High-Pressure gas (H.P.G.Racing Clicker)		
Front arm shock abs. part number		503 190 582		
Standard front spring part number		503 191 019		
Front preload adjustment type		Variable Spring Load		
Rear arm shock abs. qty & type		1 High-Pressure gas (H.P.G.Racing Clicker)		
Rear arm shock abs. part number		503 190 581		
Standard rear spring part number	RH	503 190 999		
	LH	503 119 000		
BRAKE SYSTEM				
Brake type		Hydraulic Caliper, self-adjust.		
Brake lining material		FERIT I / D 451 FF		
Brake lining surface	cm^2	2 X 24.8		
Minimum lining thickness	mm in	1.00	0.039	
TRACK				
Track # & profile height	mm in	504 152 517	44.5	1.752
Track construction		Rubber, polyester reinforced		
Track nominal width	mm in	381.00		15.000
Track nominal length	mm in	3072.00		120.945
Track lug pitch distance	mm in	64.00		2.520
Number of track pitches		48.00		
Track deflection				
MIN	mm in	30.00		1.181
MAX	mm in	35.00		1.378
Track adjustment force	kg lbf	7.30		16.094

2005 OPTION PACKAGE COLOR		2005 MX Z X 440 RACING BLACK - YELLOW	
MODEL NUMBER		CDN / U.S. : BM5A (1.75" TRACK)	
GENERAL SPECIFICATIONS			
Vehicle overall length	mm in	2882.00	113.465
Chassis overall length	mm in	2157.00	84.921
Vehicle overall width	mm in	1217.00	47.913
Vehicle overall height	mm in	1022.00	40.236
Ski stance (Carbides to carbides)	mm in	1080.00	42.520
Ski protected length	mm in	875.00	34.449
Ski overall length	mm in	997.00	39.252
Ski width	mm in	133.00	5.236
Total toe-out (raised vehicle)	mm in	0.00	---
Camber angle	deg.	0°	
Track projected length	mm in	1140.00	44.882
Total projected bearing area	cm^2 in^2	6670.9	1033.992
Dry vehicle ground pressure	kPa psi	2.93	0.425
Dry vehicle mass	kg lb	199	438
MATERIALS AND COLORS			
Front member & frame material		Aluminium	
Frame color		Natural Aluminium	
Bottom pan material		Impact resistant copolymer	
Bottom pan color		Black (B - 160)	
Ski, material		UHMW Polyethylene	
Ski, color		Black (B - 160)	
Ski Handle, color		Yellow (B - 190)	
Hood material		Surlyn	
Hood color		Black (B - 160)	
Side panels material		Polypropylene	
Side panels color		Yellow (B - 190)	
Windshield material		Polycarbonate	
Windshield color		Tinted	
Front bumper material		Polypropylene	
Front bumper color		Yellow (B - 190)	
Rear bumper material		Aluminium	
Rear bumper color		Natural Aluminium	
Suspension wheels material		UHMW Polyethylene & Rubber	
Inside wheels color		Black (B - 160)	
Outside wheels color (141 mm)		Black (B - 160)	
Outside wheels color (180 mm)		Black (B - 160)	
Runner Shoe, color		Black (B - 160)	
VEHICLE ELECTRICAL SYSTEM			
Headlamp bulb hi/low beam	W	60/55	H-4
Tail/stop lamp bulb	W	8/27	
Tachometer bulb	W	2 x 3	
Lamp-pilot (oil level)	W	0.5	
Lamp-pilot (high beam)	W	0.5	
Lamp-pilot (temperature)	W	0.5	
Heat. throttle handle (**hi/low**)	W	7 / 5	
Heated grips hi/low (driver)	W	40 / 20	

2005 OPTION PACKAGE COLOR		**2005 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER		CDN / U.S. : BM5A (1.75″ TRACK)		
LIQUIDS SPECIFICATIONS				
Fuel tank (SAE J288a rated)	L US gal	21		5.5
Recommended fuel type		Race Fuel		
Minimum octane number (R+M)/2		104		
Premix fuel/oil ratio		33 : 1		
Recommended mixing oil		XP-S Premix Oil		
Chaincase oil capacity	mL US oz	250		8.5
Oil level height	mm in	Maximum mark on dipstick		
Recommended chaincase oil		XP-S synthetic chaincase oil		
Cooling system capacity	L US oz	3.7		125.1
Ethylene-glycol concentration	% vol.	50 / 50		
Brake fluid reservoir	mL US oz	60		2.0
Recommended brake fluid		Brake fluid SRF (DOT 4)		
STANDARD/OPTIONAL EQUIPMENT				
Tachometer		STD		
Speedometer		STD		
Mirrors (kit)			OPT	861 784 500
Quick ajustment kit			OPT	860 306 500
Bridge & fastener plastic ski	(FLEX)	STD		
Bridge & fastener plastic ski	(Precision)		OPT	860 507 700
Plastic ski soles, black B-160	(FLEX)	STD		
Plastic ski soles, black B-160	(Precision)		OPT	505 070 727
Plastic ski soles, yellow B-190	(Precision)		OPT	505 070 831
Plastic ski soles, red B-212	(Precision)		OPT	505 070 832
Ski runner		STD	OPT	505 069 300
Ski runner (With Carbides)		OPT		
Skid plate fastener kit				861 773 600 861 783 600
Skid plate black			OPT	502 006 743
Skid plate orange			OPT	502 006 742
Skid plate yellow			OPT	502 006 741
Windshield (Low)		STD		

TABLE OF CONTENTS

SECTION 08 - 2005 MX Z 550 AND 380 FC

05 MXZ 550 F/C PERFORMANCE KITS

STAGE 1 - 860 428 500

PART #	DESCRIPTION	QTY
505 070 703	Shock, HPG Piggy Back, Front LH	1
505 070 702	Shock, HPG Piggy Back, Front RH	1
414 562 900	Spherical Bearing, Front Shock	2
371 910 600	Circlip, Bearing. Front Shock	2
506 120 200	Spacer Bushing, Front Shock	4
505 071 200	Spring, Front Shock - 105 lbs/in	2
503 189 745	Shock, HPG, Center	1
503 190 854	Spring, Center shock - 325 lbs/in	1
503 190 471	Spring, Center Shock - 215 lbs/in	1
505 070 538	Spring Spacer, center shock - aluminum	1
503 189 280	Shock, HPG - C46, Rear	1
503 190 329	Spring, Torsion, Rear LH	1
503 190 331	Spring, Torsion, Rear RH	1
503 190 766	Reinforced Pivot Arm, SC-3	1
503 189 861	Bushing, Pivot Arm, SC-3	2
503 190 232	Idler Wheel, Rear, 180 mm, SC-3	2
503 182 900	Spacer, Aluminium, Short, SC-3	2
503 156 000	Spacer, Aluminium, Long, SC-3	1
503 167 900	Axle, Rear, SC-3	1

PART #	DESCRIPTION	QTY
503 190 563	Strap, Limiter, SC-3	1
224 081 301	Washer, Limiter Strap	4
207 182 544	Bolt, Limter Strap	2
232 581 414	Nut, Limiter Strap	2
415 020 400	Clutch spring (pink-pink) 310-460	1
415 128 986	Clutch weight bi-cylinder 43g (IBC part)	3
417 114 400	Clutch weight thin (coin) 3.5g	9
414 860 700	Belt, Drive	1
515 167 900	Tether Cord	1
520 000 333	Extension, Snow Flap	1
520 000 332	Snow Flap, 440	1
250 000 124	Bolt, Snow Flap	8
391 301 600	Washer, Snow Flap	12
233 251 414	Nut, Snow Flap	8
415 073 300	Plastic Cap	4
404 100 200	Main Jet 240	2
404 109 500	Pilot Jet 50	2
Air screw must be adjusted at 3/4 turn.		
Kit contains additional mounting hardware not listed and installation instructions		

STAGE 2 - 860 428 600

PART #	DESCRIPTION	QTY
517 303 160	Windshield, 440 X	1
293 150 089	Plastic Rivet, Push thru	3
516 001 738	Decal, Windshield	1
506 151 984	Tube, Handlebar extension	1
506 151 984	Extension, Handlebar	1
506 151 622	Steering Support, 440 X	4
506 151 196	Plate, Reinforcement	4
250 000 074	Bolt, .M8 x40	8
506 151 888	Pad, Handlebar 440 X	1
415 128 768	Hand Guard kit	1
205 444 086	Screw, M4 x 40	2
232 541 484	Nut, Nyloc, M4	2
234 041 480	Washer, Flat M4	4
517 303 264	U Clamp, Handguard	2
517 303 265	Deflector Support, RH	1
517 303 266	Deflector Support, LH	1
250 000 172	Screw, Socket Head, M6 x 16	4
515 175 817	Terminal Housing, Male, 8 Circuits	1
515 175 332	Tubing, 1/4 X 1200mm	

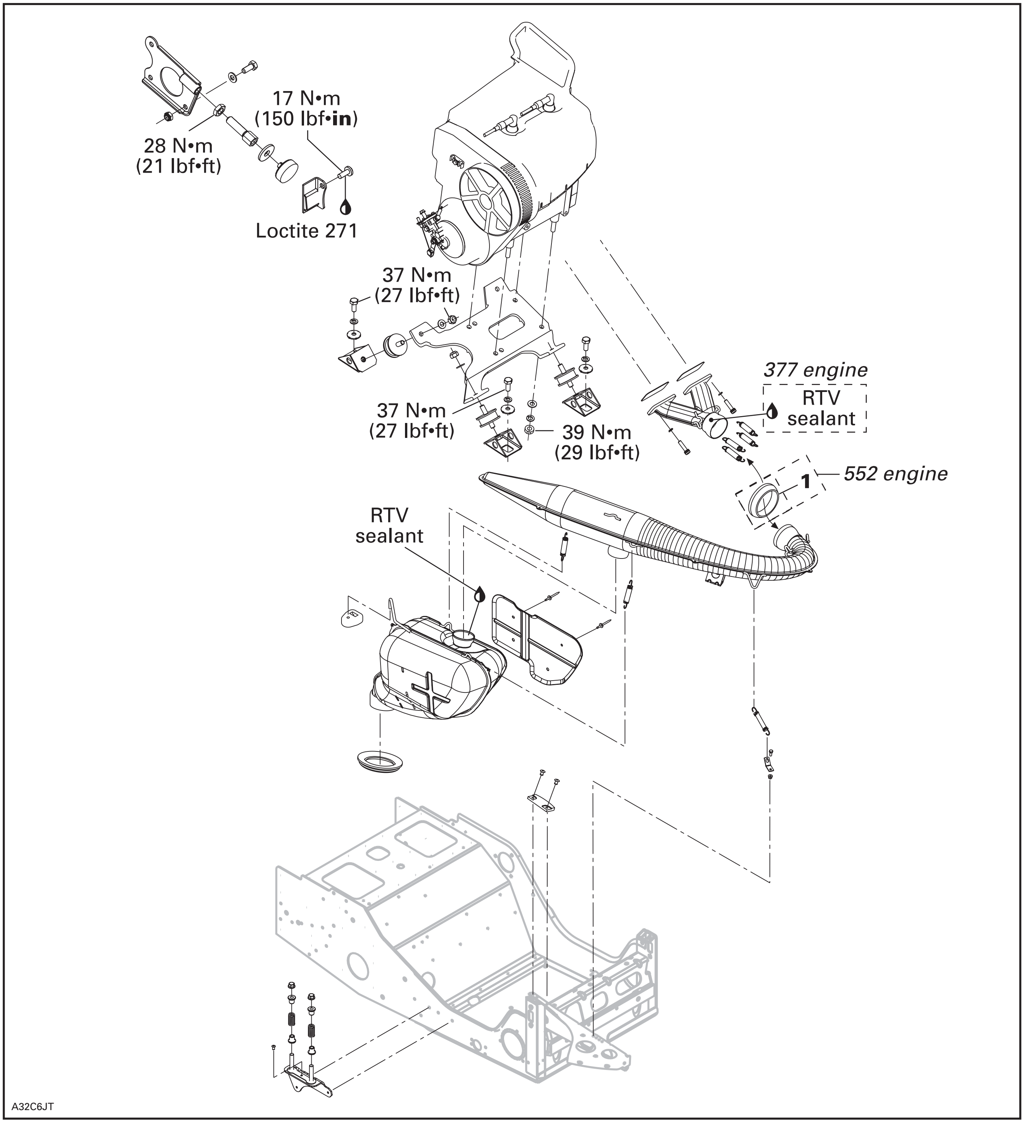
PART #	DESCRIPTION	QTY
515 175 662	Terminal Housing, Male 6 Circuits	1
512 059 537	Housing, Bottom	1
512 059 538	Housing, Top	1
205 052 544	Screw, Socket Head, M5 x 25	2
515 175 685	Kill switch, Handlebar	1
506 151 820	Handlebar, 440 X	1
506 151 530	Grip, Handlebar, RH	1
506 151 541	Grip, Handlebar, LH	1
515 176 111	Heater, Handlebar	2
515 175 232	Terminal, Male	6
518 321 609	Tunnel Protector, Aluminum Extrusion	2
518 322 344	Tunnel Protector, Plastic	2
390 402 200	Rivet, Aluminum	20
Kit contains additional mounting hardware not listed and installation instructions		
Replacement Track sold separately		
504 152 483	Track, 1.25" lug	1
Qualifies for track exchange program		

To order entire kits or replacement parts, contact your local Ski-Doo Dealer

377 AND 552 ENGINE TYPES

ENGINE REMOVAL AND INSTALLATION

377 and 552 Engine Types



ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

⚠ WARNING

Before disconnecting any electrical wire in starter system always first disconnect the BLACK negative battery cable (on electric starting models).

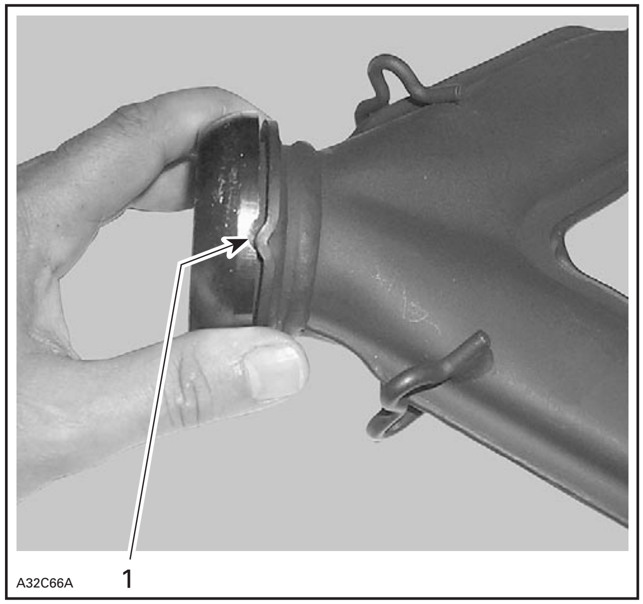
- negative cable from battery (on electric starting models)
- guard
- drive belt
- drive pulley using appropriate puller, refer to DRIVE PULLEY
- air silencer and carburetors
- impulse line from engine crankcase
- electrical connector housings
- exhaust pipe
- oil pump inlet line and plug it
- oil pump cable
- rewind cable: tie a knot near rewind housing and remove starting grip.

Tightening fasteners to recommended torque in appropriate exploded view.

Apply high temperature RTV sealant (P/N 293 800 090) on metal-to-metal exhaust joints.

552 Engine Only

Install doughnut shaped exhaust gasket **no. 1** with its both notches aligned with Y-manifold protrusions.

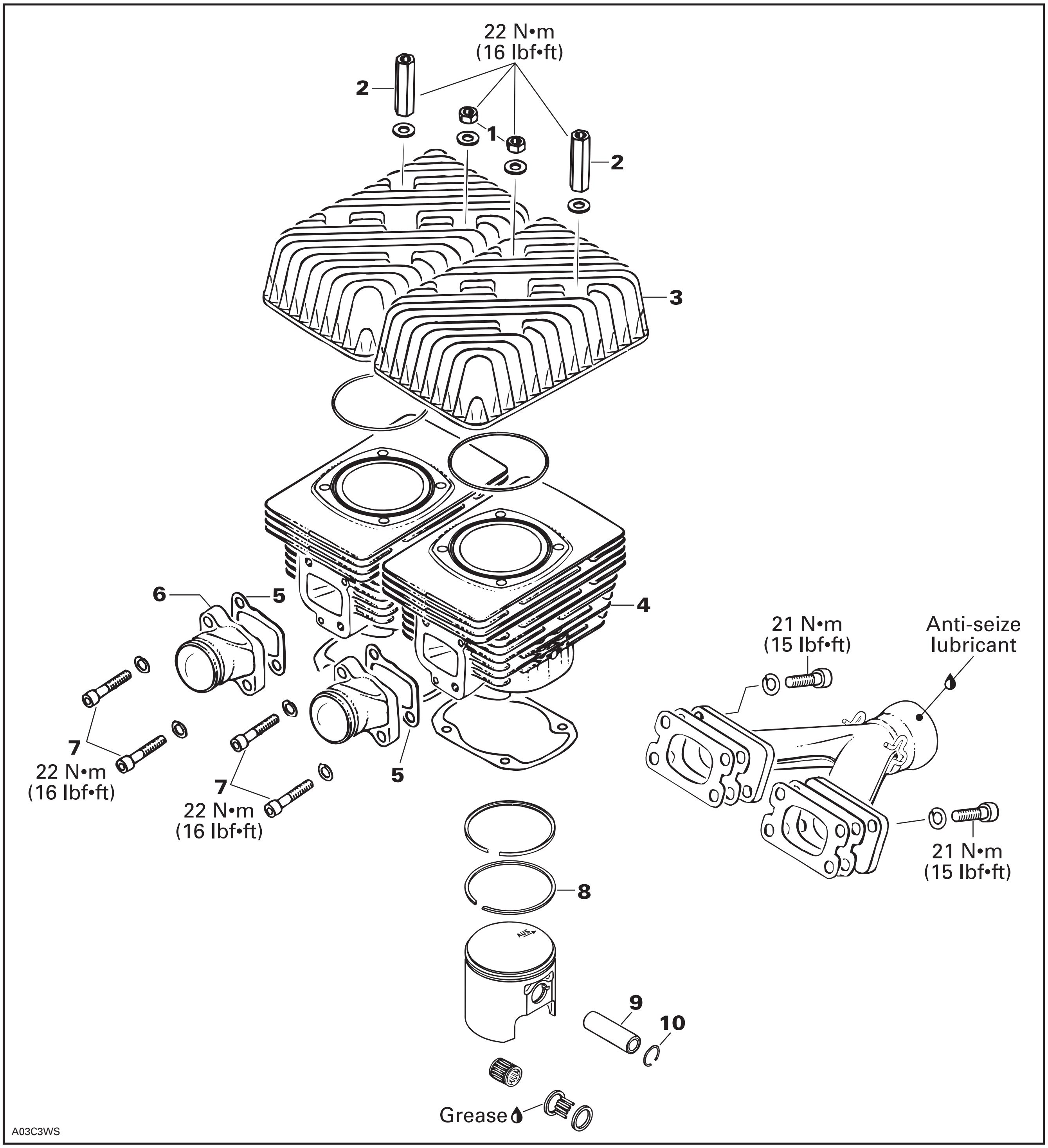


ONE SIDE SHOWN
1. Notch aligned with protrusion

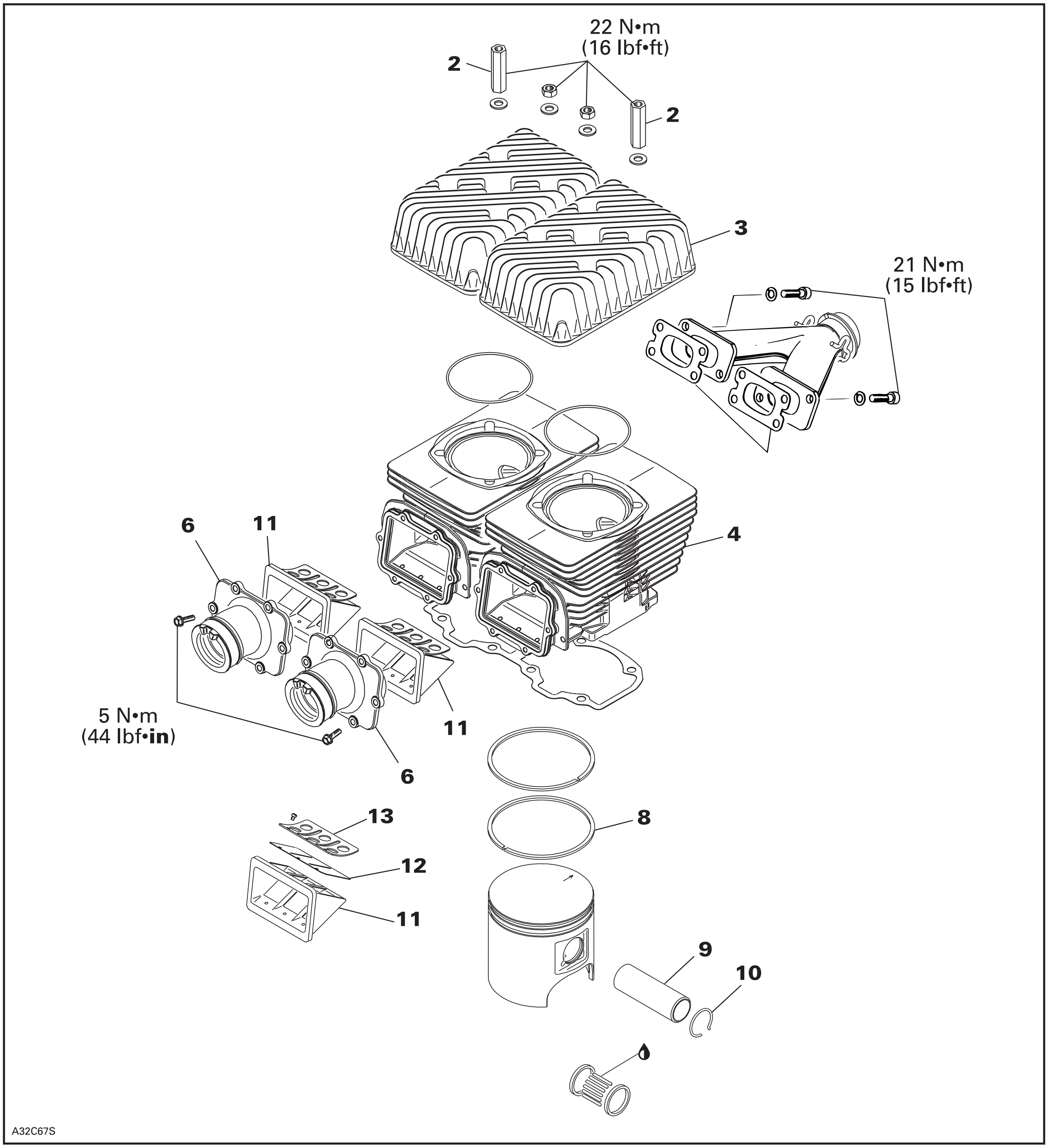
NOTE: No RTV sealant required on doughnut shaped exhaust gasket **no. 1**.

TOP END

377 Engine Type



552 Engine Types



GENERAL

CAUTION: While performing any engine related procedure, always make sure that the working area is clean and free from dust or particles to reduce the risk of damaging the engine.

TROUBLESHOOTING

Before completely disassemble engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets. Use Gasket Remover (P/N 413 708 500) to clean mating surfaces.

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

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

NOTE: The letters «AUS» and arrow on the piston dome must be visible after cleaning.

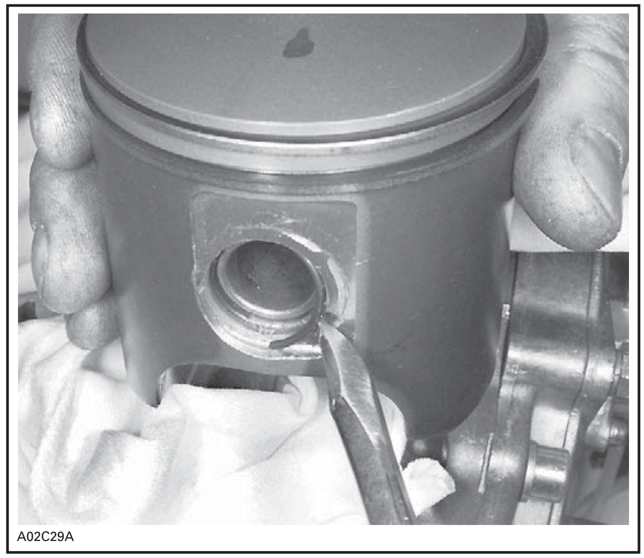
Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

DISASSEMBLY

Remove top fan cowl, intake sockets and lower fan cowl.

Remove cylinder heads.

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase to prevent circlips **no. 10** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston **no. 8**.



TYPICAL

377 Engine

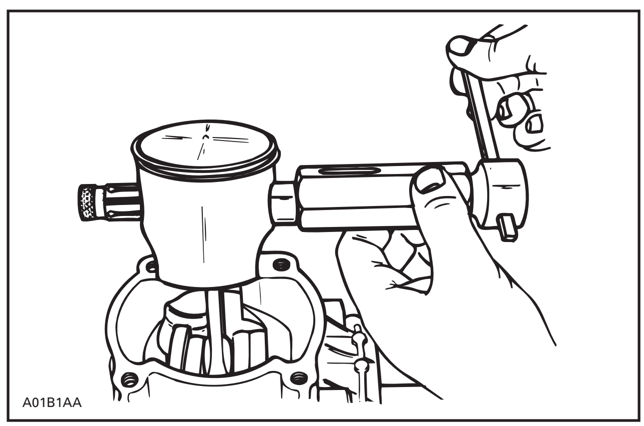
To remove piston pin **no. 9**, use piston pin puller (P/N 529 035 503).

Fully screw puller handle.

Insert puller end into piston pin.

Screw (LH threads) extracting nut.

Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.



TYPICAL

NOTE: The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

552 Engine

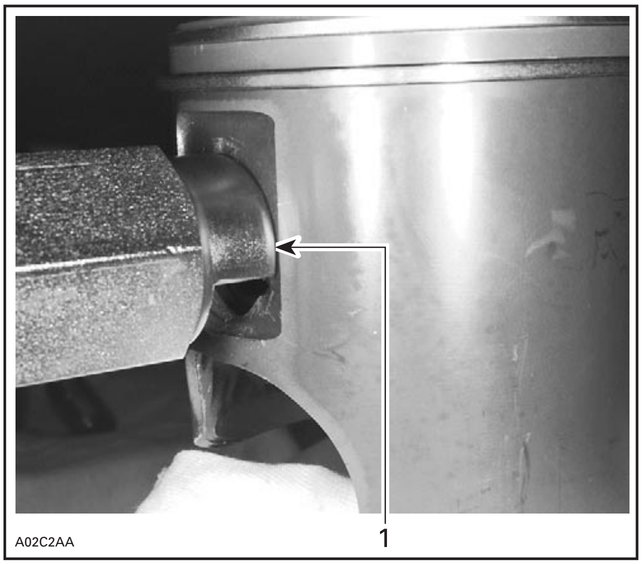
On this engine, piston pin needle bearing is mounted without a cage.

NOTE: The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

Use piston pin puller (P/N 529 035 503) along with 20 mm sleeve kit (P/N 529 035 542) and locating sleeve (P/N 529 023 800).

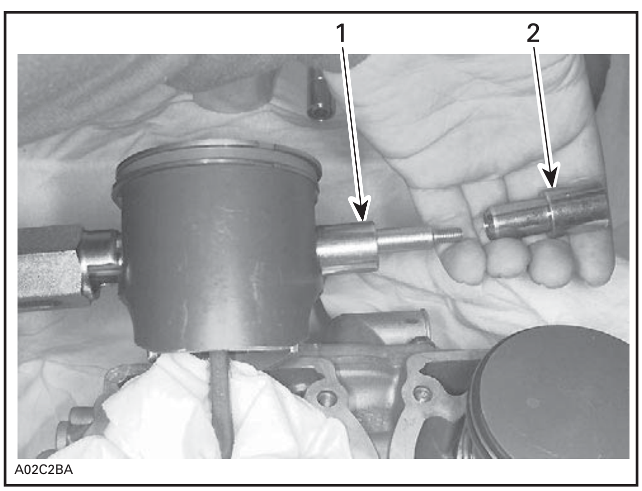
NOTE: The locating sleeve is the same that contains new cageless bearing.

Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



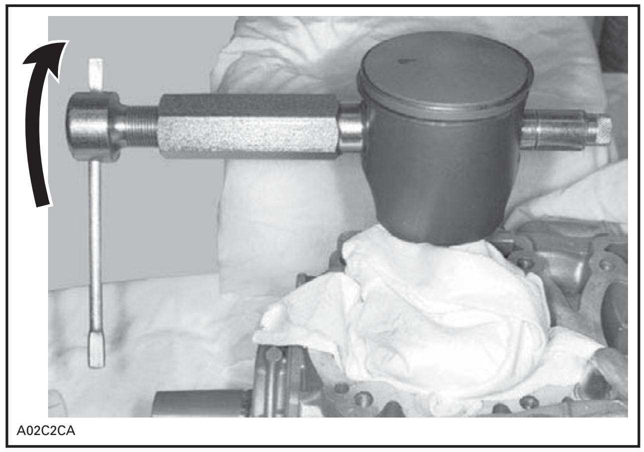
TYPICAL
1. Properly seated all around

Install sleeve then shouldered sleeve over puller rod.

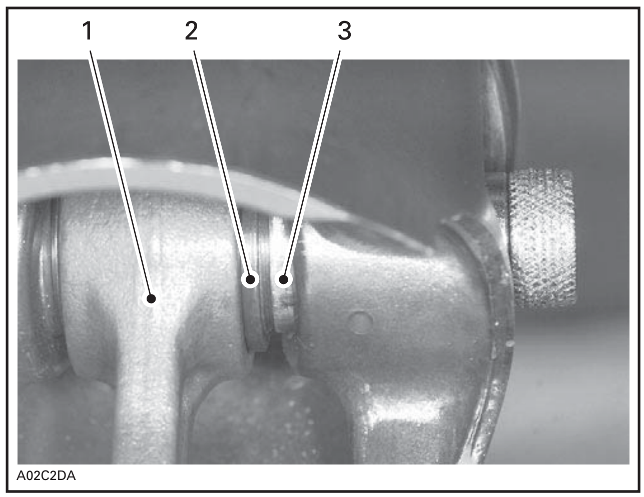


TYPICAL — INSTALLATION OF SLEEVE KIT
1. Sleeve
2. Shouldered sleeve

Pull out piston pin **no. 10** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.

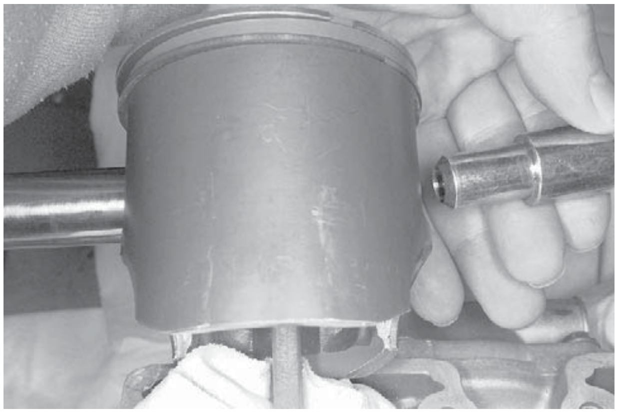


TYPICAL — PISTON PIN EXTRACTION



TYPICAL
1. Sleeve inside bearing
2. Thrust washer
3. Shouldered sleeve end

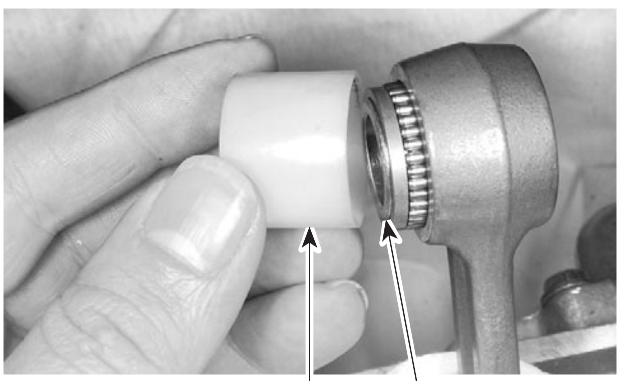
Remove puller. Pull out shouldered sleeve carefully.


A02C2EA

TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



A02C2FA

TYPICAL
1. Locating sleeve
2. Sleeve

NOTE: 0.25 and 0.5 mm oversized piston and rings are available if necessary.

Use a locking tie to fasten all needles and thrust washers along with locating sleeve.

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT.

ASSEMBLY

552 Engine

When reinstalling original needle bearings, make sure that 34 needles are inserted between sleeve and locating sleeve.

When installing a new cageless bearing, replace half plastic cages by sleeve.

A02C2GA

TYPICAL
1. Sleeve

Grease thrust washers and install them on each end of needles.

Insert cageless bearing into connecting rod.


A02C2HA

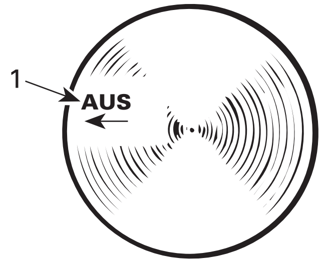
TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Heat piston using bearing heater (P/N 529 035 969).


A32CBHA

CAUTION: Piston temperature must not exceed 46°C (115°F). NEVER USE DIRECT FLAME to heat the piston and never freeze the pin. Inappropriate heating procedure(s) may damage the piston.

Mount piston over connecting rod with the letters «AUS» (over an arrow on the piston dome) facing in the direction of exhaust port.



A01C01A

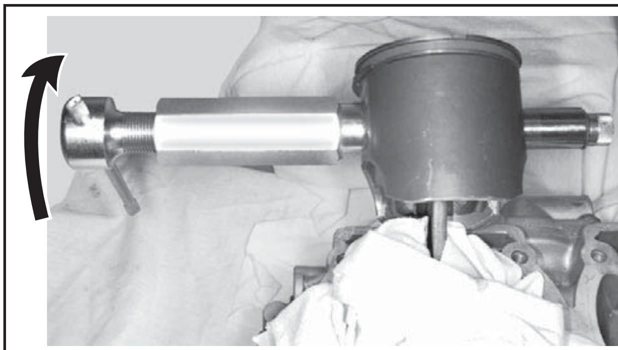
1. *Exhaust*

Install shouldered sleeve.


A02C2IA

TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.

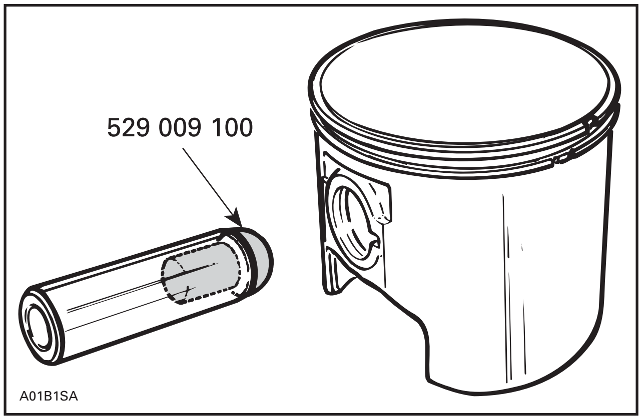

A02C2JA

TYPICAL

– Remove piston pin puller and sleeve kit.

377 Engine

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 009 100).

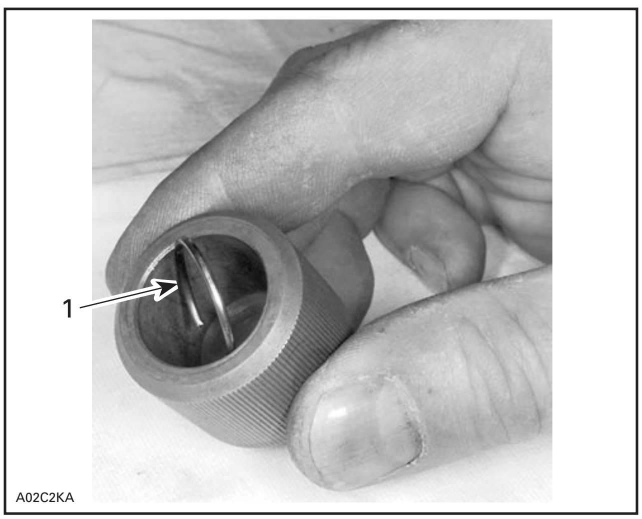


NOTE: The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

Use piston pin puller (P/N 529 035 503) to install a piston pin that cannot be installed as described above.

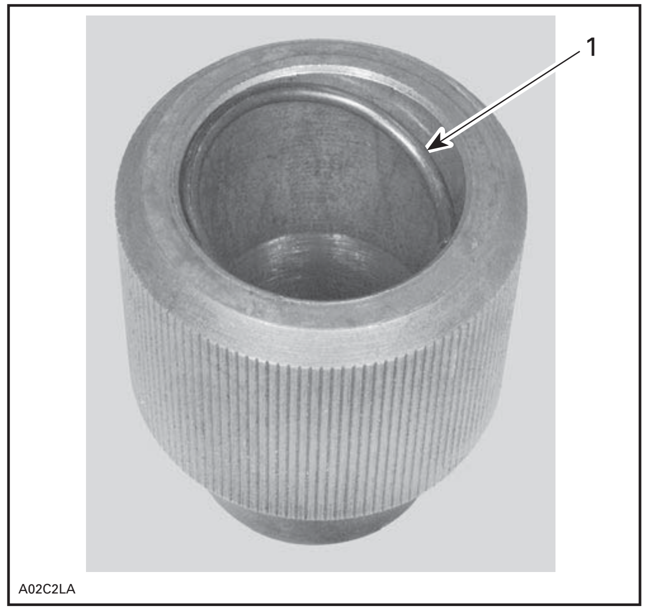
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 035 561).

Insert circlip in tool at an angle.



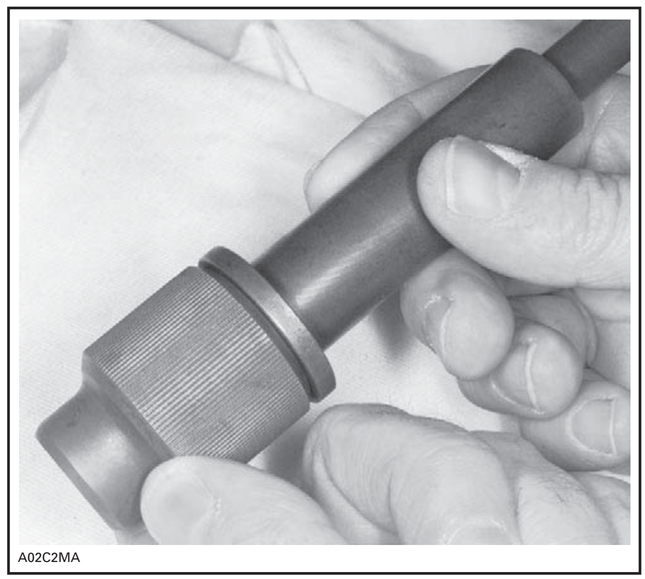
1. Circlip

Square it up using a finger.

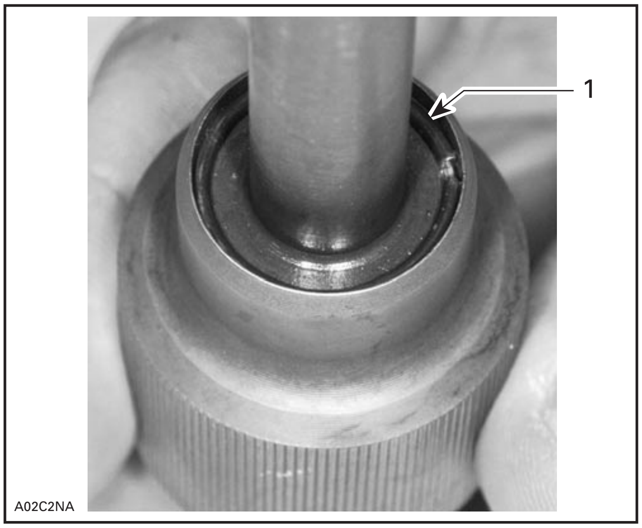


1. Circlip

Continue to square it up using round end of circlip installer.

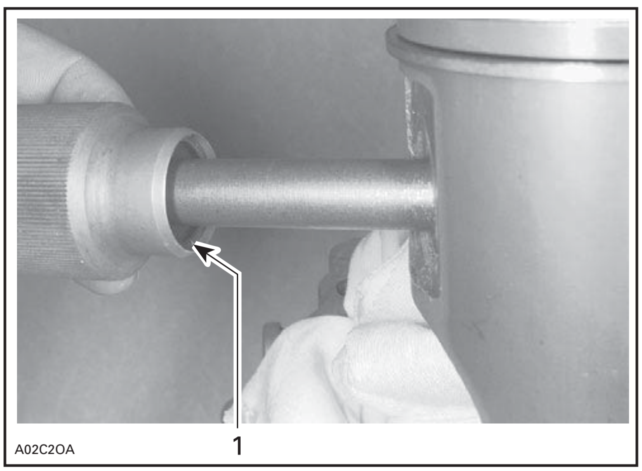


Using square end of tool, push circlip in until it rests in groove.



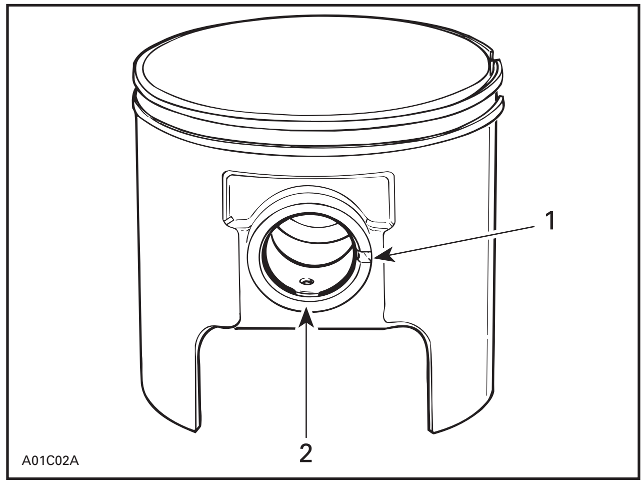
1. Circlip in groove

Mount tool in piston making sure that circlip break is facing down.



TYPICAL
1. *Circlip break facing down*

Hold tool firmly against piston then strike on round end of tool with a plastic hammer. Circlip will move from tool groove to piston groove.



1. *Piston notch*
2. *Circlip break at 6 o'clock*

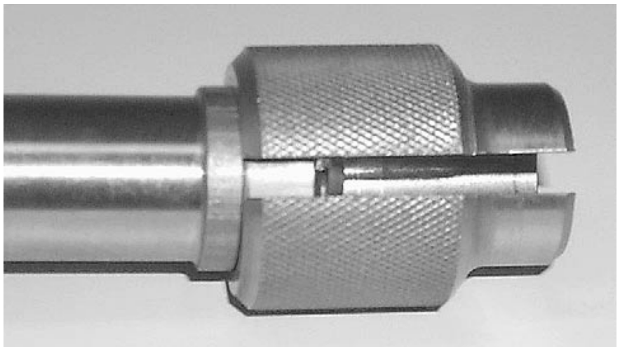
CAUTION: **Circlips must not move freely in the groove after installation. If so, replace them.**

552 Engine

Use circlip installer (P/N 529 035 686) to install new mono-hook circlips **no. 10**.

Insert circlip into support in such a way that when installed in piston groove, the tab will face upward.

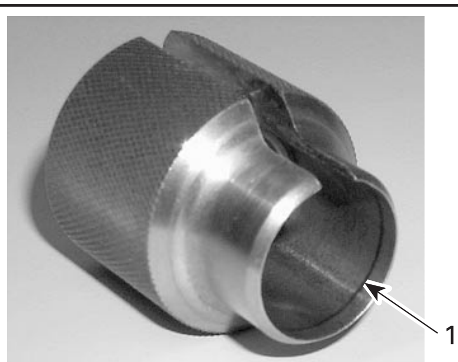
With round end of pusher, position circlip perpendicular to the support axis.



A32B0BA

With the other end of the pusher, push circlip into the support groove.

A32B0CA



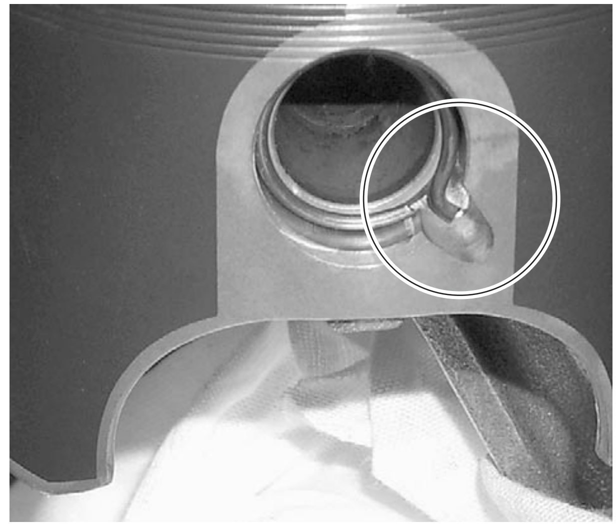
A32B0DA

1. Groove

A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to insert circlip in place. Take care to install new circlips with tab toward top as per following photo.



A32C4BA

TAB TOWARD TOP

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one as on a second attempt circlip will lose its normal retaining capabilities.

CAUTION: Circlips must not move freely after installation; if so, replace them.

Clean cylinders and crankcase mating surfaces with Loctite Chisel (P/N 413 708 500).

Coat crankcase mating surface with Loctite 518 (P/N 293 800 038). Choose the right gasket thickness according to combustion chamber volume. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT. Install it on crankcase. Coat gasket with Loctite 518.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

All Models

NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.

Before inserting piston in cylinder **no. 4**, lubricate the cylinder with new injection oil or equivalent.

Install proper ring compressor on piston assembly.

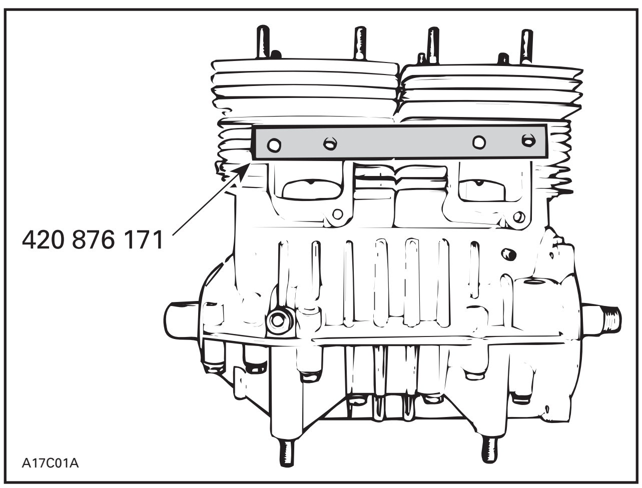
ENGINE TYPE	RING COMPRESSOR P/N
377	420 876 090
552	420 876 972

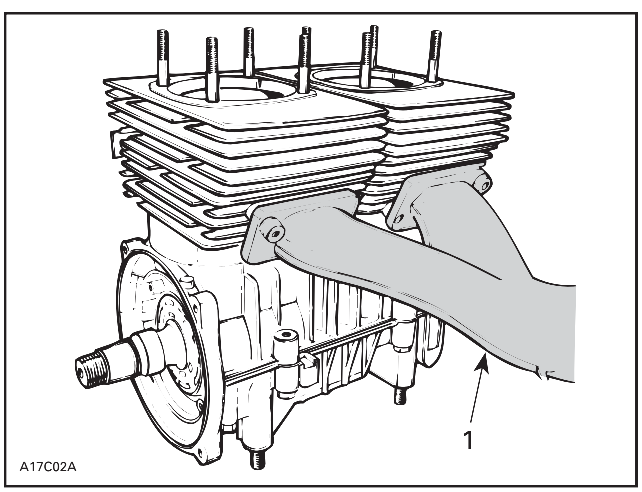
NOTE: The ring compressor will not fit on over size pistons.

Check flatness of intake sockets no. 6. Refer to ENGINE DIMENSION MEASUREMENT and look for CHECKING SURFACE FLATNESS.

At cylinder no. 4 and/or cylinder head no. 3 installation, use aligning tool or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.

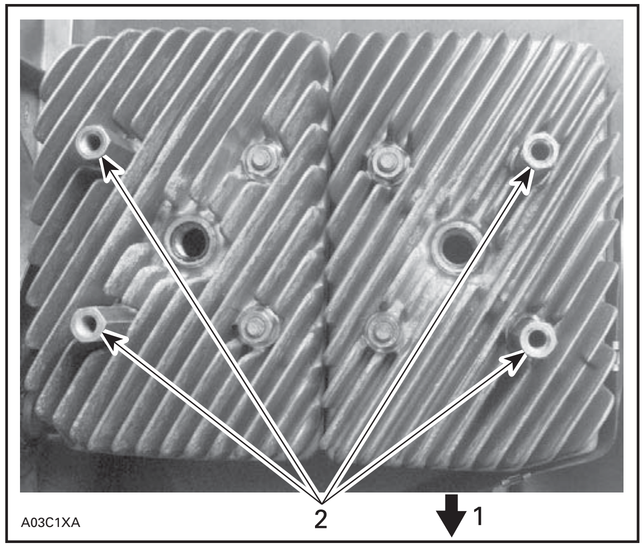
ENGINE TYPE	ALIGNING TOOL P/N
377 and 552	420 876 171





1. *Or use exhaust manifold to align cylinders*

Position distance nuts no. 2 as shown below.



1. *Exhaust*
2. *Distance nuts*

Cross torque cylinder head nuts no. 1 and no. 2 to 22 N•m (16 lbf•ft); torque each cylinder head individually.

Install armature plate, fan housing and then air deflector.

Install a gasket on each side of the air deflector.

Torque intake socket bolts to 22 N•m (16 lbf•ft).

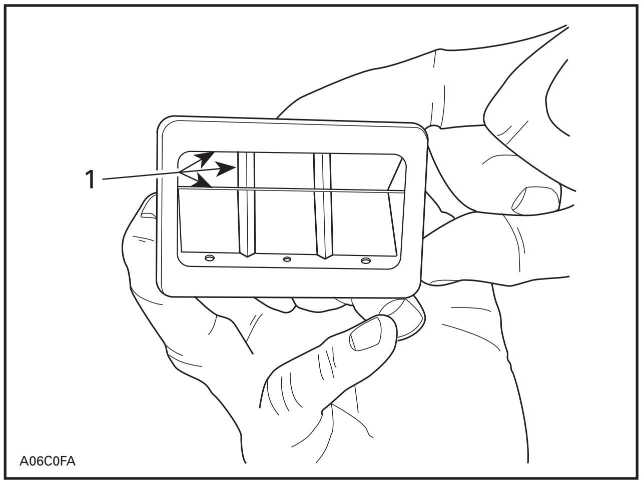
552 Engine

12, Reed Valve

Blades have a curved shape. Install with their curve facing reed block.

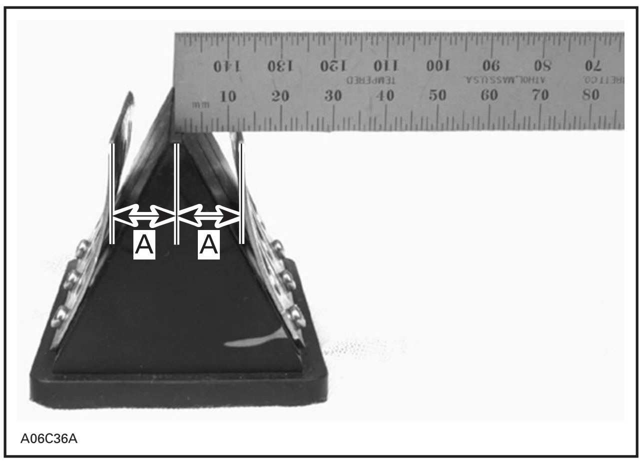
With blade stopper no. 13 removed, check reed valve for proper tightness. There must be no play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.



1. No play

Check distance from blade stopper inner edge and distance from center of reed valve block.



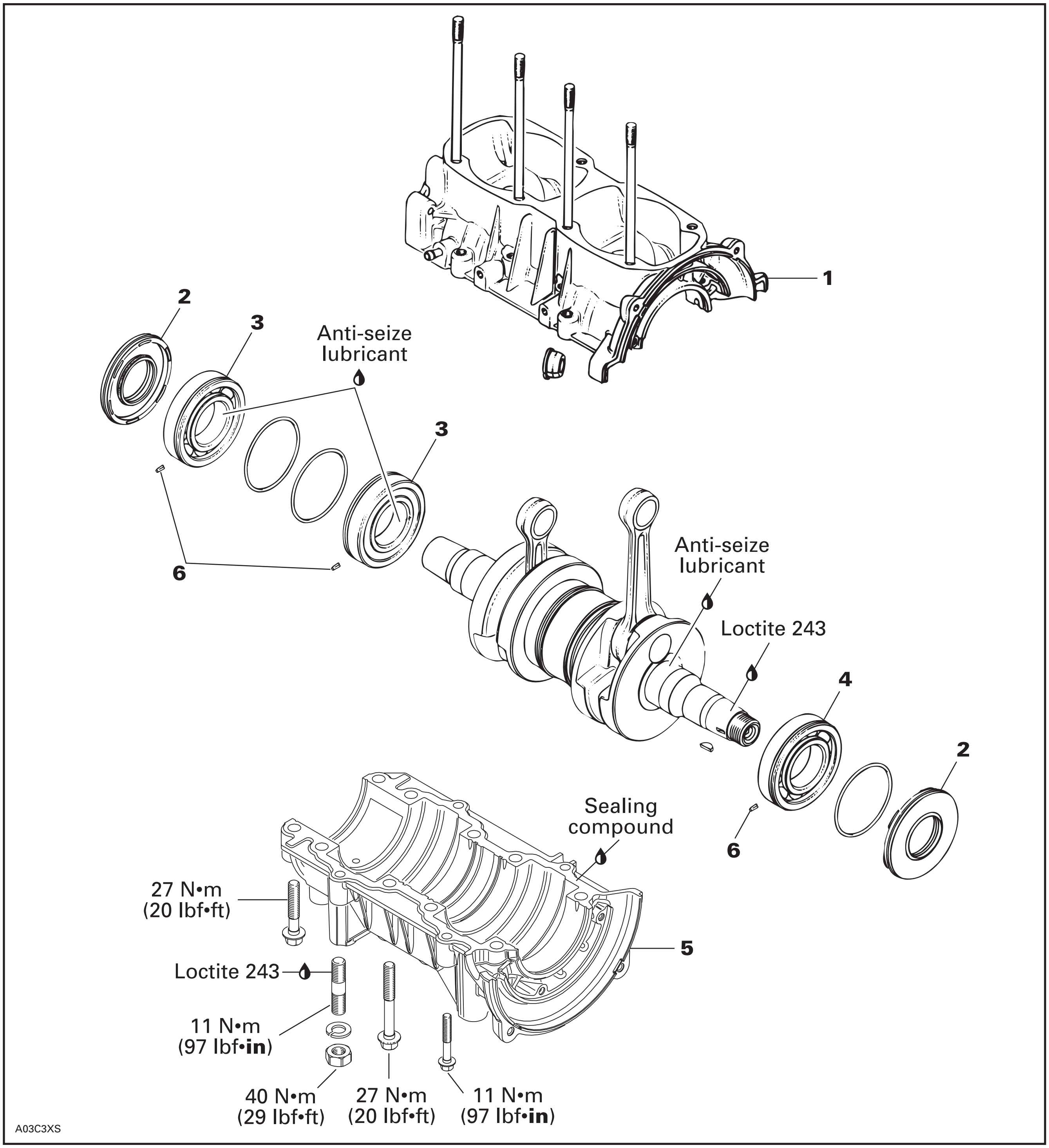
TYPICAL
A. 14.75 - 0, + 0.75 mm (.580 - 0, + .030 in)

Bent blade stopper as required to obtain the proper distance.

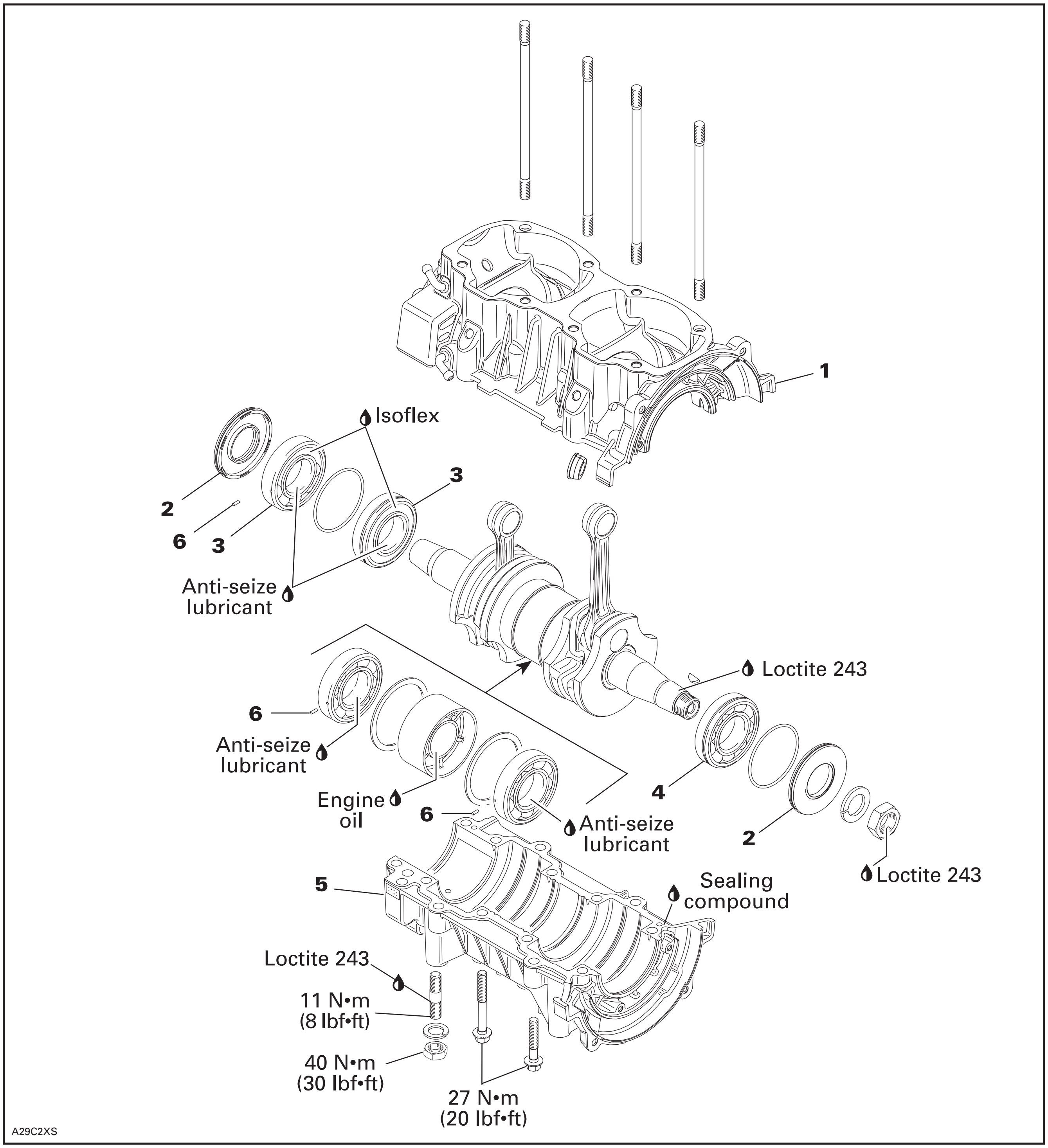
Blade stoppers may slightly interfere with cylinder during installation. Adjusted distance will be reduced automatically upon installation.

BOTTOM END

377 Engine Type



552 Engine Types



NOTE: Engine must be removed from chassis to perform the following procedures.

Remove engine from chassis.

Remove fan guard, rewind starter, starting pulley, trigger coil wire from 4-connector housing, magneto flywheel then fan housing.

Remove stator plate.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

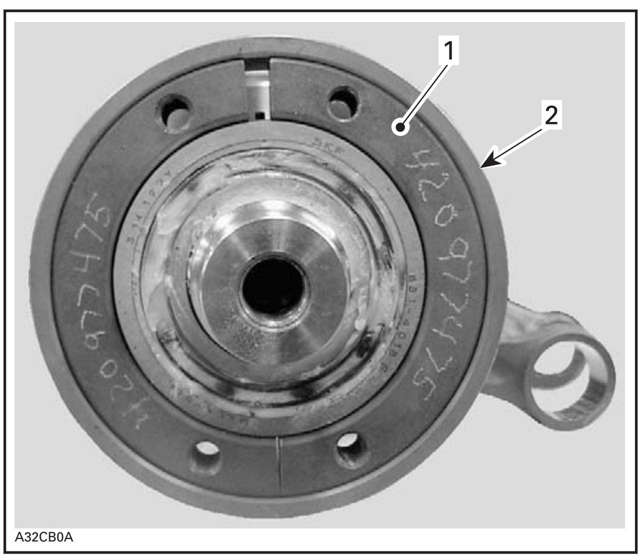
Remove all trace of Loctite 243 from crankshaft taper.

Remove old sealant from crankcase mating surfaces with Bombardier gasket remover (P/N 413 708 500).

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

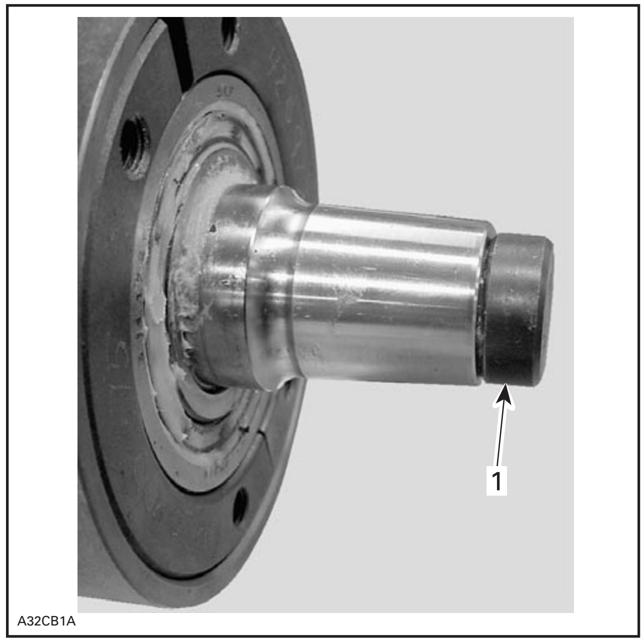
DISASSEMBLY

To remove PTO side bearings **no. 3** from crankshaft, install half rings and puller ring on the bearing.



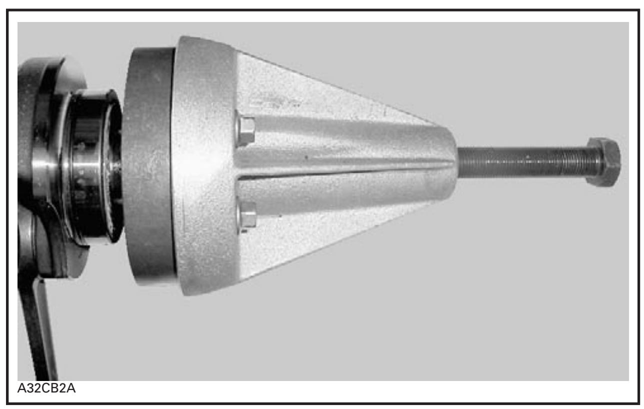
1. Half ring
2. Puller ring

Apply synthetic grease (P/N 413 711 500) on the crankshaft end and install protective cap (P/N 420 876 552).



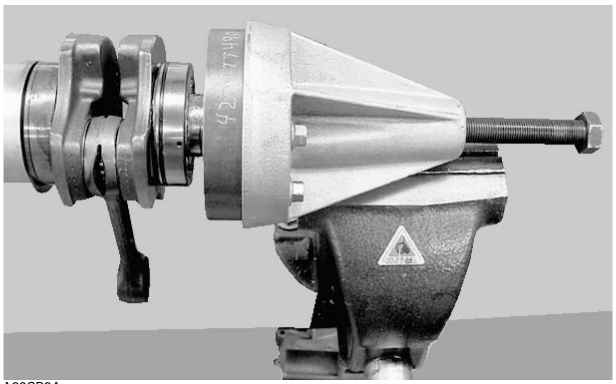
1. Protective cap

Using screws (P/N 420 840 681) Install bearing puller on the half rings.



PULLER INSTALLED ON THE HALF RINGS

Secure the bearing puller in a vise by one of its rib.



A32CB3A

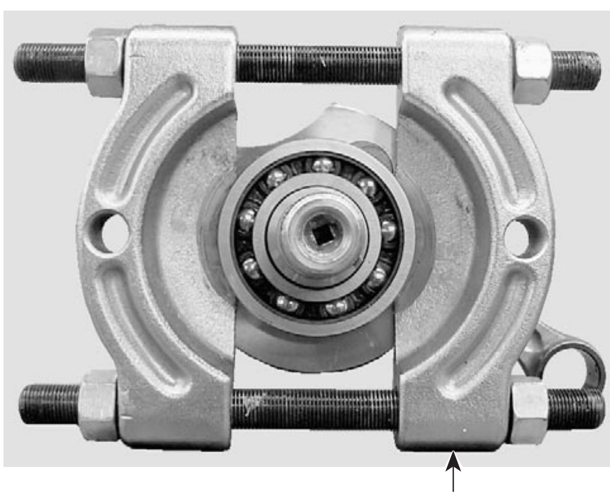
BEARING PULLER SECURED IN THE VISE

CAUTION: Never use any air impact tool for tightening the puller bolt.

Lubricate the puller bolt and then proceed with tightening the puller bolt until the bearing comes out.

Follow the same procedure for the inner bearing.

NOTE: In the case of damaged bearing or less clearance between crankshaft counterbalance and the bearing or on the MAG side bearing, use bearing separator (SNAP-ON tool (P/N CJ951 or SPX/OTC) tool (P/N 1124) to facilitate the removal.



A32CB4A

1. *Bearing separator*

Procedure for MAG side bearings **no. 4** is same as of PTO side with the exception of protective cap (P/N 420 876 557).

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT.

ASSEMBLY

Clean crankshaft end with sand paper no. 180 and remove all residue using Pulley flange cleaner (P/N 413 711 809).

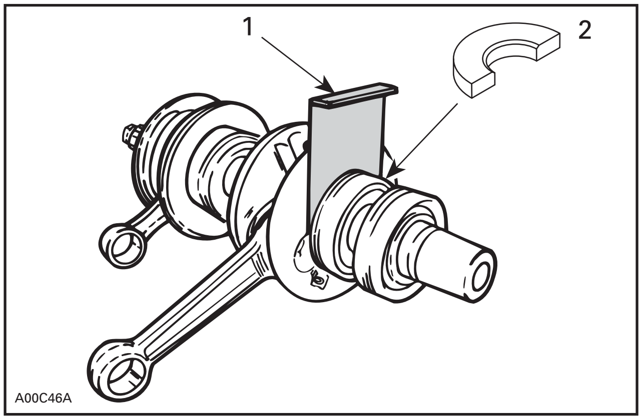
A32CB5A

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.

A32CB6A

To check proper clearance between bearing no. 3 and crankshaft counterbalance , use feeler gauge (P/N 420 876 620).

Mount second bearing with distance gauge (P/N 420 876 822) for 377 for proper positioning.



1. Feeler gauge
2. Distance gauge

Prior to installation, heat the bearing as per the procedure given farther in this sub-section.

This will expand bearings and ease installation. Install bearings with groove as per exploded view.

552 Engine

Heat up the bearing(s) using bearing heater (P/N 529 035 969). This will expand bearings and ease installation. If required, put a suitable plate or shim to avoid the direct contact between integrated seal with the heating surface.

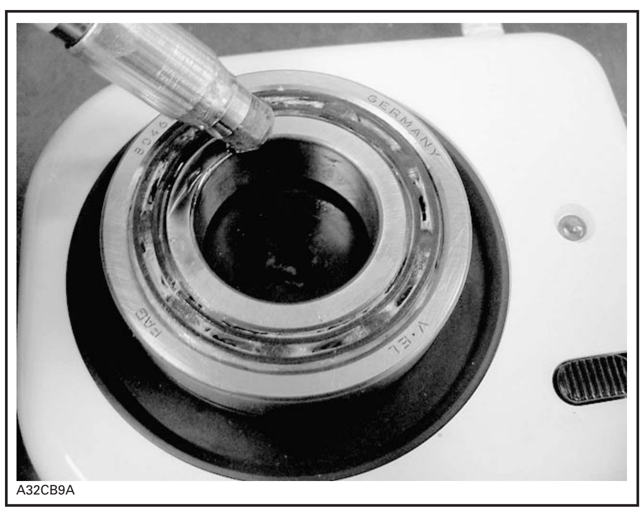
CAUTION: Bearing should not be heated to more than 80°C (176°F). Do not heat bearing with direct flame or heat gun or heated oil. Inappropriate heating procedure(s) may cause inner seal failure.

Turn bearing(s) several times during heating process for heating it (them) properly.

NOTE: Normally it takes approximately 10 minutes to heat up a bearing so in the event of replacing bearing, it's recommended to start the bearing heating process prior to removal operation. Two bearings can be heated at the same time on one bearing heater.

1. Bearings

Touch the inner race of the bearing with the temperature indicator stick (P/N 529 035 970). Stick will liquefy when the bearing reach the proper temperature.



⚠ WARNING

Do not touch heated bearing with bare hands. Wear heat resisting gloves before handling the heated bearing(s).

Slide in the inner PTO bearing with the integrated seal facing crankshaft. Push bearing to end position.

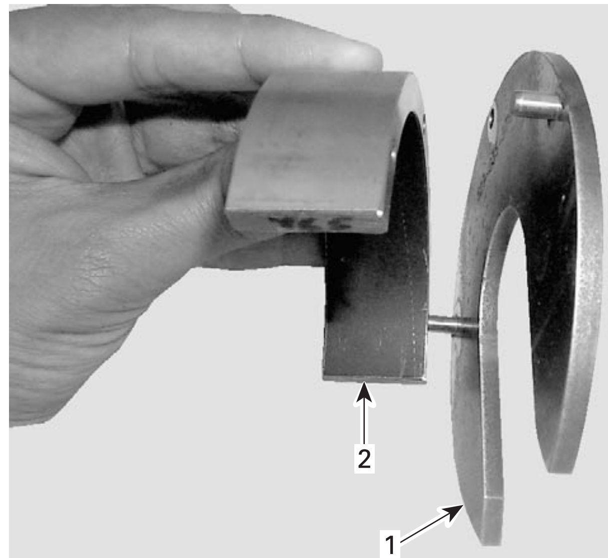
A32CBAA

A32CBBA

BEARING TO END POSITION

Install the O-ring.

Make a bearing locator tool using support plate (P/N 529 035 976) and distance gauge (P/N 529 035 965).



A32CBCA

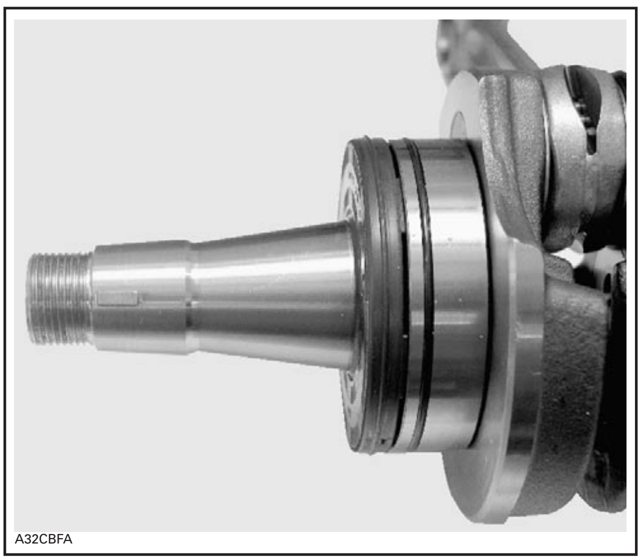
1. *Support plate*
2. *Distance gauge*

Install bearing locator tool.

A32CBDA

Slide in the heated outer PTO bearing onto the crankshaft.

Install the MAG side heated bearing.



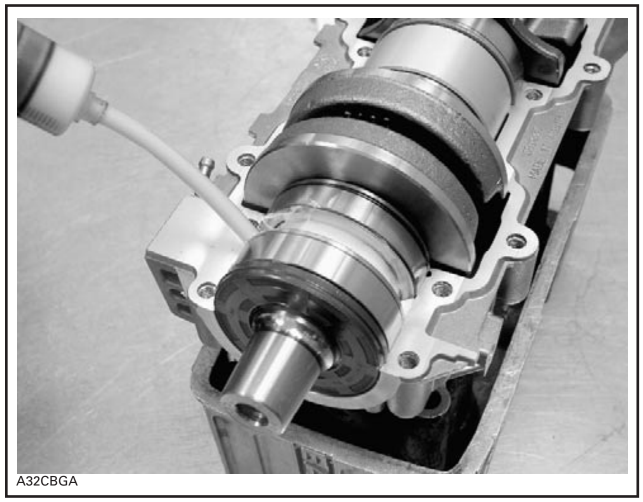
552 Engine

CAUTION: Use only the recommended Isoflex grease (P/N 293 550 021). Make sure not to push Isoflex grease between outside bearing race and half crankcase.

NOTE: The 50 g tube corresponds to 50 cc of grease.

Put 27 to 32 mL of grease in a syringe.

With the syringe, fill in the PTO side ball bearings with 27 to 32 mL of Isoflex grease as shown below.

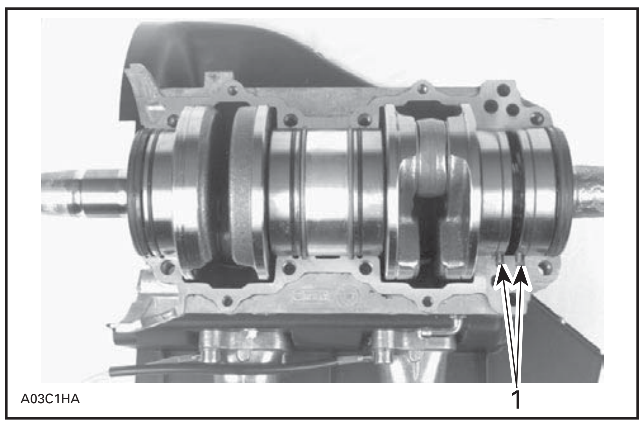


TYPICAL — BALLS COATED WITH A SEAM OF GREASE

All Engines

Bearings are pressed on crankshaft until they rest against radius. These radius maintain the gap needed for bearings lubrication.

When installing crankshaft, position drive pins **no. 6** as illustrated.

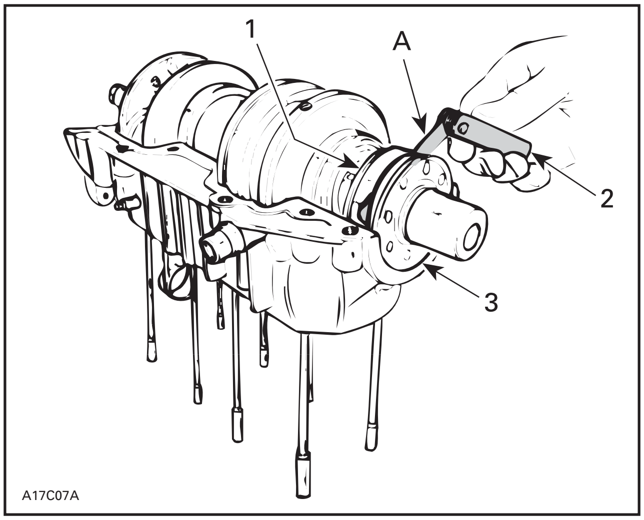


TYPICAL
1. Drive pins

At seal **no. 2** assembly, apply a light coat of lithium grease on seal lip.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain 1.0 mm (.040 in) gap.



1. *Bearing*
2. *Feeler gauge*
3. *Plain oil seal*

A. 1 mm (.040 in)

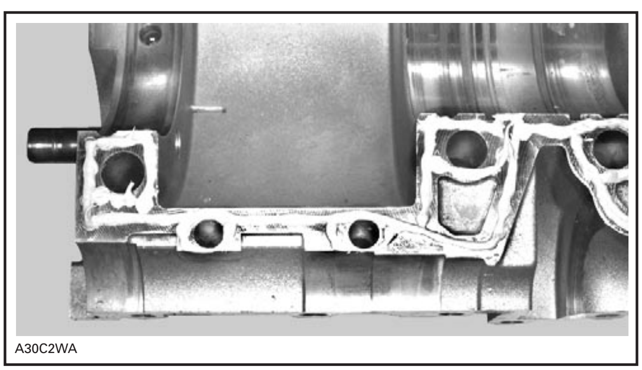
Crankcase halves **nos.1** and **5** are factory matched and therefore, are not interchangeable as single halves.

Crankcase Assembly

IMPORTANT: The total assembly sequence, including sealing compound spreading, screwing and torquing of bolts according to the proper sequence must be performed within 10 minutes.

Before screwing both parts of crankcase, seal it with a sealing compound (P/N 420 297 906). Make sure surfaces are clean and degreased before applying sealing compound.

Spread a seam of 1.2 mm (1/16 in) maximum in diameter on surface of lower crankcase half.



TYPICAL

As far as possible, sealing compound must be applied in one run to avoid any risks of leaking through the crankcase.

Align both crankcase halves before tightening screws.

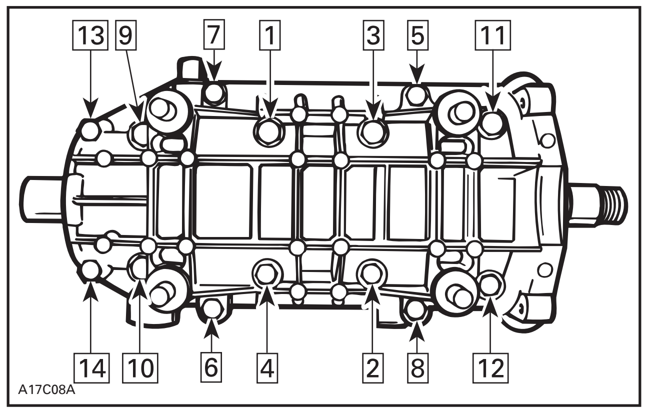
Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align the crankcase halves.

Screw the 4 central bolts (bolts **no. 1** to **no. 4** in the torquing sequence) to squeeze compound between crankcase halves before it starts to dry.

NOTE: Sealing compound spreading plus screwing of engine four central bolts must be performed within 2 minutes to ensure a good sealing and avoid linking.

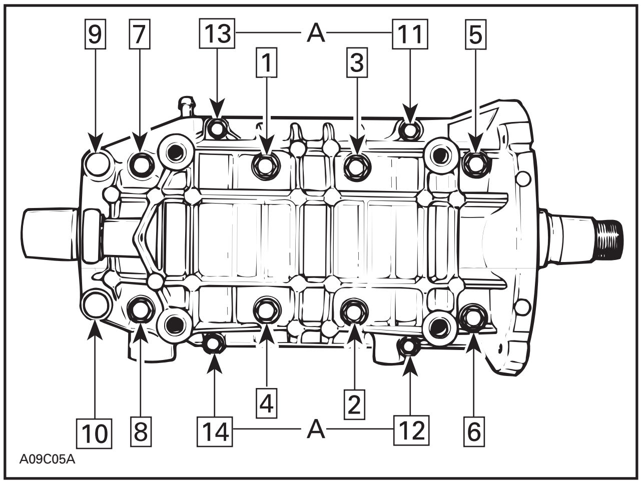
Screw all crankcase bolts in place in the following sequence and to the appropriate torque through a two steps torquing: first, screw bolts up to 60% of the final torque 13 N•m (115 lbf•**in**) for M8 bolts), then, tighten to the required torque (i.e. 22 N•m (16 lbf•ft).

552 Engine Type



TIGHTENING SEQUENCE FOR 552 ENGINE TYPE

377 Engine Type



TIGHTENING SEQUENCE FOR 377 ENGINE TYPE
A. 10 N•m (89 lbf•in)
All the other screws are torqued to 22 N•m (16 lbf•ft)

All Engines

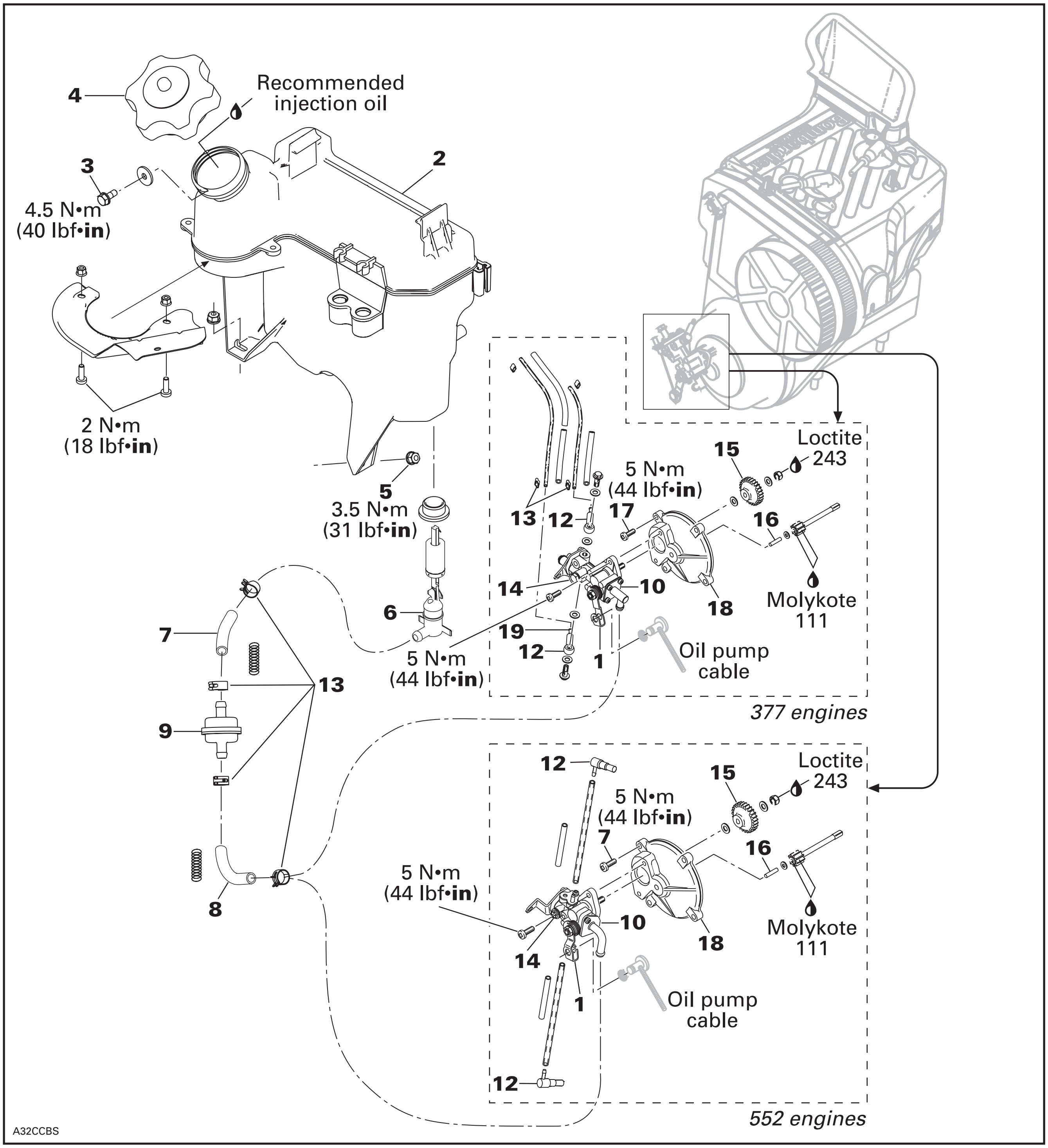
To install magneto, refer to CDI MAGNETO.

BREAK-IN

After rebuilding an engine always observe a break-in period as described in *Operator's Guide*.

OIL INJECTION SYSTEM

377 and 552 Engines



GENERAL

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to SELF-LOCKING FASTENERS and LOCTITE APPLICATION at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strickly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

NOTE: The following procedures can be done without removing the engine from chassis.

OIL TYPE

MODEL	OIL TYPE
2-TEC SDI	BOMBARDIER FORMULA XP-S II synthetic injection oil (1)
All others 2-stroke engines	BOMBARDIER FORMULA XP-S II synthetic injection oil OR BOMBARDIER injection oil (2) (3)

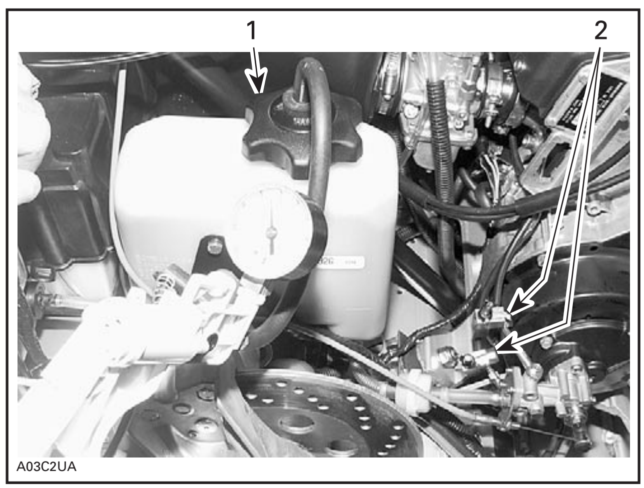
(1) CAUTION: The BOMBARDIER Formula XP-S II synthetic injection oil is specially formulated and tested for the severe requirement of these engines. Use of any other brand two-stroke oil may void the limited warranty. Use only BOMBARDIER Formula XP-S II synthetic injection oil. There is no known equivalent on the market for the moment. If a high quality equivalent were available, it could be used.
(2) If BOMBARDIER injection oil is not available, API TC high-quality low ash two-stroke injection oil may be used.
(3) BOMBARDIER FORMULA XP-S II synthetic injection oil and BOMBARDIER injection oil are compatible, they can be mixed together.

OIL SYSTEM LEAK TEST

The following test will indicate any leak from oil reservoir and all other component of oil system.

Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on outlet hoses.



TYPICAL
1. Special cap on reservoir
2. Hose pinchers on outlet hoses

Connect leak testing kit pump to special cap.

Pressurize oil system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s).

NOTE: An oil pump shaft test must be done to complete the oil system leak test. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT for the procedure.

OIL PUMP IDENTIFICATION

Pump Lever

Different engines need different pumps. See identification on lever **no. 1**.

CAUTION: Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
377	05
552	03
593 and 593 HO SDI	02
693	01
793 SDI	01

CLEANING

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

DISASSEMBLY

NOTE: Some oil pump components are not available as single parts.

Injection Oil Reservoir

Empty injection oil reservoir **no. 2** by siphoning injection oil.

Remove:

– tuned pipe
– electronic module or fuse box
– upper screw **no. 3** (near reservoir cap **no. 4**)
– lower nut **no. 5**.

NOTE: Cut the ties retaining the wiring harness if necessary.

Injection Oil Level Switch

Before replacing the injection oil level switch **no. 6**, check it according to the following procedure:

– Remove tuned pipe.
– Disconnect switch connectors and place a jumper wire between them.
– If the oil light turns on, replace the switch.
– If the light stay off, check the light and the wiring harness.

To remove the switch, use the following procedure.

Remove tuned pipe.

Siphon injection oil reservoir.

Unplug switch connectors.

Pull oil level switch **no. 6** out of reservoir.

Injection Oil Filter

Remove tuned pipe.

Siphon injection oil reservoir.

Disconnect oil filter hose **no. 7** from the reservoir **no. 2**.

Remove air box and carburetor or throttle body.

Disconnect oil hoses **no. 7** and **no. 8** from the oil filter **no. 9** and remove it.

Injection Oil Pump

NOTE: Before removing the injection oil pump **no. 10**, check its operation. Refer to the end of this section.

377 and 552 Engines

Remove:

– air box
– carburetor
– pump mounting flange screws **no. 17**

Unplug all hoses connected to oil pump **no. 10**.

NOTE: Mark hose locations for installation.

Disconnect the oil pump cable.

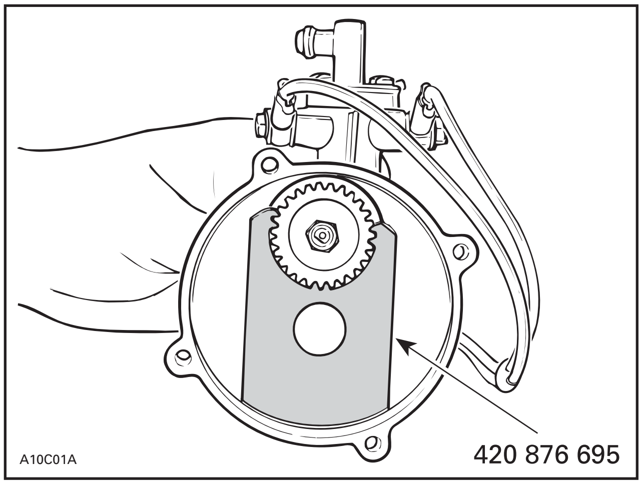
Oil Pump Gear

377 and 552 Engines

Remove the oil pump from engine.

To remove the gear retaining nut **no. 15**, first extract the needle roller **no. 16** with pliers then lock gear in place using the following gear holder.

ENGINE TYPE	TOOL P/N
377 and 552	420 876 695



TYPICAL

Separate the oil pump from the pump mounting flange **no. 18** by removing oil pump screws **no. 19**.

Check Valve

552, 593, 593 HO SDI, 693 and 793 SDI Engines

NOTE: Before removing check valve **no. 12**, check its operation. Refer to the end of this section.

Remove air box and carburetor or throttle body.

Clean check valve area to remove oil or dirt.

Heat check valve **no. 12** then pull it out of crankcase.

ASSEMBLY

NOTE: During installation, always check for spring clips **no. 13** tightness.

Injection Oil Reservoir

For installation, reverse the removal procedure.

Injection Oil Level Switch

For installation, reverse the removal procedure.

Injection Oil Filter

For installation, reverse the removal procedure.

NOTE: The filter must be installed with the arrow pointing toward the pump.

Injection Oil Pump

For installation, reverse the removal procedure. However, pay attention to the following.

Torque the screws **no. 11** to 5 N•m (44 lbf•**in**).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Install cable lock washer on left side of support.

Verify cable and oil pump lever operation then adjust cable.

Oil Pump Gear

377 and 552 Engines

The installation is the reverse of removal procedure. However, pay attention to the following details.

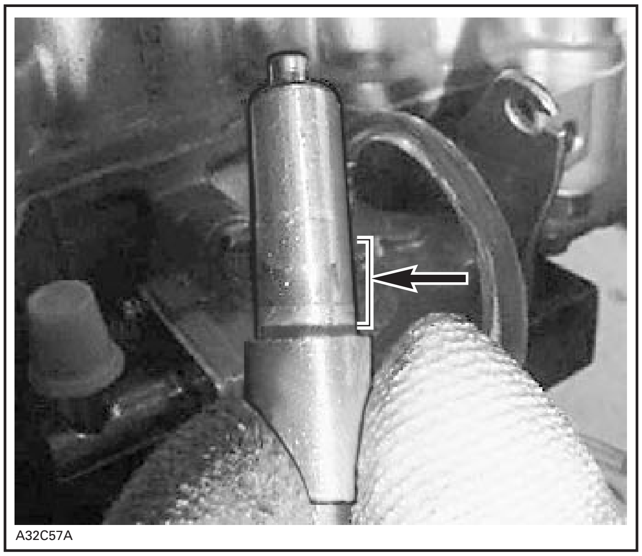
At gear assembly, apply a light coat of Molykote 111 (P/N 413 707 000) on gear teeth.

The needle roller **no. 16** must be engaged as deep as possible in the pump mounting flange.

Check Valve

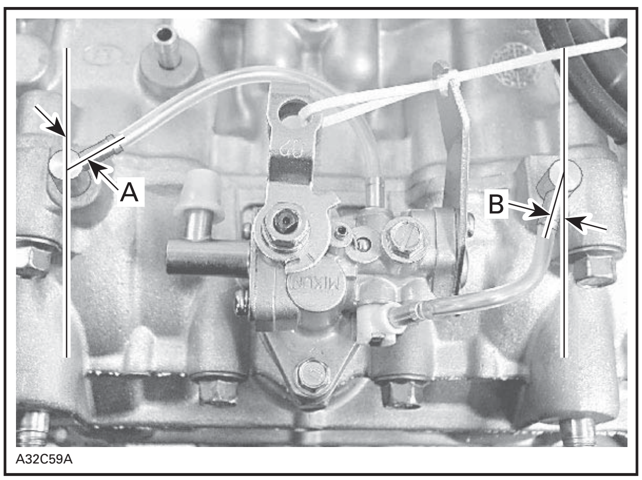
Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is ONLY in this area.

NOTE: Prior to coating it with Loctite, make sure check valve body is clean and dry. Clean from dirt or oil, if any, with Pulley flange cleaner (P/N 413 711 809).



APPLY LOCTITE ON THIS AREA ONLY

Install the check valve in the correct position as described on next photos into the crankcase lower side.



TYPICAL — POSITION FOR LIQUID COOLED ENGINES
A. PTO side 45° ± 5° from cylinder axis to the top
B. MAG side 20° ± 5° from cylinder axis to the bottom

Punch in the check valve carefully with a plastic hammer.

Clean the crankcase from surplus of Loctite 648 with a rag.

ADJUSTMENT

Oil Pump Cable

377 and 552 Engines

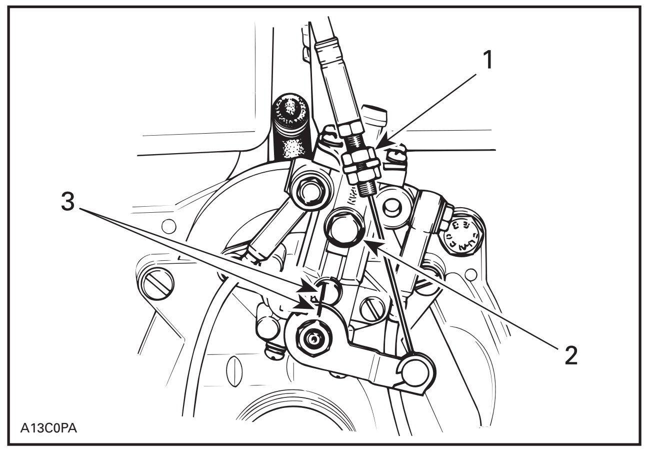
Prior to adjusting the pump, make sure all carburetor adjustments are completed and engine is stopped.

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place.

The mark on the pump casting and on the lever must align. Width of lever mark is the tolerance.

Loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



TYPICAL
1. Adjuster nut
2. Bleeder screw
3. Marks

CAUTION: Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To Bleed Oil Lines

Bleed main oil line (between reservoir and pump) by loosening the bleeder screw **no. 14** until air has escaped from the line. Add injection oil as required.

Reinstall all parts.

Bleed the small oil line between pump and engine by running engine at idle while holding the pump lever in fully open position.

NOTE: Make a J hook out of mechanical wire to lift the lever.

⚠ WARNING

No ensure not operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

Oil Pump

On Vehicle

NOTE: Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unplug small oil lines from pump. Start engine and stop it as soon as it fires.

Check that oil in small oil lines has been sucked up (this will be indicated by a clear section of small oil lines). Repeat the procedure until this condition is attained.

Reconnect small oil lines, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.

If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in injection nozzle. Replace as necessary.

Test Bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a clockwise rotating drill rotate pump shaft. Oil must drip from outer fittings while holding lever in a fully open position. If not replace pump.

Check Valve

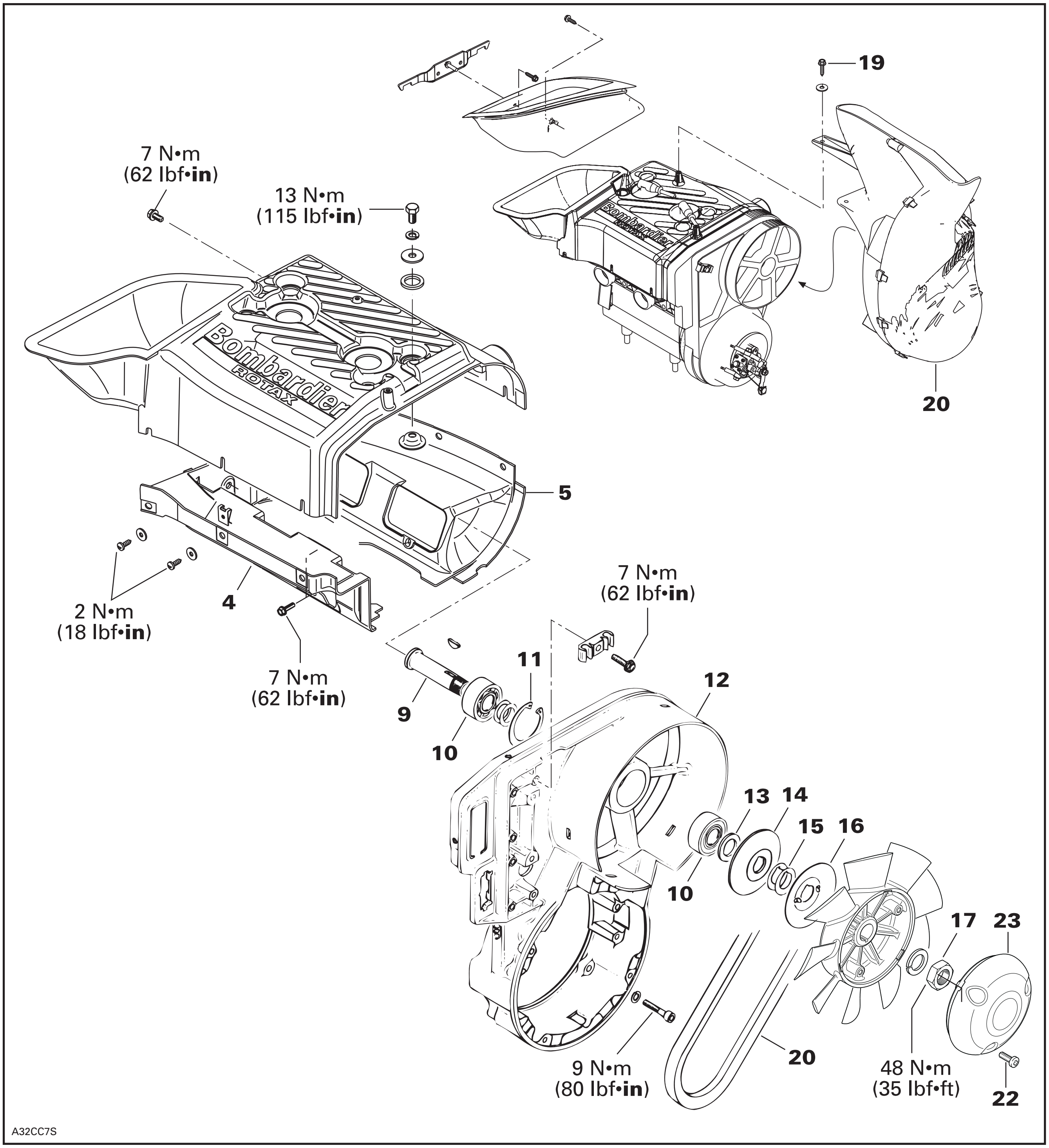
For all engines, check valve is part (built-in) of injection nozzle.

To verify the check valve, proceed the same as for checking pump operation on vehicle. First unplug oil line from check valve. After restarting the engine, check that a clear section in small oil line is present. Reconnect oil line.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

AXIAL FAN COOLING SYSTEM

377 and 552 Engines



NOTE: The following procedures can be done without removing engine from chassis.

REMOVAL

NOTE: To facilitate further disassembly, fan nut may be removed before removing fan housing.

Remove rewind starter, starting pulley, trigger coil wire from 4-connector housing then fan housing ass'y.

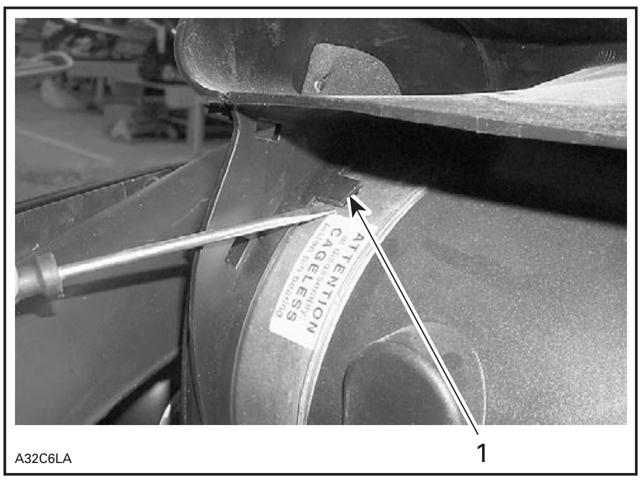
CLEANING

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

DISASSEMBLY AND ASSEMBLY

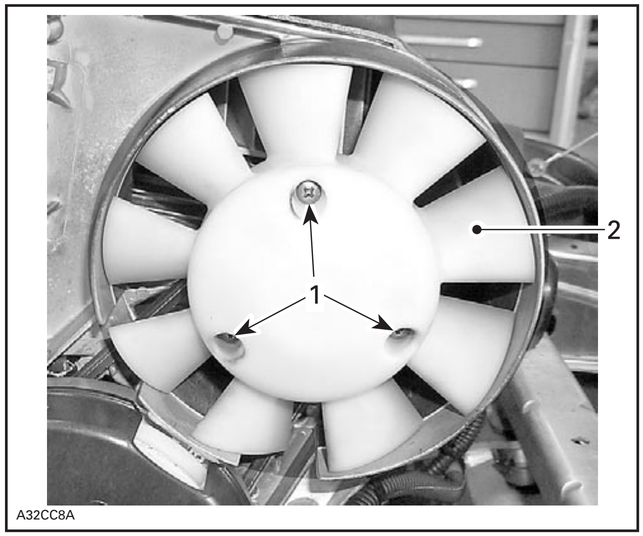
Remove the tuned pipe to gain access.

Unscrew the 2 screws no. 19 of inlet duct no. 20. Remove the inlet duct by unclipping three tabs using a flat screwdriver from the engine fan housing.



1. Tab

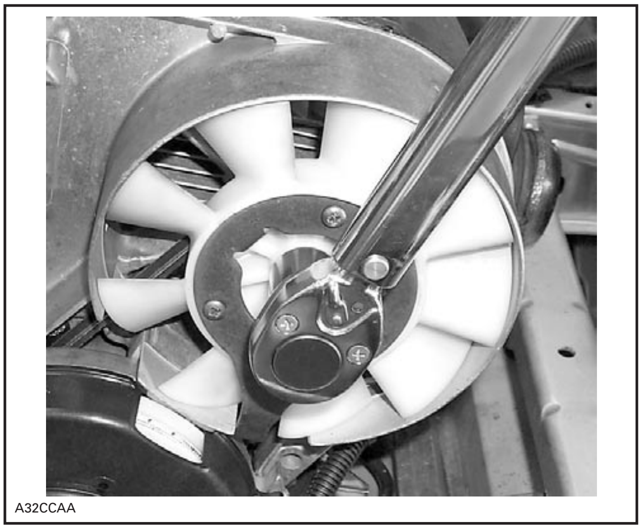
Unscrew the screws no. 22 to remove the fan cover no. 23.



1. Screws
2. Cover

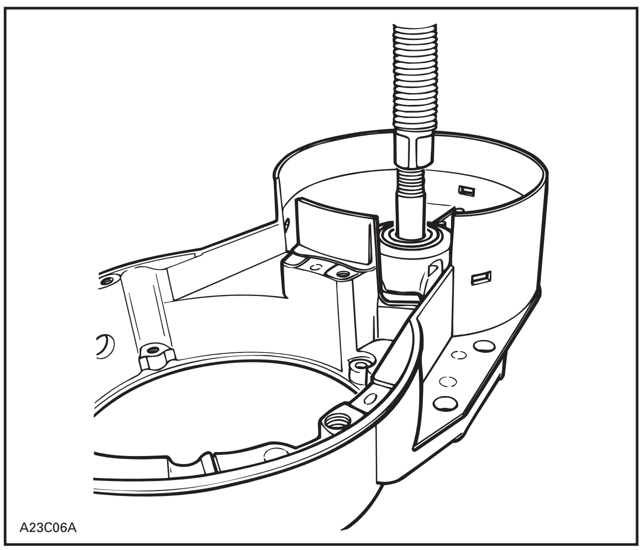
To remove or install fan pulley retaining nut no. 17, lock fan pulley with special holder wrench (P/N 420 876 357) and 3 screws.

At assembly, torque nut to 48 N•m (35 lbf•ft).

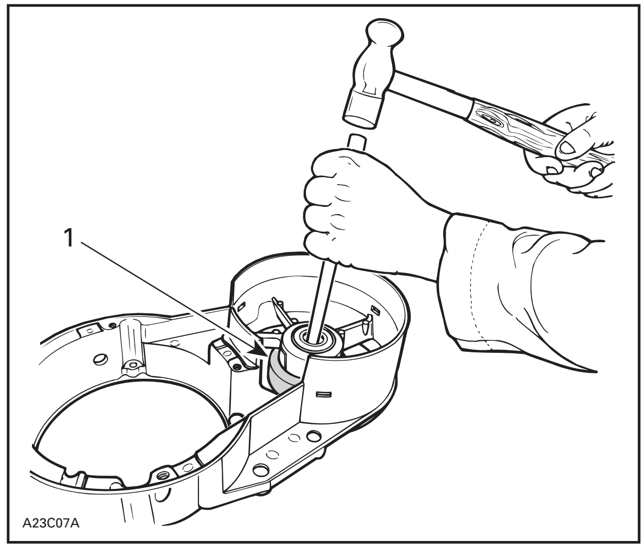


TYPICAL

Using a press, drive the fan shaft **no. 9** out.



Support fan housing **no. 12** with a ring. With a punch, working all around bearing **no. 10** inner race, drive bearing out of fan housing. Keep shims for installation.



1. Ring supporting fan housing

Remove circlip **no. 11** then remaining bearing.

To install, press one bearing in place then install circlip and shims. Press the other bearing from opposite side until it is flush with housing. Press fan shaft from engine side of fan housing. Check for free rolling action.

INSTALLATION

At assembly, apply a light coat of Loctite 243 (blue) on screw **no. 1** threads.

A gasket must be placed on both sides (inner and outer) of intake and exhaust holes of cylinder cowl **no. 4** and **no. 5**.

Reinstall fan protector **no. 18** properly.

⚠ WARNING

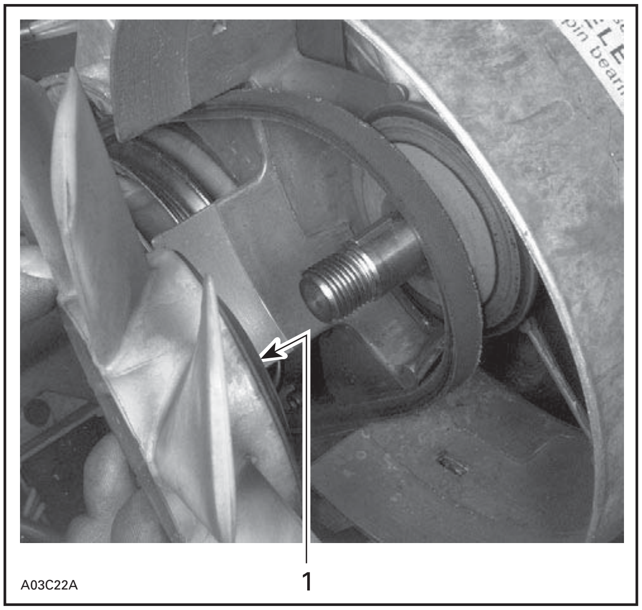
Always reinstall fan protector after servicing.

FAN BELT REPLACEMENT AND DEFLECTION ADJUSTMENT

Remove muffler, rewind starter and on so equipped models connecting flange. Follow procedure described above.

Using fan holder tool (P/N 420 876 357), remove fan nut.

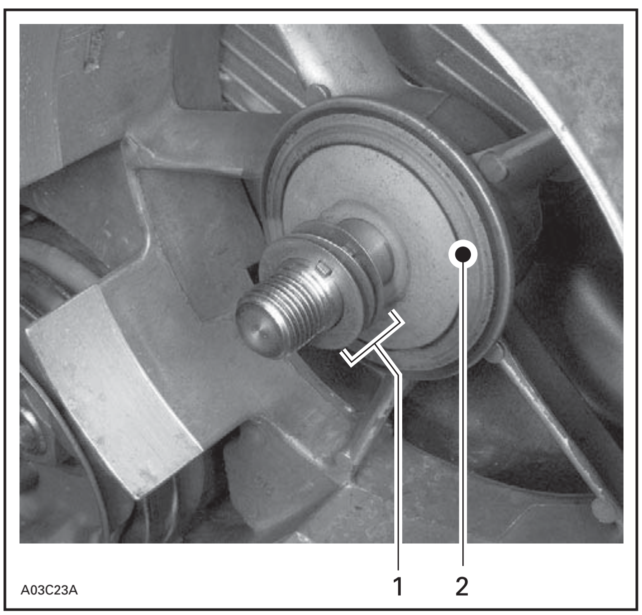
Remove fan with pulley half.



1. Remove fan with pulley half

Remove fan belt.

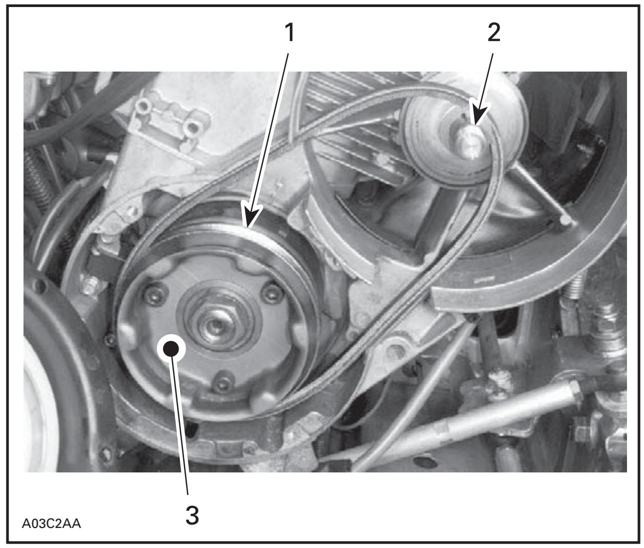
Leave shims and second half pulley in place. Refer to the following photo.



1. Keep shims
2. Leave second half pulley in place

Reassembly

Install fan belt on bottom pulley first then position onto fan shaft, as shown in the next photo.



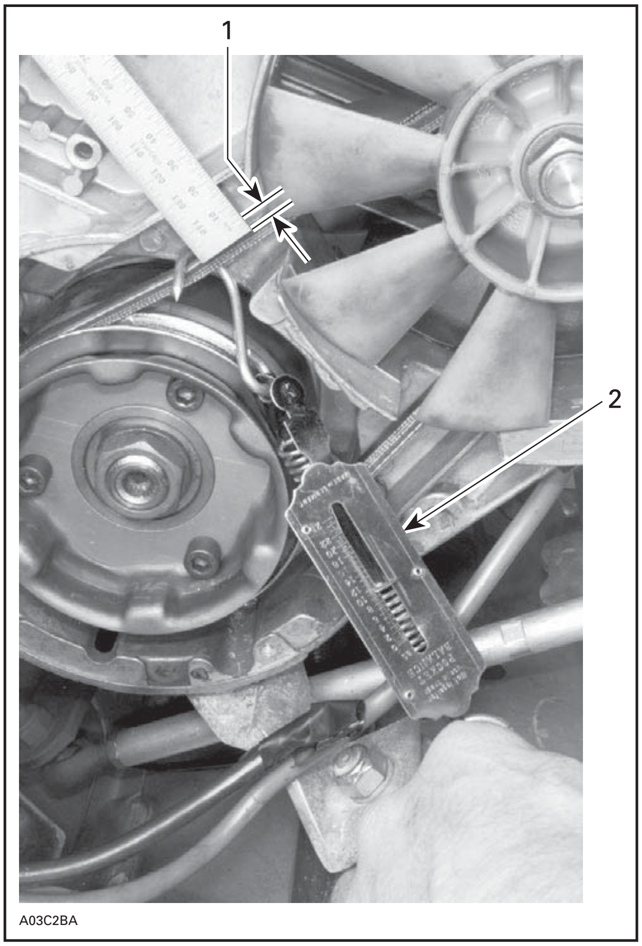
FAN BELT PROPERLY INSTALLED ON BOTTOM PULLEY AND FAN SHAFT
1. Bottom pulley
2. Fan shaft
3. Starting pulley

Reinstall fan assembly on fan shaft. Temporarily tighten fan nut.

CAUTION: When reinstalling fan assembly, ensure that key is properly positioned into fan shaft keyway.

Fan Belt Deflection Adjustment

Check fan belt deflection using a ruler and a fish scale positioned midway between pulleys as per following photo.

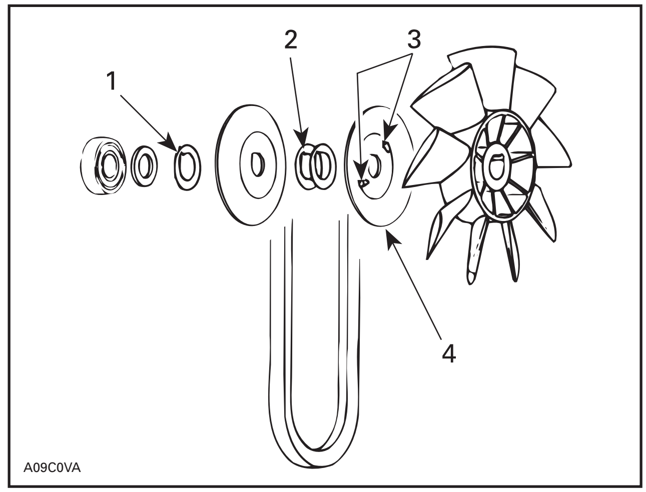


TYPICAL
1. *Measure deflection here*
2. *Fish scale*

Belt deflection must be according to the following specifications:

ENGINE TYPE	BELT DEFLECTION	FORCE APPLIED
377 and 552	9.5 mm (3/8 in)	5 kg (11 lb)

To adjust deflection tension, add or remove shim(s) **no. 15** between pulley halves **no. 14** and **no. 16**. Install excess shim(s) between distance sleeve **no. 13** and pulley half **no. 14** (housing side).



TYPICAL
1. *Unused shim(s) here*
2. *Adjust here*
3. *Positioning noses*
4. *Some engines only*

Select pulley halves so that the one with 2 positioning noses will be on fan side. Ensure to insert these noses into fan notches.

Once fan belt is properly adjusted, torque fan nut to 48 N•m (35 lbf•ft) using holder wrench (P/N 420 876 357), as shown in the following photo.

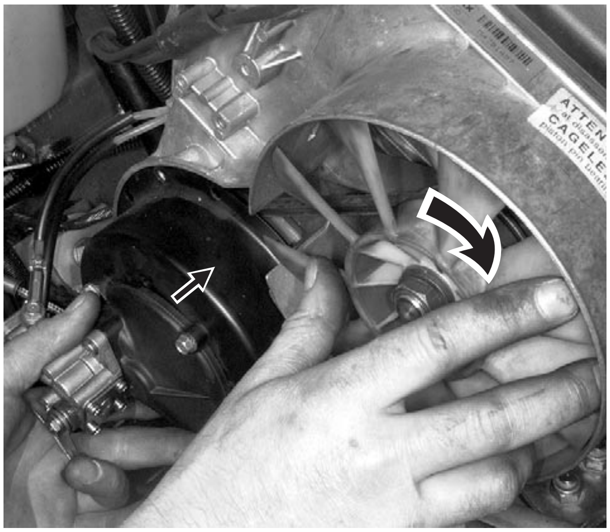
NOTE: Apply Loctite 243 (blue) on fan nut threads.

TYPICAL — TORQUE FAN NUT USING HOLDER WRENCH

Finalizing Reassembly

Reinstall rewind starter.

CAUTION: When installing rewind starter, ensure that oil pump shaft is properly positioned. Do not force shaft insertion. Turn fan until oil pump shaft slides in place, as shown in the following photo.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TURN FAN TO SLIDE OIL PUMP SHAFT IN PLACE

Secure rewind starter with original screws.

Reinstall fan protector **no. 18** properly.

Install the air inlet duct **no. 20** with screws **no. 19** and Loctite Black Max 380.

⚠ WARNING
Always reinstall fan protector after servicing.

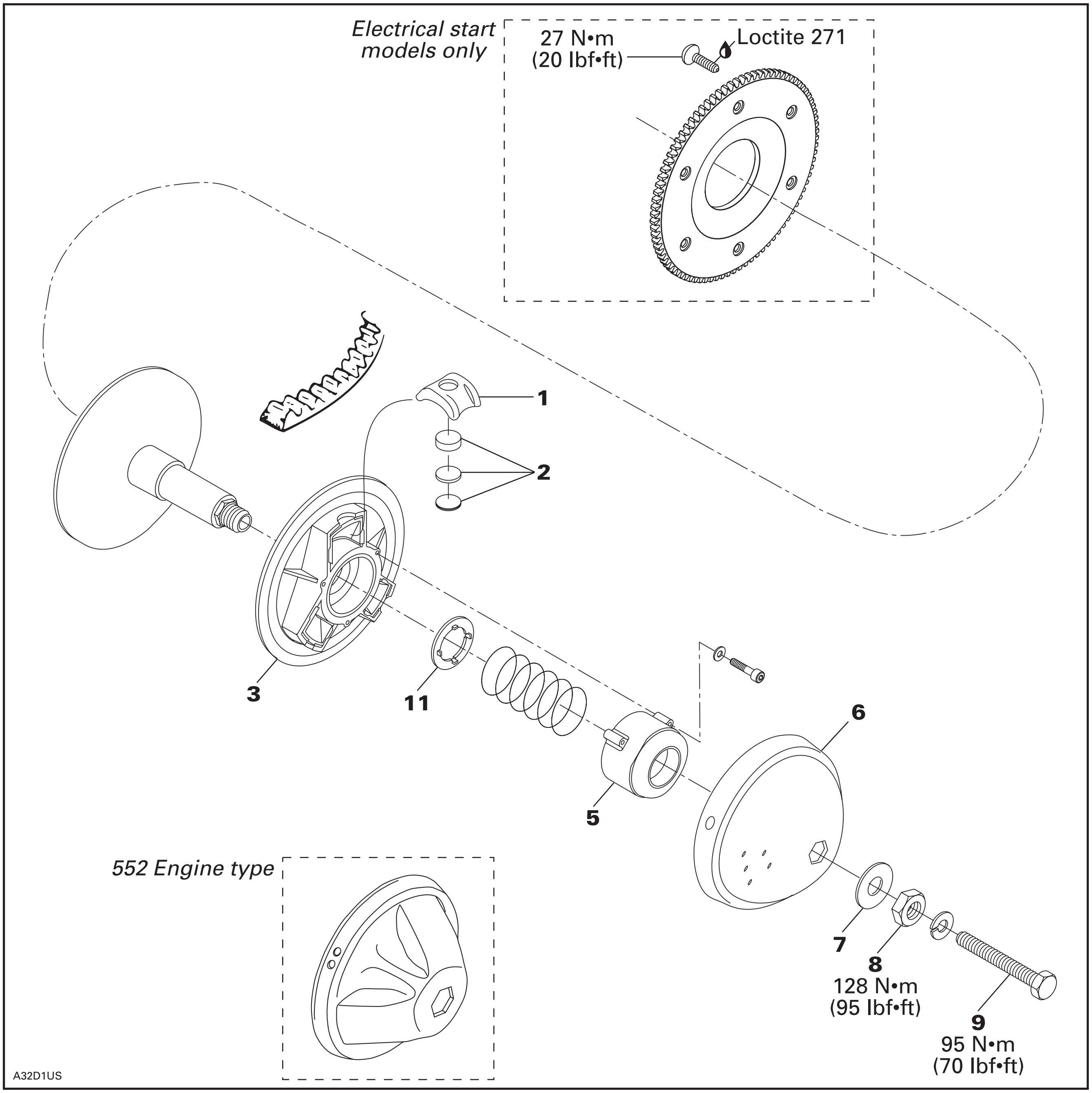
Reinstall muffler.

DRIVE PULLEY

BOMBARDIER LITE

NOTE: This is a lubrication free drive pulley.

377 and 552 Engines



GENERAL

Some drive pulley components (return spring, calibration disk) can be changed to improve vehicle performance in high altitude regions. A service bulletin will give information about calibration according to altitude.

CAUTION: Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

NOTE: If disassembling drive pulley, first straighten tab washer no. 7 then untighten nut no. 8.

⚠ WARNING

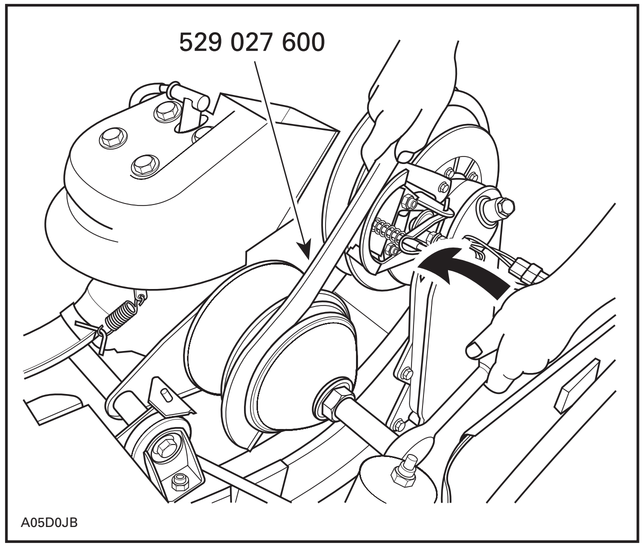
Never use an impact wrench to remove or install the drive pulley.

⚠ WARNING

The drive pulley assembly is a precisely balanced unit. Never replace parts with used parts from another drive pulley assembly.

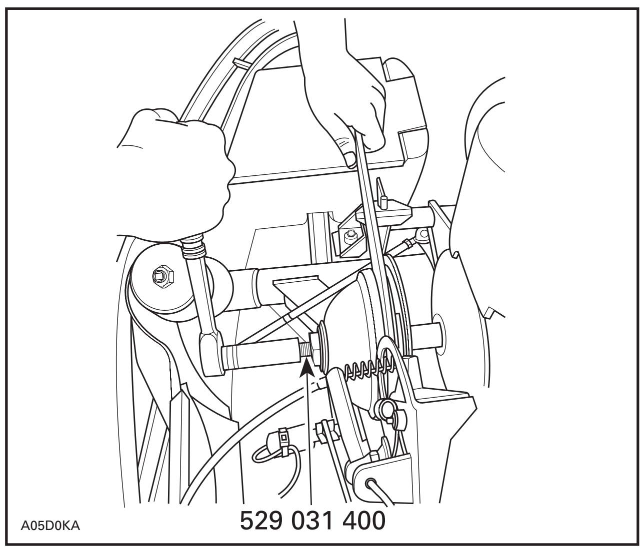
Use holder (P/N 529 027 600).

Remove retaining screw no. 9.



TYPICAL

Insert drive pulley puller (P/N 529 031 400) then remove drive pulley.

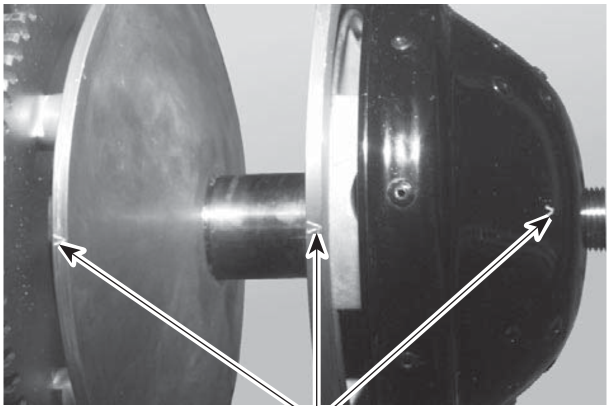


TYPICAL

DISASSEMBLY

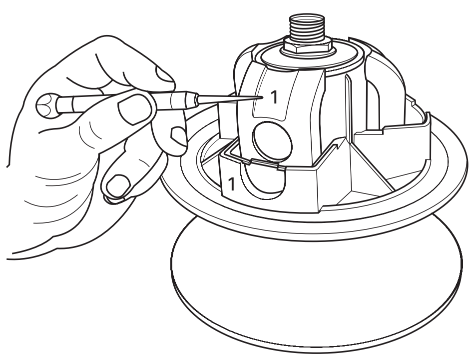
Unscrew nut. Remove tab washer.

Check for alignment marks for proper indexing at reassembly.



1. Alignment marks

Identify blocks **no. 1** and their respective positive positions for reassembly.

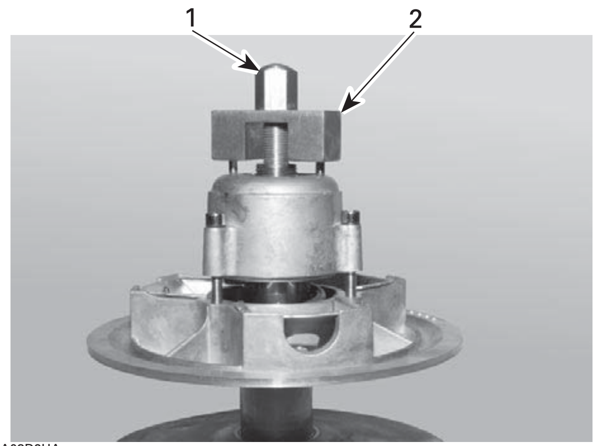


1. Identify

2, Cap, Washer and Disk

These are calibration parts. Refer to TECHNICAL DATA.

Install spring cover tool (P/N 529 027 300) with puller (P/N 529 031 400) on spring cover.



1. Puller tool
2. Spring cover tool

Screw puller (hand tight) to hold spring cover and remove screws holding spring cover.

Slowly unscrew puller to release spring pressure.

Remove spring cover no. 5, spring and spring seat **no. 11**.

CLEANING

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

INSPECTION

Check sliding half for excessive lateral play and fixed half shaft for scratches. Replace as required.

ASSEMBLY

Install spring seat **no. 11** then the spring and its cover **no. 5**.

Make sure to install blocks at their original position and with their curved end toward governor cup. See following illustration.

Tighten nut **no. 8** to 128 N•m (95 lbf•ft).

INSTALLATION

Torque screw to 80 to 100 N•m (59 to 74 lbf•ft).

Install drive belt and belt guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

⚠ WARNING

Make sure the track is free of particles that could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake, repeat 5 times.

Retorque screw to 90 to 100 N•m (66 to 74 lbf•ft).

⚠ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

IGNITION TIMING

377 and 552 Engine Types

If for any reason, ignition timing accuracy is suspected, it can be verified as follows.

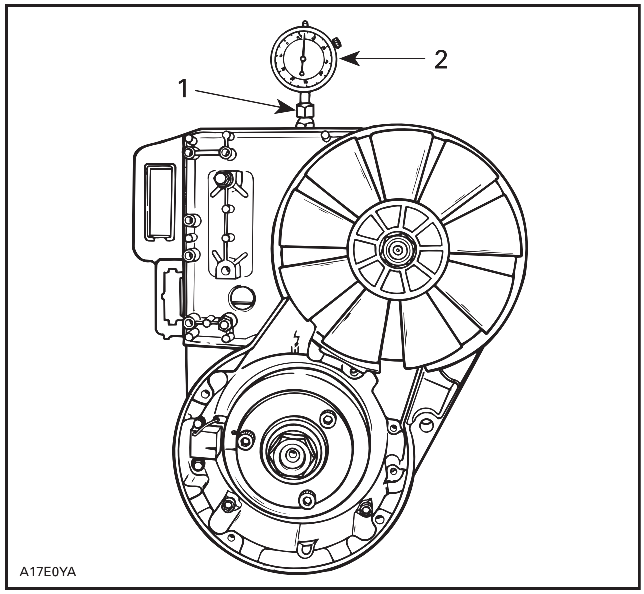
VERIFYING MAGNETO FLYWHEEL TIMING MARK POSITION

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

- To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual breakdown of the engine.
- To correctly locate and mark a timing mark on a new service magneto flywheel.
- To verify the correct location of the factory timing mark.
- To detect a wrong magneto flywheel corresponding to a different engine type.

To verify the position of the timing mark on the magneto flywheel, proceed as follows:

- Clean the area around the spark plugs, and remove them.
- Remove the rewind starter from the engine.
- Install the TDC gauge in the spark plug hole, (magneto/generator side) and adjust as follows:
  – Position the magneto flywheel at approximately TDC.

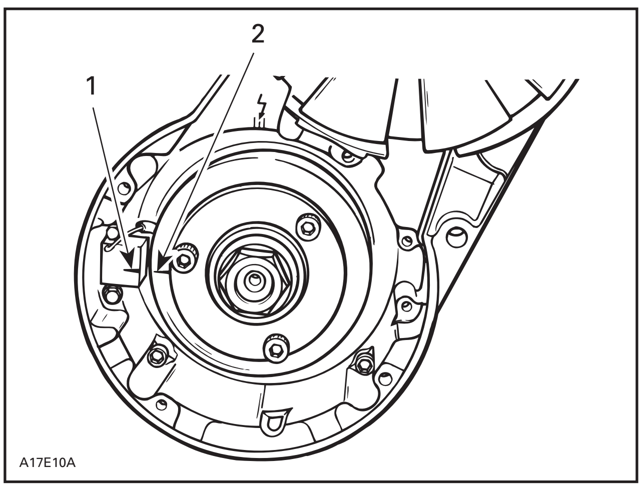


TYPICAL — INSTALLATION OF TDC GAUGE
1. Adaptor lock nut
2. Gauge on MAG side cylinder

  – Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
  – Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
  – Position the dial face toward the magneto/generator. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
- Locate the piston TDC position as follows:
  – Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
  – Rotate the dial face so that «0» is in line with the needle when it stops moving.
  – Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to «0», until the needle always stops exactly at «0» before changing direction.
  – «0» now indicates exact TDC.
- Verify the position of the timing mark on the magneto flywheel as follows:

NOTE: When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto/generator. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least one-quarter turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

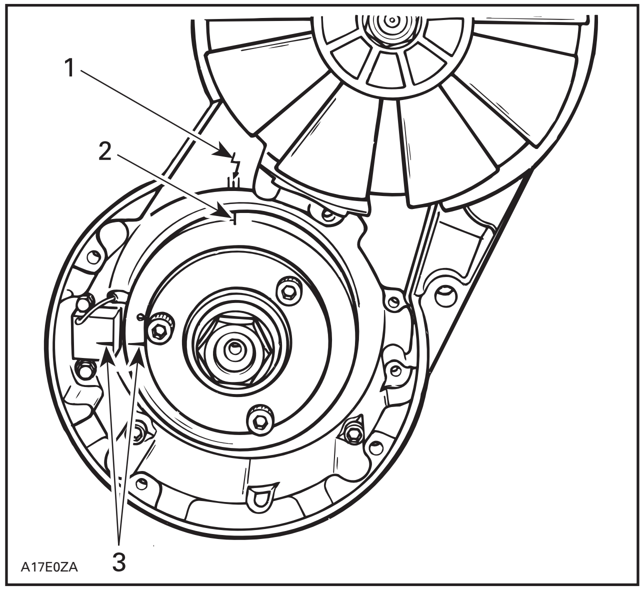
– Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA.
– Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.
– If the marks do not align, check magneto flywheel and trigger coil part numbers and check Woodruff key condition. If all parts are the appropriate ones and if Woodruff key is in good condition, continue the procedure.



TYPICAL
1. *Trigger coil mark*
2. *Magneto flywheel mark*

NOTE: These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: a new mark must be scribed on magneto flywheel for this purpose.

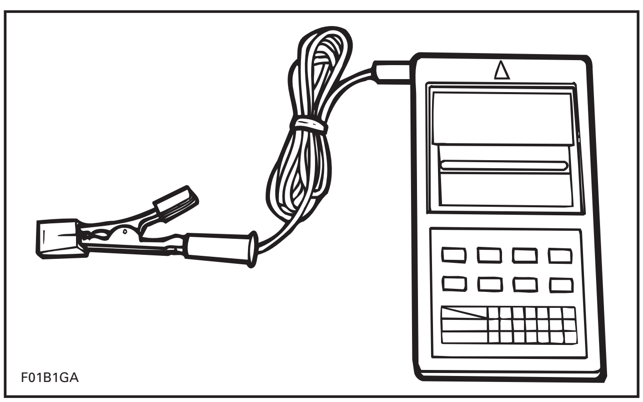
- Scribe a new mark on magneto flywheel as follows.
  – Remove the fan cover from the engine.
  – Maintain magneto flywheel so that previous marks remain aligned.
  – Scribe or punch a mark on magneto flywheel so that it perfectly aligns with the arrow on crankcase, refer to illustration. This new timing mark should be used for future timing checks (dynamic timing).
  – Reinstall rewind starter.
  – Check the timing with a timing light.



TYPICAL
1. *Crankcase arrow*
2. *Scribe a mark here*
3. *Maintain verified timing marks aligned (static timing)*

CHECKING IGNITION TIMING

Use a timing light and digital induction type tachometer (P/N 529 014 500).



TACHOMETER

To check the ignition timing, refer to illustration and proceed as follows:

- Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground.

⚠ WARNING

Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

- Connect the timing light pick-up to a spark plug cable.

NOTE: To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

- Connect tachometer wire to spark plug wire or aim tachometer toward spark plug wire without using any connection wire.
- Start the engine and raise the engine speed at least to 3500 RPM (3000 to 4000 RPM) while observing the timing marks, refer to illustration. The magneto flywheel mark scribed previously and the crankcase arrow should be perfectly aligned. If the marks do not align, a faulty trigger coil (check proper grounding of coil), a faulty flywheel, a faulty Woodruff key, a misaligned (twisted) crankshaft or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

NOTE: Ignition timing may be verified when engine speed is anywhere within 3000 - 4000 RPM.

- Install parts which were removed.

TABLE OF CONTENTS

2005 OPEN MOD SNOCROSS ENGINE SPECIFICATIONS & PARTS 793 (ROTAX) 2 CYLINDERS

BORE	82 mm
STROKE	75.7 mm
CC	799.2 cc
SQUISH	1.4 mm (.055 in)
VOLUME COMBUSTION CHAMBER (FLAT PLATE) INSTALLED	28.6 cc 28.0 cc
CYLINDER HEAD INSERT DOME	P/N 420 613 810
CYLINDER HEAD DOME COVER	P/N 420 613 802
IGNITION	290 watts
ELECTRONIC BOX	P/N M512 059 304
DAMPER	P/N 420 866 990
MAGNETO ASS'Y	P/N 420 888 665
STATOR	P/N 420 888 665
FLYWHEEL	P/N 410 922 954
IGNITION COIL	P/N 512 059 564
RAVE SPRING 0.8 X 52.0	P/N 420 239 941 (blue)
NO THERMOSTAT	Use gasket P/N 420 850 338 (but put restriction in bypass hose with 1/8 dia. hole).
CONNECTING ROD	P/N 420 917 398
CYLINDER	P/N M420 613 852
RAVE VALVE	P/N 420 854 465
VALVE COVER	P/N 420 911 558
PISTON PIN BEARING	Cage less P/N 420 832 425 With cage P/N 420 832 442 (optional)
O-RING FOR CUP	P/N 420 950 890
SQUARE O-RING	P/N 420 931 590
O-RING	P/N 290 931 410
PISTON	P/N 420 889 451
PISTON RING (CKS)	P/N 420 815 360

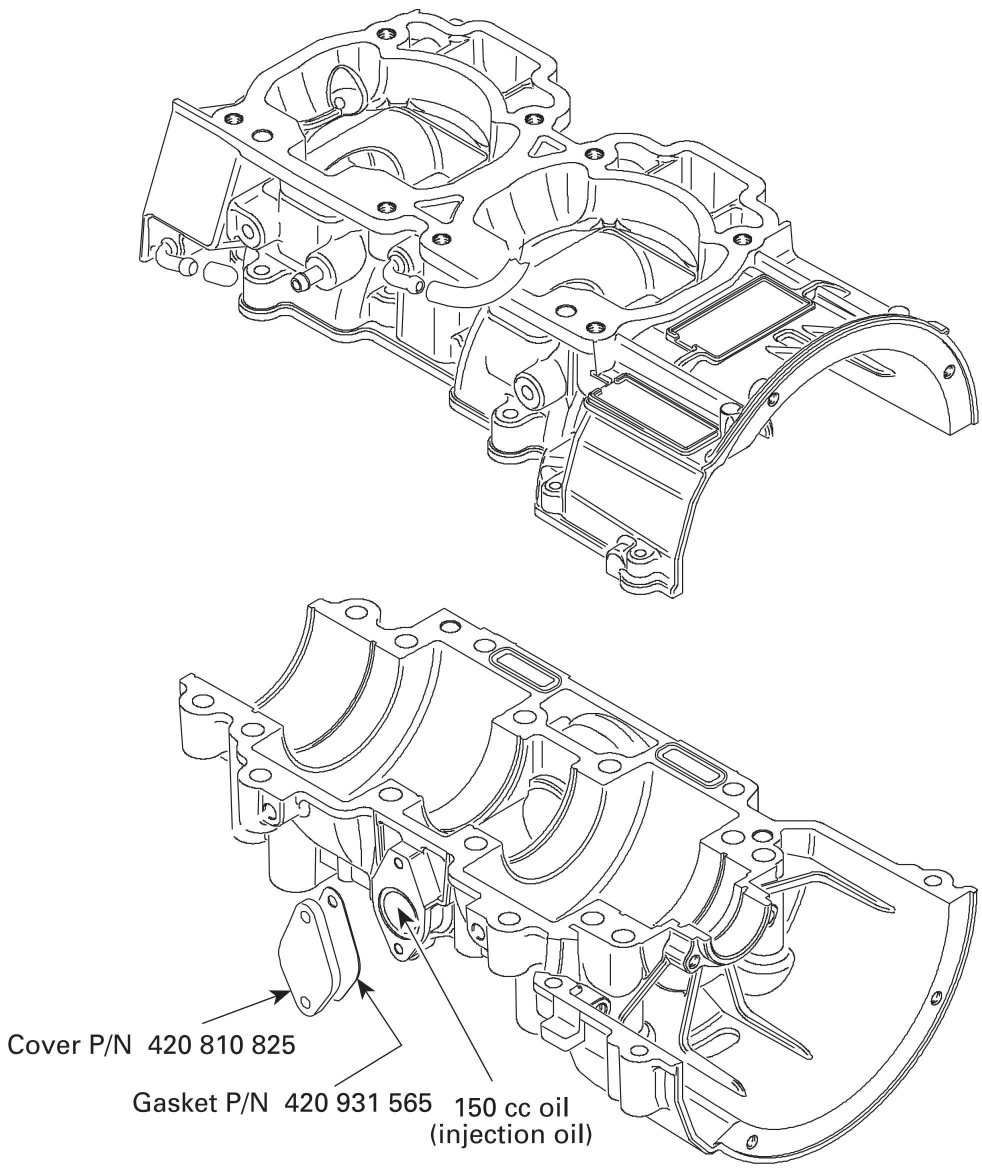
PISTON PIN	P/N 420 916 370
CIRCLIP	P/N 420 845 106
BASE GASKET AVAILABLE .4 mm .5 mm .6 mm .7 mm .8 mm	 P/N 420 931 836 P/N 420 931 838 P/N 420 931 837 P/N 420 931 964 (already installed on the engine) P/N 420 931 839
CRANKSHAFT	P/N 420 888 408
CRANKCASE	P/N 420 890 160
SEAL COVER	P/N 420 812 420
SPARK PLUG	BR9ES (gap .016 in) P/N 414 961 100
CONNECTING FLANGE (behind rewind)	P/N 420 810 867
CARBURETOR • MJ 360 PTO 360 MAG @ 0° F • JN 6HDY35-58 – #2 pos from top @ 0° F • *(Richer)* 6HDY35-57 • *(Leaner)* 6HDY35-59 – NJ 633 Q-4 – Opt. 633 P-6 – Opt. 633 P-8 – Opt. 633 Q-0 – Opt. 633 Q-2 – Opt. 633 Q-6 – Opt. 633 Q-8 • CA 4.0 • AS 0.5 turns • PJ 50 – Opt. 35 – Opt. 40 – Opt. 45 – Opt. 55 – Opt. 60 • VS 2.0	TMS 38 Taper Bored P/N 486 130 002 P/N 486 400 029 P/N 486 400 030 P/N 486 400 031 P/N 486 228 100 P/N 486 400 012 P/N 486 400 013 P/N 486 227 900 P/N 486 228 000 P/N 486 228 200 P/N 486 228 300 P/N 486 228 900 P/N 486 230 200 P/N 707 200 168 P/N 707 200 136 P/N 486 230 100 P/N 486 230 300 P/N 486 230 400 P/N 486 204 800
AIR FILTER - KICKASS	P/N 486 100 400
THROTTLE CABLE	P/N 486 130 007
THROTTLE HANDLE	P/N 572 101 900
FUEL PUMP (stock 440)	P/N 403 901 810
REED VALVE (rimoldi ass'y)	P/N 420 924 790

REED VALVE	Center w/slots P/N 420 924 905 Outside P/N 420 924 900
DRIVE CLUTCH Clutch ass'y - forged Ramp 419 pos. 4 Arm, std. aluminum • Pin, metric **(TOTAL WEIGHT 18.9 grams)** **Engine RPM - MAX HP is 8500 RPM** Spring 250-380 WHITE/WHITE	 P/N 417 222 806 P/N 417 222 557 P/N 417 222 383 P/N 417 222 595 P/N 417 222 004
DRIVEN CLUTCH (TEAM) • Cam - Twin Trac 44°& 48° The TEAM driven clutch cam has 2 cam angle positions. Set the Open Mod on 44° the stock 440 uses the 48° position • Spring-140/200, Red/Blue (TEAM)	 P/N 420 565 000 P/N 210 064 000
BELT MBL	P/N 414 300 253
GEARING TOP— 21 BOTTOM — 45,TEAM (SLIP GEAR)	 P/N 504 152 044 P/N 504 152 518
CHAIN 74 LINKS	P/N 504 151 932
BELT GUARD (meets ISR rules)	P/N M417 300 222
BELT GUARD (side panel)	P/N 486 130 010

	Engine Type:	793
	Stroke:	75.7
	C.R. Length:	132
DEGREE	PISTON POS. (mm)	PISTON POS. (inch)
0	0	0.000
1	0.01	0.000
2	0.03	0,001
3	0.07	0.003
4	0.12	0.005
5	0.19	0.007
6	0.27	0.010
7	0.36	0.014
8	0.47	0.019
9	0.60	0.024
10	0.74	0.029
11	0.89	0.035
12	1.06	0.042
13	1.24	0.049
14	1.44	0.057
15	1.65	0.065
16	1.88	0.074
17	2.12	0.083
18	2.37	0.093
19	2.64	0.104
20	2.92	0.115
21	3.21	0.126
22	3.52	0.139
23	3.84	0.151
24	4.17	0.164
25	4.52	0.178

	Engine Type:	793
	Stroke:	75.7
	C.R. Length:	132
DEGREE	PISTON POS. (mm)	PISTON POS. (inch)
26	4.88	0.192
27	5.25	0.207
28	5.63	0.222
29	6.03	0.237
30	6.43	0.253
31	6.85	0.270
32	7.28	0.287
33	7.73	0.304
34	8.18	0.322
35	8.64	0.340
36	9.12	0.359
37	9.60	0.378
38	10.10	0.398
39	10.60	0.417
40	11.12	0.438
41	11.64	0.458
42	12.17	0.479
43	12.72	0.501
44	13.27	0.522
45	13.83	0.544
46	14.40	0.567
47	14.97	0.589
48	15.56	0.612
49	16.15	0.636
50	16.74	0.659

Recommended fuel:
Use Racing fuel **R + M** 114 octane with pre-mix oil 25 to 1 (good quality of synthetic oil).



You must eliminate the two (2)
oil injection holes.
(use plugs or hoses)

WARNING: Note that the engine water pump gear oil cavity has to be filled with 150 mL of oil by removing oil pump block off plate and venting (opening empty bottle) then add 70 mL to bottle. (Best done when engine is on the work bench with the exhaust side facing work bench).

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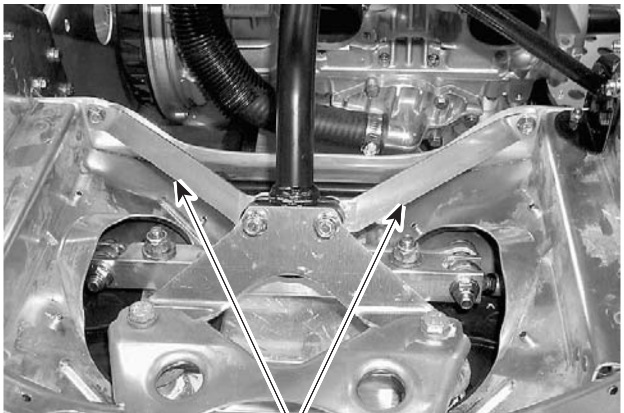
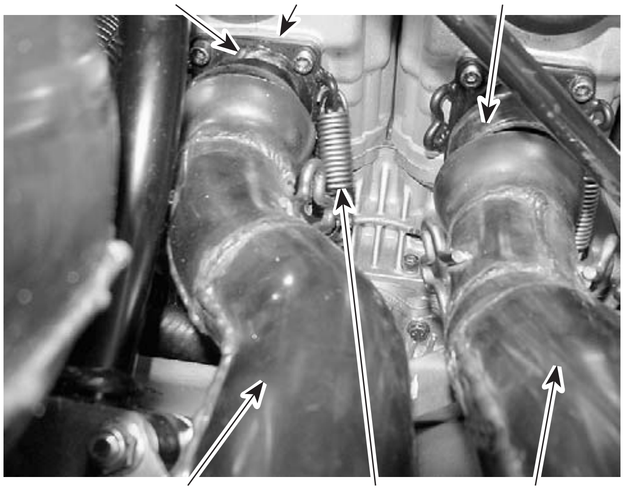
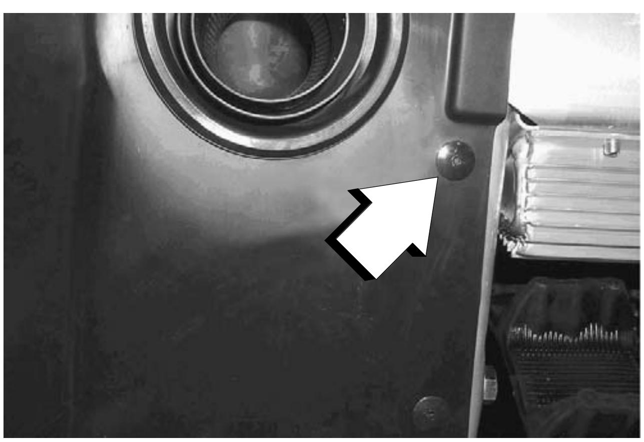
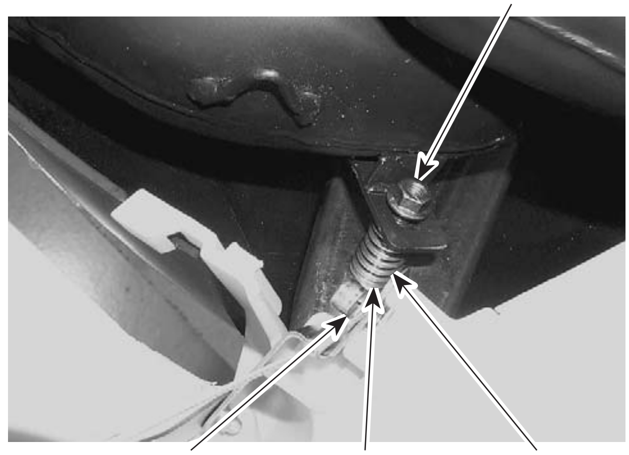
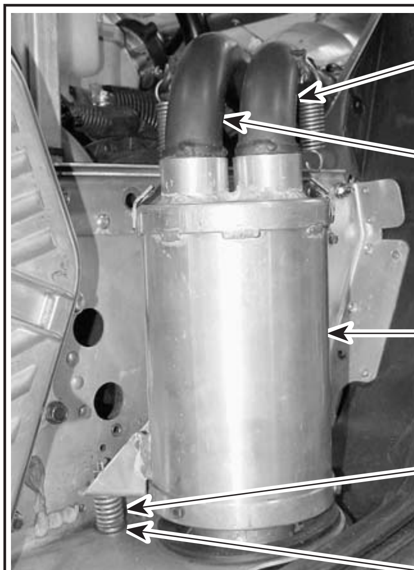


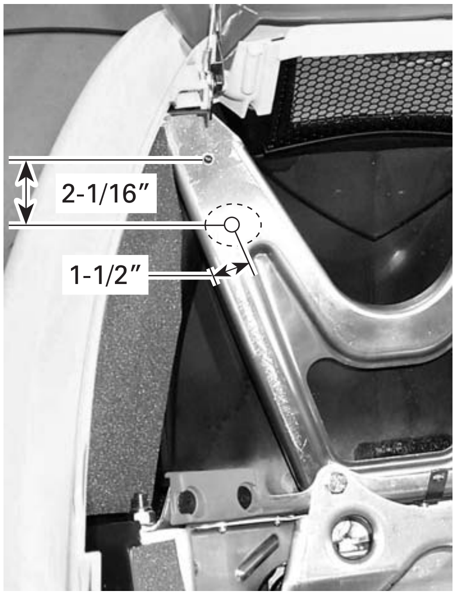




To install the after muffler fastener: Remove a pop rivet to enlarge the hole to 5/16". Insert the fastener in the 5/16" hole. Make a new hole of 3/16" then install a new pop rivet to hold the muffler fastener.







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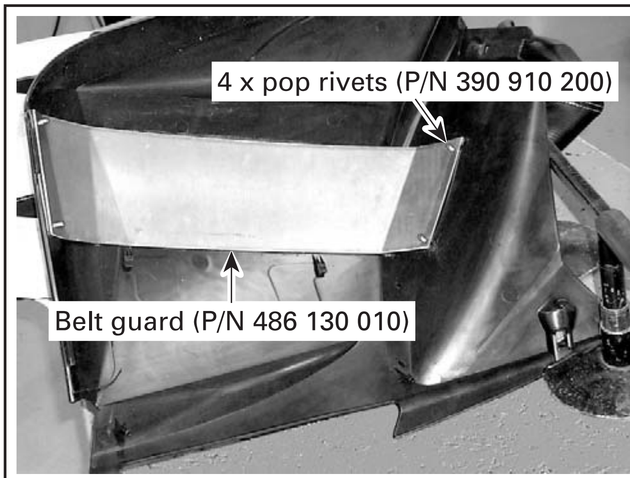

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Tune Pipe Support

Make a new hole of 5/16 in. in the support hull. Insert the fastener of the tune pipe in that 5/16 in. hole. Make an other hole of 3/16 in. the support of the hull and install a new pop rivet to hold the fasterner.

Tune Pipe Fastener Installation

Update tune pipe fastener installation. Use the black pop rivet 3/16 in. x 690 in.

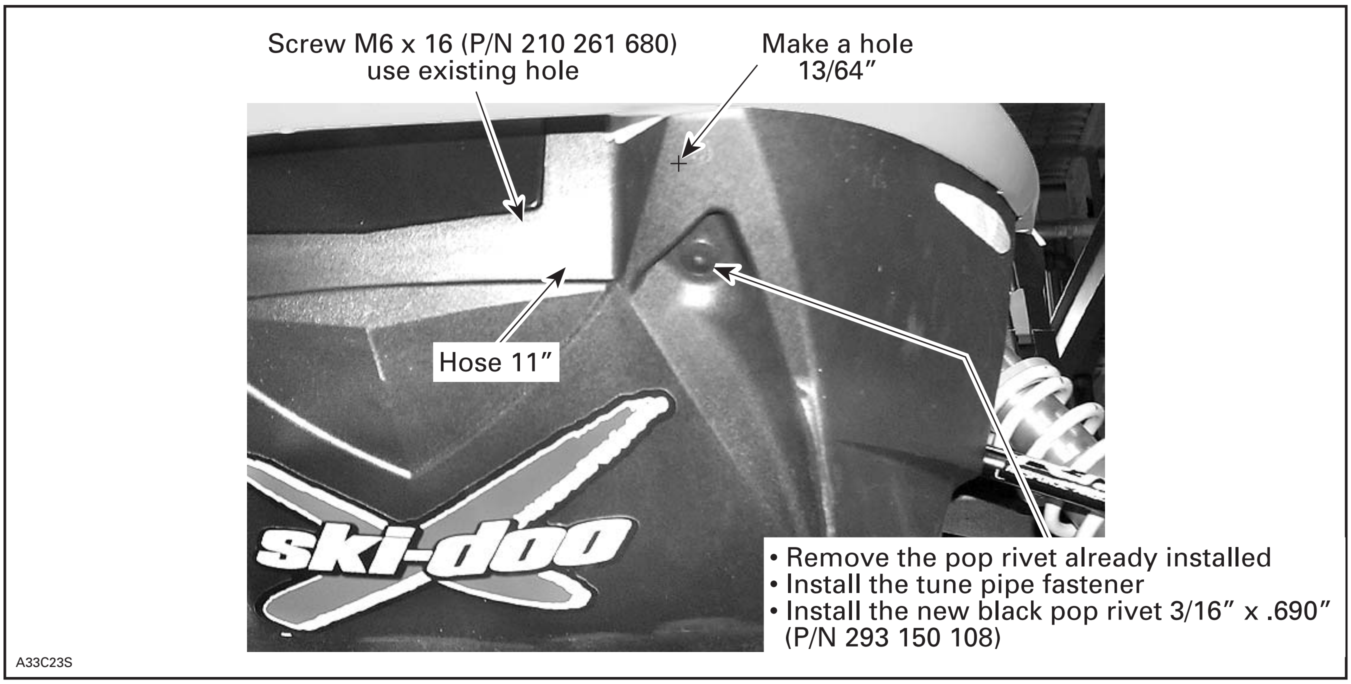

TABLE OF CONTENTS

2004 OPTION PACKAGE COLOR		**2004 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER		CDN / U.S. : 2882		
ENGINE				
Engine manufacturer		Rotax		
Engine type no.		453		
Lubrication type		Premix		
Number of cylinders		2		
Bore	mm in	65.00		2.559
Stroke	mm in	65.80		2.591
Displacement	cc cu.in	436.70		26.649
Cylinder Ø: (Piston to mm)	mm .in	64.88		2.554
Compression ratio		15.5	**± 0.5**	
1st piston ring shape type		Semi-trapez		
Reed valve	(YES/NO)	YES		
Reed valve part number		420 924 810		
RAVE system	(YES/NO)	YES		
Opening engine speed	RPM	6500 - 7250		
Spring part number		420 239 948		
Spring color		Gray		
Spring wire diameter	mm in	1.00		0.039
Spring free length	mm in	38.00		1.496
COOLING				
Cooling system type		Liquid		
Thermostat opening temp.	°C °F	42		107.60
Cap opening pressure	kPa PSI	90		13.05
ENGINE				
Piston ring end gap				
New, min.	mm in	0.400		0.0157
New, max.	mm in	0.550		0.0217
Wear limit	mm in	1.000		0.0394
Ring/piston groove clearance				
New, min.	mm in	0.040		0.0016
New, max.	mm in	0.080		0.0031
Wear limit	mm in	0.200		0.0079
Piston/cylinder clearance				
New, min.	mm in	0.100	**± 0.016**	0.0039
Wear limit	mm in	0.200		0.0079
Cylinder taper (max.)				
New, max.	mm in	0.050		0.0020
Wear limit	mm in	0.100		0.0039
Cylinder out of round (max.)				
New, max.	mm in	0.010		0.0004
Wear limit	mm in	0.080		0.0031

2004 OPTION PACKAGE COLOR		2004 MX Z X 440 RACING BLACK - YELLOW	
MODEL NUMBER		CDN / U.S. : 2882	
ENGINE (SUITE)			
Crankshaft balance factor	%	42.5 %	Pto: 29,6%
Cr. deflection (MAG side)	mm in	0.050	0.0020
Cr. deflection (center)	mm in	0.080	0.0031
Cr. deflection (PTO side)	mm in	0.060	0.0024
Crankshaft end play			
New, min.	mm in	0.100	0.0039
New, max.	mm in	0.300	0.0118
Wear limit	mm in	N/A	N/A
Con. rod big end axial play			
New, min.	mm in	0.390	0.0154
New, max.	mm in	0.737	0.0290
Wear limit	mm in	1.200	0.0472
Con. rod/piston pin clearance			
New, min.	mm in	0.003	0.0001
New, max.	mm in	0.012	0.0005
Wear limit	mm in	0.015	0.0006
Con. rod/crankpin clearance			
New, min.	mm in	0.024	0.0009
New, max.	mm in	0.038	0.0015
Wear limit	mm in	0.050	0.0020
CARBURETOR			
Carburetor manufacturer		Mikuni	
Carburetor quantity x type		2 x TMX 34mm (Choke)	
		PTO	**MAG**
Identification number		TMX34-29	TMX34-24
Carburetor #		403 138 765	403 138 738
Jet needle		6EN29-61	6EN29-61
Clip position no.		3	3
Needle jet		Q-6	Q-6
Throttle slide cut-away		4.0	4.0
Needle valve and seat		1.5	1.5
Idle throttle slide position	mm ± 0.1	1.8	1.8
	in ± 0.004	0.071	0.071
Main jet		400	400
Idle (pilot)		25.0	25.0
Idle air/mixture screw adj.	Ref	1.0	1.0
Float level adjustment			
Cable/throttle slide adjustment		At full throttle opening, cut-away lower edge must be equal or 1.0 (0.04) lower than of the venturi bore on engine side.	
Calibration engine speed	± 100 RPM	8400	
Engagement engine speed	± 100 RPM	5200	
Idle engine speed RPM	± 200	1600	

2004 OPTION PACKAGE COLOR			**2004 MX Z X 440 RACING** BLACK - YELLOW			
MODEL NUMBER			CDN / U.S. : 2882			
ENGINE ELECTRICAL SYSTEM						
Ignition system manufacturer			Nippondenso			
Ignition system type			C.D.I.			
Ig. timing BTDC (Dynamic)	mm	in	2.79	0.1098	at 3500 RPM	
Stroboscopic timing			20			
Lighting system type			AC-Generator			
Lighting sys. output (AC)	W	@6000 RPM	290			
Nominal voltage output	V		12			
Generator coil (low speed)	Ohm		17.5 - 42.5			
Generator coil (high speed)	Ohm		2.4 - 5.8			
Lighting coil	Ohm		0.1 - 0.4			
Pick-up (trigger) coil	Ohm		190 - 300			
High tension coil (pri.)	Ohm		0.3 - 0.7			
High tension coil (sec.)	KOhm		16 août			
Coils / **MIN**	mm		0.700		0.0276	
Magneto ring gap **MAX**	mm	in	1.850		0.0728	
Trig. coil / **MIN**	mm	in	0.550		0.0217	
Key mag. g. **MAX**	mm	in	1.450		0.0571	
Spark plug manufacturer		in	NGK			
Spark plug model no.			BR 9 ECS			
Electrodes gap	mm	in	0.450	**± 0.05**	0.0177	
EXHAUST SYSTEM						
Exhaust system type			Single-tuned pipe to baffle muffler			
ASSEMBLY SPECIFICATIONS						
Crankcase nuts/screws M6	N•m	lbf•ft	9.0	**± 1.0**	6.6	**± 0,7**
Crankcase nuts/screws M8	N•m	lbf•ft	29.0	**± 1.0**	21.4	**± 0,7**
Crankcase/engine sup. studs	N•m	lbf•ft	11.0	**± 1.0**	8.1	**± 2,9**
Crankcase/engine sup. nuts	N•m	lbf•ft	35.0	**± 4.0**	25.8	**± 0,7**
Cylinder head nuts / screws	N•m	lbf•ft	29.0	**± 1.0**	21.4	**± 0,7**
Water pump screws	N•m	lbf•ft	5.5	**± 1.0**	4.1	**± 3,5**
Magneto ring nut	N•m	lbf•ft	125.0	**± 5.0**	92.2	**± 0,4**
Exhaust manifold screws	N•m	lbf•ft	21.5	**± 0.5**	15.9	**± 0,7**
Intake manifold screws	N•m	lbf•ft	5.5	**± 1.0**	4.1	**± 0,7**
Magneto flywheel screws	N•m	lbf•ft	21.0	**± 1.0**	15.5	
Drive pulley retaining screw	N•m	lbf•ft	95.0		70.068	
Shouldered pin nuts	N•m	lbf•ft	10.0		7.376	
Ramp retaining screw	N•m	lbf•ft	10.0		7.376	
Spring cover screws	N•m	lbf•ft	13.0		9.588	
Nut of calibration bolt	N•m	lbf•ft	10.0		7.376	
Steering arm/ski leg bolt	N•m	lbf•ft	25.0		18.439	
Ball joints	N•m	lbf•ft	53.0		39.091	
M. length unengaged threads	mm	in	15.0		0.591	
Handlebar bolts	N•m	lbf•ft	26.0		19.177	
ADDITIONAL INFORMATION			*Torque 80 to 100 N•m (59-74 lbf•ft), 5 "accel./brake" cycles, torque 90 to 100 N•m (66-74 lbf•ft).			

2004 OPTION PACKAGE COLOR			**2004 MX Z X 440 RACING** BLACK - YELLOW			
MODEL NUMBER			CDN / U.S. : 2882			
DRIVE PULLEY						
Drive pulley manufacturer			IBC Canada			
Drive pulley type			Cushion drive T.R.A. III Light			
Drive pulley part number			417 222 616			
Drive pulley diameter	mm	in	210.00		8.268	
Ramp identification			427			
Ramp quantity			3			
Ramp part number			417 005 676			
Pressure lever part number			417 222 671			
Roller part number			417 003 900			
Roller quantity			3			
Roller pin type			Threaded Pin Ass'			
Roller pin part number			417 222 717			
Drive pulley spring part number			417 222 004			
Spring stripes colors			White/White			
Drive pulley spring length	mm	in	137.44		5.411	
Calibration screw position no.			5			
Engagement speed	± 100	RPM	5200			
DRIVEN PULLEY						
Driven pulley type			Team Rapid Reaction			
Driven pulley part number			417 126 859			
Driven pulley diameter	mm	in	273.00		10.748	
Driven pulley spring number			414 126 856			
Driven pulley spring color			Red/Blue			
Preload at external dia. MIN	kg	**± 0.7**	64-91			
	lbf	**± 1.5**	140-200			
Driven pulley cam angle	deg.		44° strt and 48° strt			
Cam part number			417 128 850			
Pulleys center distance	mm	in	257.50	**± 0.5**	10.138	**± 0.020**
"Z" distance	mm	in	16.50		0.650	
(Without torque rod preload)						
"X" offset	mm	in	40.00	**± 0.5**	1.575	**± 0.020**
"Y-X" difference	mm	in	0.86	**± 0.75**	0.034	**± 0.030**
DRIVE BELT						
Drive belt part number			414 300 253			
Drive belt width	mm	in	37.70		1.484	
Drive belt outside perimeter	mm	in	1102.00		43.386	
Wear limit	mm	in	34.70		1.366	
Drive belt def. (+/-.197")	mm	in	32.00		1.260	
Drive belt adjustment force	kg	lbf	11.34		24.912	
Small sprocket number of teeth			21			
Small sprocket part number			504 152 044			
Large sprocket number of teeth			45			
Large sprocket part number			504 152 379			
Gear ratio			2.14			
Chain type			Silent			
Chain part number			504 151 910			
Chain pitch	mm	in	9.525		0.375	
Chain, number of links			74 - 15			

2004 OPTION PACKAGE COLOR		**2004 MX Z X 440 RACING** BLACK - YELLOW	
MODEL NUMBER		CDN / U.S. : 2882	
DRIVE BELT (SUITE)			
Drive sprocket pitch diameter	mm in	181.5	7.146
Drive sprocket number of teeth		9	
FRONT SUSPENSION			
Front suspension type		R.A.S. A-Arm	
Front suspension travel	mm in	242.00	
Sway bar type		Sway bar (Formed Shape)	9,528
Front susp. shock abs.(qty&type)		2 (H.P.G. T/A) Remote reservoir C36	
Shock absorber part number		505 070 952 R.H.	505 070 953 LH
Standard spring part number		505 071 200	
Optional spring(s) part number(s)		486 130 023	
		Soft - 486 130 023	Hard - 486 130 024
REAR SUSPENSION			
Rear suspension type		SC 10 III	
Rear suspension flat travel	mm in	369.00	14.528
Rear suspension max. travel	mm in	369.00	14.528
Wheels quantity & diameter	mm in	2 x 102 mm (4.00") 2 x 155 mm (6.10") 6 x 135 mm (5.31") 3 x 165 mm (6.50")	
Stroke limiter type		Stopper strap	
Stroke limiter standard position		2 / 7	
Front arm shock abs. qty & type		2 (H.P.G. T/A) Remote reservoir C36	
Front arm shock abs. part number		503 189 972	
Standard front spring part number		503 190 296 / 503 190 299	
Optional spring(s) part number(s)		Soft - 486 130 025 Long Spring	
Rear arm shock abs. qty & type		1(H.P.G. T/A) Remote reservoir C-36	
Rear arm shock abs. part number		503 189 974	
Standard rear spring part number	RH	503 189 902	
	LH	503 189 904	
		HARD	**SOFT**
Optional spring(s) part number	RH	503 190 483	503 189 947
	LH	503 190 485	503 189 948
Rear preload ajustment type		4 positions cam on shock abs.	
BRAKE SYSTEM			
Brake type		Hydraulic, disc, self-adjust.	
Brake lining material		FERIT # 451	
Brake lining surface	cm^2	2 X 12.4	
Minimum lining thickness	mm in	1.00	0.039

2004 OPTION PACKAGE COLOR			**2004 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER			CDN / U.S. : 2882		
TRACK					
Track # & profile height	mm	in	504 152 361	44.5/41.1	1.752/1.625
Optional Track # - Sno X			504 152 168	44.5	1.752
Optional Track # - X Country			Camoplast 9938H		
Track construction			Rubber, polyester reinforced		
Track nominal width	mm	in	381.00		15.000
Track nominal length	mm	in	3074.00		121.024
Track lug pitch distance	mm	in	63.90		2.516
Number of track pitches			48.00		
Track deflection	mm	in	30.00		1.181
MIN/MAX	mm	in	35.00		1.378
Track adjustment force	kg	lbf	7.30		16.094
GENERAL SPECIFICATIONS					
Vehicle overall length	mm	in	2787.00	109.724	
Chassis overall length	mm	in	2062.00	81.181	
Vehicle overall width	mm	in	1217.00	47.913	
Vehicle overall height	mm	in	1280.00	50.394	
Ski stance (Carbides to carbides)	mm	in	1080.00	42.520	
Ski protected length	mm	in	875.00	34.449	
Ski overall length	mm	in	997.00	39.252	
Ski width	mm	in	133.00	5.236	
Total toe-out (raised vehicle)	mm	in	0.00	—	
Camber angle	deg.		0		
Track projected length	mm	in	1140.00	44.882	
Total projected bearing area	cm^2		6670.9	1033.992	
Dry vehicle ground pressure	kPa		2.93	0.425	
Dry vehicle mass	kg	lb	199	438	

2004 OPTION PACKAGE COLOR			**2004 MX Z X 440 RACING** BLACK - YELLOW	
MODEL NUMBER			CDN / U.S. : 2882	
MATERIALS AND COLORS				
Front member & frame material			Aluminium	
Frame color			Natural Aluminium	
Bottom pan material			Impact resistant copolymer	
Bottom pan color			Black (B -160)	(T M)
Ski, material			Plastic (Flex)	
Ski, color			Black (B -160)	
Handle ski, color			Yellow (B-190)	
Hood material			Surlyn	
Hood color			Black (B -160)	
Side panels material			Surlyn	
Side panels color			Yellow (B-190)	
Windshield material			Polycarbonate	
Windshield color			30 % Tinted (Low)	
Front bumper material			Polypropylene	
Front bumper color			Yellow (B-190)	
Rear bumper material			Aluminium	
Rear bumper color			Natural Aluminium	
Suspension wheels material			Plastic	
Inside wheels color			Black (B-160)	
Outside wheels color (135 mm)			Black (B-160)	
Outside wheels color (139 mm)			N / A	
Outside wheels color (165 mm)			Black (B-160)	
Outside wheels color (180 mm)			N / A	
VEHICLE ELECTRICAL SYSTEM				
Headlamp bulb hi/low beam	W		60/55	H-4
Tail/stop lamp bulb	W		8/27	
Tachometer bulb	W		2 x 3	
Lamp-pilot (oil level)	W		0.5	
Lamp-pilot (high beam)	W		0.5	
Lamp-pilot (temperature)	W		0.5	
Heat. throttle handle (**hi/low**)	W		7 / 5	
Heated grips hi/low (driver)	W		40 / 20	
LIQUIDS SPECIFICATIONS				
Fuel tank (SAE J288a rated)	L	US gal	21	5.5
Recommended fuel type			Unleaded Race Fuel	
Minimum octane number (R+M)/2			108	
Premix fuel/oil ratio			33 : 1	
Recommended mixing oil			Bombardier Synthetic oil (FORMULA XP-S II)	
Chaincase oil capacity	mL	US oz	250	8.5
Oil level height	mm	in	Maximum mark on dipstick	
Recommended chaincase oil			Bombardier synthetic chaincase oil	
Cooling system capacity	L	US oz	4.3	145.4
Ethylene-glycol concentration		% vol.	50 / 50	
Brake fluid reservoir	mL	US oz	60	2.0
Recommended brake fluid			Brake fluid SRF (DOT 4)	

2004 OPTION PACKAGE COLOR	**2004 MX Z X 440 RACING** BLACK - YELLOW		
MODEL NUMBER	CDN / U.S. : 2882		
STANDARD/OPTIONAL EQUIPMENT			
Gauge (Tachometer (White facia))	STD		
Gauge (Speedometer (White facia))	STD		
Gauge (Fuel (electric) (White facia))	N/A		
Gauge (Temp. (electric)(White facia))		OPT	861 507 900
Heated grips (driver)	STD		
Heated throttle lever	STD		
Mirrors (kit)		OPT	861 780 800
Quick ajustment kit		OPT	860 306 500
Bridge & fasteners plastic ski (Flex)	STD		
Bridge & fasteners plastic ski (Precision)		OPT	860 507 700
Bridge & fasteners plastic ski (Mountain)	N /A		
Ski soles Black B-160 (FLEX)	STD N/A		
Ski soles Black B-160 (Precision)		OPT	505 070 727
Ski soles Yellow B-190 (Precision)		OPT	505 070 831
Ski soles Red B-212 (Precision)		OPT	505 070 832
Ski soles Black B-160 (Mountain)	N/A		
Ski runner		OPT	505 069 300
Ski runner (With Carbides)	STD		
Skid plate fasteners kit / Rivets	OPT	861 764 600 / 861 770 300	
Skid plate black		OPT	502 006 671
Skid plate orange		OPT	502 006 672
Skid plate yellow		OPT	502 006 673
Windshield (Low)	STD		
Windshield (Medium)	N/A		

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ski-doo®
Bombardier

SNOWMOBILES
COMPETITION
Bulletin

Campaign(s)
no. 2004–0006

Date: **November 28, 2003** Subject: **Drive Sprocket Replacement** No. **2004-2**

YEAR	MODEL	MODEL NUMBER	SERIAL NUMBER
2004	MX Z x 440	2882/2884	All

NOTE: This modification applies **ONLY** to MX Z® x 440, Racing Package units, that did not go through the **calibration change for trail use** as per *Warranty Bulletin 2004–1*.

NOTE: During Rouyn-Noranda and Duluth racing events, a new drive shaft assembly with drive sprockets has been distributed to racers; those vehicles, updated at the race tracks, are excluded from this *Bulletin*. No shaft assembly will be provided by the *Racing Department* after the Duluth event.

Reason of this Bulletin

Under severe racing conditions, it may be possible for the drive sprockets to slip on drive axle.

In order to avoid this situation, drive sprockets and their retainer rings need to be replaced.

Parts required to do so

DESCRIPTION	P/N	QTY
Sprocket (white)	504 152 476	2
Retainer Ring	504 152 475	2
Bearing	504 152 009	1
C-clip	504 152 194	2
Chaincase Oil (80 W140)	413 803 300*	1
Bearing Protector	501 017 400	1

* When ordering quantity 1 of this part number, dealer receives twelve (12) 355 mL containers of chain case gear oil.

Printed in Canada (mbc2004-002 MD)

Drive Sprocket Replacement

Procedure

- Validate that vehicle is equipped with suspect drive sprockets (black).
- Remove rear shock absorber to prevent damaging shock absorber rod.
- Remove rear suspension.
- Remove speed sensor and outer flange.
- Apply parking brake.
- Drain chain case oil, remove chain case cover and release drive chain tension.

NOTE: Lower gear bolts are secured with Loctite†, heat may be required to remove the bolts; be careful not to overheat, this would damage seal bearing.

- Remove chain and sprockets from chain case.
- Remove lower bearing retaining C-clip.
- Release drive axle sprocket from track and, at the same time, push drive axle toward right side.
- Remove lower bearing from drive shaft and remove shaft.

NOTE: To remove press-fitted sprocket, use a press and a suitable support.

- Remove speed sensor adapter.
- Remove C-clip and bearing from shaft, discard bearing and protector.
- Press both sprockets to the inside to allow free movement of the retainer ring and remove C-clip.

NOTE: Sprocket needs to be pushed in and out of the shaft by the left side (speed sensor side).

NOTE: To assemble press-fitted sprocket use a press, a suitable pipe and support.

- Press-in sprockets to allow enough space to install retainer ring and clip; remove plastic burr to allow retainer ring to sit correctly against sprocket.

NOTE: Sprockets need to be positioned with rounded side **[1]** OUT; refer to illustration below.

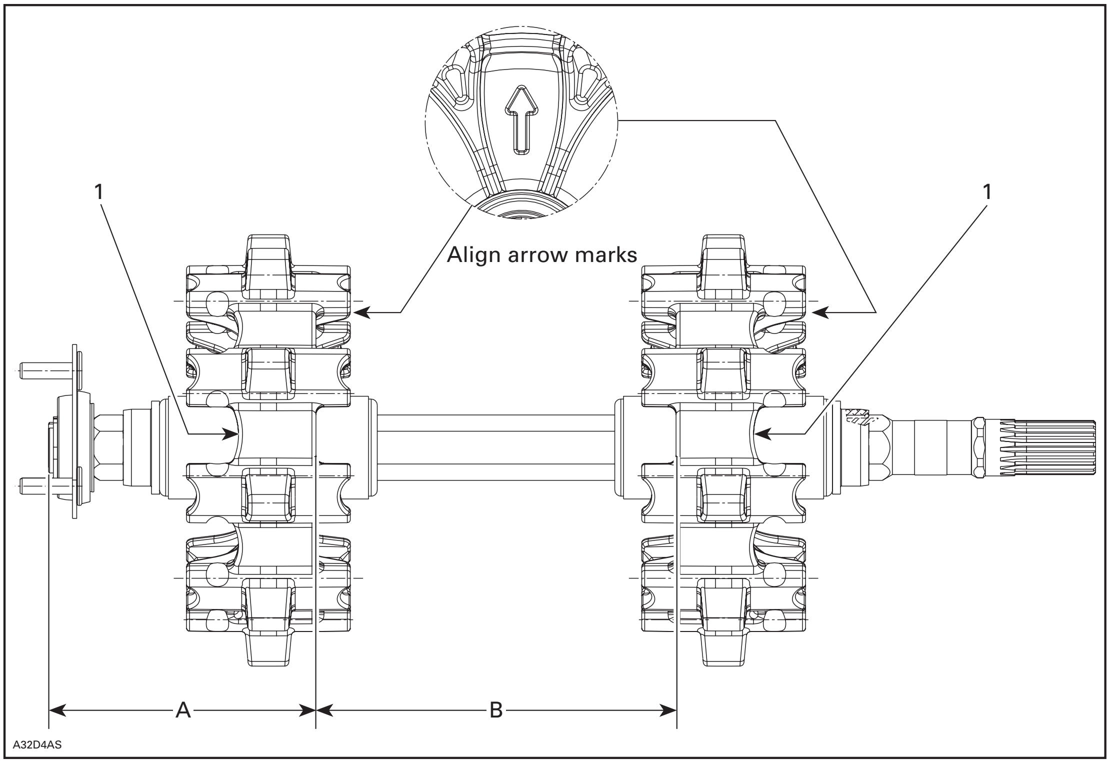
CAUTION: Ensure to align index marks of each sprocket when assembling.

† Loctite is a registered trademark of Loctite Corporation.

Drive Sprocket Replacement

NOTE: Never support sprocket by the outside when pressing shaft in.

- Install **new** retainer ring and clip, push back sprocket using the press, according to the following measures.



NOTE: Sprockets must be assembled according to the dimensions shown on drawing, where

- **[**A**]** equals 132.2 ± 0.5 mm (5.205 ± .020 in) and
- **[**B**]** equals 178.1 ± 0.5 mm (7.012 ± .020 in).

- Reassemble all parts.

Drive Sprocket Replacement

Warranty Coverage

Submit a warranty claim using the following information:

Warranty Information	
Campaign Number	2004–0006
Claim Type	07
Flat Rate Time	2.9 hours
Expiration Date	December 1st, 2004

For claiming procedure, refer to the *Dealer/Distributor Warranty Guide*.

2004 SKI-DOO MX Zx RACING TIP SHEET

SKI-DOO RACING, 7575 BOMBARDIER COURT, WAUSAU, WI 54401-8035
NUMBER: 01 NOVEMBER 23, 2003

⚠ WARNING

This information relates to the preparation and use of snowmobiles in competitive events. Bombardier, Inc. and Bombardier Corporation disclaim liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that these modifications be carried out and/or verified by a highly skilled professional racing mechanic. It is understood that racing or modifications of any Bombardier made snowmobile voids the vehicle warranty and that such modifications may render use of the vehicle illegal in other than sanctioned racing events under existing federal, provincial and state regulations.

DRIVE SHAFT SPROCKETS - 04 MXZx 440 REV and 04 Rolling Chassis

Under severe racing conditions, the drive sprockets may slip on the drive shaft. The Ski Doo Race Dept. highly recommends the drive sprockets be replaced with an updated version to eliminate slippage. Racers registered for the WSA National event in Duluth Minnesota may exchange complete driveshaft assembly at the Ski Doo Engineering (white)Truck. The exchange will take place starting Thursday, November 27th at 12:00 noon in the racer pit area at Spirit Mountain and will continue thruout the weekend. The Race Dept. requires the VIN number of your sled at the time of the exchange. Racers not attending the Duluth race must contact their local Ski Doo dealer regarding the procedure to replace the sprockets.

REAR SHOCK MOUNT UPDATE - 04 MXZx 440

Under severe racing conditions, the top mount of the rear suspension shock may bend and break. Racers that attended the Race Schools have been informed of the update. All other racers need to contact their local Ski Doo dealer regarding the proper procedure to perform the update.

IMPROVED CLUTCH SETUP

440 REV

Set clicker adjuster on #4 position in the TRA III Drive clutch. Install Delrin washer, part number 930650, under the spring in the TEAM driven clutch.

800 Mod

To reduce clutch engagement RPM, install a 200-380 (Green/White) spring, part number 417 222 371, into the TRA III drive clutch. Install Delrin washer, part number 930650, under the spring in the TEAM driven clutch.

CHAIN TENSION

During the breakin period, frequently check chain tension and adjust properly. Refer to the 2004 Race Manual for proper procedure.

SNOW FLAP

To prevent the snow flap from folding up during race conditions, securely fasten as per ISR rules.

2004 SKI-DOO MX Zx RACING TIP SHEET

SKI-DOO RACING, 7575 BOMBARDIER COURT, WAUSAU, WI 54401
NUMBER: 02 DECEMBER 03, 2003

⚠ WARNING

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TRACK TENSION - 04 MXZx 440 REV and Rolling Chassis

To prevent damage to the front heat exchanger and external drive sprocket teeth, adjust track tension to the recommended 16 lb tension as outlined on page 5-79 of the 2004 Race Manual.

OPTIONAL TRACK AND STUDDING - 04 MXZx 440 REV and Rolling Chassis

When installing the optional track, (part # 504 152 168) maximum stud length is 1.740". Installing longer studs will cause damage to the front heat exchanger and/or the tunnel.

TETHER SWITCH - 04 MXZx 440 REV and Rolling Chassis

Remove the aluminum spacer between the panel and the tether switch nut. The spacer causes the tether switch to malfunction and causes the engine to run stall and run poorly.

CONTINGENCY PROGRAM

To qualify for the Ski Doo program, only 2003 and 2004 models qualify and you MUST display the Formula XPS II decals in a visible location on the sled. If you do not have Formula XPS II decals, please contact Alisa at: 651-982-6223

2004 SKI-DOO MX Zx RACING TIP SHEET

SKI-DOO RACING, 7575 BOMBARDIER COURT, WAUSAU, WI 54401
NUMBER: 03 DECEMBER 10, 2003

⚠ WARNING

This information relates to the preparation and use of snowmobiles in compétitive events. Bombardier, Inc. and Bombardier Corporation disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that these modifications be carried out and/or verified by a highly skilled professional racing mechanic. It is understood that racing or modifications of any Bombardier made snowmobile voids the vehicle warranty and that such modifications may render use of the vehicle illegal in other than sanctioned racing events under existing federal, provincial and state regulations.

SKI DOO PARTS SUPPORT TRUCK

Due to the costs of Canadian and U.S. Customs, the Ski Doo Parts Support Truck will not be attending the WSA National Event in Winnipeg MB on December 13 -14, 2003. Please make other arrangements to obtain parts. We regret the inconvenience this may cause you.

136" TRACK EXTENSION KITS - 2004 MXZx 440 REV and Rolling Chassis

136" Track Extension kits for Hillcross Racing is now available through the Ski Doo Race Dept. To order please contact Tom Lawrence at the address listed below. These kits are of limited production and when sold out, will not be made available until next year.

COOLANT HOSE CLAMPS - 2004 MXZx 440 REV and Rolling Chassis

To avoid coolant leakage and/or a hose coming off, please check all coolant hose clamps to make sure they are secure.

Tom Lawrence
Ski Doo Race Coordinator
7575 Bombardier court
Wausau WI 54401
Ph: 715-848-4971
Fax: 715-847-6879
E-mail: tom.lawrence@recreation.bombardier.com

TABLE OF CONTENTS

These are general guide lines for preparing a stock REV chassis for various forms of competition. Refer to the appropriate section of the book for more detailed information and tuning components.

SNO CROSS

Chassis

- The ideal chassis to use is the MX Zx 440 REV chassis. This chassis is specifically designed for Sno Cross racing.

Front Suspension

- The 2004 MX Zx 440 REV comes equipped with remote adjustable shocks for both high and low speed compression. Use the low speed shock adjusters to control the small or slow bumps and adjust the high speed adjusters to control big or fast bumps to prevent the suspension from bottoming out.
- Stock spring rate is 18.4 N/mm (105 lbf/in, and there is lighter and stiffer springs available. Adjust spring preload between 0 and 13 mm (0 in and 1/2 in) of suspension ride in (sag) when the rider is standing in race position. If you have to adjust the spring pressure more than 38 mm (1-1/2 in) of preload on the shock, you may want to change to a stiffer spring.
- A 13 mm (1/2 in) diameter anti roll bar comes standard. Many racers choose to remove the anti-roll bar. If you remove the bar, make sure to cover the holes in the bulkhead area with aluminum or plastic plate as to prevent snow from entering. If you wish to use a larger bar, the 600 & 800 REV use a 16 mm (5/8 in) diameter. Those are the only options available to date.

Center Suspension

- Set spring pressure to light settings and adjust shocks adjusters to control high and low compression to prevent bottoming out. If the rear of the sled wants to pass the front while in the air, reduce spring pressure and/or shock compression.

Rear Suspension

- Again, the rear shock has external adjusters for high and low speed compression. Set adjusters so the suspension does not bottom out. This adjustment must be for different courses.
- Adjust spring pressure, with the rider in place, so the ACM block is in the center of the coupling window. Stiffer and softer springs are available. Adjust the ACM block to control the amount of weight transfer according to conditions.

Fuel and Carburetion

- Recommended fuel octane is minimum 100. Be aware that only unleaded fuel is legal to use. Use the jetting chart on the belt guard as a guideline. When installing 0.3 mm (.012 in) base gasket, you are able to increase octane and performance. Higher altitude requires lower fuel octane. Example, 1829 m (6000 feet), maximum 100 octane.

Skis

- The ski loops do not meet ISR guidelines, therefore modification to the loops must be made before using them in competition. The loop must be rapped and secured with a foam or rubber tube to meet the 25 mm (1 in) minimum width and also fold over the front of the ski tip and secured. Failure to do so may result in disqualification.

Snow Flap

- Some circuits are requiring that the snow flap be long enough to touch the ground when the rider is not on the sled. An extension may be required. Best extension material is plastic sheet or another snow flap.

HILLCROSS

Special Rules

- The stud rule is the same as Sno Cross. Care must be taken when installing studs as not to place them where they will cause damage to heat exchanger or tunnel. Tunnel protectors of the correct height are required.
- Most circuits have different classes from Stock to Modified, be sure to check with the Race Circuit for specific rules and guidelines regarding each class.

Suspension

- Use Sno Cross spring and shock set up.

Track

- Best performance and speed is achieved by installing a 136″ x 15″ with 1.75″ lug height.
- 136″ Track extension kits are available in limited quantities. Contact Ski-Doo Race Dept. for availability and information.

Transmission

- Clutch setups will be similar to Sno Cross. Due to higher speeds than Sno Cross, an increase in gearing is required, depending on length and steepness of course.

HILL CLIMBING

Front Suspension

- Use soft springs. You want the skis to compress very easily and not transmit any upward force into the chassis.
- Use minimal compression and medium rebound dampening in the shock absorbers and, the gas pressure can be reduced to 1379 kPa 200 PSI.

Center

- Use medium spring pressure. You need some track pressure for traction but the front arm must be able to compress easily to absorb bumps.
- Use minimal compression and medium rebound dampening in the shock absorbers.
- The limiter strap should be fairly short to keep front end lift to a minimum. Two to three inches of lift is plenty. A balance must be maintained between having enough traction and keeping the front end down for steering.

Rear Suspension

- Spring pressure should be kept firm in order to reduce weight transfer and help keep the front end down on the ground.
- Medium amount of compression and enough rebound to control the stiffer spring settings to prevent the rear of the machine from "pogoing".

Track

- Use a "finger" type track with a 1.75″ to 2.00″ lug height profile. Beginning of season or fresh snow, use a track with a 1.75″ lug height and later in the year when the hill has a lot of ice, use a 2.00″ lug height track.
- Use a 144″ X 15″ track for best performance.
- For information regarding chassis extension kits, contact Ski-Doo Race Dept.
- Check with the race organization for rules regarding changing of tracks.

Transmission

- Good backshifting is important. Use a few pounds more than normal preload on the driven pulley.
- Adjust the TRA to maintain optimum RPM.

Driving Style

- Contrary to popular belief, constant full throttle is not always the fastest way to the top. Use your thumb to adjust for the conditions. Sometimes you need to back out of it to keep the track from spinning excessively. You need to keep your momentum up but you must keep the sled on the ground so your track is hooked up and the skis can steer you around any obstacles.

DRAG RACING (ICE AND GRASS)

Special Rules

- Snow flap must be retained by 3 mm (1/8 in) diameter cable.
- Double limiter straps are required by many organizations.

Front Suspension

- Lower the ride height by installing shorter springs, limiter straps or spacer inside the shock to limit suspension travel. Maximum shock length is 360 mm (14.7 in) with 15 mm (.59 in) of spring preload.
- Trim the rubber blocks under the ski legs to reduce and adjust the amount of heel pressure on the ski.
- Use steel runners on the grass and stock trail carbide runners on the ice.

Center

- Use stock springs but limit suspension travel with limiter straps or stops to 76 mm (3 in), measured from the front arm to bumper stop.
- Shorter limiter straps will be required. On grass, more weight transfer can be used to keep the weight off the skis. On ice, run the limiter very short to keep ski lift to a minimum.

Rear Suspension

- Replace stock springs with (P/N 486 099 100 RH) and (P/N 486 099 300 LH). These springs have a higher spring rate but softer preload. Limit suspension travel by straps or stops to 102 mm (4 in), measured between the rear arm and bumper stop. Adjust the ACM coupling block to full couple.
- Grass: Soften preload to help weight transfer and keep the skis from dragging.
- Ice: Use a lot of preload to help keep the front end down for better top speed at the end of the chute.
- Remove slider shoes (HyFax). Add idler wheels of correct size to prevent track from contacting rails

Traction

- Most rules limit maximum stud height to 19 mm (3/4") over the tallest part of the track. Taller tunnel protectors will be required.
- Generally, fewer studs are required on grass than on ice. Also, less studs are needed on good, thick sod or hard clay. More studs will be need-ed on loose grass, dirt and sand.
- Grass: Four steel picks per bar (4 x 48 pitches on 121" track = 192 studs). Large horsepower machines may need more studs. Exchange some picks for grass hooks on looser track surfaces. Use "chisel" style studs. They have a wider pro-file but are still sharp on the ends.
- Ice: Stud quantity is directly related to horsepower on the ice. Up to about 80 HP, 4 to 5 ice picks per pitch should be used for a total of 200-250 studs. 80 to 105 HP should need 6 to 7 picks per pitch for a total of 300-350 studs. Over 110 HP will require 7 to 8 picks per pitch and possibly hooker plates welded to the track guides.

NOTE: The installation of hooker plates will require modification to the tunnel protection system and should be approached with caution.

- 51 mm (2 in), two hole angled aluminum backer plates should be used when many studs are required. They should form the basis of your stud pattern with single, square, flat or angled backer plates used in between.
- Studs should be placed so the pattern does not repeat itself for 4 to 6 pitches.

Transmission

- Gear for about 10% over the actual speed you will run in the race. On grass, your upper sprocket should be about two teeth smaller than on the ice.
- Always stay with the same belt type and size, belt deflection, and center to center distance. Have several belts of the same size broken in and ready to race. Don't test with one belt and then throw on a new one for race day.
- Keep the clutches clean! The pulley faces and belt should be lightly sanded and wiped down with acetone before every run. Excessive pulley heat indicates belt slippage and you may need to recalibrate your clutch to squeeze the belt harder.
- Torque is what overcomes resistance to rolling. Normally peak torque is about 200 to 300 RPM below peak horsepower. When accelerating at the start of a race, clutch to peak torque and let the RPM climb to max horsepower by the end of the run.
- Tune your clutches so that you run best for the final which means everything will be heat soaked. If your sled requires different set ups between early runs when everything is cold and later runs, know what to change and when to change it. Test under a variety of conditions so you are prepared for any track and race conditions.

Cooling

- Install a pair of hydraulic quick couplers in the coolant hoses at a convenient location on the sled. Make a cooling cart using a cooler filled with ice and several winds of copper tubing inside (or another type of heat exchanger) connected to an electric pump and another set of quick couplers. Connect your sled to this mobile refrigerator between runs to circulate coolant through the system and cool the engine down. Cool the engine to the same temperature every time so your runs are consistent.

Fore more drag racing and setup information contact Racing Dept. by fax at (715) 847-6869, phone (715) 848-4971.

SPEED RUNS

Generally, a speed run sled will be set up very similar to an ice drag sled with the following differences.

- Some organizations do not allow lowering for stock class sleds. Check your rules. Shorter springs may be an option to try.
- Because holeshots are not important, engagement speed does not have to be set at 5000 RPM. Top speed at the end of the course is the only concern.
- Chaincase gearing can be set for high theoretical top speeds. Use the largest top and smallest bottom sprocket available. This will keep the belt low in the drive pulley which lowers the belt and countershaft speed which makes the transmission more efficient.
- As few studs as possible should be used. It takes energy to push a stud into the ice and pull it back out again. Since holeshots are not important, use only enough studs to maintain control at top speed.
- Use standard trail carbide runners with the sharp edge worn down a bit. This way you will have steering control without sacrificing speed.
- Run with a very short limiter strap and soft center spring. This will reduce the track approach angle which helps top speed.

OVAL RACING

Special Rules

- Rear of tunnel must be enclosed per specifications in the I.S.R. rulebook.
- Snowflap must be retained by chains or 3 mm (1/8 in) diameter cable.
- Tail light AND brake light element must be on at all times! Add a jumper wire inside the taillight assembly.
- Any glass lenses must be taped over with clear tape.

Front Suspension

- Relocate ski mount in spindle by drilling out the predrilled hole 10 mm (.39 in) behind stock mounting hole.
- Lower the ride height to the two inch minimum travel requirement. Shorter springs are available.
- Valve shocks to light compression and medium rebound
- Camber: Left = 0 degrees
Right = Negative 2 to 4 degrees
- Verify ski toe out, about 3 mm (1/8 in) at the carbide edge.
- Steering ball joints should have as many jam nuts added as will fit between the tie rod and the ball joint. This helps prevent bending of the threaded portion of the ball joint.

Center

- Use spring with soft preload and compression and medium rebound.

Rear Suspension

- Lower the ride height to the 51 mm (2 in) minimum travel requirement.
- Install a 4^{th} idler wheel on the rear axle.
- Stiffer springs and firm preload may be required to reduce weight transfer and help keep the skis on the ice. If the handling is generally good but the inside ski is lifting, increase the right rear spring preload.
- Remove non guide clips and install taller track guides on the right side of the track or use designated oval track.

Traction

- Most rules limit maximum stud height to 3/8" over the tallest part of the track. Track cutting is illegal. A camoplast oval track is available (P/N 700 9844), it has 19 mm (3/4 in) lug height and tall guide clips for oval racing.
- Use a thin profile, sharp tipped stud for hard ice conditions. If the track conditions get sloppy, exchange some picks for a chisel or wedge type stud.
- Seven picks per bar for a total of 336 studs will be required for all sleds up to about 100 HP. Bigger sleds may require more picks and/or hooker plates.
- Use 51 mm (2 in), 2 hole angled aluminum backer plates for the majority of your pattern, especially on the outside belts. The right hand belt will need a 51 mm (2 in) plate on every pitch. Fill in the pattern with 25 mm (1 in) square backer plates. The pattern should not repeat itself for at least 5 pitches.
- Use a good quality square bar carbide runner with 254 mm (10 in) of carbide for starters. As you gain experience, try 356 mm (14 in) of carbide for more front end bite.
- Studs and carbides need to be SHARP! The carbide must shave your fingernail when scraped across and studs must prick your finger.

Controls

- You will probably be more comfortable in the corners if you make a curved extension for the left side of the handlebars. Many drivers make a new set of bars from the same size tubing and custom bend it to fit their preference. (Check your rule book for requirements on handlebars).
- You may also want to fabricate a stirrup for your right foot.

Transmission

- You need aggressive shifting to get a good holeshot but you also need good backshifting. Here again, testing is the key to success.
- Use the lowest TRA setting that still allows you to maintain correct RPM when exiting the corners.
- Gear for the speed you will go on the course.
- Break in several belts of the same type and size and set up your pulleys to work with these belts.
- Maintain your clutches on a weekly basis. A clean, free moving driven pulley is important to good backshifting. Clean the pulley faces with acetone on a regular basis.

Physical Conditioning

- While a well set up sled will be easier to drive than a poor one, it still takes good arm strength to turn a stocker with aggressive carbide. Train your upper body for strength and endurance. A good overall conditioning program that also works your legs and respiratory system is a smart idea. While it may not seem like 3 lap heats are very long, 10 lap finals on a short track with tight corners can really wear you down.

RACE CIRCUITS

Remember it is the driver and team's responsibility to have the sled race-ready in accordance with the rules of the circuit you race in. All races approved for Ski-Doo's Winners Circle contingency awards are governed by the general rules laid out in the ISR annual handbook. It is common practice for the various race associations across North America to modify the ISR rules for local use. This does result in conflicting standards and therefore every driver must carefully check the rules.

Contact the following circuits for detailed race rules.

ISR	International Snowmobile Racing	262-335-2401 PH 262-335-9440 Fax
WSA	World Snowmobile Association	651-209-7400 PH 651-209-7447 Fax
CSRA	Canadian Snowcross Racing Association	905-476-7182 PH 905-476-7157 Fax
ASRA	American Snowcross Racing Association	905-476-7182 PH 905-476-7157 Fax
RMR	Rock Maple Racing	802-368-2747 PH
USSA	U.S. Snowmobile Association	262-252-2000 PH
WSA Pro Ice	World Snowmobile Association Pro Ice	763-428-3800 PH 763-428-3897 Fax
SCM	Super Competition Motorsport	450-794-2298 PH 450-794-2450 Fax
PRO	Power Sled Racing Organization	315-827-4849 PH
NSRA	National Snowmobile Racing Assn.	815-789-4266 PH
MSDRA	Michigan Snowmobile Drag Racing Association	810-989-9554 PH
RMXCRC	Rocky Mountain Cross Country Racing Circuit	208-887-4884 PH
BEST	Big East Snocross Tour	315-768-3343
MIRA	Midwest International Racing Association	989-257-5264
RMSHA	Rocky Mountain Snowmobile Hillclimb	406-748-3111
NIDRA	Northern Illinois Drag Racing Assn.	517-522-8584
NWSA	Northwest Sno-cross Assn.	425-774-0505

PARTS SUPPORT

The **Ski-Doo** factory support trucks will be on hand at most major Snowcross, grass drag and oval events across the U.S. and Canada. The purpose of these trucks is to provide parts, and technical support for all racers racing Ski-Doo snowmobiles.

The Ski-Doo race support trucks carry an extensive inventory of parts, however it is always best to be self contained and not to count on anyone but himself for parts support.

SUGGESTED SPARE PARTS

You should have a self-contained parts supply. The factory parts truck won't always be there to back you up.

– parts book
– piston assembly and circlips
– tuned pipe
– radiator cap
– gas cap
– drive belts
– carb. inlet needle and seat
– drive and driven clutch springs
– driven clutch rollers
– TRA adjuster screws and nuts
– drive clutch retainer bolt
– brake fluid
– steering tie rods and ball joints
– ski shock assembly
– skis and carbide runners
– ski bolt and nut
– light bulbs
– windshield and O-rings
– tether cord and switch
– handlebars and grips
– shop manual/specification booklet
– engine gaskets, seals and O-rings
– rewind assembly and components
– exhaust springs
– spark plugs
– spark plug caps and wires
– main jets
– chaincase chain and sprockets
– TRA clutch puller and forks
– TRA clutch rollers
– driven pulley circlip and keys
– brake lever
– front suspension replacement parts
– brake pads
– steering arms
– throttle lever and housing

– tail light assembly
– hood latch rubber
– synthetic chaincase oil.

Things to DOO Between Heats:

– carefully remove ice and snow build up front and rear suspension
– inspect suspension components
– check/replace studs
– check tightness of all suspension bolts
– check all idler wheels for missing rubber and condition of bearings
– lube steering and front suspension ball joints
– check chain tension and oil level
– check clutch alignment and clean pulley faces
– coolant hose condition/routing
– check electrical connections
– inspect track for damage and missing guide clips
– check skis and carbides
– check ski toe out
– check brake disc and pad condition
– grease all zerk fittings
– check track tension and alignment
– check brake fluid and operation
– inspect drive belt
– check throttle and oil cable and
– check light bulbs.

Replace any tools or parts used from race vehicle supply.

Shut off fuel before leaving for the night.

EQUIVALENT WEIGHTS AND MEASURES CHART

LINEAR MEASURE	
1 inch = 25.4 millimeters (mm)	1 millimeter = .03937 inch
1 inch = 2.54 centimeters (cm)	1 centimeter = .3937 inch
1 foot = .3048 meter (m)	1 meter = 3.2808 feet
1 yard = .914 meter (m)	1 meter = 1.093 yards
1 statute mile = 1.609 kilometers (km)	1 kilometer = .6214 statute mile

WEIGHT	
1 Ounce = 28.35 Grams (g)	1 Gram = .03527 Ounce
1 Pound = .4536 Kilogram (kg)	1 Kilogram = 2.2046 Pounds
1 Ton = .907 Metric Ton (t)	1 Metric Ton = 1.102 Tons

VOLUME
1 Fl. U.S. Ounce = 29.574 Milliliters = .2957 Deciliter= .0296 Liter
1 Fl. U.S. Pint = 473.18 Milliliters = 4.7316 Deciliters = .4732 Liter
1 Fl.U.S. Quart = 946.35 Milliliters = 9.4633 Deciliters = .9463 Liter
1 U.S. Gallon = 3.785 Liters
1 Cu. Inch = 16.387 Cu. cm
1 Cu. Centimeter = .061 Cu. Inch
1 Cu. Foot = 2.831.16 Cu. Cm.
1 Cu. Decimeter = .0353 Cu. Foot
1 Cu. Yard = .7646 Cu. Meter
1 Dry Quart = 1.101 Liters

TEMPERATURE	
32° Fahrenheit = 0° Celsius	°F = 9/5°C + 32
0° Fahrenheit = -17.8° Celsius	°C = (°F – 32) = 5/9

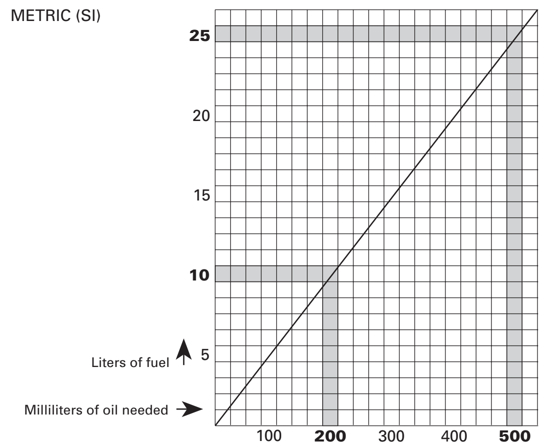
SPEED
1 MPH = 1.61 km/h

FUEL/OIL RATIO CHARTS

50/1

METRIC (SI)

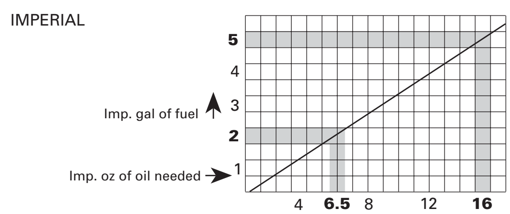
500 mL of oil + **25 L of fuel = 50/1**



IMPERIAL

16 oz of oil + **5 Imp. gal of fuel = 50/1**

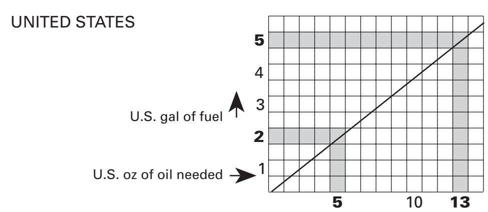
500 mL of oil + **5.5 Imp. gal of fuel = 50/1**



UNITED STATES

13 oz of oil + **5 U.S. gal of fuel = 50/1**

500 mL of oil + **6.6 U.S. gal of fuel = 50/1**



A00A1WJ

40/1

METRIC (SI)

500 mL of oil + **20 L of fuel = 40/1**

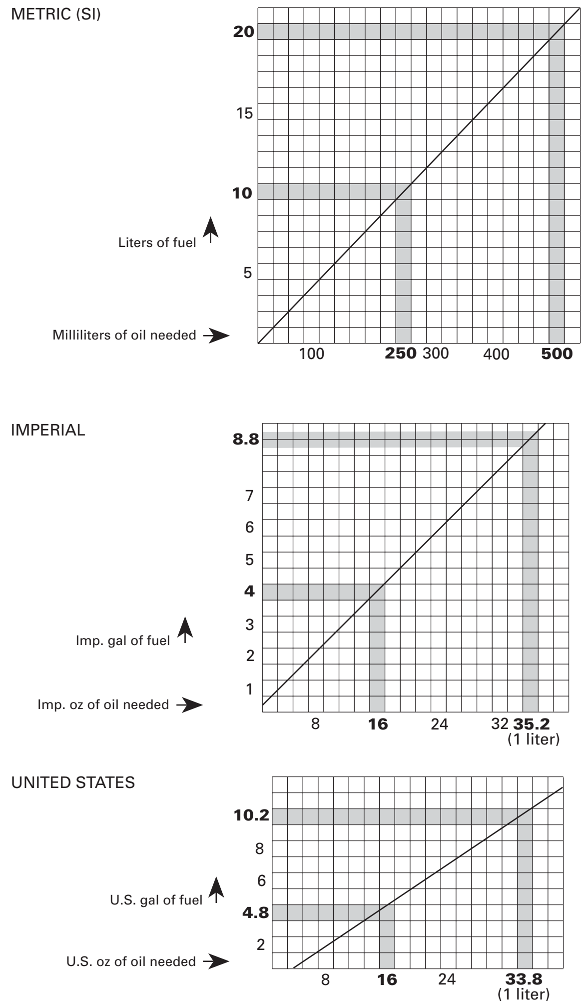
IMPERIAL

16 oz of oil + **4.0 Imp. gal of fuel = 40/1**

500 mL of oil + **4.8 Imp. gal of fuel = 40/1**

UNITED STATES

500 mL of oil + **5.3 U.S. gal of fuel = 40/1**

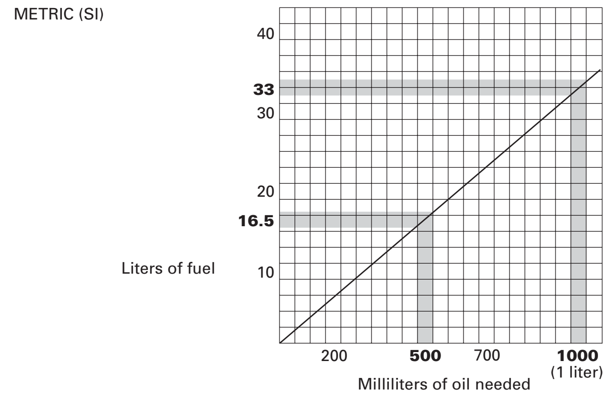


A00A2WJ

33/1

METRIC (SI)

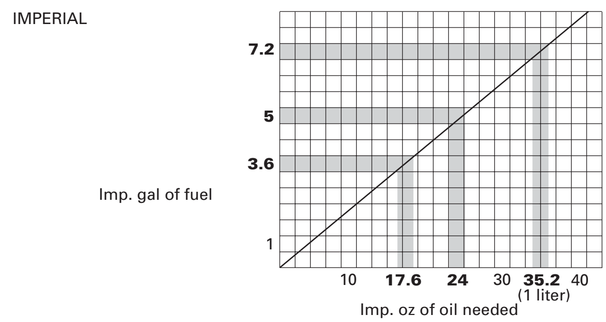
500 mL of oil + **16.5 L of fuel = 33/1**



IMPERIAL

24 oz of oil + **5 Imp. gal of fuel = 33/1**

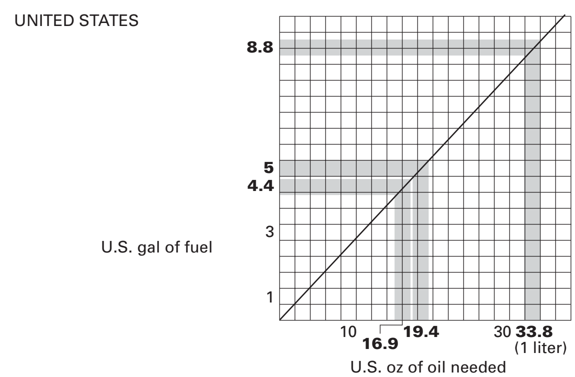
500 mL of oil + **3.6 Imp. gal of fuel = 33/1**



UNITED STATES

19.4 oz of oil + **5 U.S. gal of fuel = 33/1**

500 mL of oil + **4.4 U.S. gal of fuel = 33/1**



A00A6KJ

25/1

METRIC (SI)

500 mL of oil + **12.5 L of fuel = 25/1**

IMPERIAL

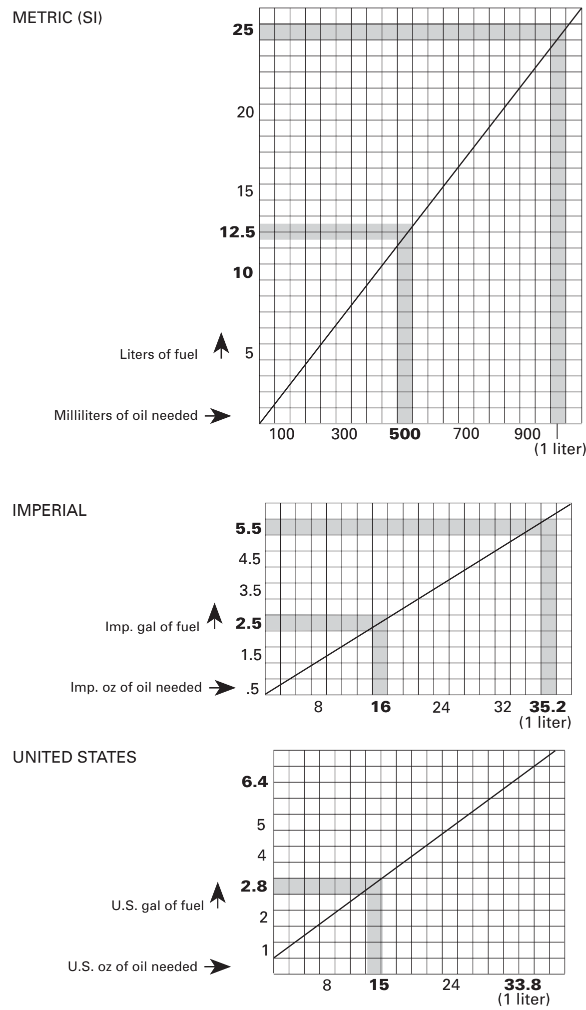
16 oz of oil + **2.5 Imp. gal of fuel = 25/1**

500 mL of oil + **2.7 Imp. gal of fuel = 25/1**

UNITED STATES

15 oz of oil + **2.8 U.S. gal of fuel = 25/1**

500 mL of oil + **3.2 U.S. gal of fuel = 25/1**

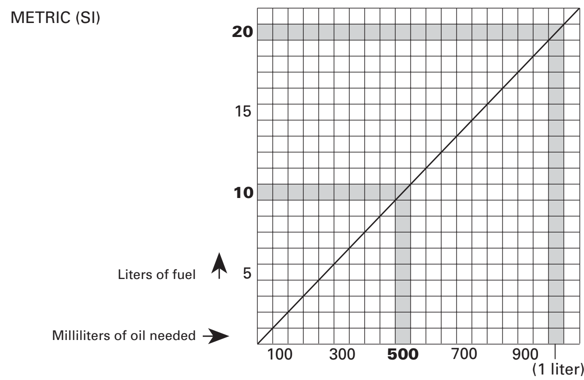


A00A2YJ

20/1

METRIC (SI)

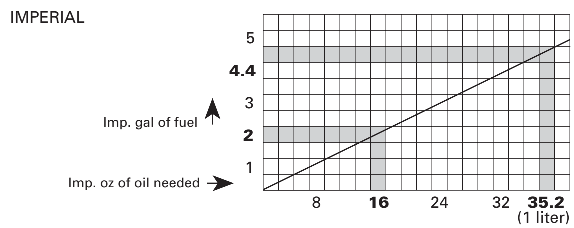
500 mL of oil + **10 L of fuel = 20/1**



IMPERIAL

16 oz of oil + **2 Imp. gal of fuel = 20/1**

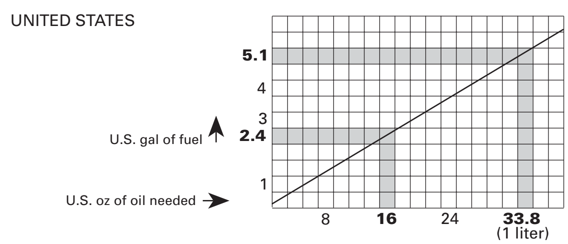
500 mL of oil + **2.2 Imp. gal of fuel = 20/1**



UNITED STATES

16 oz of oil + **2.4 U.S. gal of fuel = 20/1**

500 mL of oil + **3.2 U.S. gal of fuel = 20/1**

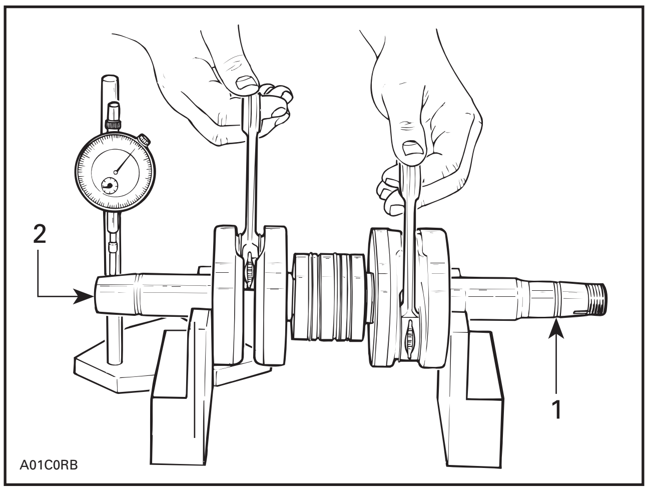


A00A2ZJ

STOCK CLASS PREPARATION

NOTE: Any machining and/or grinding is illegal in stock class racing. Keep your machine legal!

1. Remove and disassemble the engine according to correct *Shop Manual* procedures.
2. With the crankshaft resting in the lower half of the crankcase, set up a dial indicator and check the run out of the crankshaft at both ends. You should see no more than 0.05 mm (0.002 in) run out. If you have the capability, adjust the crankshaft as close to perfect as possible.



1. Measure behind the key
2. Measure at 6 mm (1/4 in) from edge

3. Set your cylinder base gaskets and cylinders on the upper half of the crankcase, and lightly torque the cylinders to the half. Be sure to install exhaust manifold on the cylinders before tightening them to the upper crankcase half to ensure the same position of the cylinders on final assembly.

Check the match of the gaskets and cylinders to the base; match them perfectly with a die grinder in the areas of transfer port passages. Also check for any over lap of the exhaust manifold gaskets where the exhaust manifold joins the cylinders. Before reassembling make sure that parts are free of any dust or particles.

4. Check piston to cylinder clearances, ring end gap, cylinder taper and out-of round.
5. Assemble the engine using the correct sealants where needed.

Rotary valve timing should be set with the closing edge as close to specs as possible or slightly higher.

NOTE: Refer to chart page.

6. The engine should be pressure-tested for air leaks. It should hold 6 PSI for 6 minutes with no more than a 1 PSI/min. loss.
7. Lube the rewind and inspect the rope for frays or cuts.
8. Oval racing must use taillight, brake light element on continuously (jumper from taillight wire terminal to brake light terminal on taillight assembly), regulator, tachometer, and temperature gauge.
9. Synchronize carburetors so that they open precisely together and ensure that the cut aways of the slides clear the inlet bores of the carburetors. After carb. adjustment, adjust oil injection pump.
10. On RAVE valve-equipped engines, check for free movement of the RAVE valve mechanism. Check the passageways between valve piston and exhaust port for any carbon buildup.

Adjust RAVE preload. It is better to have the valve open a little earlier than later.

NOTE: Pump fuels can be oxygenated or contain alcohol. Have your fuel tested prior to the race.

Do not use fuel de-icers.

11. Tie wrap ignition wire connectors together.
12. Adjust carburetors for atmospheric conditions. (See ENGINE PREPARATION section).
13. Break in a new engine before racing it. Performance can be gained by getting some run time on the engine. Ten hours of break-in is recommended.

TECHNICAL DATA

Supplement for model: REV 600 2005

MODEL: REV 600 2005						
	RACING TYPE	*-GRASS DRAGS-*				
	Maximum horsepower *	① RPM		*7600-7700*		
CARBURETOR	Carburetor type					
				PTO	*CENTER*	*MAG*
	Main jet	foam/paper type filters		*400*		*400*
	Needle			*std*		*std*
	Needle clip position (use a plastic washer to raise the needle) P/N 404 137 600					
	Slide cut-away			*std*		*std*
	Pilot jet	P/N 404 110 300		*25*		*25*
	Needle jet					
	Pilot screw adjustment	± 1/8 turn		*2.0*		*2.0*
	Needle valve			*std*		*std*
	Fuel			*minimum 100 octane*		
DRIVE RATIO	Drive ratio			*20 teeth P/N 504 074 800*		
	Chain		*43 teeth P/N 504 148 600*	*72 links P/N 504 151 883*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification		*419 P/N 417 222 557*		
		Calibration screw position		*no. 3*		
		Spring white/silver 260 lb-420 lb		*P/N 417 222 164*		
		Clutch engagement	RPM	*5200*		
		Pin weight	417 222 594	*18.8 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color **std White**	*P/N 486 130 046*		
			Preload kg (lb)	*B 3 position*		
		Cam **whitout RER**	**Angle 48°-44° std**			
	Drive belt			*P/N 417 300 230*		
	Calibration done at temperature of 20° Celcius					
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

A) Ski Spring = 150 lb/in P/N 415 020 700 - 5 mm preload shock length = 360 mm

B) Center Spring = std 2-1/4 in travel max. for center arm

C) Rear Spring = 11.9 mm 140° 3rd position: 486 099 100 right
486 099 300 left

D) 3-1/2 in travel max. for rear arm

E) Block ACM full uncouple (thickess block downside)

To ensure maximum performance, reprogramming of the MPEM is required. Contact the race Department.

Supplement for model: REV 600 2005 with RER

MODEL: REV 600 2005 with RER						
	RACING TYPE	*-GRASS DRAGS-*				
	Maximum horsepower *	① RPM		*7600-7700*		
CARBURETOR	Carburetor type					
				PTO	*CENTER*	*MAG*
	Main jet	foam/paper type filters		*400*		*400*
	Needle			*std*		*std*
	Needle clip position	(use a plastic washer to raise the needle) P/N 404 137 600		—		—
	Slide cut-away			*std*		*std*
	Pilot jet	P/N 404 110 300		*25*		*25*
	Needle jet			—		—
	Pilot screw adjustment		± 1/8 turn	*2.0*		*2.0*
	Needle valve			*std*		*std*
	Fuel			*minimum 100 octane*		
DRIVE RATIO	Drive ratio			*20 teeth P/N 504 074 800*		
	Chain	43 teeth P/N 504 148 600		*72 links P/N 504 151 883*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification		419 *P/N 417 222 557*		
		Calibration screw position		*no. 3*		
		Spring white/silver 260 lb-420 lb		*P/N 417 222 164*		
		Clutch engagement	RPM	*5200*		
		Pin weight	*P/N 417 222 594*	*18.8 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color **blue**	*P/N 417 126 848*		
			Preload kg (lb)	*4° position*		
		Cam **whitout RER**	Angle 47°-44°std	*P/N 417 126 385*		
	Drive belt			*P/N 417 300 230*		
	Calibration done at temperature of 20°Celcius					
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

A) Ski Spring = 150 lbs/in P/N 415 020 700 - 5 mm preload shock length = 360 mm

B) Center Spring = std 2-1/4 in travel max. for center arm

C) Rear Spring = 11.9 mm 140° 3rd position: 486 099 100 right
486 099 300 left

D) 3-1/2 in travel max. for rear arm

E) Block ACM full uncouple (thickess block downside)

To ensure maximum performance, reprogramming of the MPEM is required. Contact the race Department.

Supplement for model: REV 800 2005

MODEL: REV 800 2005						
	RACING TYPE	*-GRASS DRAGS-*				
	Maximum horsepower *	① RPM		*7600*		
CARBURETOR	Carburetor type					
				PTO	*CENTER*	*MAG*
	Main jet	foam/paper type filters		*370*		*370*
	Needle		P/N 404 162 033	*9 DG158*		*9 DG158*
	Needle clip position			3°		3°
	Slide cut-away			*std*		*std*
	Pilot jet			*30*		*30*
	Needle jet			—		—
	Pilot screw adjustment		± 1/8 turn	*1.0*		*1.0*
	Needle valve			*std*		*std*
	Fuel			*minimum 100 octane*		
DRIVE RATIO	Drive ratio			*21 teeth P/N 504 084 000*		
	Chain	43= P/N 504 148 600	43= std	*74 links P/N 504 151 859*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification		419 *P/N 417 222 557*		
		Calibration screw position		*no. 4*		
		Spring white/silver 260 lb-420 lb		*P/N 417 222 164*		
		Clutch engagement	RPM	*5000*		
		Pin weight (kit pin P/N 486 400 003)		*20.5 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color blue	*P/N 417 126 848*		
			Preload kg (lb)	*4° position*		
		Cam	Angle 50°-47°	*P/N 417 126 580*		
	Drive belt			*P/N 486 300 230*		
	Calibration done at temperature of 20° Celcius					
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

A) Ski Spring = 150 lb/in P/N 415 020 700 - 5 mm preload shock length = 360 mm

B) Center Spring = std 2-1/4 in travel max. for center arm

C) Rear Spring = 11.9 mm 140° 3rd position: 486 099 100 right
486 099 300 left

D) 3-1/2 in travel max. for rear arm

E) Block ACM full uncouple (thickess block downside)

To ensure maximum performance, reprogramming of the MPEM is required. Contact the race Department.

High Altitude OPEN MOD: 800 REV Chassis

TEMPERATURE 40-50 DEGREES F ALTITUDE 8100 FT

	RACING TYPE	*-GRASS DRAGS-*				
	Maximum horsepower *	① RPM		*8200-8300*		
CARBURETOR	Carburetor type					
				PTO	*CENTER*	*MAG*
	Main jet	foam/paper type filters		*260-270*		*260-270*
	Needle			*std*		*std*
	Needle clip position			2		2
	Slide cut-away			*std*		*std*
	Pilot jet			*55-60*		*55-60*
	Needle jet			*P-8*		*P-8*
	Pilot screw adjustment		± 1/8 turn	*1.0*		*1.0*
	Needle valve			*std*		*std*
	Fuel			*minimum 110 octane*		
DRIVE RATIO	Drive ratio			*22/45*		
	Chain			*74 links std*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification		412		
		Calibration screw position		*no. 3*		
		Spring green 280 lb-420 lb		*250-380*		
		Clutch engagement	RPM	*N/A*		
		Pin Weight		*17-18 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color	BK/VIOLET	OR	BK/WHITE
			Preload kg (lb)	*160/240*		*160/260*
		Cam		*62-48-46*		
	Drive belt		Part Number	*P/N 417 300 230*		
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

Supplement for model: REV 440 2005

MODEL: REV 440 2005						
	RACING TYPE	*Sno-X*				
	Maximum horsepower *	① RPM		*8400*		
CARBURETOR	Carburetor type			*TMX 34 mm*		
				PTO&MAG	*FINLAND*	*MAG*
	Main jet			*400*	*350*	
	Needle			*6EN29-61*	*6EHY2-59*	
	Needle clip position			3	*3*	
	Slide cut-away			*4.0*	-	
	Pilot jet			*25*	-	
	Needle jet			*Q-6*	-	
	Pilot screw adjustment		± 1/8 turn	*1.0*	-	
	Needle valve			*1.5*	-	
	Fuel			*minimum 108 octane*		
DRIVE RATIO	Drive ratio	*45 teeth TEAM*	**504 152 518**	*21 teeth 504-152-044*		
	Chain			*74 links std 504 151 932*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification **435**		417 222 814		
		Calibration screw position		*no. 5*		
		Spring 250 lb-380 lb **WHITE/WHITE**		*417 222 004*		
		Clutch engagement	RPM	*5400*		
		1 set screw 206 261 699 + set 206 261 299		*16.4 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color **Black/Light Blue**	**210-190**		
			Preload kg 180-260(lb)			
		Cam ***without RER***	Angle 42° Straight	*420-453*		
	Drive belt		Part Number	*P/N 417 300 288*		
	Calibration done at temperature of 0° Celcius					
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

Supplement for model: OPEN MOD 2005

MODEL: OPEN MOD 2005						
	RACING TYPE	*Sno-X*				
	Maximum horsepower *	① RPM		*8400*		
CARBURETOR	Carburetor type			*TMX 40 mm*		
				PTO	*CENTER*	*MAG*
	Main jet			*360*		*360*
	Needle			*6HDY35-58*		*6HDY35-58*
	Needle clip position			2		2
	Slide cut-away			*4.0*		*4.0*
	Pilot jet			*50*		*50*
	Needle jet			*Q-4 (633)*		*Q-4 (633)*
	Pilot screw adjustment		± 1/8 turn	*1/2*		*1/2*
	Needle valve			*2.0*		*2.0*
	Fuel			*minimum 114 octane*		
DRIVE RATIO	Drive ratio	*45 teeth TEAM*	504 152 518	*21 teeth 504-152-044*		
	Chain			*74 links std* *504 151 932*		
	Drive pulley	Type of drive pulley		*TRA III*		
		Ramp identification	419	417 222 556		
		Calibration screw position		*no. 4*		
		Spring 250 lb-380 lb	**WHITE/WHITE**	*417 222 004*		
		Clutch engagement	RPM	*5200*		
		1 set screw 206 261 699 + set 206 261 299		*18.8 grams*		
		Lever		*std*		
	Driven pulley	Spring	Color **Black/Light Blue**	210-190		
			Preload kg 180-260(lb)			
		Cam ***without RER***	Angle 42° Straight	*420-453*		
	Drive belt		Part Number	*P/N 417 300 288*		
	Calibration done at temperature of 0° Celcius					
	① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and BRP reserves the right to modify it without obligation.					

2005 ISR FILED ENGINE SPECIFICATIONS

550 F/C MXZ

		MIN	MAX
INSTALLED cc	35,3 ± 1,77	33,54	37,07
FLAT PLATE cc	34,6 ± 1,73	32,87	36,33
SQUISH mm	1,3 ± 0,30	1,00	1,60
SQUISH in	0,051 ± 0,012	0,039	0,063

440 LC MXZ X

		MIN	MAX
INSTALLED cc	17,6 ± 0,88	16,72	18,48
FLAT PLATE cc	17,0 ± 0,85	16,15	17,85
SQUISH mm	1,30 ± 0,30	1,00	1,60
SQUISH in	0,051 ± 0,01	0,039	0,063

600 HO MXZ & SUMMIT

		MIN	MAX
INSTALLED cc	28,6 ± 1,43	27,17	30,03
FLAT PLATE cc	26,6 ± 1,33	25,27	27,93
SQUISH mm	1,2 ± 0,40	0,80	1,60
SQUISH in	0,047 ± 0,016	0,031	0,063

800 HO MXZ

		MIN	MAX
INSTALLED cc	38,5 ± 1,93	36,58	40,43
FLAT PLATE cc	39,1 ± 1,96	37,15	41,06
SQUISH mm	1,45 ± 0,40	1,05	1,85
SQUISH in	0,057 ± 0,016	0,041	0,073

800 HO SUMMIT

		MIN	MAX
INSTALLED cc	34,8 ± 1,74	33,06	36,54
FLAT PLATE cc	35,4 ± 1,77	33,63	37,17
SQUISH mm	1,05 ± 0,40	0,65	1,45
SQUISH in	0,041 ± 0,016	0,025	0,057

TABLE OF CONTENTS

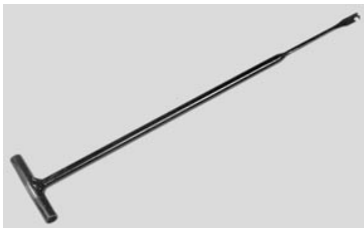
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobiles. The list includes both the mandatory tools and the recommended tools. If you need to replace or add your tool inventory these items can be ordered through the regular parts channel.

Following mention points out new tool and product: **N –>**

ENGINE — MANDATORY TOOLS

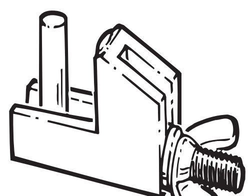
Exhaust spring installer/remover
(P/N 529 035 401)



APPLICATION
All models.

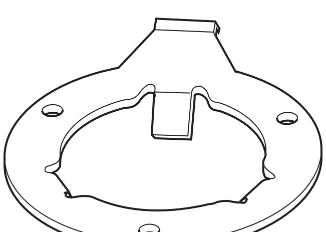
NOTE: This tool replaces exhaust spring installer/remover (P/N 529 035 400).

Hose pincher (2)
(P/N 295 000 076)



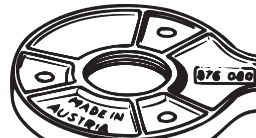
APPLICATION
All vehicles.

Holder wrench
(P/N 420 876 357)



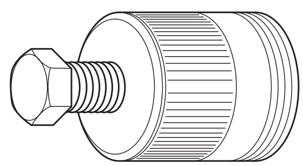
APPLICATION
All axial fan cooled engines.

Magneto puller ring
(P/N 420 876 080)



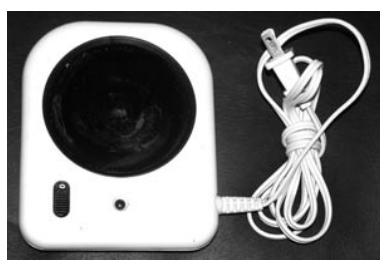
APPLICATION
All axial fan cooled engines.

Magneto puller
(P/N 529 035 547)



APPLICATION
All engines 7.

N–> Bearing heater
(P/N 529 035 969)



APPLICATION
All models.

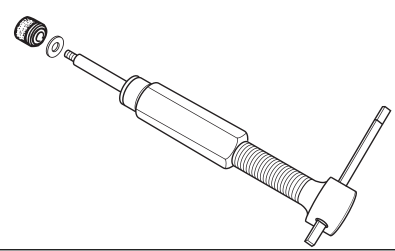
N–> Temperature indicator
(P/N 529 035 970)

APPLICATION
All models.

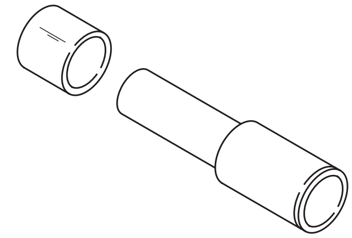
Fuel and oil system leak tester kit
(P/N 529 033 100)

APPLICATION
All models.

1) Piston pin puller
(P/N 529 035 503)



2) Sleeve kit 18 mm
(P/N 529 035 541)
3) Sleeve kit 20 mm
(P/N 529 035 542)



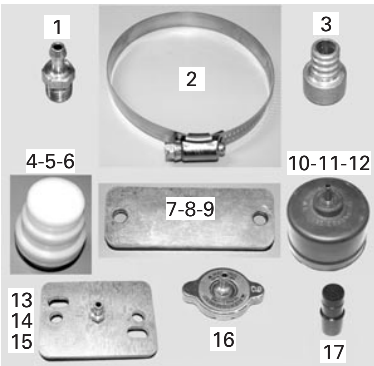
NOTE: 18 mm sleeve kit contains 1 shouldered sleeve and 3 sleeves. 20 mm sleeve kit contains 1 shouldered sleeve and 2 sleeves.

APPLICATION

1) All engines.
2) 277 and 443 engines.
3) 552, 593, 693 and 793 engines.

Engine leak tester kit
(P/N 861 749 100)

NOTE: Should be used with hand pump (P/N 529 021 800).

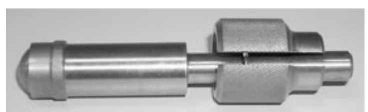


1) Fitting
(P/N 408 201 100) (2)
2) Clamp
(P/N 408 803 500)
3) Adapter
(P/N 517 234 900) (2)
4) Intake plug
(P/N 529 011 000) (2)
5) Intake plug
(P/N 529 030 500)
6) Intake plug
(P/N 529 035 963) (2)
7) RAVE plate
(P/N 529 011 200) (2)
8) RAVE plate
(P/N 529 035 971) (2)
9) RAVE plate
(P/N 529 035 972) (2)
10) Manifold plug
57 mm (2–1/4 in)
(P/N 529 021 100)
11) Manifold plug
63 mm (2–1/2 in)
(P/N 529 035 961)
12) Manifold plug
70 mm (2–3/4 in)
(P/N 529 021 200)
13) Exhaust plate
(P/N 529 021 300) (2)
14) Exhaust plate
(P/N 529 024 600) (2)
15) Exhaust plate
(P/N 529 035 962) (2)
16) Radiator cap
(P/N 529 021 400)
17) Resonator plug
(P/N 529 035 973) (2)

APPLICATION
All engines.

NOTE: To prevent leak in manifold plug, use Loctite Black MAX (P/N 413 408 300).

Piston circlip installer 20 mm
(P/N 529 035 686)



APPLICATION
Engines with tab type circlip.

9–volt adaptor
(P/N 529 035 675)

APPLICATION
All models equipped with a DESS.

Supply harness
(P/N 529 035 869)

APPLICATION
All DESS equipped models.

VCK (Vehicle Communication Kit)
(P/N 529 035 844)

APPLICATION
All models equipped with a DESS.

DESS KEY for BUDS
(P/N 529 035 896)

APPLICATION
All models equipped with a DESS.

Engine removal hook
(P/N 529 035 829)

APPLICATION
REV series.

Lifting ring (2)
(P/N 529 035 830)

APPLICATION
Liquid cooled engines except 4-TEC.

ENGINE — RECOMMENDED TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

N–> Support plate
(P/N 529 035 976)

APPLICATION
552 engine type.

N–> Crankshaft distance gauge

a. (P/N 529 035 965)
b. (P/N 529 035 966)
c. (P/N 529 035 967)
d. (P/N 529 035 968)

APPLICATION

a. 552 engine type.
b. 493 and 593 engine type.
c. 593 HO, 593 SDI, 693 and 793.
d. 793 HO and 793 HO SDI.

Hand pump
(P/N 529 021 800)

APPLICATION
All models.

N–> Leak down tester
(P/N 529 035 661)

APPLICATION
1004 and 1503 engines.

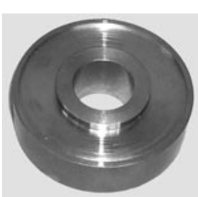
Crankshaft locking tool
(P/N 529 035 900)

APPLICATION
1004 engines.

N–> Crankshaft locking tool
(P/N 529 035 821)

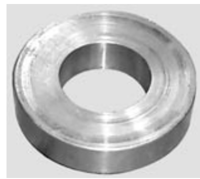
APPLICATION
1503 engines.

N–> Engine support bearing installer
(P/N 529 035 952)



APPLICATION
1503 engines.

N–> Engine support bearing support
(P/N 529 035 953)



APPLICATION
1503 engines.

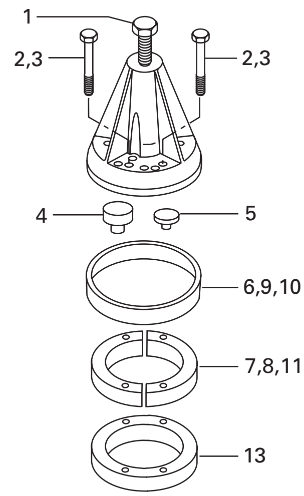
N–> 4-Tooth socket
(P/N 529 035 960)

APPLICATION
1503 engines.

N–> Torque flange remover
(P/N 529 035 958)

APPLICATION
1503 engines.

Crankshaft bearing puller
(P/N 420 877 635)



1) Screw M16 x 1.5 x 150 (P/N 420 940 755)
2) Screw M8 x 40 (4) (P/N 420 840 681)
3) Screw M8 x 70 (4) (P/N 420 841 201)
4) Crankshaft protector PTO (P/N 420 876 552)
5) Crankshaft protector MAG (P/N 420 876 557)
6) Puller ring (P/N 420 977 490) (use with half rings (P/N 420 977 475) or (P/N 420 276 025))
7) Half ring (2) (P/N 420 977 475) (for 72 mm O.D. bearings)
8) Half ring (2) (P/N 420 276 025) (for 62 mm O.D. bearings)
9) Puller ring (P/N 420 977 480)
10) Puller ring (P/N 420 977 494) (for hal rings (P/N 420 977 479))
11) Half ring (2) (P/N 420 977 479) (for 80 mm O.D. bearings)
12) Half ring (2) (P/N 420 876 330) (for 52 mm O.D. bearings)
13) Distance ring (P/N 529 035 964) (for MAG side bearing)

APPLICATION
All engines.

Piston circlip installer
(P/N 529 035 765)

APPLICATION
1004 and 1503 engines.

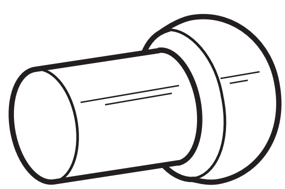
Piston circlip installer

a. 18 mm (P/N 529 035 561)
b. 20 mm (P/N 529 035 562)

APPLICATION
a) All engines except 593, 693 and 793.
b) 2001 and older 593 and 693 engines.

Piston pin/connecting rod bearing centering tool
(P/N 529 009 100)

NOTE: New diameter is 9.65 mm (.380 in).



APPLICATION
All engines except cageless engines.

Pusher (55/59 mm)
(P/N 529 035 913)

APPLICATION
1004 engines.

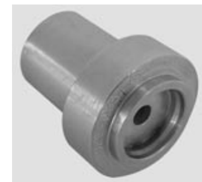
Pusher (38/42 mm)
(P/N 529 035 914)

APPLICATION
1004 engines.

Support sleeve
(P/N 529 035 944)

APPLICATION
1004 engines.

N–> Water pump ceramic seal installer
(P/N 529 035 766)

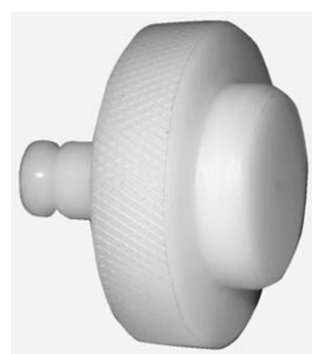


APPLICATION
1004 engines.

N–> Water pump oil seal installer
(P/N 529 035 757)

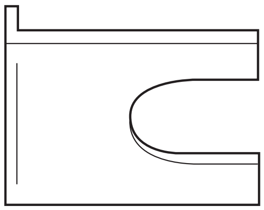
APPLICATION
1004 engines.

PTO cover oil seal installer
(P/N 529 035 910)



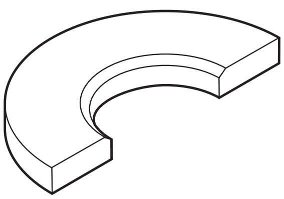
APPLICATION
1004 engines.

Crankshaft feeler gauge
(P/N 420 876 620)



APPLICATION
377 and 443 engines.

Crankshaft distance gauge (5.7 mm)
(P/N 420 876 822)



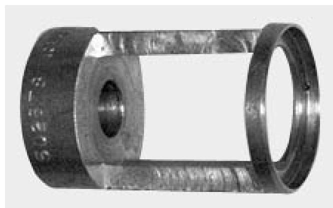
APPLICATION
377 and 443 engines.

N–> Camshaft locking tool
(P/N 529 035 839)

APPLICATION
1004 and 1503 engines.

Valve spring compressor cup
a) (P/N 529 035 764)

N–> b) (P/N 529 035 725)



APPLICATION
A) 1004 engines.
B) 1503 engines.

Ring compressor
Not sold by BOMBARDIER.

Snap-On RC980

APPLICATION
1004 and 1503 engines.

Special pliers for valve stem seal removal
Not sold by BOMBARDIER.

Snap-On YA 8230

APPLICATION
1004 and 1503 engines.

Valve stem seal installer
(P/N 529 035 687)

APPLICATION
1004 and 1503 engines.

Oil VAC
(P/N 529 035 880)

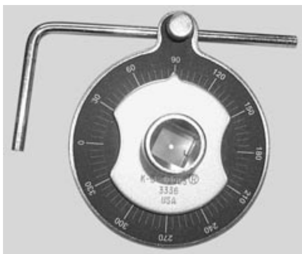
APPLICATION
All liquid cooled models.

Spring compressor clamp
(P/N 529 035 724)

APPLICATION
1004 and 1503 engines.

Torque angle gauge
Not sold by BOMBARDIER.

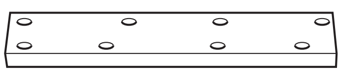
Snap-On TA362



APPLICATION
1004 and 1503 engines.

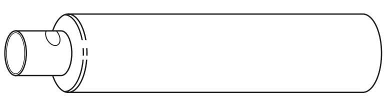
Cylinder aligning tool

a. (P/N 420 876 904) (on exhaust side)
b. (P/N 420 876 171) (on intake side)



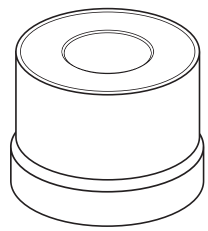
APPLICATION
a. 2-cylinder liquid cooled engines.
b. 2-cylinder fan cooled engines.

Driver tool
(P/N 529 035 521)



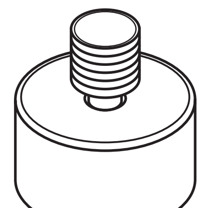
APPLICATION
Mini Z.

Attachment
(P/N 529 035 522)



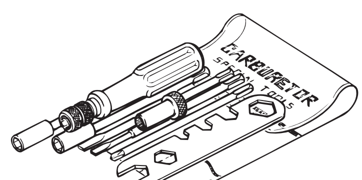
APPLICATION
Mini Z.

Pilot 22 mm
(P/N 529 035 523)



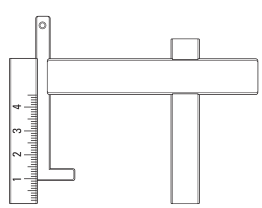
APPLICATION
Mini Z.

Carburetor tool kit
(P/N 404 112 000)



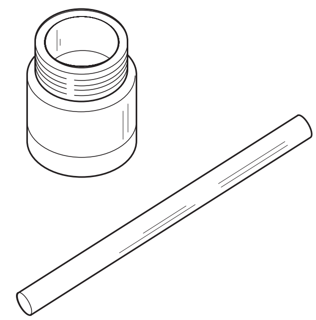
APPLICATION
All models with carburetor(s).

Float level gauge
(P/N 529 035 520)



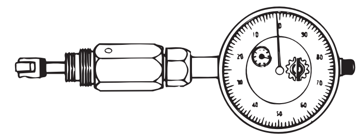
APPLICATION
All models with carburetor(s).

RAVE movement indicator
(P/N 861 725 800)



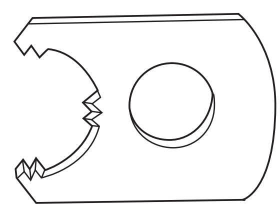
APPLICATION
All RAVE equipped engines.

Dial indicator (TDC gauge)
(P/N 414 104 700)



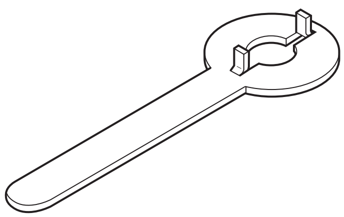
APPLICATION
All engines.

Injection pump gear holder
(P/N 420 876 695)



APPLICATION
377 engines.

Injection pump gear holder
(P/N 420 277 905)

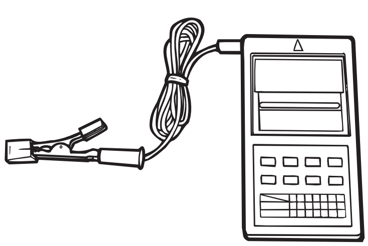


APPLICATION
All liquid cooled engines except 1004 and 1503.

Multimeter
(P/N 529 035 868)

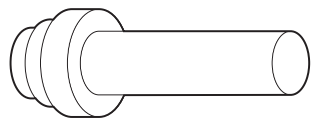
APPLICATION
All models.

Digital/induction type tachometer
(P/N 529 014 500)



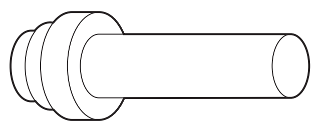
APPLICATION
All engines.

MAG seal pusher
(P/N 420 277 875)



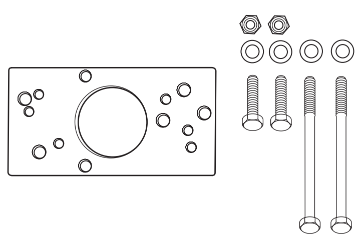
APPLICATION
277 engines.

PTO seal pusher
(P/N 420 876 660)



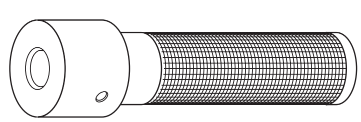
APPLICATION
277 engines.

Base puller plate kit
(P/N 529 024 900)



APPLICATION
277 engines.

Insertion jig handle
(P/N 420 877 650)

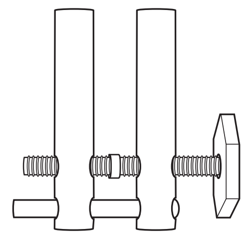


APPLICATION
1004 engines.

Oil pump seal installer
(P/N 529 035 911)

APPLICATION
1004 engines.

Large hose pincher
(P/N 529 032 500)

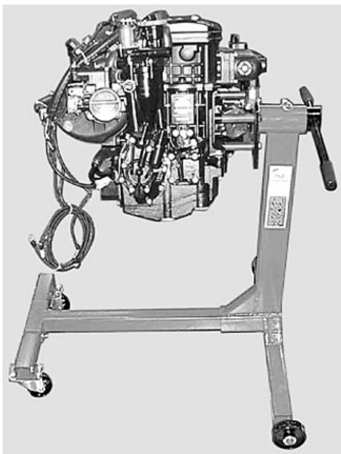


APPLICATION
All vehicles.

N–> 2–stroke engine lifting tool
(P/N 529 035 940)

APPLICATION
2–stroke engines.

Engine stand
Not sold by BOMBARDIER.



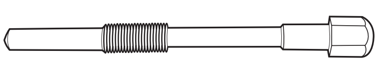
APPLICATION
1503 engines.

TRANSMISSION — MANDATORY TOOLS

Drive pulley retainer
(P/N 529 035 674)

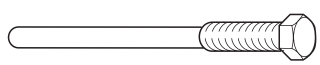
APPLICATION
All TRA, TRA III, TRA IV and TRA IV HD drive pulleys.

Drive pulley puller
(P/N 529 022 400)



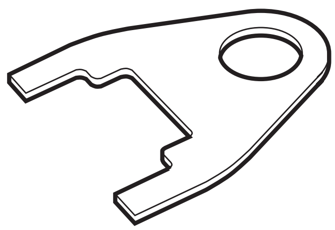
APPLICATION
2003 and up BOMBARDIER Lite drive pulley.
Most TRA, TRA III and TRA IV drive pulleys.

TRA drive pulley puller (25 mm)
(P/N 529 007 900)



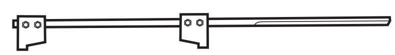
APPLICATION
TRA drive pulley for 443 engines.

Forks (3)
(P/N 529 005 500)



APPLICATION
All vehicles equipped with a TRA drive pulley.

Specific alignment bar
(P/N 529 035 530)

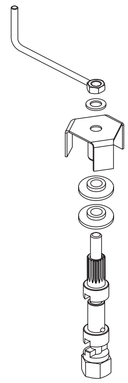


APPLICATION
ZX series with TRA and RER.

Universal alignment bar
(P/N 529 035 831)

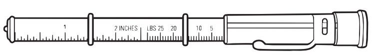
APPLICATION
All models except Elite.

Pulley spring compressor
(P/N 529 035 524)



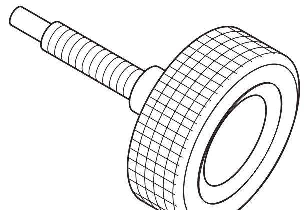
APPLICATION
All models.

Tension tester
(P/N 414 348 200)



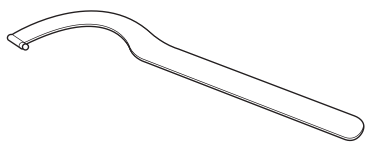
APPLICATION
All models.

Driven pulley opening tool
(P/N 529 017 200)



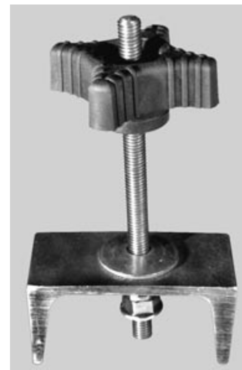
APPLICATION
Most models.

Clutch holder
(P/N 529 027 600)



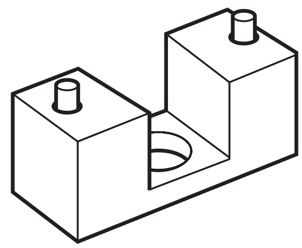
APPLICATION
BOMBARDIER Lite drive pulley.

Driven pulley spring compressor
(P/N 529 035 300)



APPLICATION
Tundra.

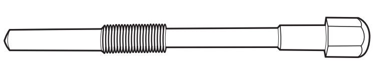
Spring cover tool
(P/N 529 027 300)



APPLICATION
BOMBARDIER Lite drive pulley.

TRANSMISSION — RECOMMENDED TOOLS

N–> Drive pulley puller
(P/N 529 035 959)

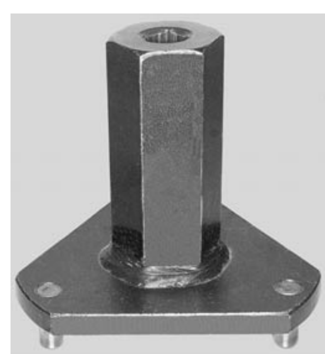


APPLICATION
Elite.

Tapered tool
(P/N 529 035 826)

APPLICATION
Skandic LT.

Spider tool
(P/N 529 025 200)



APPLICATION
Skandic LT.

Drive pulley puller
(P/N 529 025 000)

APPLICATION
Skandic LT.

Governor cup
(P/N 529 035 894)

APPLICATION
TRA IV.

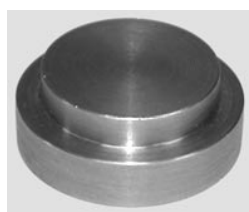
N–> TRA IV dial indicator kit
(P/N 529 035 939)

APPLICATION
TRA IV and TRA IV HD.

N–> Short dial indicator
(P/N 295 000 143)

APPLICATION
TRA IV and TRA IV HD.

TRA IV drive pulley support
(P/N 529 035 942)

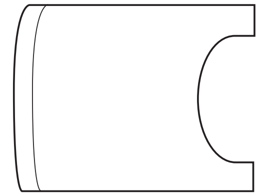


APPLICATION
TRA IV and TRA IV HD.

Driven pulley opening tool
(P/N 529 034 200)

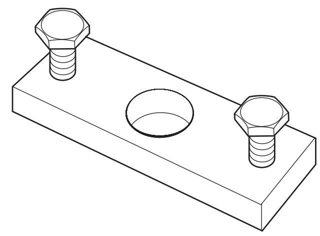
APPLICATION
Tundra.

Alignment tool
(P/N 420 476 010)



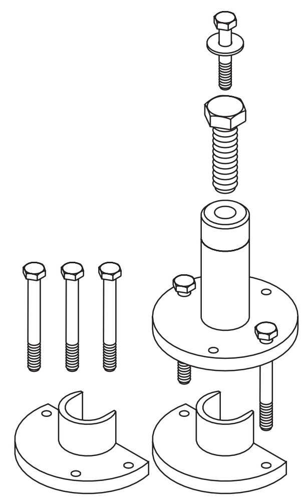
APPLICATION
Skandic WT.

Cam pusher
(P/N 529 012 900)



APPLICATION
Tundra.

Countershaft bearing remover/installer
(P/N 529 035 699)

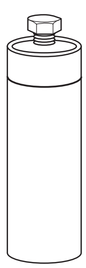


APPLICATION
ZX series.

Countershaft bearing remover
(P/N 529 035 812)

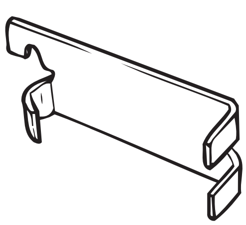
APPLICATION
Skandic LT.

Countershaft bearing installer
(P/N 529 035 815)



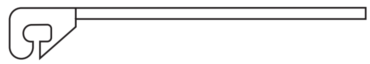
APPLICATION
Skandic LT.

Spring scale hook (long)
(P/N 529 006 500)



APPLICATION
Tundra.

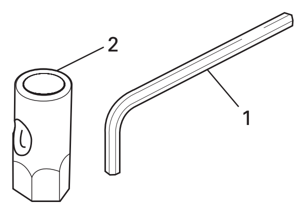
Transmission adjuster
(P/N 529 030 300)



APPLICATION
Vehicles equipped with "push-pull shifter" reverse transmission.

Drive belt tension adjuster tool
(P/N 529 008 700)
Parts included:

1) Hexagonal wrench (P/N 420 876 730)
2) Socket wrench (P/N 529 015 000)



APPLICATION
All vehicles except Tundra and Skandic WT.

Alignment bar
a. (P/N 529 035 808)
b. (P/N 529 035 586)
c. (P/N 529 035 594)
d. (P/N 529 026 900)
e. (P/N 529 026 700)

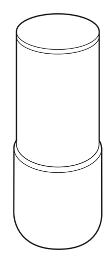
N–> f. (P/N 529 035 974)

APPLICATION
a. Skandic LT.
b. ZX series with BOMBARDIER Lite and RER.
c. Elite model.

NOTE: The alignment bar (P/N 529 035 594) must be modified to fit on Elite. Refer to PULLEY DISTANCE AND ALIGNMENT.

d. Tundra
e. ZX series with TRA.
f. 2004 Skandic WT/SWT/SUV 550.

Burnishing bar
(P/N 529 026 402)

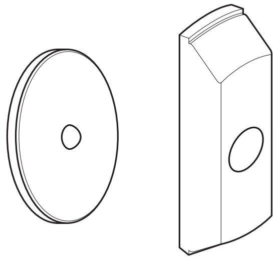


APPLICATION
Tundra and Skandic.

Bushing extractor/installer
(P/N 529 031 300)

APPLICATION
TRA drive pulley spring cover with replaceable bushing.

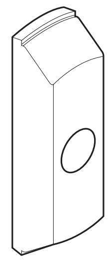
Large bushing extractor
(P/N 529 031 100)



APPLICATION
Formula type driven pulley.

NOTE: Use this tool only with former puller (P/N 529 018 600) that has regular threads.

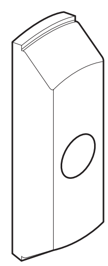
Large bushing extractor
(P/N 529 035 576)



APPLICATION
Formula type driven pulley.

NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads and support plate included with extractor (P/N 529 031 100).

Large bushing extractor
(P/N 529 035 575)



APPLICATION
LPV 27 driven pulley.

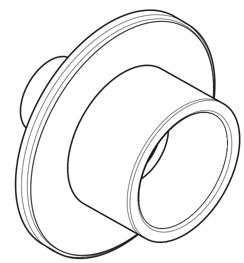
NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads and support plate included with extractor (P/N 529 031 100).

N–> Sliding half bushing remover/installer
(P/N 529 035 931)

APPLICATION
TRA III and TRA IV.

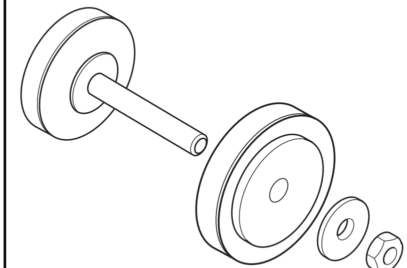
Large bushing installer and small bushing extractor

a. (P/N 529 031 200)
b. (P/N 529 035 931)

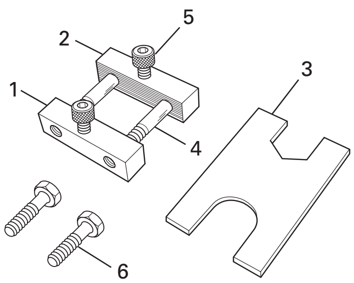


APPLICATION
a. All models except Tundra, Skandic WT/SWT.
b. TRA III drive pulley spring cover.

Chaincase seal pusher
(P/N 529 035 584)

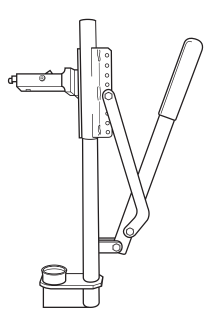


APPLICATION
ZX series.

Drive axle sprocket adjuster (P/N 861 725 700) 
Parts included in the kit: 1) Block with threads (P/N 529 010 700) 2) Block without threads (P/N 529 010 800) 3) Plate (P/N 529 010 600) 4) Bolt M10 (2) (P/N 222 007 565) 5) Allen screw M8 (2) (P/N 222 983 065) 6) Screw M8 (2) (P/N 222 082 565) NOTE: When the tool is to be used between tunnel and sprocket use screw M8.
APPLICATION All vehicles.

Belt tension tool (P/N 529 035 957) 
APPLICATION Elite.

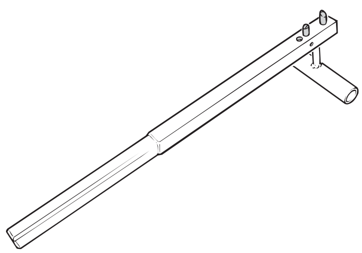
SUSPENSION — MANDATORY TOOLS

Shock spring removal kit (P/N 529 035 504) Replacement clevis pin (P/N 414 528 400) 
APPLICATION All suspension with coil spring.

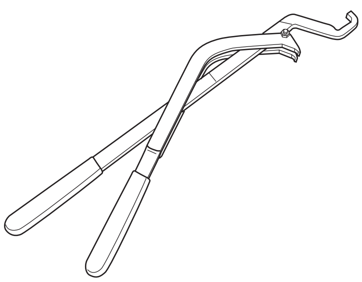
SUSPENSION — RECOMMENDED TOOLS

a) Track cleat remover
(P/N 529 008 200)
Pins
(P/N 529 008 204)

NOTE: Pins can be rotated 180° depending on wheter the tool is used by a left-hander or righ-hander.



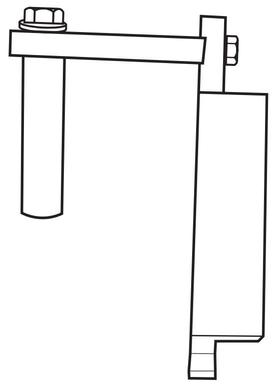
b) Track cleat remover
(P/N 529 028 700)



APPLICATION
a) 1993 and older.
b) All models except Tundra.

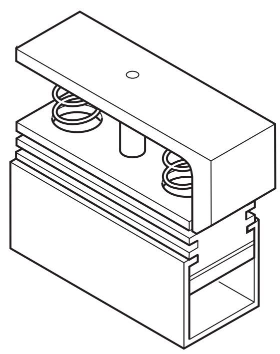
Camber angle tool
(P/N 529 021 600)

NOTE: Angle finder with a magnetic base must be used.
Suggestion: K_D tool no. 2968



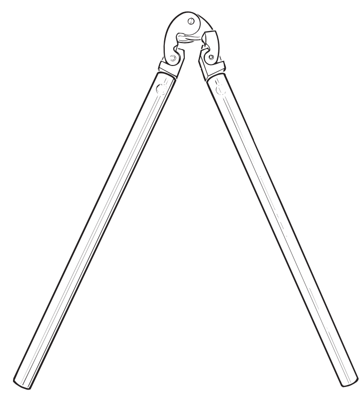
APPLICATION
All DSA front suspensions.

Track tension gauge
(P/N 529 021 500)



APPLICATION
All models.

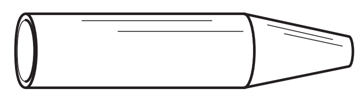
Track cleat installer
a. (P/N 529 028 800) narrow



APPLICATION
a. 1994 and newer.

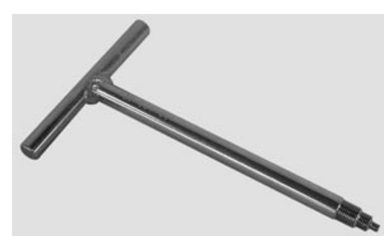
Dome guide

a. (P/N 529 026 500)
b. (P/N 529 035 728)



APPLICATION
a. C-36 T/A shocks.
b. C-46 T/A shocks.

N–> Floating piston puller
(P/N 529 035 901)



APPLICATION
T/A shock with external gas reservoir.

Shock wrench
(P/N 529 035 727)

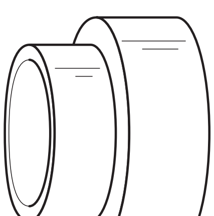
APPLICATION
All T/A shocks.

HPG shock holding tool
(P/N 529 035 769)

APPLICATION
All HPG shocks.

Piston guide

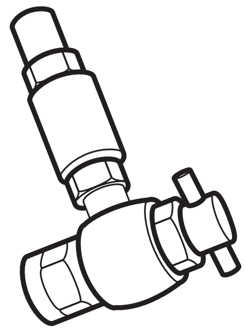
a. (P/N 529 026 600)
b. (P/N 529 035 608)



APPLICATION

a. C-36 T/A shocks.
b. C-46 T/A shocks.

Gas shock valve tool (tire valve type)
(P/N 529 035 570)

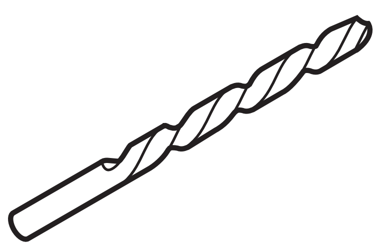


APPLICATION
Some 2000 and up T/A shocks.

Gas fill tool kit (needle type)
(P/N 503 190 102)

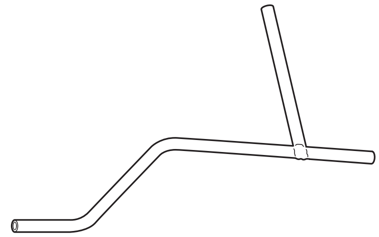
APPLICATION
2003 and up T/A shocks.

Drill bit
(P/N 529 031 800)



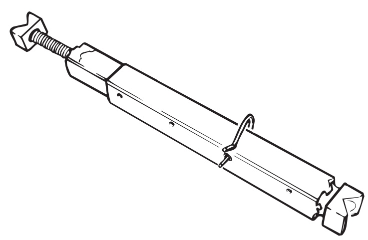
APPLICATION
All 3/16 inch rivets.

Spring installer (bar)
(P/N 529 005 000)



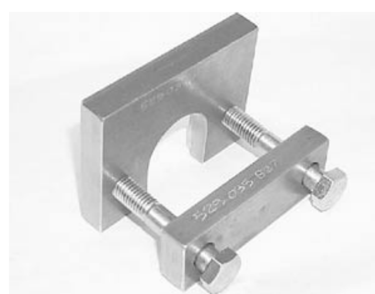
APPLICATION
Tundra and all SC-10 suspensions.

Drive axle holder
(P/N 529 007 200)



APPLICATION
All models.

Ball joint extractor
(P/N 529 035 827)



APPLICATION
REV series.

N–> Extension to torque ball joint nut
(P/N 529 035 876)

APPLICATION
REV series.

N–> REV ball joint lock
(P/N 529 035 945)

APPLICATION
REV series.

Ball joint remover support
(P/N 529 035 873)

APPLICATION
REV series.

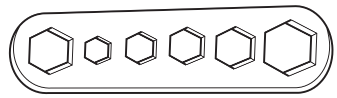
N–> Ball joint installer
(P/N 529 035 975)

APPLICATION
2004 REV series.

Ball joint installer support
(P/N 529 035 875)

APPLICATION
REV series.

Hexagonal wrench
(P/N 529 014 700)



APPLICATION
All SC-10 suspensions.

Suspension adjustment wrench
(P/N 529 032 900)

APPLICATION
SC-10 suspensions.

Adjustment wrench
(P/N 520 000 126)

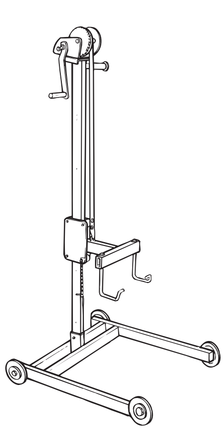
APPLICATION
SC-10 II and III (coupling blocks).

VEHICLE — RECOMMENDED TOOLS

Protective mat
(P/N 529 030 600)

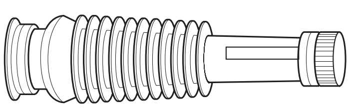
APPLICATION
All vehicle.

Snowmobile jack
(P/N 529 020 000)



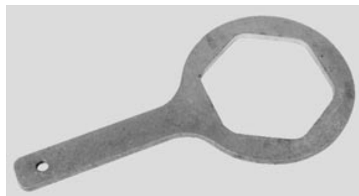
APPLICATION
All models.

Flexible spout for oil container
(P/N 414 837 300)



APPLICATION
All models.

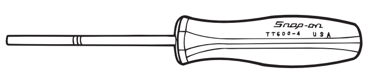
Adjustment wrench
(P/N 529 035 603)



APPLICATION
To remove and install fuel tank nut on ZX series.

Terminal (Packard) remover
Not sold by BOMBARDIER.

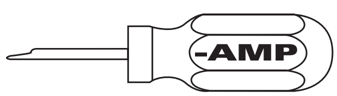
Snap-On TT 600–4



APPLICATION
Models with Packard connectors.

Multilock-terminal housing connector extractor tool
Not sold by BOMBARDIER.

AMP 755430–2

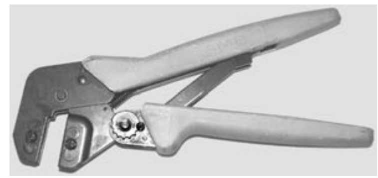


APPLICATION
For AMP multilock-terminals.

N–> DESS socket
(P/N 529 035 943)

APPLICATION
All DESS equipped models.

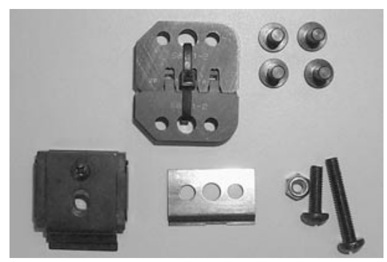
N–> Crimping tool
(dies sold separately)
(P/N 529 035 909)



APPLICATION
To crimp specific terminals.

Crimper die

a. (P/N 529 035 828)
b. (P/N 529 035 906)
c. **N –>** (P/N 529 035 908)

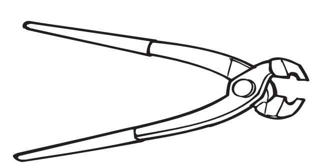


APPLICATION

a. AMP multilock connectors.
b. ECM connectors A and B.
c. Some Deutsch connectors.

NOTE: These dies fit on crimping tool (P/N 529 035 909).

Hose clamp pliers
(P/N 295 000 070)



APPLICATION
Some models.

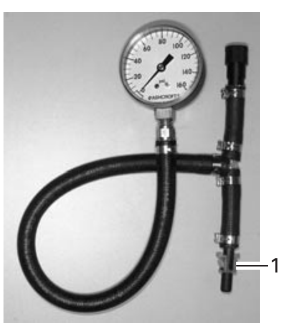
Adjustment wrench
(P/N 529 035 891)

APPLICATION
REV series.

Fuel pump nut wrench
(P/N 529 035 899)

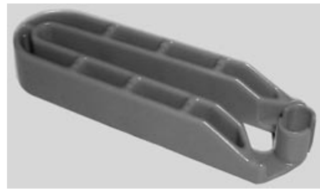
APPLICATION
2-TEC and 1004 engine equipped models.

Pressure gauge
(P/N 529 035 591)
1) Clip
(P/N 529 021 800)



APPLICATION
2–TEC, 1004 and 1503 engine equipped models.

Fuel line remover
(P/N 529 035 714)



APPLICATION
2-TEC, 1004 and 1503 engine equipped models.

Oil pressure gauge
(P/N 529 035 709)

APPLICATION
1004 and 1503 engine equipped models.

Oil pressure adaptor
(P/N 529 035 652)

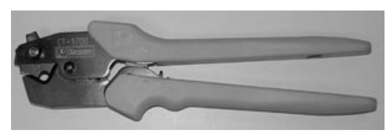
APPLICATION
1004 and 1503 engine equipped models.

Heated grips insertion tool

a. (P/N 529 035 897)
b. (P/N 529 035 936)

APPLICATION
a. ZX liquid cooled models with straight grips.
b. Models with j-hook type grips.

Crimp pliers
(P/N 529 035 730)



APPLICATION
All models with a battery.

N–> Insert pliers
(P/N 295 000 162)

APPLICATION
6 mm insert equipped models.

SERVICE PRODUCTS

Retaining compound (P/N 413 703 100) Loctite® RC/609: Retaining compound (10 mL) (green) 
APPLICATION Used for retaining bushings, bearings in slightly worn housing or on shaft.

Medium-strength threadlocker (P/N 293 800 060) Loctite® 243: Threadlocker (10 mL) (blue, medium strength) 
APPLICATION Flywheel nut, crankcase studs, etc. NOTE: This product replaces Loctite (P/N 293 800 015).

High strength threadlocker
(P/N 293 800 005)
Loctite® 271:
Threadlocker (10 mL) (red, high strength)

APPLICATION
Fasteners and studs up to 25 mm (1 in) diameter.

Sealing compound
(P/N 420 297 906)
(30 mL)

APPLICATION
To seal crankcase on all ZX series engines.

NOTE: This product replaces the larger tube (P/N 420 297 905).

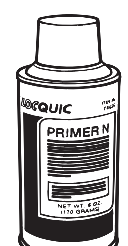
Paste gasket
(P/N 413 702 700)
Loctite® 515:
Gasket eliminator (50 mL)

APPLICATION
Crankcase halves and gearbox mating surfaces.

Paste gasket
(P/N 293 800 038)
Loctite® 518:
Gasket eliminator (50 mL)

APPLICATION
Crankcase halves and gearbox mating surfaces.

Loctite® primer
(P/N 293 800 041)
Primer N 128 g (5 oz)



APPLICATION
To prepare mating surfaces before applying paste gasket, retaining compound or threadlockers.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 708 100.

Gasket/paint remover
(P/N 413 708 500)
Loctite® Chisel 510 g (18 oz)

APPLICATION
Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

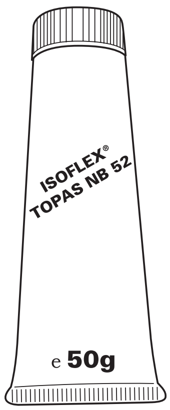
Molykote PG 54
(P/N 420 899 763)
(10 g)

APPLICATION
To lubricate pawl and pawl lock of rewind starter.

Molykote G-n paste
(P/N 711 297 433)
(50 g)

APPLICATION
To lubricate RAVE valve stem on engine with oil seal in RAVE housing.

Isoflex grease
(P/N 293 550 021)
(50 g)



APPLICATION
To lubricate some crankshaft bearings on some engines.

Petamo grease
(P/N 420 899 271)

APPLICATION
To lubricate lip of all ZX series engine crankshaft seals and plain bearings on 4-TEC.

SYNTHETIC BOMBARDIER
4-STROKE engine oil
0W-40
(P/N 293 600 054)
(12 x 1 L)

APPLICATION
4-TEC.

Pre-mix oil
(P/N 413 803 100)
(12 x 500 mL)

APPLICATION
All pre-mix models.

BOMBARDIER FORMULA XP-S II synthetic injection oil
(P/N 293 600 045)
(12 x 1 liter)

(P/N 293 600 046)
(3 x 4 liter)

(P/N 293 600 047)
(205 liter)

APPLICATION
All engines.

NOTE: This synthetic injection oil replaces XP-S and XP-S DI injection oils.

BOMBARDIER injection oil
(P/N 413 802 900)
(12 x 1 liter)

(P/N 413 803 000)
(3 x 4 liters)

(P/N 413 803 200)
(205 liters)

APPLICATION
All engines.

Premixed coolant 50/50
- 37°C (- 35°F)
(P/N 293 600 038)
(16 x 1 L)

APPLICATION
All liquid cooled models.

NOTE: This product replaces pre-mixed coolant (P/N 413 711 802).

Fuel stabilizer
(P/N 413 408 600)
(12 x 8 oz)

APPLICATION
All models.

Chaincase oil
(P/N 413 801 900)
(16 x 250 mL)

APPLICATION
Chaincase lubricant on all fan-cooled models except Skandic WT series.

Storage oil
CANADA: (P/N 413 711 600)
U.S.A.: (P/N 413 711 900)
(350 g spray can) (12 x 350 g)

APPLICATION
All models.

NOTE: Only the P/N has been changed. This product is identical to the P/N 496 014 100.

Synthetic chaincase oil
(P/N 413 803 300)
(12 x 355 mL)

APPLICATION
Chaincase lubricant on all liquid-cooled models and Skandic WT series.

Grease LMZ no. 1
(P/N 413 707 500)
(400 g)

APPLICATION
Mainly used between regulators or rectifiers and frame to transfer the heat build-up and to assure a good ground.

Synthetic grease
(P/N 413 711 500)
(400 g)

APPLICATION
Drive axle bearing.

N–> Suspension synthetic grease
(P/N 293 550 033)
(10 tubes of 400 g each)

APPLICATION
For front and rear suspension components and drive axle bearing.

BOMBARDIER LUBE
(P/N 293 600 016)
(12 x 14 oz)

APPLICATION
Steering ball joints on all models.

Molykote 111
(P/N 413 707 000)

APPLICATION
Crankshaft seals on all engines except ZX series ones.

Brake fluid SRF (DOT 4)
(P/N 293 600 063)

APPLICATION
All models with hydraulic brake.

Brake fluid GTLMA (DOT 4)
(P/N 293 600 062)

APPLICATION
All models with hydraulic brake.

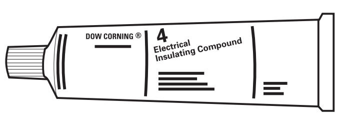
Shock oil
(P/N 293 600 035)
(32 oz)

APPLICATION
T/A shocks.

Anti-seize lubricant
(P/N 293 800 070)
Loctite anti-seize lubricant
236 mL (8 oz)

APPLICATION
Mounting surfaces of driven pulley and brake disc on countershaft.

Silicone dielectric grease
(P/N 293 550 004)
(3 oz)



APPLICATION
On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

NOTE: Only the P/N has been changed. This product is identical to the (P/N 413 701 700).

Pulley flange cleaner
(P/N 413 711 809)
(320 g)

APPLICATION
Engine crankcase joining surfaces, pulleys and any greasy surfaces.

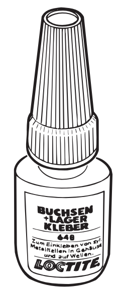
Heavy duty cleaner
(P/N 293 110 001)
(400 g)
(P/N 293 110 002)
(4 L)

APPLICATION
All models.

Plastic & vinyl cleaner
(P/N 413 711 200)
(6 x 1 L)

APPLICATION
Hood, bottom pan and seat.

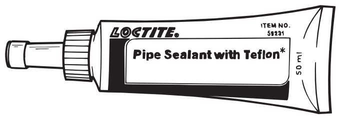
High temperature and strength retaining compound
(P/N 413 711 400)
Loctite 648 (5 mL) (green)



APPLICATION
To fasten oil injection nozzle to crankcase.

NOTE: Only the P/N has been changed. This product is identical to the P/N 420 899 788.

Pipe sealant
(P/N 293 800 018)
Loctite 592 (50 mL)



APPLICATION
Engine plugs and senders.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 702 300.

Loctite 5150
(P/N 293 800 086)

APPLICATION
All models to seal bottom pan.

Instant gasket
(P/N 293 800 088)
(7 oz)

APPLICATION
All models.

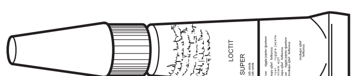
RTV silicone sealant
(P/N 293 800 066)
Loctite 5900 (300 mL)

APPLICATION
Tundra R chaincase cover.

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)

APPLICATION
Isolating foam and rubber strip.

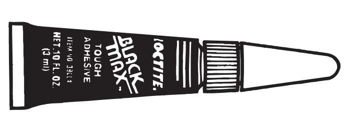
General purpose instant adhesive
(P/N 293 800 021)
Loctite 495 (3 g)



APPLICATION
Rubber to metal bonding and most hard plastic.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 703 200.

Tough adhesive
(P/N 413 408 300)
Loctite Black Max 3 mL (.10 oz)



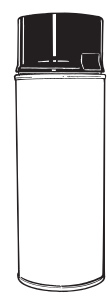
APPLICATION
Shifter boot or grip.

High temperature RTV sealant
(P/N 293 800 090)
Ultra Copper (80 mL)

APPLICATION
All models.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 710 300.

Paint for frame touch-up
(P/N 413 401 000)
Black semi-gloss (spray can)



APPLICATION
All models with a black frame.

N–> Scratch remover
(P/N 861 774 800)

APPLICATION
All models.

NEW TOOL FOR THE 2-TEC 1000 SDI

Piston circlip installer (MANDATORY)

P/N 529 035 998

APPLICATION

All models.

NOTE: This tool replaces exhaust spring installer/remover (P/N 529 035 400).

Exhaust plug plate (MANDATORY)

P/N 529 035 999

APPLICATION

Two of these are required when doing a leak down test.

Intake plug (MANDATORY)

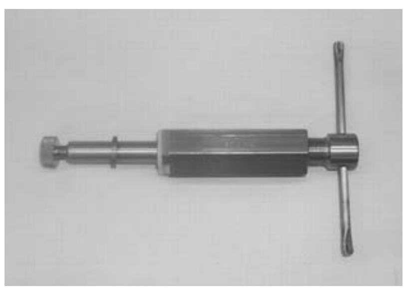
P/N 529 036 000

APPLICATION

Two of these are required when doing a leak down test.

Piston pin puller / installer (MANDATORY)

P/N 529 036 002



APPLICATION

To remove and install the piston pin.

RAVE plug plate (MANDATORY)

P/N 529 036 003

APPLICATION

Two of these are required when doing a leak down test

New tool that replaces the previous bearing puller
P/N 420 877 636

Crankshaft bearing puller (OPTIONAL)

P/N 529 036 004

APPLICATION

To remove the bearings from the crankshaft.

Stronger construction than previous model.

Magneto holder (MANDATORY)

P/N 529 036 001

APPLICATION

To be used to hold the crankshaft.

NEW TOOL TO USE WITH BUDS

Supplied Harness (MANDATORY)
P/N 529 035 997

APPLICATION

To supply 12V power from a battery to a non-running unit. To use along with BUDS. Works with the supplied harness P/N 529 035 869.

TABLE OF CONTENTS

280100060	Cover Mach Z (ADRN),Summit solution dyed (Intense) (RT)
280100061	Cover Mach Z (ADRN),Summit solution dyed (Racing) (RT)
280100059	Cover GTX ; Skandic Exp. Sport, solution dyed(Intense) (REV)
280100062	Cover MXZ (X, 440) , solution dyed (intense) (REV)
280100063	Cover MXZ (X, 440), solution dyed (Racing) (REV)
280100064	Cover MXZ/GSX (Sp, Ad,Tr,Re,F),Summit solution dyed (Intense) (REV)
280100065	Cover MXZ/GSX/Summit (Sp, Ad,Tr,Re,F), solution dyed (Racing) (REV)
280100066	Cover Skandic LT, solution dyed (intense)
280100067	Cover Skandic SWT, solution dyed (intense)
280100068	Cover Skandic WT/SUV, Skandic TUV solution dyed (intense)
280000135	Cover GTX ; Skandic Exp. Sport, nylon (Expedition)(REV)
280000134	Cover GTX ; Skandic Exp. Sport, solution dyed(Intense) (REV)
280000138	Cover Mach Z (ADRN), solution dyed (Extreme) (RT)
280000136	Cover Mach Z (ADRN), Summit solution dyed (Intense) (RT)
280000137	Cover Mach Z (ADRN),Summit nylon (Expedition) (RT)
280000139	Cover Mach Z (ADRN),Summit solution dyed (Racing) (RT)
280000141	Cover MXZ (X, 440) , solution dyed (intense) (REV)
280000140	Cover MXZ (X, 440), nylon (Expedition) (REV)
280000143	Cover MXZ (X, 440), solution dyed (Extreme) (REV)
280000142	Cover MXZ (X, 440), solution dyed (Racing) (REV)
280000146	Cover MXZ/GSX (Sp, Ad,Tr,Re,F), solution dyed (Extreme) (REV)
280000145	Cover MXZ/GSX (Sp, Ad,Tr,Re,F), Summit solution dyed (Intense) (REV)

280000144	Cover MXZ/GSX (Sp, Ad,Tr,Re,F),Summit nylon (Expedition) (REV)
280000147	Cover MXZ/GSX/Summit (Sp, Ad,Tr,Re,F), solution dyed (Racing) (REV)
280000148	Cover Skandic LT, nylon (Expedition)
280000152	Cover Skandic LT, solution dyed (intense)
280000149	Cover Skandic SWT, nylon (Expedition)
280000153	Cover Skandic SWT, solution dyed (intense)
280000150	Cover Skandic WT/SUV, Skandic TUV nylon (Expedition)
280000154	Cover Skandic WT/SUV, Skandic TUV solution dyed (intense)

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
860508800	A arm protector black for REV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
860509100	A arm protector orange for REV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
860509000	A arm protector yellow for REV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
415128917	Aluminum Backer 5/16 Pack 1000	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X					
415128887	Aluminum Backer 5/16 Pack 144	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X					
415128885	Aluminum Backer 5/16 Pack 24		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X				
415128886	Aluminum Backer 5/16 Pack 96		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X				
517302803	Body panel black LH			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
517302802	Body panel black RH			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
517302805	Body panel yellow LF			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
517303180	Body panel yellow RH			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
417126715	Cam 44, Formula RER													X	X									
417126683	Cam 47, Formula RER													X	X									
417126685	Cam 48/44, Formula RER													X	X									
417126716	Cam 50, Formula RER													X	X									
417126680	Cam 50/47, Formula RER													X	X									
860428000	Cam aluminum RER 47													X	X									
860428400	Cam aluminum RER 47-44													X	X									
860427900	Cam aluminum RER 50													X	X									
860428300	Cam aluminum RER 50-44													X	X									
860428200	Cam aluminum RER 50-47													X	X									
860428100	Cam aluminum RER 52-47													X	X									
417126747	Cam anod. 44, Formula RER													X	X									

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
417126718	Cam anod. 44, Formula, Formula VSA						X		X															
417126445	Cam anod. 44, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
417126748	Cam anod. 47, Formula RER													X	X									
417126707	Cam anod. 47, Formula, Formula VSA						X		X															
417126577	Cam anod. 47, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
417126724	Cam anod. 47/40, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
417126385	Cam anod. 47/44, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
417126750	Cam anod. 48/44, Formula RER													X	X									
417126719	Cam anod. 48/44, Formula, Formula VSA						X		X															
417126749	Cam anod. 50, Formula RER													X	X									
417126704	Cam anod. 50, Formula, Formula VSA						X		X															
417126721	Cam anod. 50/40, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
417126751	Cam anod. 50/47, Formula RER													X	X									
417126720	Cam anod. 50/47, Formula, Formula VSA						X		X															
417126580	Cam anod. 50/47, HPV, VSA			X	X	X	X		X		X	X				X	X	X	X	X		X	X	X
861301600	Ceramic coated brake pads kit	X	X	X	X	X	X	X	X	X	X	S	X	X	X	X	X	X	X	X	X	X	X	X
861803200	Chassis reinforcement, yellow (REV) (2004)	X	X	X	X	X	X	X	S	X					X	X	X	X						
861509300	Clear tail light		S	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
517302795	Console black (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
517302797	Console orange(REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
517302845	Console yellow (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
280100062	Cover MXZ (X, 440) , solution dyed (intense) (REV) Pers.			X	X						X		X			X			X					
280100063	Cover MXZ (X, 440), solution dyed (Racing) (REV) Pers.			X	X						X		X			X			X					
280100064	Cover MXZ/GSX (Sp, Ad,Tr,Re,F),Summit solution dyed (Intense) (REV) Pers.					X	X	X	X	X		X		X	X		X	X		X				
280100065	Cover MXZ/GSX/Summit (Sp, Ad,Tr,Re,F), solution dyed (Racing) (REV) Pers.					X	X	X	X	X		X		X	X		X	X		X		X	X	X
280000138	Cover Mach Z (ADRN), solution dyed (Extreme) (RT)	X																						
280000136	Cover Mach Z (ADRN), Summit solution dyed (Intense) (RT)	X																						
280000137	Cover Mach Z (ADRN),Summit nylon (Expedition) (RT)	X																						
280100060	Cover Mach Z (ADRN),Summit solution dyed (Intense) (RT) Pers.		X																					
280100061	Cover Mach Z (ADRN),Summit solution dyed (Racing) (RT) Pers.		X																					
280000139	Cover Mach Z (ADRN),Summit solution dyed (Racing) (RT)	X																						
280000141	Cover MXZ (X, 440) , solution dyed (intense) (REV)	X	X						X		X			X			X							
280000140	Cover MXZ (X, 440), nylon (Expedition) (REV)	X	X						X		X			X			X							

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
280000143	Cover MXZ (X, 440), solution dyed (Extreme) (REV)	X	X						X		X			X			X							
280000142	Cover MXZ (X, 440), solution dyed (Racing) (REV)	X	X						X		X			X			X							
280000146	Cover MXZ/GSX (Sp, Ad,Tr,Re,F), solution dyed (Extreme) (REV)	X	X	X	X	X		X		X	X		X	X		X								
280000145	Cover MXZ/GSX (Sp, Ad,Tr,Re,F), Summit solution dyed (Intense) (REV)	X	X	X	X	X		X		X	X		X	X		X								
280000144	Cover MXZ/GSX (Sp, Ad,Tr,Re,F),Summit nylon (Expedition) (REV)	X	X	X	X	X		X		X	X		X	X		X								
280000147	Cover MXZ/GSX/Summit (Sp, Ad,Tr,Re,F), solution dyed (Racing) (REV)	X	X	X	X	X		X		X	X		X	X		X		X	X	X	X			
280000086	Cover Racing REV sport, Solution dyed				X	X	X	X	X		X		X	X		X	X		X					
280000087	Cover Racing REV X, Solution dyed		X	X						X					X			X						
280000077	Cover REV sport 1UP, nylon					X	X	X	X	X		X		X	X		X	X		X				
280000080	Cover REV sport 1UP, Solution dyed				X	X	X	X	X		X		X	X		X	X		X					
280000088	Cover REV sport, Ultra					X	X	X	X	X		X		X	X		X	X		X				
280000078	Cover REV X 1UP, nylon			X	X						X					X			X					
280000081	Cover REV X 1UP, Solution dyed		X	X						X					X			X						
280000089	Cover REV X, Ultra (PAS DE NOUVELLE)				X	X	X	X	X		X		X	X		X	X		X		X	X	X	
280000079	Cover Summit REV, nylon																					X	X	X

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
280000085	Cover Summit REV, Solution dyed																				X	X	X	X
280000095	Cover, bottom pan REV		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
280000061	Cover, canevas, REV 440												X											
280000128	Cover, compact travel cover REV	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
280000161	Cover, compact travel, lightweight nylon (Racing)(REV,RT)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
280000129	Cover, storage REV		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
415127752	Decal Rear reflective"Ski-Doo Racing" FLAG graphic for enclosed trailer (44"X22")																							
415128252	Decal X team for trailer 2 side (44" X 22")																							
415128665	Decal, Bee front																							
415128876	Decal, Bee muscle																							
415128664	Decal, Bee on spark plug																							
415128692	Decal, Bee Rotax																							
860702000	Decal, Checkered windshield graphics (Red)																							
860702100	Decal, Checkered windshield graphics (Yellow)																							
861775900	Decal, Checkered windshield graphics carbon Fiber																							
861775800	Decal, Chrome Checkered windshield graphics																							

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
415128363	Decal, Extreme Skidoo (set of 3), 1(4"X15") 2(2¼"X7½")																							
415128364	Decal, Formula XPS-II, (3½"X9")																							
415128365	Decal, Hornet (2 size) (7½"X7½")(3"X3")																							
415127747	Decal, Reflective hood graphics (Mach Z)																							
415127745	Decal, Reflective hood graphics (MXZ 600 & 700)																							
415128366	Decal, Rotax w/ flames (set of 2) (2½"X13")																							
415128367	Decal, Rotax w/ flames 40" (LF+RH)																							
415128368	Decal, Skidoo 5" and 10" (set of 12)																							
415127969	Decal, Ski-Doo electrostatic windshield decal																							
415128370	Decal, Skidoo MXZ (4½"X15½")																							
415128691	Decal, Skidoo REV																							
415128371	Decal, Skidoo Summit (5"X15")																							
415128372	Decal, Skidoo w/ flames (set of 5) (from 7" to 36")																							
415128373	Decal, Skidoo w/ flames 40" (LF+RH)																							
415128374	Decal, Skidoo w/ racing flag bkgrd (5½"X25")																							
415128375	Decal, Skidoo X (set of 5) (from 2½" to 16")																							

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
415128376	Decal, Skidoo X for windshield (6"X12¾")																							
415128120	Decal, Skidoo X team (set of 3)																							
415128377	Decal, Skidoo X team racing (set of 2) (3"X10")																							
415128378	Decal, various skidoo decals (10/ sheet)																							
415128379	Decal, Windshield flames graphics																							
415128960	Decal, wings Mach Z yellow		X																					
415128380	Decal, X team w/ flames (set of 5) (from 5½" to 24")																							
415128877	Decal, XPS (2X:15X5.5, 2X:7X2.5, 2X:3X1) Blk Bkgrd																							
415128878	Decal, XPS (2X:15X5.5, 2X:7X2.5, 2X:3X1) Clear Bkgrd																							
415128879	Decal, XPS (30 X 11) (2 /pak) Blk Bkgrd																							
415128880	Decal, XPS (30 X 11) (2 /pak) Clear Bkgrd																							
295100187	Decal,Rotax performance (4"X11")																							
415127973	Decal,Ski-Doo racing 4 per sheet																							
415127977	Decal,Ski-Doo sticker 10 per sheet																							
415127974	Decal,Ski-Doo sticker for window (24" X 5") (12" X 2")																							
415127970	Decal,Ski-Doo USA flag (24" X 3")																							

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
415127972	Decal,Team Ski-Doo (24" X 8")																							
415127976	Decal,Team Ski-Doo stickers 5 per sheet																							
415127750	Decals, Trailer front spray deflector graphic (Ski-Doo Racing) 38"x10"																							
860307000	Extension kit SC-10 (136) REVX				X	X	X	X	X		X													
861509700	Gauge, fuel Electr. (REV 2005)		X	X	X	X	X	X	X				X	X	X	X	X				X	X	X	X
861510300	Gauge, fuel Electr. (SDI 2005)	X								X	X							X	X	X				
861510100	Gauge, tachometer, REV Fan													X	X									
861509800	Gauge, temp. Electr. (REV 2005)		X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	
861788100	Grill kit RT, yellow		X																		X			
861782000	Grill kit, orange (REV)			X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X
861782100	Grill kit, yellow (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
861789100	Grill, prefilter grill kit (REV, RT)														X	X	X	X	X	X	X	X	X	X
860603000	handguard kit, Acerbis black			X	X						X		X			X			X					
860602700	handguard kit, Acerbis yellow		S	S						S		S			S			S						
517302851	Handlebar deflector, black B160				X	X	X	X	X		X		X	X		X	X		X					
517302852	Handlebar deflector, orange B228				X	X	X	X	X		X		X	X		X	X		X					
517302853	Handlebar deflector, yellow B190				X	X	X	X	X		X		X	X		X	X		X					
506151954	Handlebar pad, Super Bee			X	X						X					X			X					
860603700	Handlebar riser kit (115mm)			S	S						S		X			S			S					
860603800	Handlebar riser kit (130mm)			X	X						X		S			X			X					
860603900	Handlebar riser kit (90mm)			X	X						X		X			X			X					
861783600	Kit fastener long skid rivet		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
861787000	Knee deflector kit yellow (RT)		X																		X			
861783100	Knee deflector, orange (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
861783200	Knee deflector, yellow (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
861787100	Knee pad kit, black (RT), English		X																		X			
861789000	Knee pad kit, black (RT), Français		X																		X			
861787200	Knee pad kit, yellow (RT), English		X																		X			
861788900	Knee pad kit, yellow (RT), Francais		X																		X			
861788800	Knee pad REV, black- English			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
861788600	Knee pad REV, black- Français		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
861788700	Knee pad REV, yellow - English		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
861788500	Knee pad REV, yellow - Français		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	
861787300	Light weight hood & panels MXZ (REV)			X	X	X	X	X	X	X	X	X	X			X	X	X	X	X				
861787500	Light weight hood & panels clear (REV)			X	X	X	X	X	X	X	X	X	X			X	X	X	X	X		X	X	X
861787400	Light weight hood & panels SUMMIT (REV)																					X	X	X
504152020	Light-Weight Cross Shaft REV 440											X												
861802500	Nonskid strip kit, black (REVX 2004 121")	X	X	X	X	X	X	X	X	X		X	X											
861802300	Nonskid strip kit, black (REVX 2004 136" to 159")									X	X	X	X	X										
861802700	Nonskid strip kit, orange (REVX 2004 136" to 159")									X	X	X	X	X										

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
861802600	Nonskid strip kit, yellow (REVX 2004 121")	X	X	X	X	X	X	X	X	X		X	X											
861802400	Nonskid strip kit, yellow (REVX 2004 136" to 159")									X	X	X	X	X										
860506900	Plastic handle ski scarlet red B-212	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
505070963	Plastic handle ski, black B-160	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
860507600	Plastic handle ski, blue B-226	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
505071556	Plastic handle ski, Full Moon B-211	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
860507500	Plastic handle ski, orange B-228	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
860507400	Plastic handle ski, viper red B-176	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
860506400	Plastic handle ski, yellow B-190	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
860307100	Rail reinforcment kit (Summit)																			X	X	X	X	
861803500	Rear Summit footrest kit																				X	X	X	X
510004309	Rear trunk lid, yellow(REV)		X			X	X	X	X	X		X		X	X		X	X		X				
512059503	Rewind handle scarlet red		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
572111209	Rewind handle, Yellow		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
860602500	Riser kit REV 2003					X	X	X	X	X		X					X	X		X				
510004141	Seat cover X team (yellow REV)				X	X	X	X	X		X		X	X		X	X		X					
861001600	Seat kit REV short w/lid			X	X						X					X			X					
510004220	Seat lower structure (1+1) (REV X)(RT)	X			X	X	X	X	X		X		X	X		X	X		X					
861001300	Seat skin Rotax (REV) (short seat)				X	X	X	X	X		X		X	X		X	X		X					
415128670	Seat snowcross XPS II (long seat)		X	X						X					X			X						

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
861778000	Shock protector kit Scarlet red B-212		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X					
861775600	Shock Protector Kit, Black		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
861781000	Shock protector kit, blue labr. B-226																			X	X	X	X	X
861785300	Shock protector kit, Titane		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
861775500	Shock Protector Kit, yellow B190	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
861787800	Side panels deflector kit (REV)		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X					
505071392	Ski plastic (Mountain) LF, Black B - 160																	S	X	S	S	S		
505071407	Ski plastic (Mountain) LF, Yellow B-190																		X	S	X	X	X	
505070727	Ski plastic (Precision), Black B - 160	S	S	S	S	S	S	S	S	S	S				S	S	S	S	S					
505070831	Ski plastic (Precision), Jaune B-190	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
505070832	Ski plastic (Precision), Scarlet red B-212	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
505071050	Ski plastic (PRECISION), mix blk/ yel		X	X	X	X	X	X	X	X	X				X	X	X	X	X					
505071051	Ski plastic (PRECISION), mix yel/ viper red	X	X	X	X	X	X	X	X	X				X	X	X	X	X						
505071597	Ski Precision viper red		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X				
505070864	Ski runner (Precision)														X									
860507900	Ski runner (4" Carbides) plastic ski (Blow Mold)						X	X																

part #	DESCRIPTION	RT Mach Z 1000 SDI (R) [ADRENALINE]	REV MX Z 800HO (R) [X]	REV MX Z 600HO (R) [X]	REV MX Z 800HO (R) [ADRENALINE]	REV MX Z 600HO (R) [ADRENALINE]	REV MX Z 500SS (R) [ADRENALINE]	REV MX Z 600HO (R) [TRAIL]	REV MX Z 500SS (R) [TRAIL]	REV MX Z 600HO SDI (R) [X]	REV MX Z 600HO SDI (R) [ADRENALINE]	REV MX Z X 440 [Racing]	REV MX Z 550 F (R) [FAN]	REV MX Z 380 F (R) [FAN]	REV MX Z 800HO (R) [RENEGADE X]	REV MX Z 800HO (R) [RENEGADE]	REV MX Z 600HO (R) [RENEGADE]	REV MX Z 600HO SDI (R) [RENEGADE X]	REV MX Z 600HO SDI (R) [RENEGADE]	RT SUMMIT 1000 SDI (R) [HIGHMARK, X 162"]	REV SUMMIT 800HO (R) [X] 144" - 151" - 159"	REV SUMMIT 800HO (R) [ADRENALINE] 144" - 151"	REV SUMMIT 600HO / 800HO (R) [ADRENALINE] 144"	REV SUMMIT 550 F (R) [FAN]
860504900	Ski runner (5" Carbides) plastic ski (Precision)	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X					
860505200	Ski runner 6"/4" 60 degree, Precision	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X					
860505100	Ski runner 6"/4" 90 degree, Precision	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X					
860508700	Ski stance widening kit (REV)																			X	X	X	X	X
502006743	Skid plate, black (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
502006762	Skid plate, black (RT)		X																		X			
502006742	Skid plate, orange (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
502006741	Skid plate, yellow (REV)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
502006763	Skid plate, yellow (RT)		X																		X			
503190629	Slider shoe SC4 (121"), Black (B-160)	S	X	X						S														
503190573	Slider shoe SC4 (121"), yellow (B-190)	X	S	S						X														
520000412	Snowguard REV X, yellow		X	X	X	X	X	X	X	X	X	X		X	X									
508000454	Sock filter for air box REV			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
860306500	Suspenssion quick ajustment kit				X	X	X	X	X		X		X	X										
860508500	Titanium front springs kit (X package)	X	X						X		X			X			X		X	X	X	X		
860508600	Titanium front springs kit (none X package)	X			X	X	X	X	X		X					X	X		X					X
861785500	Tunnel protector kit (REV) 1", Blair Morgan									X	X													
861802800	Tunnel protector kit (REV X 121")	X	X	X	X	X	X	X	X	X	X													

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
861786400	Tunnel protector kit (REV X 121-136" 1 1/4")	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X					
860306900	Wheel 180mm for rear suspension kit	X	X	X	X	X	X	X	X	X	X	S	X	X	X	X	X	X	X	X	X	X	X	X
517303402	Windshield low fix checker Bee REV			X	X						X		X			X			X					
517303403	Windshield low fix Ski-Doo X (REV)			X	X						X		X			X			X					
517303130	windshield low fix swift, fire Bee		X	X						X					X			X						
517303131	windshield low fix swift, piston Bee		X	X						X					X			X						
517303408	Windshield Med fix Black mountain (Summit) (REV)																					X	X	X
517303420	Windshield Med fix Black mountain (Summit) (RT)																				X			
517303407	Windshield Med fix Ski-Doo X black (Summit) (REV)			X	X						X					X			X			X	X	X
517303418	Windshield Med fix Ski-Doo X black (Summit) (RT)																				X			
517303406	Windshield Med fix Ski-Doo X yellow (Summit) (REV)			X	X						X					X			X			X	X	X
517303419	Windshield Med fix Ski-Doo X yellow (Summit) (RT)																				X			
517303417	Windshield med fix yellow Mach Z		X																					
517303404	Windshield Med mobile Bee/ smoked (REV)					X	X	X	X	X		X		X	X		X	X		X				

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
517303405	Windshield Med mobile red lightning (REV)					X	X	X	X	X		X		X	X		X	X		X				
517302775	Windshield med, yellow (REV)					X	X	X	X	X		X		X	X		X	X		X				
517303000	Windshield med. chrome DBD REV				X	X	X	X	X		X		X	X		X	X		X					
517303028	Windshield mobile low Scorch					X	X	X	X	X		X		X	X		X	X		X				
517303029	Windshield mobile low Vector					X	X	X	X	X		X		X	X		X	X		X				
517302793	Windshield REV (Low) yellow transparent			X	X	X	X	X		X		X	X		X	X		X						
517302443	Windshield REV (Medium)					S	S	S	S	S		S		S	S		S	S		S				
861789900	Windshield hardware kit			X	X						X					X			X					
861786700	Windshield Summit kit			X	X						X					X			X					
517302843	Windshield, high mobile clear (REV)				X	X	X	X	X		X		X	X		X	X		X					
517302617	Windshield, low fix black REV											S												
415128570	Windshield, low fix yellow REV											X												
415128947	Woodies Gold Diggers 5/16 -1.0" Pack 1000											X	X											
415128948	Woodies Gold Diggers 5/16 -1.0" Pack 144											X	X											
415128949	Woodies Gold Diggers 5/16 -1.0" Pack 24											X	X											
415128950	Woodies Gold Diggers 5/16 -1.0" Pack 96											X	X											
415128951	Woodies Gold Diggers 5/16 - 1.075" Pack 1000	X	X	X	X	X	X	X	X	X	X													

part #	DESCRIPTION	Mach Z 1000 SDI (R) [ADRENALINE] RT	MX Z 800HO (R) [X] REV	MX Z 600HO (R) [X] REV	MX Z 800HO (R) [ADRENALINE] REV	MX Z 600HO (R) [ADRENALINE] REV	MX Z 500SS (R) [ADRENALINE] REV	MX Z 600HO (R) [TRAIL] REV	MX Z 500SS (R) [TRAIL] REV	MX Z 600HO SDI (R) [X] REV	MX Z 600HO SDI (R) [ADRENALINE] REV	MX Z X 440 [Racing] REV	MX Z 550 F (R) [FAN] REV	MX Z 380 F (R) [FAN] REV	MX Z 800HO (R) [RENEGADE X] REV	MX Z 800HO (R) [RENEGADE] REV	MX Z 600HO (R) [RENEGADE] REV	MX Z 600HO SDI (R) [RENEGADE X] REV	MX Z 600HO SDI (R) [RENEGADE] REV	SUMMIT 1000 SDI (R) [HIGHMARK, X 162"] RT	SUMMIT 800HO (R) [X] 144" - 151" - 159" REV	SUMMIT 800HO (R) [ADRENALINE] 144" - 151" REV	SUMMIT 600HO / 800HO (R) [ADRENALINE] 144" REV	SUMMIT 550 F (R) [FAN] REV
415128952	Woodies Gold Diggers 5/16 - 1.075" Pack 144	X	X	X	X	X	X	X	X	X	X													
415128953	Woodies Gold Diggers 5/16 - 1.075" Pack 24	X	X	X	X	X	X	X	X	X	X													
415128954	Woodies Gold Diggers 5/16 - 1.075" Pack 96	X	X	X	X	X	X	X	X	X	X													
415128955	Woodies Gold Diggers 5/16 - 1.325" Pack 144												X	X	X	X	X							
415128956	Woodies Gold Diggers 5/16 - 1.325" Pack 24												X	X	X	X	X							
415128957	Woodies Gold Diggers 5/16 - 1.325" Pack 96													X	X	X	X	X						
415128969	Woodies Gold Diggers 5/16 - 1.325" Pack 1000												X	X	X	X	X							

484 200 063 CA

RACING HANDBOOK / ENGLISH
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FAIT AU / MADE IN CANADA U/M:P.C.