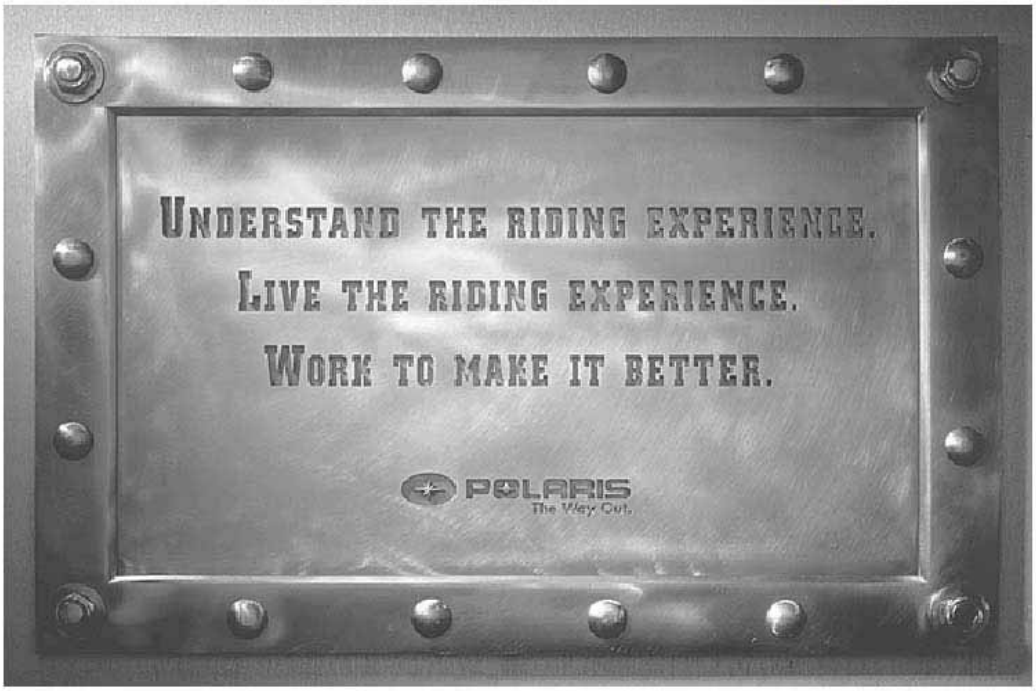


2006 - 2007 FS / FST SERVICE MANUAL
SERVICE MANUAL

FOREWORD

This service manual is designed primarily for use by certified Polaris Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

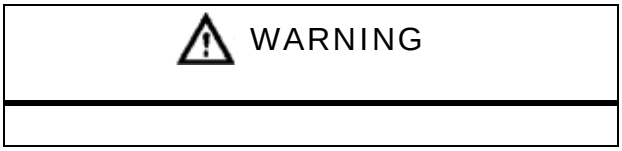
Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

Comments or suggestions about this manual may be directed to: Service Publications Dept. @ Polaris Sales Inc. 2100 Hwy 55 Medina Minnesota 55340.

2007 Service Manual PN 9920472

UNDERSTANDING MANUAL SAFETY LABELS AND DIRECTIONS

Throughout this manual, important information is brought to your attention by the following symbols:



SAFETY ALERT WARNING indicates a potential hazard that may result in severe injury or death to the operator, bystander or person(s) inspecting or servicing the vehicle.

SAFETY ALERT CAUTION indicates a potential hazard that may result in minor personal injury or damage to the vehicle.

CAUTION indicates special precautions that must be taken to avoid vehicle damage or property damage.

NOTE:

NOTE provides key information by clarifying instructions.

IMPORTANT:

IMPORTANT provides key reminders during disassembly, assembly and inspection of components.

TRADEMARKS

POLARIS ACKNOWLEDGES THE FOLLOWING PRODUCTS MENTIONED IN THIS MANUAL:

Loctite, Registered Trademark of the Loctite Corporation

Nyogel, Trademark of Wm. F. Nye Co.

Fluke, Registered Trademark of John Fluke Mfg. Co.

Mity-Vac, Registered Trademark of Neward Enterprises, Inc.

Torx, Registered Trademark of Textron

Rapid Reaction Clutch, Registered Trademark of Team Industries, Inc.

Some Polaris factory publications can be downloaded from www.polarisindustires.com, purchased from www.purepolaris.com or by contacting the nearest Polaris dealer.

CHAPTER 1
Model Specifications

1

SPECIFICATIONS

2006 FS Classic

Model Number: S06PD7ES

Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1450
Engagement RPM ±200	3500

Table 1-1: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-50	3120 60/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
600-1200 (2000-4000)	11-48	3120 60/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
1200-1800 (4000-6000)	11-44	3120 60/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
1800-2400 (6000-8000)	11-42	3076 40/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
2400-3000 (8000-10000)	11-40	3076 40/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
3000-3600 (10000-12000)	11-40	3076 40/340	Red/ Black	62/40.46 64/40.55 NON-ER	21:46-80
Drive Clutch Bolt Torque: 50 lb.ft. (68Nm)					

Table 1-2: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	53 / 134.6
Estimated Dry Weight (lb/kg)	554 / 251.5
Fuel (Gallons / Liters)	9.2 / 34.8
Oil qts/l	3/2.8
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil Filter (paper cartridge)	0451848
Oil Breather Foam	5813009
Coolant qts/l	6.34/6.0
Brake Fluid	DOT 4
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 21 46 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-3: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253520-01
Throttle Body Bore	46mm
TPS Voltage @ Idle	0.56 Vdc
Fuel Pressure - PSI (bar)	43.5 (3.0)
Recommended Fuel Octane (R+M/2)	87 (Minimum)

Table 1-4: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	.031 (.80)
Spark Plug	Champion RC7YC (PN 3070195)

Table 1-5: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	128 (325)
Lug Height - Inches (cm)	1.25 (3.175)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-6: Front Suspension

Suspension Type	IQ
Shocks	Nitrex Select
IFS Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length Inches (cm)	9.95 (25.3)
Front Vertical Travel Inches (cm)	9.92 (25.2)
Ski Center Distance Inches (cm)	42.5 (108)
Camber Inches (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out Inches (cm)	0 - 0.12 (0 - 0.31)

Table 1-7: Rear Suspension

Suspension Type	Fast M-10 128
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	180 (31)
FTS Spring Installed Length Inches (cm)	8.5 (21.6)
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate lbs/in (N/mm)	715 (125)
Lower Inner Spring Rate lbs/in (N/mm)	425 (74.4)
Upper Spring Rate lbs/in (N/mm)	273 (48)
Rear Travel Inches (cm)	13 (33)

2006 FST Classic

Model Numbers: S06PD7FS / S07PD7FE

Table 1-8: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-9: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
Drive Clutch Bolt Torque: 50 Ft. Lbs. (68Nm)					

Table 1-10: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	53 / 134.6
Estimated Dry Weight (lb/kg)	564 / 256.1
Fuel (Gallons / Liters)	9.2 / 34.8
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Oil Filter (paper cartridge)	0451848
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (in) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 40 78 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-11: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recomended)

Table 1-12: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.029 (.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-13: Track

Width in (cm)	15 (38)
Length in (cm)	144 (366)
Lug Height in (cm)	1.25 (3.175)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-14: Front Suspension

Suspension Type	IQ
Shocks	Nitrex Select
IFS Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length Inches (cm)	9.95 (25.3)
Front Vertical Travel Inches (cm)	9.92 (25.2)
Ski Center Distance Inches (cm)	42.5 (108)
Camber Inches (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out Inches (cm)	0 - 0.12 (0 - 0.31)

Table 1-15: Rear Suspension

Suspension Type	Fast M-10 128
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	180 (31)
FTS Spring Installed Length Inches (cm)	8.5 (21.6)
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate lbs/in (N/mm)	715 (125)
Lower Inner Srping Rate lbs/in (N/mm)	425 (74.4)
Upper Spring Rate lbs/in (N/mm)	273 (48)
Rear Travel Inches (cm)	13 (33)

2006 FS Touring

Model Number: S06PT7ES

Table 1-16: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1450
Engagement RPM ±200	3500

Table 1-17: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-52	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
600-1200 (2000-4000)	11-50	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
1200-1800 (4000-6000)	11-46	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
1800-2400 (6000-8000)	11-44	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
2400-3000 (8000-10000)	11-42	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
3000-3600 (10000-12000)	11-40	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-18: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	583 / 264.7
Fuel (Gallons / Liters)	9.2 / 34.8
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	7 / 6.6
Brake Fluid	DOT 4
Oil Filter (paper cartridge)	0451848
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 21 46 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-19: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253520-01
Throttle Body Bore	46mm
TPS Voltage @ Idle	0.56 Vdc
Fuel Pressure - PSI (bar)	43.5 (3.0)
Recommended Fuel Octane (R+M/2)	87 (Minimum)

Table 1-20: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.031 (.80)
Spark Plug	Champion RC7YC (PN 3070195)

Table 1-21: Track

Width in. (cm)	15 (38)
Length in. (cm)	136 (345)
Lug Height in. (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-22: Front Suspension

Suspension Type	IQ
Shocks	Nitrex Select
IFS Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length Inches (cm)	9.95 (25.3)
Front Vertical Travel Inches (cm)	9.92 (25.2)
Ski Center Distance Inches (cm)	42.5 (108)
Camber Inches (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out Inches (cm)	0 - 0.12 (0 - 0.31)

Table 1-23: Rear Suspension

Suspension Type	Fast M-10 136
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	220 (38.5)
Mid Track Shock (MTS)	Nitrex Gas Bag
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate lbs/in (N/mm)	715 (125)
Lower Inner Spring Rate lbs/in (N/mm)	425 (74.4)
Upper Spring Rate lbs/in (N/mm)	273 (48)
Rear Travel Inches (cm)	14 (35.6)

2006 FST Touring

Model Number: S06PT7FS

Table 1-24: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-25: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:44-80
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:44-80
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:44-80
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-26: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	583 / 264.7
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Fuel (Gallons / Liters)	9.2 / 34.8
Oil qts/l	3 / 2.8
Coolant qts/l	7 / 6.6
Brake Fluid	DOT 4
Oil Filter (paper cartridge)	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 44 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-27: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure (PSI/bar)	43.5 / 3 + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recomended)

Table 1-28: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	.029 (.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-29: Track

Width in. (cm)	15 (38)
Length in. (cm)	136 (345)
Lug Height in. (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-30: Front Suspension

Suspension Type	IQ
Shocks	Nitrex Select
IFS Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length Inches (cm)	9.95 (25.3)
Front Vertical Travel Inches (cm)	9.92 (25.2)
Ski Center Distance Inches (cm)	42.5 (108)
Camber Inches (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out Inches (cm)	0 - 0.12 (0 - 0.31)

Table 1-31: Rear Suspension

Suspension Type	Fast M-10 136
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	220 (38.5)
Mid Track Shock (MTS)	Nitrex Gas Bag
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate lbs/in (N/mm)	715 (125)
Lower Inner Spring Rate lbs/in (N/mm)	425 (74.4)
Upper Spring Rate lbs/in (N/mm)	273 (48)
Rear Travel Inches (cm)	14 (35.6)

2006 FST Switchback

Model Numbers: S06PS7FS / S07PS7FE

Table 1-32: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-33: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 (64/38-.46) NON ER	24:40-78
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
2400-3000 (8000-10000)	11-64	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
3000-3600 (10000-12000)	11-64	Black/ Green	Red/ Black	64/38-.46 (64/38-.65) NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-34: General

Width (in/cm)	48 / 121.9
Length (in/cm)	128 / 325.1
Height (in/cm)	48.5 / 123.2
Estimated Dry Weight (lb/kg)	568 / 257.9
Fuel (Gallons / Liters)	9.2 / 34.8
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter (paper cartridge)	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 40 78 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-35: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recomended)

Table 1-36: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.029 (.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-37: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	144 (366)
Lug Height - Inches (cm)	1.25 (3.175)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	3/8″ - 1/2″ (1 - 1.3cm)

Table 1-38: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX HPG w/IFP (Rebuildable)
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	11.2 (28.4)
Front Vertical Travel in (cm)	9.92 (25.2)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-39: Rear Suspension

Suspension Type	IQ Switchback 144
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	170 (30)
FTS Spring Installed Length in (cm)	7.25 (16.4)
Rear Track Shock (RTS)	Fox HPG w/IFP Compression Adjustable (Rebuildable)
Rear Travel in (cm)	16.5 (41.9)
Torsion Springs	.359 Square 77°

2007 FST IQ

Model Numbers: S07PP7FS / S07PP7FSA / S07PP7FE

Table 1-40: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-41: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-42: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	583 / 264.7
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 40 78 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-43: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recommended)

Table 1-44: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.029 (.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-45: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	121 (307.3)
Lug Height - Inches (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-46: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX HPG w/IFP (Rebuildable)
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	10.92 (27.7)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ±0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-47: Rear Suspension

Suspension Type	IQ 121
Front Track Shock (FTS)	Ryde FX HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	130 (270)
FTS Spring Installed Length in (cm)	7.72 (19.6)
Rear Track Shock (RTS)	Fox PS5 (Rebuildable)
Rear Travel in (cm)	13.9 (35.3)
Torsion Springs	.347 Square - 80°

2007 FST IQ LX

Model Number: S07PD7FS

Table 1-48: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-49: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-50: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	588 / 267
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 40 78 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-51: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recommended)

Table 1-52: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	.029 (.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-53: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	128 (325)
Lug Height - Inches (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-54: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX Gas Bag Compression Adjustable
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	9.95 (25)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-55: Rear Suspension

Suspension Type	Fast M-10 128
Front Track Shock (FTS)	Ryde FX Gas Bag
FTS Spring Rate lbs/in (N/mm)	180 (31)
FTS Spring Installed Length in (cm)	8.50 (21.6)
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate	715 (125)
Lower Inner Spring Rate	425 (74.4)
Upper Spring Rate	273 (48)
Rear Travel in (cm)	13 (33)

2007 FS IQ Touring

Model Numbers: S07PT7ES / S07PT7EE

Table 1-56: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3500

Table 1-57: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-52	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
600-1200 (2000-4000)	11-50	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
1200-1800 (4000-6000)	11-46	3121 60/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
1800-2400 (6000-8000)	11-44	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
2400-3000 (8000-10000)	11-42	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
3000-3600 (10000-12000)	11-40	3076 40/340	Red/ Black	62/40.46 (64/40.55) NON ER	21:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-58: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	632 / 286.9
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 21 46 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-59: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253520-01
Throttle Body Bore	46mm
TPS Voltage @ Idle	0.56 Vdc
Fuel Pressure - PSI (bar)	43.5 (3.0)
Recommended Fuel Octane (R+M/2)	87 (Minimum)

Table 1-60: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.031 (.80)
Spark Plug	Champion RC7YC (PN 3070195)

Table 1-61: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	136 (345.4)
Lug Height - Inches (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-62: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX Gas Bag Compression Adjustable
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	9.95 (25)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-63: Rear Suspension

Suspension Type	Fast M-10 136
Front Track Shock (FTS)	Ryde FX Gas Bag
FTS Spring Rate lbs/in (N/mm)	220
FTS Spring Installed Length in (cm)	8.50 (21.6)
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate	715 (125)
Lower Inner Spring Rate	425 (74.4)
Upper Spring Rate	273 (48)
Rear Travel in (cm)	14 (35.6)

2007 FST IQ Touring

Model Numbers: S07PT7FS / S07PT7FE

Table 1-64: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-65: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:44-80
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-80
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:44-80
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-66: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	650 / 295.1
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 44 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-67: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recommended)

Table 1-68: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	0.029 (0.75)
Spark Plug	Champion RC7PYCB (PN 0451967)

Table 1-69: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	136 (345.4)
Lug Height - Inches (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-70: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX Gas Bag Compression Adjustable
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	9.95 (25)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.079)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-71: Rear Suspension

Suspension Type	Fast M-10 136
Front Track Shock (FTS)	Ryde FX Gas Bag
FTS Spring Rate lbs/in (N/mm)	220
FTS Spring Installed Length in (cm)	8.50 (21.6)
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate	715 (125)
Lower Inner Spring Rate	425 (74.4)
Upper Spring Rate	273 (48)
Rear Travel in (cm)	14 (35.6)

2007 FST IQ Cruiser

Model Numbers: S07PY7FS / S07PY7FE

Table 1-72: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-73: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:44-80
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:44-80
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:44-80
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-74: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	657 / 298.3
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 44 80 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-75: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recommended)

Table 1-76: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	.029 (.75)
Spark plug	Champion RC7PYCB (PN 0451967)

Table 1-77: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	136 (345.4)
Lug Height - Inches (cm)	1 (2.54)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	7/8” - 1 1/8” (2.2 - 2.9cm)

Table 1-78: Front Suspension

Suspension Type	IQ
Shocks	Ryde FX Gas Bag Compression Adjustable
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	9.95 (25)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-79: Rear Suspension

Suspension Type	Fast M-10 136 ACE
Front Track Shock (FTS)	Ryde FX Gas Bag
FTS Spring Rate lbs/in (N/mm)	220
FTS Spring Installed Length in (cm)	8.50 (31.6)
Mid Track Shock	Nitrex Gas Bag
Rear Track Shock (RTS)	Fox HPG w/IFP (Rebuildable)
Lower Outer Spring Rate	715 (125)
Lower Inner Spring Rate	425 (74.4)
Upper Spring Rate	273 (48)
Rear Travel in (cm)	14 (35.6)

2007 FST IQ Switchback

Model Numbers: S07PS7FS / S07PS7FE

Table 1-80: Engine

Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749cc
Bore (inches/mm)	3.45 / 85
Stroke (inches/mm)	2.60 / 66
Piston to Cylinder Clearance (inches/mm)	0.0006-0.002 / 0.017-0.052
Ring Installed End-Gap Top Ring Middle Ring Oil Control Ring (inches / mm)	 0.009-0.019 / 0.25-0.50 0.007 - 0.013 / 0.20 - 0.35 0.005 - 0.011 / 0.15 - 0.30
Operating RPM ±200	8000
Idle RPM	1550
Engagement RPM ±200	3800

Table 1-81: Clutching

ALTITUDE meters (feet)	DRIVE CLUTCH		LW DRIVEN CLUTCH		
	Shift Weight	Clutch Spring	Clutch Spring	Driven Helix	Gearing
0-600 (0-2000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
600-1200 (2000-4000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1200-1800 (4000-6000)	11-66	3121 100/340	Red/ Black	64/38-.65 NON ER	24:40-78
1800-2400 (6000-8000)	11-66	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
2400-3000 (8000-10000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
3000-3600 (10000-12000)	11-64CS	Black/ Green	Red/ Black	64/38-.46 NON ER	23:46-80
Drive Clutch Bolt Torque 50 Ft.Lbs. (68Nm)					

Table 1-82: General

Width (in/cm)	48 / 121.9
Length (in/cm)	115 / 292.1
Height (in/cm)	48 / 121.9
Estimated Dry Weight (lb/kg)	591 / 268.3
Fuel (Gallons / Liters)	10.2 / 38.6
Engine Oil 0W-50 Synthetic SJ Minimum Rating	2874865 (Quart) 2875522 (Oil Change Kit) Kit includes 3 quarts oil, filter, o-ring, and ignition jumper.
Oil qts/l	3 / 2.8
Coolant qts/l	6.34 / 6.0
Brake Fluid	DOT 4
Oil Filter	0451848
Air Filter	5812801
Oil Breather Foam	5812950
Drive Belt Part Number Width (inches / cm) Side Angle Circumference (inches / cm) Center Distance (inches / cm)	 3211099 1.49 / 3.78 28_ 46.063 / 116.9 11 / 28
Chaincase Center Distance (inches) Top Gear (Stock) Bottom Gear (Stock) Chain (Stock) Gear Lube Capacity (oz / ml) Reverse System	 8.42 24 40 78 Polaris Synthetic 9 / 266.2 Perc 4

Table 1-83: Fuel Delivery

Type	Sequential Fuel Injection
Throttle Body Marking	1253519-01
Throttle Body Bore	39mm
TPS Voltage @ Idle	0.585 Vdc
Fuel Pressure PSI (bar) + Boost	43.5 (3.0) + Boost
Recommended Fuel Octane (R+M/2)	87 (Reduced Performance) 91,92,93 (Recomended)

Table 1-84: Electrical

Alternator Output Operating Voltage Watts @ 13.5 Vdc (Total) Watts @ 13.5 Vdc (After EMS) Amps @ 13.5 Vdc (No Load)	 13.5 - 14.5 Vdc 780 630 60
Ignition Timing	Variable
Spark Plug Gap in.(mm)	.029 (.75)
Spark plug	Champion RC7PYCB (PN 0451967)

Table 1-85: Track

Width - Inches (cm)	15 (38)
Length - Inches (cm)	144 (365.7)
Lug Height - Inches (cm)	1.25 (3.175)
Track tension sag in/cm with 10 lbs/4.54kg placed 16 in/ 40cm ahead of rear idler shaft	3/8″ - 1/2″ (1 - 1.3cm)

Table 1-86: Front Suspension

Suspension Type	IQ
Shocks	Fox HPG w/IFP (Rebuildable)
Spring Rate lbs/in (N/mm)	120 (21)
Spring Installed Length in (cm)	11.17 (28)
Front Vertical Travel in (cm)	10 (25.4)
Ski Center Distance in (cm)	42.5 (108)
Camber - in (cm)	2.25 ± 0.31 (57.2 ± 0.79)
Toe Out - in (cm)	0 - 0.12 (0 - 0.31)

Table 1-87: Rear Suspension

Suspension Type	IQ Switchback 144
Front Track Shock (FTS)	Fox HPG w/IFP (Rebuildable)
FTS Spring Rate lbs/in (N/mm)	170 (30)
FTS Spring Installed Length in (cm)	7.25 (18.4)
Rear Track Shock (RTS)	Fox HPG w/IFP / Compression Adjustable (Rebuildable)
Rear Travel in (cm)	16.5 (41.9)
Torsion Springs	.359 Square - 77°

NOTES

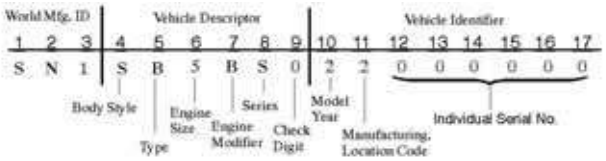
CHAPTER 2
General Information

2

VIN (VEHICLE IDENTIFICATION NUMBER)

VIN Organization

A 17-digit Vehicle Identification Number (VIN) is stamped into the right-hand side of the tunnel. The VIN is organized as follows:



Digits 1-3: World Manufacturer Identifier. For Polaris, this is SN1.

Digits 4-9: Vehicle Descriptor Section.

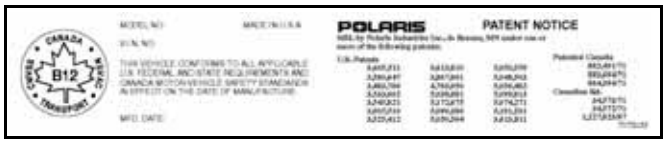
Digits 10-17: Vehicle Indicator Section.

Digits 4-8 of the VIN identify the body style, type, engine type, and series. The VIN and the model number must be used with any correspondence regarding service or repair.

VIN Vehicle Descriptor (4th - 8th digits)

4th	5th	6th	7th	8th	9th	10th	11	12-17
Body Style	**Type**	**Engine Modifier**		**Series**	**Ck digit**	**Model Year**	**Asm Line**	**Ser #**
P = IQ	D = Classic P = Performance S = Switchback T = Touring	7E = 750 NA 7F = 750 Turbo		E = Europe S = Standard	Check Digit	6 = 2006 7 = 2007 8 = 2008 9 = 2009	A B C D	Serial Number

TUNNEL DECAL



The VIN should be referred to in any correspondence regarding warranty, service or replacement parts. The machine model and serial number identification decal is located on the right front side of the tunnel. The serial number is permanently stamped into the tunnel. The model number is embossed on the decal.

PUBLICATION PART NUMBERS

2006 PART NUMBERS

Publication Part Numbers

Model	Model Number	Owner's Manual	Owner's Manual Supplement	Parts Manual	Microfiche	Assembly Instruction	Service Manual
340 Classic	S06ND3AS	9919667	9919683	9919719	9919720	9916508	9919763
500 Classic	S06ND4BS	919667	9919938	9919939	9919940	9916508	9919763
550 Classic	S06ND5BS	9919667	9919684	9919721	9919722	9916508	9919763
600 Classic	S06ND6ES	9919667	9919884	9919885	9919886	9916508	9919763
600 Edge Touring	S06NT6ES	9919669	9919887	9919888	9919889	9916508	9919763
700 HO Classic	S06PD7HS	9919666	9919694	9919735	9919736	9916508	9919763
700 HO Touring	S06PT7HS	9919674	-	9919753	9919754	9916508	9919763
FS/FST Classic	S06PD7E(F)S	9919670	9919692	9919733	9919734	9916508	9919765
FS/FST IQ Touring	S06PT7E(F)S	9919673	9919710	9919751	9919752	9916508	9919765
Indy 340 Touring	S06NT3AS	9919669	9919690	9919729	9919730	9916508	9919763
Trail Touring (DLX)	S06NT5BS(A)	9919669	9919691	9919731	9919732	9916508	9919763
Widetrak LX	S06SU4BS	9919669	9919712	9919755	9919756	9916508	9919763
600 HO RMK	S06PK6FS(A)	9920058	9919696	9919739	9919740	9919882	9919763
600 Switchback	S06PS6FS(A)	9920058	9919707	9919745	9919746	9916508	9919763
700 HO RMK	S06PK(L,M)7HS(A)	9919671	9919700	9919743	9919744	9919882	9919763
900 RMK	S06P(M,N,R)8DS(A, B)	9920103	9919701	9919743	9919744	9919882	9919763
900 Switchback	S06PS8DS(A)	9920103	9919709	9919749	9919750	9916508	9919763
FST Switchback	S06PS7FS	9919672	9919708	9919747	9919748	9916508	9919765
Trail RMK	S06NJ5BS(A)	9919668	-	9919727	9919728	9919882	9919763
120	S06WB1AS	9919675	-	9919757	9919758	9916891	9919766

Publication Part Numbers

Model	Model Number	Owner's Manual	Owner's Manual Supplement	Parts Manual	Microfiche	Assembly Instruction	Service Manual
500 Indy	S06NB4BS	9919667	9919935	9919936	9919937	9916508	9919763
500 XC SP Edge/M-10	S06NE(P)5CS(A,B)	9919667	9919686	9919725	9919726	9916508	9919763
600 HO Fusion	S06MP6FS(A,B)	9920057	9919680	9919713	9919714	9919882	9919763
600 HO Fusion Lux	S06ME6FS	9920057	9919677	9919713	9919714	9919882	9919763
700 HO Fusion	S06MP7HS(A,B)	9919666	9919681	9919715	9919716	9919882	9919763
700 HO Fusion Lux	S06ME7HS	9919666	9919678	9919715	9919716	9919882	9919763
900 Fusion	S06MP(E)8DS(A,B)	9920102	9919682	9919715	9919716	9919882	9919763
Supersport Edge/M-10	S06N(E)P5BS(A,B)	9919667	9919685991 9688	9919723	9919724	9916508	9919763

2007 Publication Part Numbers

2007 MODEL	MODEL NUMBER	OWNER'S MANUAL	OWNER'S MANUAL	PARTS BOOK	ASSEMBLY INSTRUCTIONS	SERVICE MANUAL
440 IQ	S07MX4CS	9920432	9920433	9920434	9919882	9920436
340 Edge LX	S07ND3AS	9920437	9920438	9920442	9916508	9920444
550 Edge LX	S07ND5BS	9920437	9920439	9920445	9916508	9920444
Trail RMK	S07NJ5B(E,S	9920449	9920450	9920451	9919882	9920444
Supersport	S07NP5BS	9920437	9920440	9920445	9916508	9920444
500 XCSP	S07NP5C(E,	9920437	9920441	9920447	9916508	9920444
Indy 340 Touring	S07NT3A(E,	9920449	9920453	9920454	9916508	9920444
Trail Touring Deluxe	S07NT5B(E,	9920449	9920456	9920457	9916508	9920444
Dragon	S07PC7J(E,S	9920648	9920460	9920461	9919882	9920463
600 CFI IQ LX	S07PD6HS	9920464	9920465	9920466	9916508	9920463
FST IQ LX	S07PD7FS	9920468	9920473	9920474	9916508	9920472
FST IQ LX LTD	S07PF7FS	9920468	9920473	9920474	9916508	9920472
600 RMK 144	S07PK6FS	9920476	9920477	9920478	9919882	9920463
Dragon RMK	S07PL7JS	9920911	N/A	9920912	9920606	9920463
600 RMK 155	S07PM6FS(A	9920476	9920483	9920478	9919882	9920463
600 HO IQ	S07PP6FS(A,	9920459	9920460	9920461	9919882	9920463
600 CFI IQ	S07PP6HS(A	9920464	9920487	9920466	9919882	9920463
FST IQ	S07PP7F(E,S	9920468	9920488	9920474	9919882	9920472
600 HO IQ Switchback	S07PS6FS(A)	9920459	9920597	9920598	9916508	9920463
600 SDI IQ	S07PS6HS(A	9920464	9920495	9920496	9916508	9920463
FST IQ Switchback	S07PS7F(E,S	9920468	9920498	9920499	9916508	9920463
600 CFI IQ Touring	S07PT6H(E,S	9920464	9920501	9920502	9916508	9920463
FS IQ Touring	S07PT7E(E,S	9920468	9920504	9920505	9916508	9920472
FST IQ Touring	S07PT7F(E,S	9920468	9920507	9920508	9916508	9920472
FST IQ Crusier	S07PY7F(E,S	9920468	9920507	9920508	9916508	9920472
Widetrak LX	S07SU4B(E,	9920449	9920510	9920511	9916508	9920444
120	S07WB1AS	9920513	no suppl.	9920515	9916891	9920517

Misc. Publications

Publication	PN
Track Diagnosis Poster	9918459
FS / FST Service Manual Binder	9921004
2006 Specification Handbook/Quick Reference Manual	9920147
Wiring Schematics for 2006 Model Year Sleds	9920672

TAP DRILL SIZES

SAE

Thread Size/ Drill Size		Thread Size / Drill Size	
#0-80	3/64	1/2-13	27/64
#1-64	53	1/2-20	29/64
#1-72	53	9/16-12	31/64
#2-56	51	9/16-18	33/64
#2-64	50	5/8-11	17/32
#3-48	5/64	5/8-18	37/64
#3-56	45	3/4-10	21/32
#4-40	43	3/4-16	11/16
#4-48	42	7/8-9	49/64
#5-40	38	7/8-14	13/16
#5-44	37	1-8	7/8
#6-32	36	1-12	59/64
#6-40	33	1 1/8-7	63/64
#8-32	29	1 1/8-12	1 3/64
#8-36	29	1 1/4-7	1 7/64
#10-24	24	1 1/4-12	1 11/64
#10-32	21	1 1/2-6	1 11/32
#12-24	17	1 1/2-12	1 27/64
#12-28	4.6mm	1 3/4-5	1 9/16
1/4-20	7	1 3/4-12	1 43/64
1/4-28	3	2-4 1/2	1 25/32
5/16-18	F	2-12	1 59/64
5/16-24	I	2 1/4-4 1/2	2 1/32
3/8-16	O	2 1/2-4	2 1/4
3/8-24	Q	2 3/4-4	2 1/2
7/16-14	U	3-4	2 3/4
7/16-20	25/64		

Metric

Tap Size	Drill Size	Decimal Equivalent	Nearest Fraction
3x.50	#39	0.0995	3/32
3x.60	3/32	0.0937	3/32
4x.70	#30	0.1285	1/8
4x.75	1/8	0.125	1/8
5x.80	#19	0.166	11/64
5x.90	#20	0.161	5/32
6x1.00	#9	0.196	13/64
7x1.00	16/64	0.234	15/64
8x1.00	J	0.277	9/32
8x1.25	17/64	0.265	17/64
9x1.00	5/16	0.3125	5/16
9x1.25	5/16	0.3125	5/16
10x1.25	11/32	0.3437	11/32
10x1.50	R	0.339	11/32
11 x 1.50	3/8	0.375	3/8
12x1.50	13/32	0.406	13/32
12x1.75	13/32	0.406	13/32

SAE / METRIC EQUIVALENTS

Decimal Equivalents

1/64 - .0156"
- - - - - - - - - 1/32 - .0312 - - - - - 1 mm= .0394"
3/64 - .0469
- - - - - - - - - 1/16 - .0625
5/64 - .0781 - - - - - 2 mm = .0787"
- - - - - - - - - 3/32 - .0938
7/64 - .1094 - - - - - 3 mm =.1181"
- - - - - - - - - 1/8 - - - - - - .1250
9/64 - .1406
- - - - - - - - - 5/32 - .1563 - - - - - 4 mm = .1575"
11/64 - .1719
- - - - - - - - - 3/16 - .1875 - - - - - 5mm= .1969"
13/64 - .2031
- - - - - - - - - 7/32 - .2188
15/64 - .2344 - - - - - 6 mm = .2362"
- - - - - - - - - 1/4 - - - - - - .25
17/64 - .2656 - - - - - 7 mm = .2756"
- - - - - - - - - 9/32 - .2813
19/64 - .2969
- - - - - - - - - 5/16 - .3125 - - - - - 8mm= .3150"
21/64 - .3281
- - - - - - - - - 11/32 - .3438 - - - - - 9 mm = .3543"
23/64 - .3594
- - - - - - - - - 3/8 - - - - - - .375
25/64 - .3906 - - - - - 10 mm = .3937"
13/32 - .4063
27/64 - .4219 - - - - - 11 mm =.4331"
- - - - - - - - - 7/16 - .4375
29/64 - .4531
- - - - - - - - - 15/32 - .4688 - - - - - 12 mm = .4724"
31/64 - .4844
- - - - - - - - - 1/2 - - - - - - .5 - 13mm = .5118"
33/64 - .5156
- - - - - - - - - 17/32 - .5313
35/64 - .5469 - - - - - 14 mm = .5512"
- - - - - - - - - 9/16 - .5625
37/64 - .5781 - - - - - 15 mm = .5906"
- - - - - - - - - 19/32 - .5938
39/64 - .6094
- - - - - - - - - 5/8 - - - - - - .625 - 16mm=. 6299"
41/64 - .6406
- - - - - - - - - 21/32 - .6563 - - - - - 17 mm =.6693"
43/64 - .6719
- - - - - - - - - 11/16 - .6875
45/64 - .7031 - - - - - 18 mm = .7087"
- - - - - - - - - 23/32 - .7188
47/64 - .7344 - - - - - 19 mm = .7480"
- - - - - - - - - 3/4 - - - - - - .75
49/64 - .7656
- - - - - - - - - 25/32 - .7813 - - - - - 20 mm = .7874"
51/64 - .7969
- - - - - - - - - 13/16 - .8125 - - - - - 21 mm =.8268"
53/64 - .8281
- - - - - - - - - 27/32 - .8438
55/64 - .8594 - - - - - 22 mm = .8661"
- - - - - - - - - 7/8 - - - - - - .875
57/64 - .8906 - - - - - 23 mm = .9055"
- - - - - - - - - 29/32 - .9063
59/64 - .9219
- - - - - - - - - 15/16 - .9375 - - - - - 24 mm = .9449"
61/64 - .9531
- - - - - - - - - 31/32 - .9688 - - - - - 25 mm = .9843"
63/64 - .9844
- - - - - - - - - 1 - - - - - - - 1.0

Conversion Table

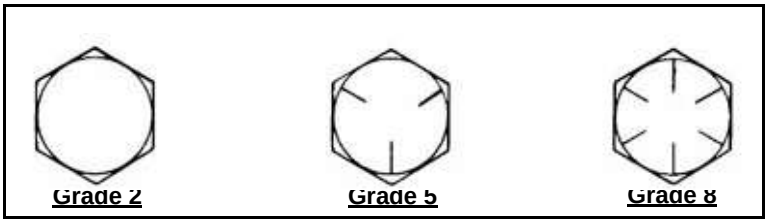
Unit of Measure	Multiplied by	Converts to
ft. lbs.	x12	= in. lbs.
in. lbs.	x .0833	= ft. lbs.
ft. lbs.	x 1.356	= Nm
in. lbs.	x.0115	= kg-m
Nm	x .7376	= ft. lbs.
kg-m	x 7.233	= ft. lbs.
kg-m	x 86.796	= in. lbs.
kg-m	x 9.807	= Nm
in.	x25.4	=mm
mm	x .03937	= in.
in.	x2.54	= cm
mile (mi.)	x1.6	= km
km	x.6214	= mile (mi.)
Ounces (oz)	x 28.35	= Grams (g)
Fluid Ounces (fl. oz.)	x 29.57	= Cubic Centimeters (cc)
Cubic Centimeters (cc)	x .03381	= Fluid Ounces (fl. oz.)
Grams (g)	x 0.035	= Ounces (oz)
lb.	x.454	= kg
kg	x 2.2046	= lb.
Cubic inches (cu in)	x 16.387	= Cubic centimeters (cc)
Cubic centimeters (cc)	x 0.061	= Cubic inches (cu in)
Imperial pints (Imp pt)	x 0.568	= Liters (l)
Liters (l)	x1.76	= Imperial pints (Imp pt)
Imperial quarts (Imp qt)	x 1.137	= Liters (l)
Liters (l)	x0.88	= Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	x 1.201	= US quarts (US qt)
US quarts (US qt)	x 0.833	= Imperial quarts (Imp qt)
US quarts (US qt)	x 0.946	= Liters (l)
Liters (l)	x 1.057	= US quarts (US qt)
US gallons (US gal)	x 3.785	=Liters (l)
Liters (l)	x 0.264	= US gallons (US gal)
Pounds - force per square inch (psi)	x 6.895	= Kilopascals (kPa)
Kilopascals (kPa)	x 0.145	= Pounds - force per square inch (psi)
Kilopascals (kPa)	x0.01	= Kilograms - force per square cm
Kilograms - force per square cm	x98.1	= Kilopascals (kPa)
ð(3.14)xR^2xH (height)		= Cylinder Volume

°C to °F: 9 (°C + 40)+ 5 - 40 = °F

°F to °C: 5 (°F + 40) + 9 - 40 = °C

FASTENER INFORMATION

Standard Bolt Specifications



The following torque specifications are to be used as a general guideline when torque value is not specified. There are exceptions in the steering, suspension, and engine areas. Always consult the torque chart and the specific manual section for torque values of fasteners.

Standard Bolt Specifications

Bolt Size	Threads/ In	Grade 2 ft-lb(Nm)	Grade 5 ft-lb(Nm)	Grade 8 ft-lb(Nm)
1/4	20	5 (7)	8 (11)	12 (16)
1/4	28	6 (8)	10 (14)	14 (19)
5/16	18	11 (15)	17 (23)	25 (35)
5/16	24	12 (16)	19 (26)	29 (40)
3/8	16	20 (27)	30 (40)	45 (62)
3/8	24	23 (32)	35 (48)	50 (69)
7/16	14	30 (40)	50 (69)	70 (97)
7/16	20	35 (48)	55 (76)	80 (110)
1/2	13	50 (69)	75 (104)	110 (152)
1/2	20	55 (76)	90 (124)	120 (166)
ft-lb X 1.356 = Nm Nm X.7376 = ft-lb				

GASOLINE INFORMATION

GASOLINE VOLATILITY

One of the misunderstood properties of gasoline is its volatility, or ability to vaporize at different ambient temperatures and altitudes during the year.

When gasoline is blended, it is given a Reid Vapor Pressure (RVP) number which reflects its ability to vaporize or mix with air at a given temperature range. Gasoline vapor pressure is measured by putting a sample of fuel inside a closed container and applying a specified amount of heat to the container for a certain amount of time. RVP will vary from about 7.0 PSI during the summer to approximately 13.5 PSI during the colder months. Service stations selling a large volume of fuel will normally have the correct blend to work well at all times throughout the year in their local area.

When the weather is very cold, gasoline must be able to vaporize very quickly in order for an engine to start and warm up properly. If summer blend fuel is being used in the winter, little or no vaporization will occur. Droplets will form causing flooding and very hard starting.

If winter blend fuel is being used during the summer months, it may cause vapor lock (boiling fuel) inside the fuel lines, fuel pump, or carburetor. This will cause warm engine drive ability problems and hard starting when warm. Some states are limiting the Reid Vapor number to 9.0 PSI year around to help meet evaporative emissions standards.

Gasoline Volatility

MAXIMUM REID VAPOR		AMBIENT AIR TEMP RANGE	
CLASS	PRESSURE	LOW	HIGH
A	7.0 psi (0.5 bar)	60_F (16_C)	110F+ (43_C+)
B	9.0 psi (0.6 bar)	50_F (10_C)	110F (43_C)
C	10.5psi (0.7 bar)	40_F (4_C)	97F (36_C)
D	12.0psi (0.8 bar)	30_F (-1_C)	85F (29_C)
E	13.5psi (0.9 bar)	20_F (-7_C)	69F (21_C)
Add 2.45_F for each 1000 ft (305m) above sea level			

CHAPTER 3
Maintenance

MAINTENANCE PROGRAM

Break-In Period Maintenance Interval

The first 500 miles (800 km) of use is considered the break-in period for FS and FST snowmobiles. At the 500 mile (800 km) mark, follow the recommended Break-In Period Maintenance Table.

500 Mile (800km) Break-In Period Maintenance Table

ITEM	INSTRUCTIONS
Field Updates	Reference any and all published Technical Service Bulletins, Team Tips, service literature, or product group literature.
Engine Oil / Filter	Replace the engine oil and filter cartridge. See "Engine Oil and Filter Change Procedure" on page 3.5.
Alternator / Alternator Belt	Inspect and check belt tension. Adjust belt if required. See "Alternator Belt Inspection / Adjustment" on page 3.9.
FST Air Filter	Inspect filter for contamination. Replace as required. (Do not wash filter.) See "FST Air Filter" on page 3.9.
Airbox Breather Foam	Inspect breather foam and clean if saturated with oil. Always clean after tipping snowmobile3 times on to left side. See "Airbox Oil Breather Foam Element" on page 3.7.
Cooling System	Verify coolant fluid level in system and recovery bottle. Re-fill as required. Verify cooling system is purged of air. See "Adding Engine Coolant / Air Bleed" on page 3.12.
Chaincase Drive Chain	Adjust chain deflection. Replace chaincase gear fluid. See "Chaincase Chain Tension" on page 3.14.
Chaincase Oil Level	Change chaincase oil. See "Chaincase Oil Level" on page 3.17.
PVT System	Check, and adjust if required, belt deflection, belt-to-sheave clearance. Inspect belt for abnormal wear.

500 Mile (800km) Break-In Period Maintenance Table

ITEM	INSTRUCTIONS
Air Intake System	Check all air intake hoses and clamps.
FST Reference Hose System	Check the hoses that route between the: -Intake Air Pressure / Temp. Sensor-to-Tee Fitting -Tee Fitting-to-Fuel Pressure Regulator -Tee Fitting-to-Purge "Dump" Valve -Wastegate Solenoid-to-Turbo Compressor Housing -Wastegate Solenoid-to-Wastegate Actuator
Chassis / Suspension	Check chassis components for damage, loose fasteners. Check suspension fasteners. Grease rear suspension pivot points / grease zerks.

Maintenance Program

To ensure many trouble-free miles of snowmobiling enjoyment, follow recommended regular maintenance and service checks outlined in this manual. All necessary replacement parts and labor incurred, with the exception of authorized warranty repairs, become the responsibility of the registered owner. If, during the course of the warranty period, part failures occur as a result of owner neglect in performing recommended regular maintenance, the cost of repairs are the responsibility of the owner.

Personal safety is critical when attempting to service or adjust your snowmobile. If you're not familiar with safe service or adjustment procedures and the use of tools, or if you don't feel comfortable performing these tasks yourself, contact an authorized Polaris dealer for service.

The following chart is a guide based on average riding conditions. You may need to increase frequency based on riding conditions. When inspection reveals the need for replacement parts, always use genuine Polaris parts, available from your Polaris dealer.

Maintenance Intervals

●= Perform Service ■= Replace		Daily / Pre-Ride	Yearly or Every mi (km)
Item	**Instructions**		**1500 (2400)**
Ignition Start/Stop Switch	Test for proper operation.	✔	
Throttle Safety Switch Safety Slap Switch		✔	
Lights (Headlights, Taillights, Brake Light)	Test for proper operation, replace bulb(s) as needed.	✔	
Skags (Wear Bars)	Inspect for wear or damage, replace when worn.	✔	✔
Fluid Leaks	Inspect for fluid leaks.	✔	
Parking Brake	Test for proper engagement and release.	✔	
Brake Lever	Check lever travel and lever “feel”	✔	
Coolant	Inspect level, add as needed.	✔	
Brake Fluid	Inspect fluid level add as needed.	✔	■ Every 2000(3200km)
Hood Latches	Secure properly, replace if damaged.	✔	
Seat latches	Secure properly, replace if damaged.	✔	
Rail Slides	Inspect for wear or damage, replace when worn.	✔	
Foam Oil Breather Element	Check pre-ride, clean or replace with each oil change. Clean after tipping 3 times onto left side	✔	●
Front/Rear Suspension and Steering Fasteners	Inspect for missing or loose bolts and fasteners, tighten or replace as needed	Weekly/Before Long Trips	
Front Limiter Strap	Inspect for wear, damage and missing or loose fasteners, replace as needed	Weekly/Before Long Trips	
Oil Lines	Inspect, replace if worn or damaged		●
Alternator Belt	Check tension and condition, replace if worn or damaged		●
Coolant Hoses	Inspect, replace if worn or damaged		●
Heat Exchangers	Inspect, replace if damaged		●
Throttle Lever	Inspect, replace if worn or damaged		●
Fuel Lines	Inspect, replace if worn or damaged		●
Battery	Clean terminals, test voltage		●
Track Alignment	Verify alignment, adjust as needed		●
Track Tension	Verify tension, adjust as needed		●
Handlebars	Verify alignment, adjust as needed		●
Drive Chain	Verify tension, adjust as needed		
Rear Track Shock (M-10)	Inspect covers and caps for wear of damage, replace as needed		●
Gearcase Oil	Check at 500 mi (800km), change every 1000 mi (1600km)		Every 1000(1600)
Rear Suspension	Lubricate pivot shafts (more often in wet snow conditions)		●

Maintenance Intervals

●= Perform Service ■= Replace		Daily / Pre-Ride	Yearly or Every mi (km)
Item	**Instructions**		**1500 (2400)**
Bearings	Lubricate drive shaft and jackshaft bearings.		●
Throttle Cable	Lubricate		●
Clutches	Verify offset alignment, inspect for wear, residue, loose bushings, see your dealer for all service.		●
Drive Belt	Check tension and condition, replace if worn or damaged.		●
FST Air Filter	Inspect for oil and dirt, replace as needed.		●
Oil/Filter Change	Replace oil and filter.		■
Engine Mounts	Inspect, replace if worn or damaged.		●
Spark Plugs	Inspect condition, replace as needed.		●
Exhaust System	Check muffler and pipe condition, replace damaged or missing components, clean plastic surfaces.		●
Hoses	Inspect for wear, damage and proper routing replace as needed.		●
Brake Pads/Disc	Inspect, replace if worn or damaged.		●
Fuel Vent Lines	Inspect, replace if worn or damaged.		●
Ski Toe	Verify alignment.		●
Cooling Fins/Shroud	Inspect and clean.		●
Valve Lash	Adjust as needed.		Initially: 1,500 (2400) After initial service: 10,000 (16,000)
Cooling System	Bleed the cooling system, inspect for leaks and proper circulation.		Every 2000 (3200)
Fuel Filter	Inspect, replace as needed.		Every 2000 (3200)
Suspension Shock Oil	Inspect, replace or rebuild as needed or every 2000 miles (3200km).		Every 2000 (3200)

ENGINE OIL MAINTENANCE

Engine Oil Level Check

NOTE: The following procedure must be performed when the engine coolant temperature is between 145° and 160° F (63° - 71°C). Failure to verify engine oil level between these temperatures will yield false oil level readings.

⚠ CAUTION

Severe engine damage may occur if the procedure for checking the oil level is not followed precisely.

Always verify the oil level with the snowmobile on a flat, level surface. Always check the oil level when the engine coolant temperature is within the specified range.

⚠ WARNING

Never attempt to verify the oil level inside the storage tank immediately after operating the snowmobile at a high rate of speed for an extended period of time OR if the nose of the snowmobile is pointed downwards.

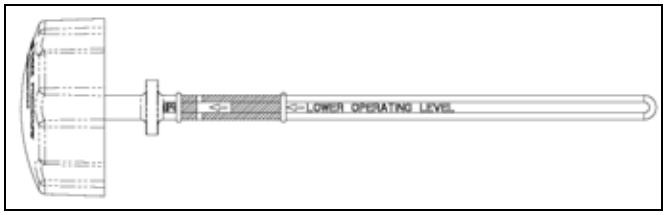
Always close the engine compartment doors and hood while the engine is running.

Always run the engine outside or in an open environment with plenty of fresh air.

1. To verify there is oil in the storage tank, position the snowmobile on a flat, level surface. Start the engine and let run for no more than 5 seconds. Turn off the engine.
2. Verify there is engine oil on the dipstick. If low, add just enough oil so that oil can be seen on the dipstick.
3. If the engine is cold (engine temperature is not between 145° and 160°F), start the engine and allow it to idle until the engine coolant temperature reaches the specified range. Proceed with step 4.
4. If the engine has been running, stop the engine and verify the engine coolant temperature is within the specified range. Allow the engine to cool if required. Once the coolant temperature is within the specified range, re-start the engine and let it run for no more than 20 seconds to circulate the oil from the engine back into the storage tank.
5. Turn the engine off.
6. Remove and clean the dipstick. Re-insert the dipstick completely.
7. Quickly remove dipstick again to verify the oil level.

NOTE: The oil level inside the storage tank will only be accurate for approximately 3 minutes after stopping the engine. After 3 minutes, re-start the engine and let idle for 20 seconds to re-fill the storage tank.

8. Maintain the oil level in the "SAFE" operating range located between the upper and lower marks on the dipstick. If the level is low, add oil in 2 oz. increments and re-check the level.



9. If the oil level is high. the excess oil MUST be removed from the storage tank. Again, remove excess oil from the tank in 2 oz. increments.

⚠ CAUTION

Never overfill the oil storage tank. Severe engine damage, airbox / EMS sensor damage, or poor engine performance may occur if the storage tank is overfilled.

Engine Oil and Filter Change Procedure

⚠ WARNING

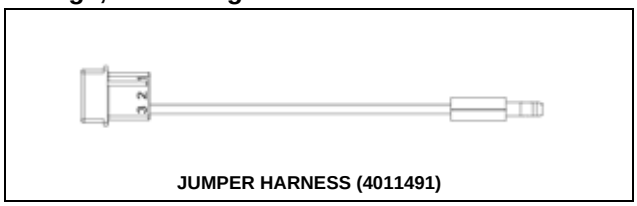
The following procedure involves working with and around hot oil, engine parts, and exhaust components which can cause serious burns if your skin or clothing comes into contact with them.

Never turnover the engine or run the engine without first closing the side panels and hood on the snowmobile.

Always run the engine outside or in an open environment with plenty of fresh air.

NOTE: A jumper harness, PN 4011491, is required to bypass the main relay system so the engine can be turned-over using the start key without starting the engine. The jumper is included with the oil change kit, PN 2875522. The kit includes the jumper, three

quarts of Polaris 0W-50 synthetic oil, one oil filter cartridge, and o ring.

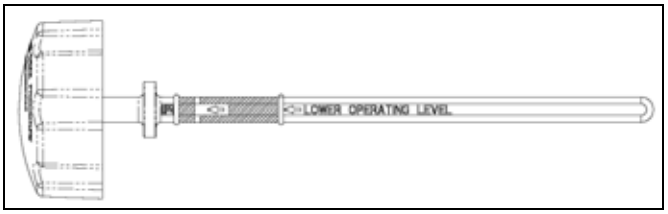


JUMPER HARNESS (4011491)

1. Position the snowmobile on a flat, level surface.
2. Verify the engine coolant temperature is between 145° and 160°F (63° - 71°C).

NOTE: The coolant temperature must be within the specified range prior to beginning the oil change procedure.

3. Verify the engine is off.
4. Open the hood, and remove the left-side panel.
5. Disconnect the starter motor solenoid control harness.
6. Insert the female WHT/RED plug into the male pin from the solenoid.
7. Insert the BROWN male pin from the jumper harness into the solenoid's female port.
8. Open the handlebar cover. Locate the connector with the BROWN and RED/WHITE wires connected to it.
9. Connect the plug from the jumper to the handlebar harness connector so that the BROWN wires match.
10. Open the fuse panel cover and remove the 20A EFI fuse from the fuse panel.
11. Reinstall the left-side compartment door panel.
12. Remove the oil return hose from the front of the oil storage tank.
13. Have an assistant, wearing eye protection and protective gloves, position the end of the hose into an oil collection container or oil pan.
14. Turn the start key to the "START" position and hold until the ECU switches the solenoid off.
15. Wait 30 seconds to allow the starter motor to cool down.
16. Repeat steps 14 and 15 four more times for a total of five cycles.
17. Reinstall the oil return hose and tighten the gear clamp. Verify the hose cannot be pulled off of the storage tank's nozzle, but do not overtighten the clamp.
18. Remove the jumper harness from the handlebar harness and starter solenoid plug.
19. Reconnect the starter solenoid plug to the solenoid. Reinstall the 20A EFI fuse, then install the cover.
20. REMOVE THE KEY FROM THE IGNITION SWITCH.
21. Open the air box by removing the top cover plate.
22. Locate the foam breather in the back of the airbox.
23. Clean the foam breather using a mixture of hot, soapy water and allow to air dry.
24. Locate the oil filter cover. Verify at least five minutes has passed since the engine has been turned over before removing filter cover.
25. Remove filter cover. Remove filter from inside of cover and inspect for signs of foreign material such as metal pieces.
26. Insert new filter element into cover.
27. Inspect oil filter cap o-ring. Replace o-ring if damaged.
28. Reinstall o-ring and torque cover to 17 ft.lbs. (23Nm).
29. Re-install the foam breather element (if dry) into the air box and secure air box cover.
30. Remove the oil storage tank dipstick and add two quarts of Polaris 0W-50 synthetic oil to the tank. Reinstall the dipstick.
31. Start the engine and run until the engine coolant temperature is between 145° and 160°F. Turn off the engine.
32. Remove the dipstick and clean with a shop rag. Reinstall the dipstick and screw in completely.
33. Remove the dipstick and observe the oil level. Add additional oil to bring the oil level up to the oil change fill mark. Reference the chart for the approximate amounts to add to the tank during this step. **DO NOT OVERFILL THE OIL STORAGE TANK**.

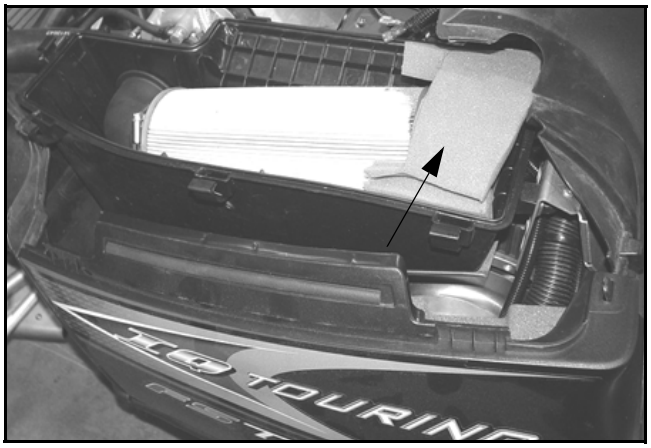


MODEL	OIL ADDED AT STEP 33
FS	4 - 6 OUNCES (118 - 473ML)
FST	24 - 32 OUNCES (710 - 946 ML)

34. Reinstall the dipstick and test drive the snowmobile.

Airbox Oil Breather Foam Element

The breather foam will soak up oil discharged by the ventilation cyclone.



Clean the element during each oil change and after the snowmobile has been tipped over on to its left-side three or more times.

> **⚠ CAUTION**
>
> Operating the snowmobile with a saturated breather element may cause severe engine damage and/or poor engine performance.
>
> Tipping the snowmobile over on to its left side or rolling the snowmobile over increases the amount of oil discharged by the ventilation system.

1. Open the hood, then open the air box cover.
2. Remove the breather foam and inspect for damage. Replace the element if damaged.
3. Clean the element in a mixture of hot water and dishwater soap. Once clean, air dry the element.
4. Reinstall the element when dry. Reinstall the airbox cover and fasten each retaining clip.

Spark Plug Servicing

Due to the location of several components, follow these steps to access the MAG-side ignition coil pack.

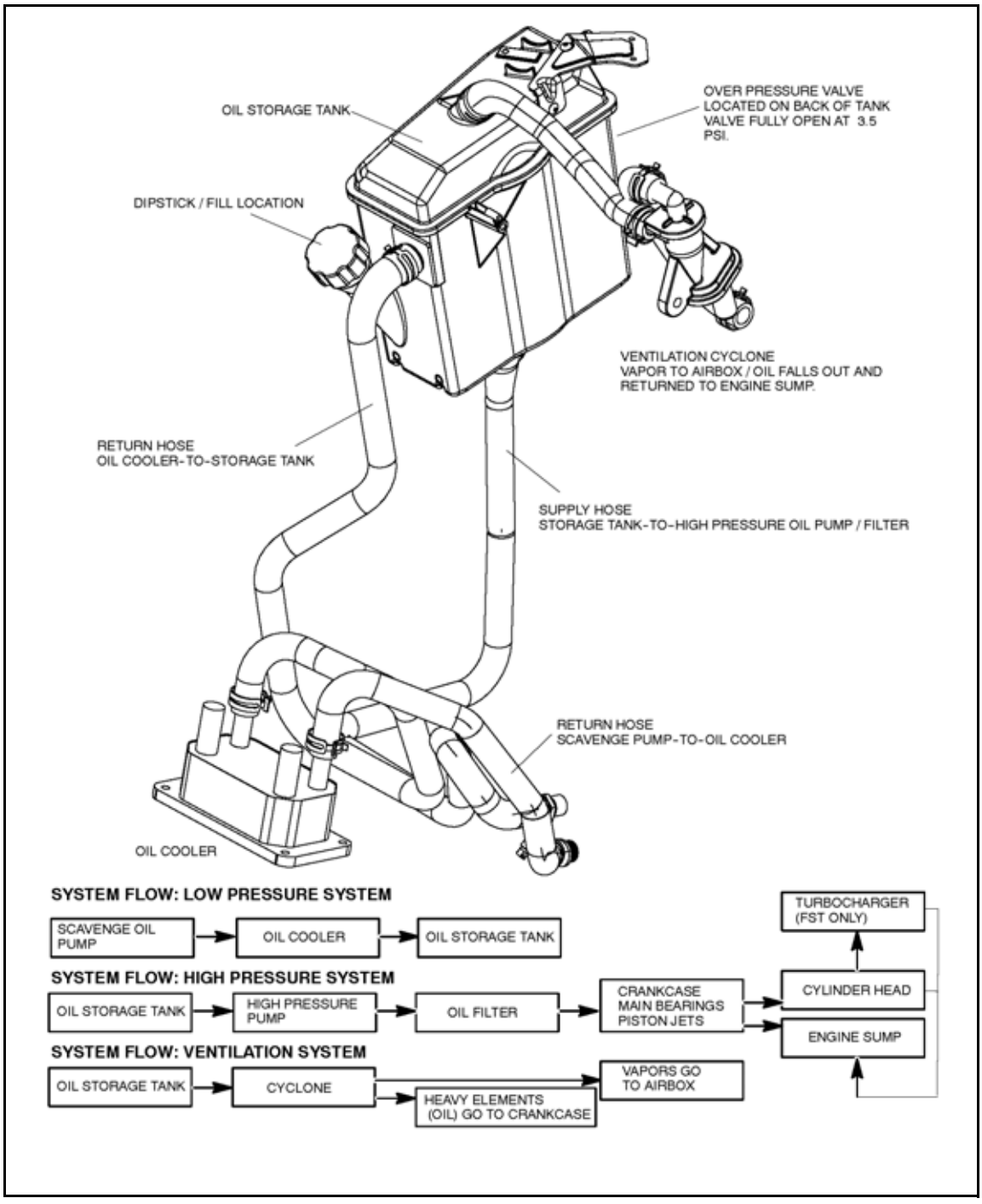
1. Remove the screw securing the filler neck to the oil storage tank.
2. Re-route the bleed hose so it is not between the fuel hoses.
3. Move the filler neck away from storage tank, then move bleed hose out of the way of the coil.
4. Lift the cooling hose to access the ignition coil pack.
5. Torque spark plug to 18 - 20 Ft.Lbs. (24 - 27 Nm). Torque the coil pack fasteners to 7 Ft.Lbs. (10 Nm).
6. Return bleed hose to original position. Do not over-tighten the filler neck-to-storage tank fastener.

Engine Lubrication System Overview

There are two lubrication systems; low and high pressure.

The low pressure lubrication system consists of the engine sump scavenge pump, oil cooler, and storage tank. The high pressure lubrication system consists of the storage tank, high pressure oil pump, oil filter, main - counter balancer - piston jets, cylinder head oil supply and turbocharger oil supply on FST models.

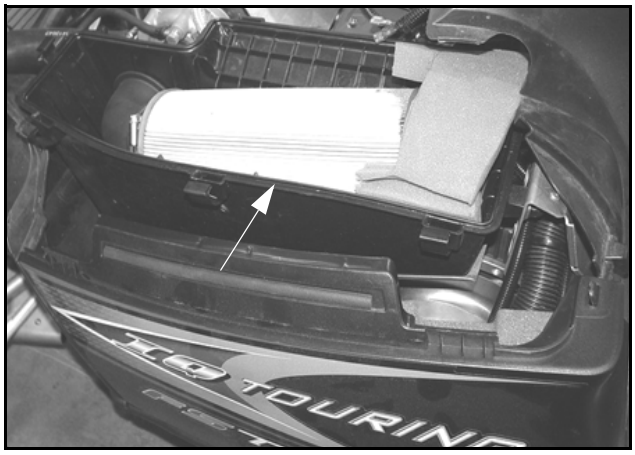
A crankcase ventilation system is used to return unburned fuel vapors present in the oil storage tank to the air intake system as well as oil mist back into the engine sump.



ENGINE MAINTENANCE

FST Air Filter

FST models feature an air filter element to protect the turbocharger compressor. Replace the air filter if damaged, dirty or saturated with engine oil.

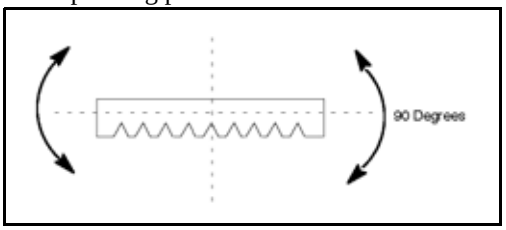


NOTE: Do not clean the air filter cartridge.

Alternator Belt Inspection / Adjustment

The alternator belt deflection must be maintained to ensure trouble-free operation.

1. Inspect the alternator belt deflection by rotating the belt as far as possible. The correct amount of deflection is achieved when the belt can only be twisted 90 degrees from its operating postion.



2. Adjust the belt deflection by loosening the upper and lower alternator fasteners.
3. Insert a large pry bar between the crankcase and alternator and pull firmly.
4. Twist the belt while pulling back on the pry bar.
5. Have an assistant tighten the two alternator fasteners once the correct belt deflection is achieved.

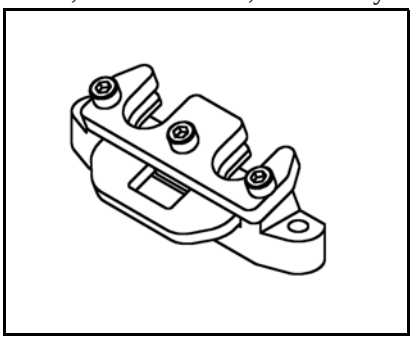
Valve Lash Adjustment

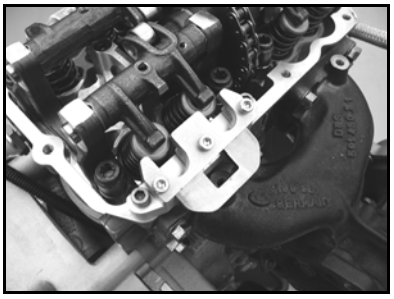
1. Open the hood and remove the left-side door panel.
2. Remove the key from the ignition switch.
3. Remove the airbox / clutch guard from the engine compartment.
4. Remove the console assembly.
5. Remove the seat assembly to gain access to the fuel tank.
6. Remove the fasteners securing the fuel tank to the tunnel.
7. Cover the supply and return fuel hose connectors with a clean shop rag. Disconnect the fuel hoses from the fuel pump flange.
8. Disconnect the fuel pump wiring harness.
9. Remove the fuel tank from the snowmobile.
10. Remove the wiring harness connectors from the ignition coils and cam phase sensor. Verify each connector is labeled with its position. Label connector for re-assembly if required.
11. Remove the air intake tube (FST models) that is routed over the top of the valve cover.
12. Remove the ignition coils, then remove the valve cover.
13. Rotate the drive clutch in the direction of forward vehicle operation until the rocker arms on the PTO-side of the engine are at TDC-compression stroke. The TDC-compression stroke can be identified when the rockers arms are loose and not contacting the camshaft lobes.
14. Insert a feeler gauge between the valve shim and rocker arm tappet at each valve location. Write-down each measurement.
15. Compare each measurement to the specification.
16. If the valve shim clearance is within specification, no change is required. If the clearance is outside the specification, the valve shim must be replaced with one that will satisfy the specification.

Valve Clearance

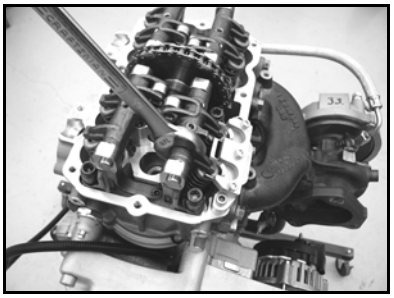
ENGINE / VALVES	SPECIFICATION
NA	
Intake	.08 -.15mm (.003″ -.006″)
Exhaust	.15 -.22mm (.006″ -.008″)
Turbo	
Intake	.08 -.15mm (.003″ -.006″)
Exhaust	.18 -.25mm (.007″ -.009″)

17. To remove each valve shim, install the valve shim guillotine tool, PN: PW-47163, on to the cylinder head.





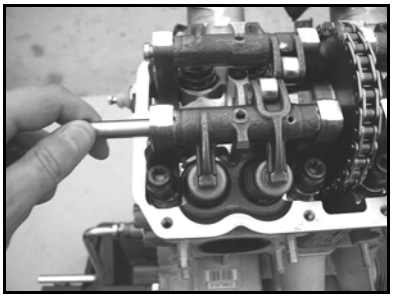
18. Insert the open-end of a 18mm wrench around one of the rocker arms. Gently compress the rocker arm and push the valves downwards.



NOTE: Do not compress the valves into the piston face. Do not dis-lodge the valve stem keys.

19. Engage the guillotines over the valve assemblies. Remove the wrench.

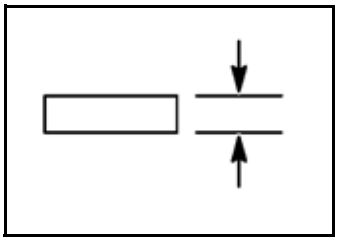
20. Extract each shim with a pick, or remove the rocker arm axle, then rocker arm, and then the shim.



⚠ CAUTION

DO NOT DROP SHIMS INTO ENGINE.

21. Measure the thickness of each shim removed from the engine and note next to the corresponding valve clearance measured in previous steps.



22. Select a new valve shim, thicker or thinner, from the table that will bring the measured valve clearance back into specification.

Valve Shims

SHIM THICKNESS (MM)	PART NUMBER
2.50	0452014
2.55	0452015
2.60	0452016
2.65	0452017
2.70	0452018
2.75	0452019
2.80	0452020
2.85	0452021
2.90	0452022
2.95	0452000
3.00	0452001
3.05	0452023
3.10	0452002
3.15	0452003
3.20	0452004
3.25	0452005
3.30	0452024
3.35	0452006
3.40	0452007
3.45	0452008
3.50	0452009
3.55	0452010
3.60	0452011
3.65	0452012
3.70	0452013

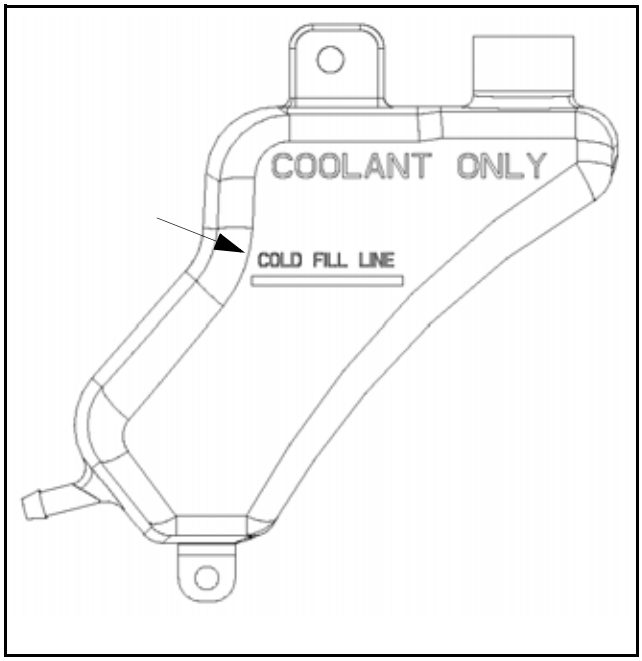
23. After completing the valve lash adjustment on the PTO cylinder valve train, remove the valve lash adjustment tool from the cylinder head.
24. Rotate the drive clutch in the direction of normal rotation until the MAG piston is at TDC-compression stroke.
25. Perform the valve adjustment procedure on the MAG cylinder valve train.
26. When completed, re-install the valve cover. Verify the rocker arm retaining tabs inside the valve cover are seated. Tighten the valve cover fasteners to 7 ft.lbs. (10 Nm).
27. Re-install the ignition coils and torque fasteners to 7 ft.lbs. (10 Nm).

COOLING SYSTEM MAINTENANCE

Expansion Tank

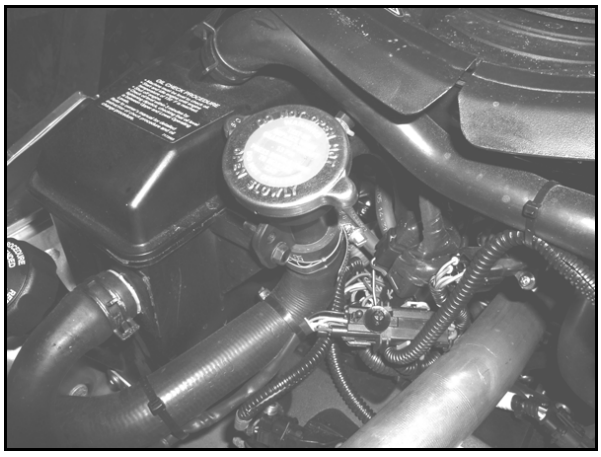
When the engine is cold, the coolant level should be at the COLD FILL LINE. Only add or remove coolant from the system when the engine is cold.

NOTE: Do not overfill the expansion tank. Coolant inside the tank will rise as engine temperature increases.

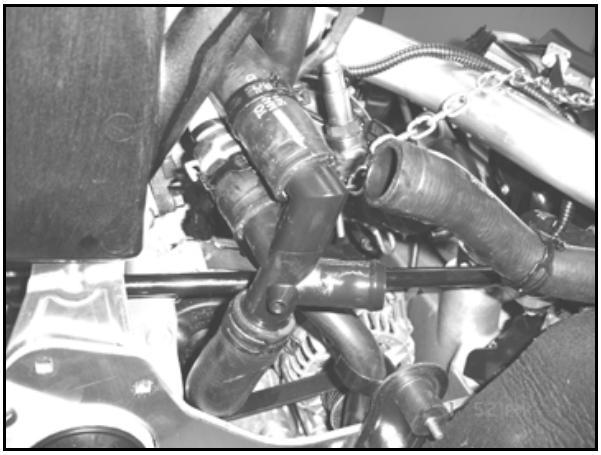


Engine Coolant Removal

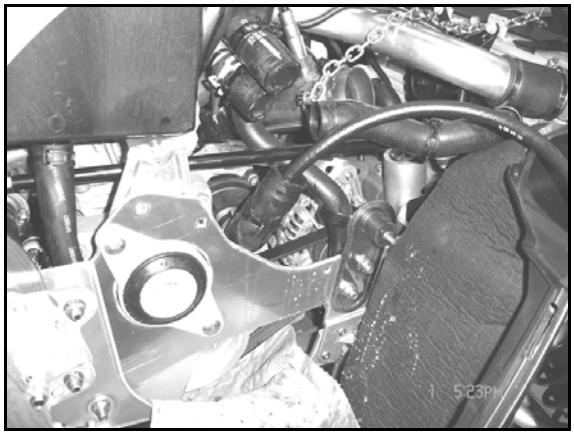
1. To drain the cooling system, place towels or floor dry underneath the snowmobile.
2. Using a siphon, remove as much coolant as possible from the filler cap location.



3. Remove the hose connecting the main tee to the radiator. Pour as much coolant out as possible into a container.



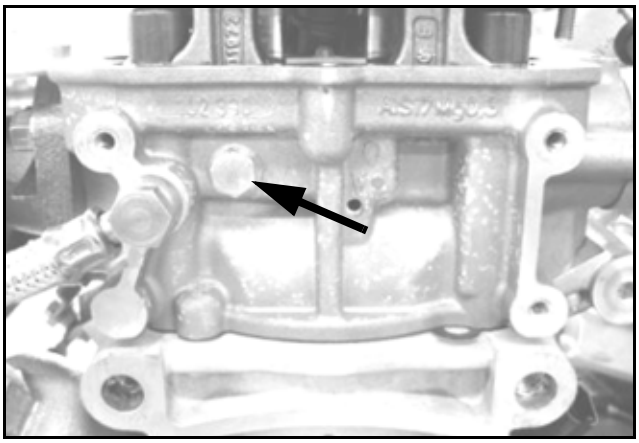
4. Insert the siphon into the tee fitting and into the hose connected to the water pump. Remove the rest of the coolant.



Adding Engine Coolant / Air Bleed

NOTE: When adding coolant after the engine has been drained or when pockets of air within the system are suspected, the air must be removed to prevent serious engine damage.

1. Verify all of the cooling hoses are secured to each fitting with a clamp.
2. Fill the system at the main filler neck with a 60%Propolyne Glycol / 40% distilled water mixture, Polaris PN 2871323.
3. Add coolant to bring the level up to the fill tube opening.
4. Remove the clutch guard / air intake assembly and set aside. Close the engine compartment door.
5. Safely raise the front of the snowmobile using a floor jack or snowmobile lift until the skis are off the ground.
6. Locate the air bleed screw on the PTO-side of the cylinder head. Place a towel or shop rag underneath the screw.

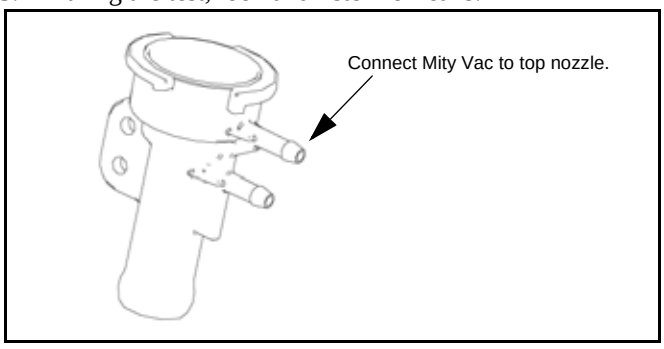


7. Open the screw just enough to allow air and coolant to escape.
8. Start the engine.
9. Run the engine until the temperature displayed on the gauge is at or above 180°F (82°C). Continue running the engine.
10. Monitor the air bleed screw. Close the screw when a steady stream of coolant flows out of the hole.
11. Verify the heat exchanges are warm to the touch.
12. Turn off the engine.
13. Top-off the main fill tube, then replace the cap.
14. Allow the engine to cool completely.
15. Reinstall the clutch guard / air intake.
16. Add coolant to the expansion tank to bring the fluid level up to the COLD FILL LINE.

Cooling System Pressure Test

To test the pressure-holding capability and to check for system leaks, perform a pressure test.

1. Remove the filler neck-to-expansion tank hose from the filler neck (top hose).
2. Connect a Mity Vac hand pump to the filler neck nozzle.
3. Pressurize the cooling system to 14 psi (1 bar).
4. The cooling system should hold the pressure for at least 5 minutes.
5. During the test, look and listen for leaks.

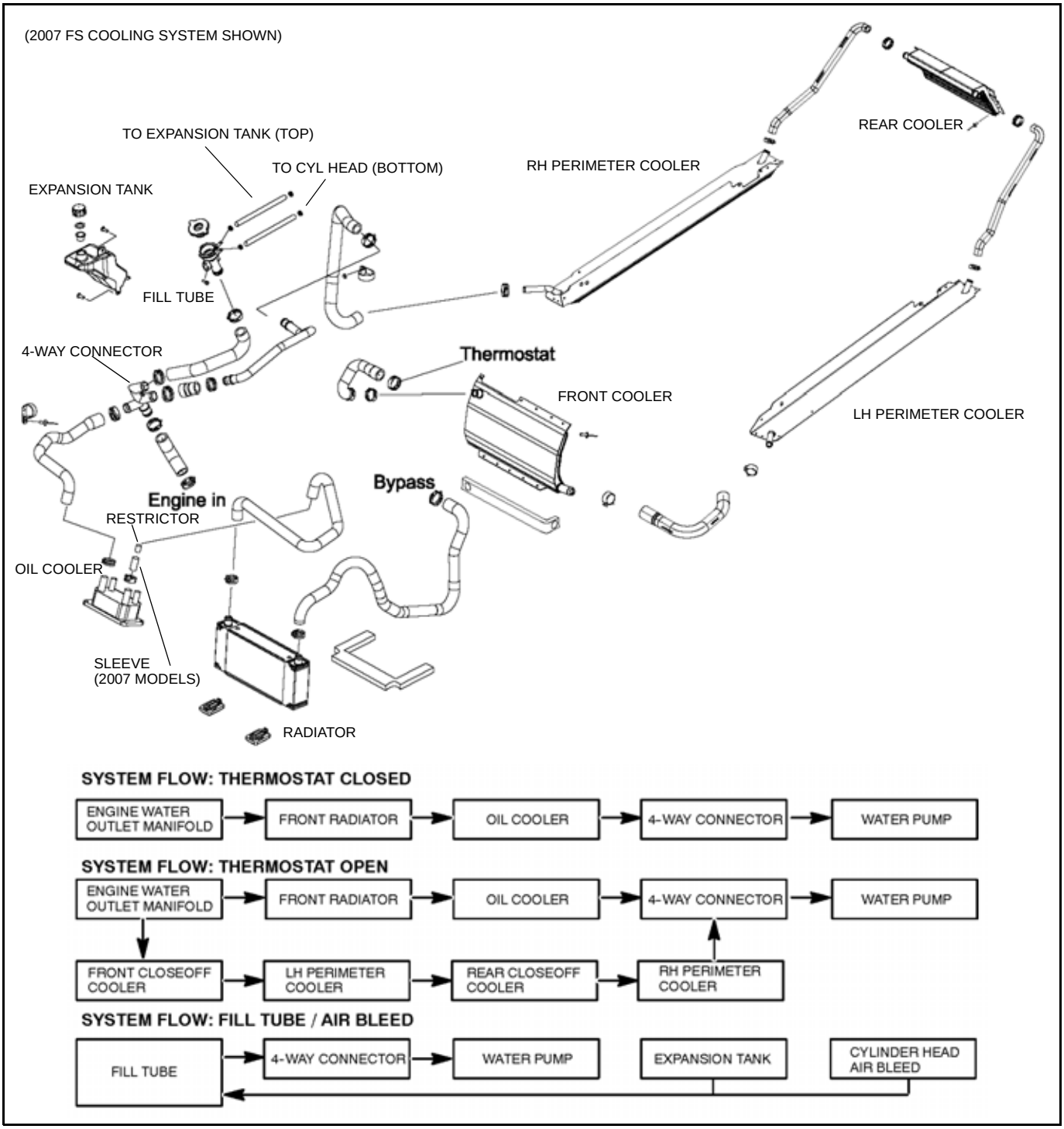


Engine Cooling System Overview

The engine cooling system consists of the following components:

- Water Pump
- Water Inlet / Outlet Manifolds
- Thermostat
- Front Tunnel, Left and Right-Hand Perimeter and Rear Tunnel Cooling Extrusions
- Front Radiator
- Expansion Tank / Coolant Fill Tube

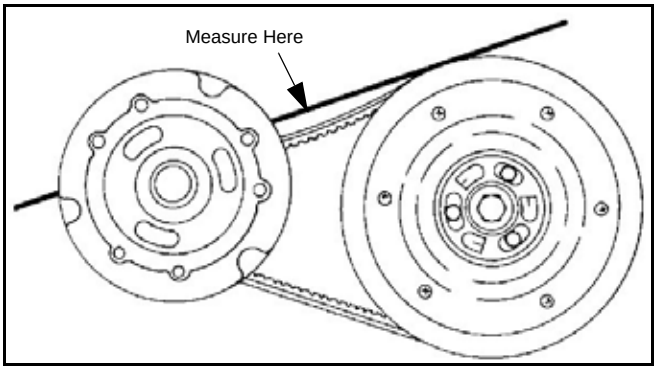
The cooling system is filled via the designated main fill tube, not the expansion tank.



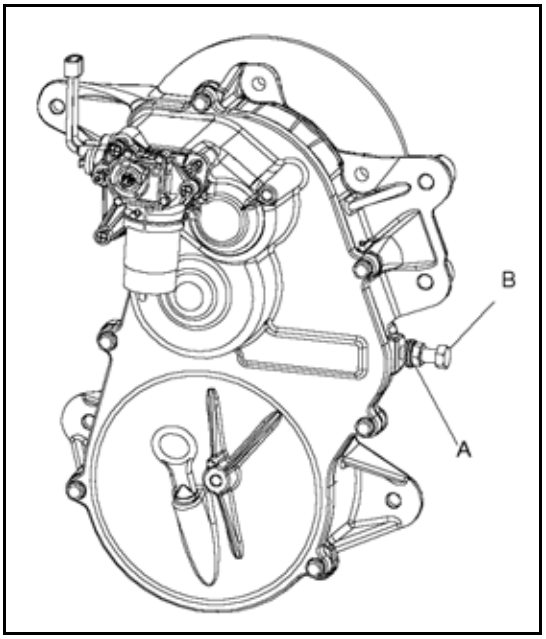
PVT / DRIVE SYSTEM MAINTENANCE

Drive Belt Deflection

1. Measure the belt deflection with both clutches in their full neutral position.
2. Place a straight-edge across the clutches, and on top the belt.
3. Pull the belt down and measure the distance between the straight-edge and top of belt.
4. The measurement should be no more than 1 1/4" (3.2cm).



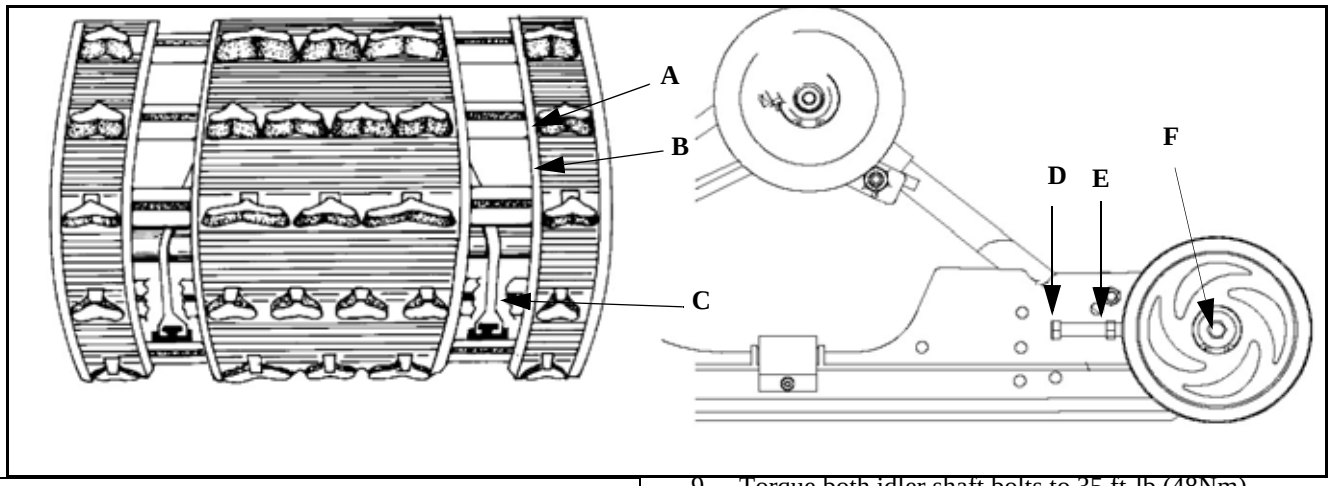
Chaincase Chain Tension



1. Elevate the rear of the machine so that the track is off the floor.
2. Rotate the driven clutch counter-clockwise to move all the chain slack to the tensioner side.
3. Lock the parking brake while holding the driven clutch stationary.
4. Loosen the adjuster bolt jam nut (A)
5. Finger tighten the adjuster bolt (B).
6. Back off the adjuster bolt 1/4 turn out (counterclockwise).
7. Tighten the jam nut while holding the adjuster bolt.
8. Release parking brake.

NOTE: It may be necessary to remove the exhaust pipe and resonator to access the tensioner bolt.

Track Alignment



WARNING

Broken track rods can cause a rotating track to come off the machine. Never operate or rotate a damaged track under power with a broken rod. Serious injury or death may occur.

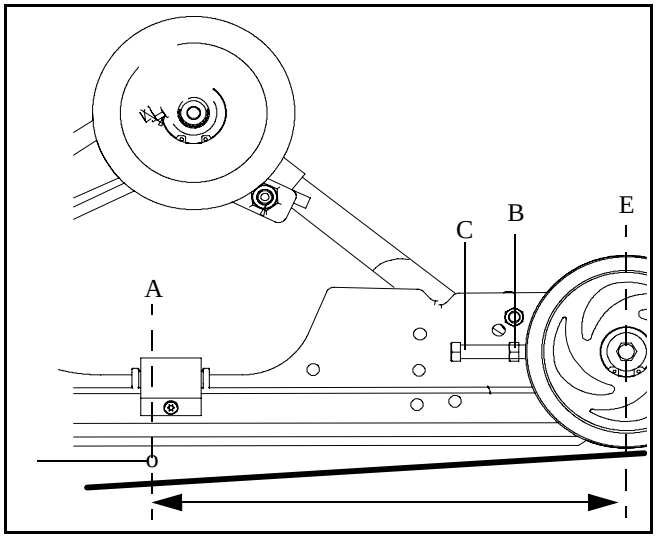
WARNING

When performing the following checks and adjustments, stay clear of all moving parts to avoid personal injury. Never make any adjustments with the engine running, as serious personal injury can result.

NOTE: ***Track alignment affects track tension. Misalignment of the track will cause excessive wear to the track, rail slides, and rail.***

1. Using a track stand or similar device, lift and support the rear of the snowmobile off the ground.
2. Inspect the lugs and rods for damage. If any damage is found, the track should be replaced.
3. Start the engine. Apply just enough throttle to slowly rotate the track at least five complete revolutions.
4. Stop the engine.
5. Verify the rails are centered within each track window.
6. To adjust the track, loosen the rear idler wheel shaft fasteners.
7. If the track runs to the left, loosen the left locknut and tighten the left adjusting bolt (D). If the track runs to the right, loosen the right locknut and tighten the right adjusting bolt. It may be necessary to check this with the engine rotating the track. ALWAYS SHUT THE MACNINE OFF before making any adjustments.
8. After any adjustments are complete, torque the locknuts to 35 ft-lb (48Nm).
9. Torque both idler shaft bolts to 35 ft-lb (48Nm).

Track Tension



Track Tension Data

SUSPENSION	Measurement
IQ 144″ / 155″	3/8″ - 1/2″ (1 - 1.3cm)
IQ 121″	7/8″ - 1 1/8″ (2.2 - 2.9cm)
M-10 128″	
M-10 136″	

1. Using a track stand or similar device, lift and support the rear of the snowmobile off the ground.
2. Place a 10 lb. (4.54kg) weight at point (A). Point (A) is 16” (41cm) ahead of the rear idler shaft (E).
3. Measure the distance (D) between the rail slider and the track. This measurement should fall with in the measurement range for the appropriate vehicle.
4. If adjustment is needed, loosen up the lock nuts (B) on each side.
5. Loosen he idler shaft bolts (F).
6. Turn each adjuster bolt (C) toward the idler wheel (clockwise) if you need less of a measurement. Tun the adjuster bolt (C) toward the front of the sled (counterclockwise) if you need a greater measurement.

When you achieve the correct tension listed below, torque the lock nuts (B) and idler shaft bolts on each side to 35 ft-lb (48Nm).

Track Lubrication

⚠ WARNING

Operating with insufficient lubrication between the rail slide and track guide clips can cause track failure, loss of vehicle control and loss of braking ability, which can result in serious injury or death. Avoid operating vehicle on ice and other surfaces that have little or no snow conditions.

The slide rails need snow for lubrication and cooling. Excessive wear indicates insufficient lubrication. A new rail slide can cause faster heat build-up in limited lubrication, resulting in excessive wear.

CHASSIS LUBRICATION

Lubrication Points

NOTE: A grease gun kit (PN 2871312) comes with grease and adapters to lubricate all the fittings needed to service Polaris snowmobiles.

Lubricate the following fittings with Polaris Premium All Season grease every 1000 miles (1600 km) and before summer storage. When applying grease to these points, free up all the weight form the component being greased to permit better penetration.

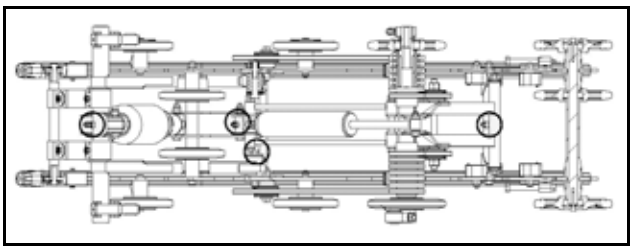
- Rear Suspension Pivot Shafts
- Driveshaft Retainer Flange

Driveshaft Bearing

1. Apply a few pumps of grease into the grease zerk on the clutch-side driveshaft bearing retainer flange. Clean up any residual grease on the fitting.

Rear Suspension

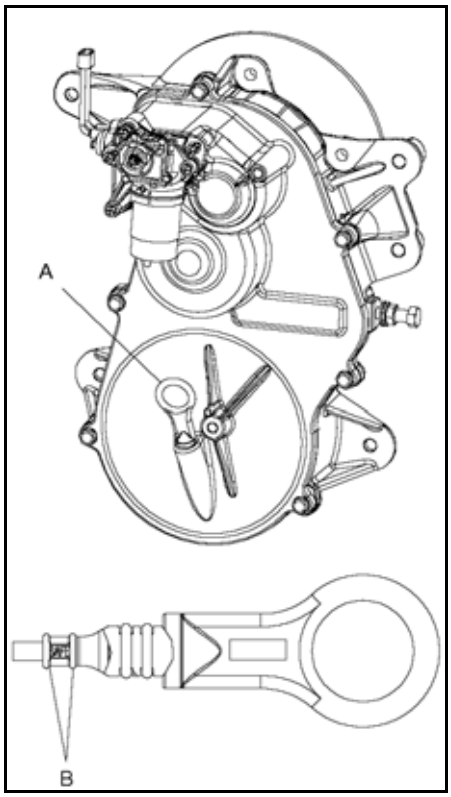
To maintain rider comfort and to reduce pivot shaft wear, grease the suspension pivot shafts at 500 mile (800 km) intervals, and before summer storage.



Chaincase Oil Level

The drive chain is continuously immersed in the chaincase oil. To get an accurate level reading the machine must be placed on a level surface.

Remove the chaincase dipstick (A) to verify oil level.



⚠ CAUTION

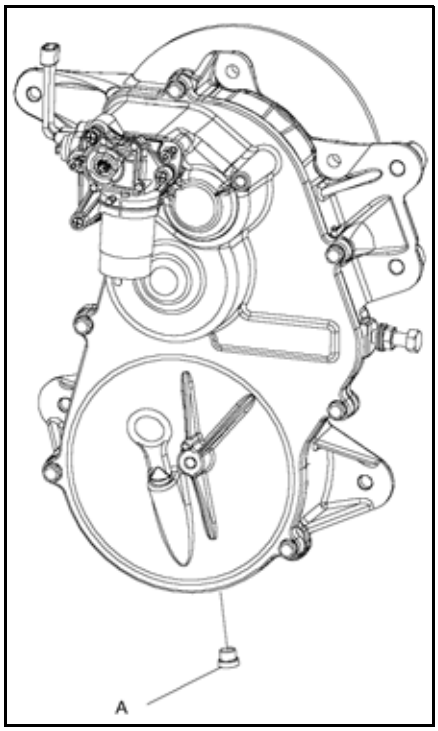
Do not mix or use improper types of lubricants in the chaincase. Excessive wear to chain, sprockets and bearings may result.

Verify the oil level is between the “SAFE” markings. To add fluid to this style chaincase you can add it through the dipstick hole.

The dip stick has magnetic tip that attracts metal shavings in the oil. The magnetic tip should be cleaned every time the fluid level is checked. It is common to see shavings during chaincase break-in or when new components are installed.

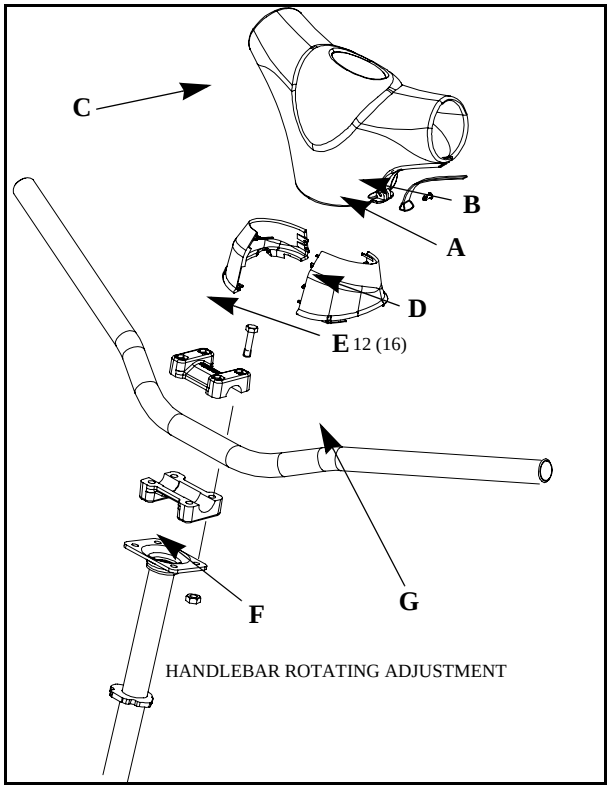
Chaincase Drain Plug

A drain plug (A) is located on the bottom of the chaincase. Securely tighten the plug when re-installing, but do not overtighten and strip the screw threads.



ADJUSTMENT

Handlebar Adjustment



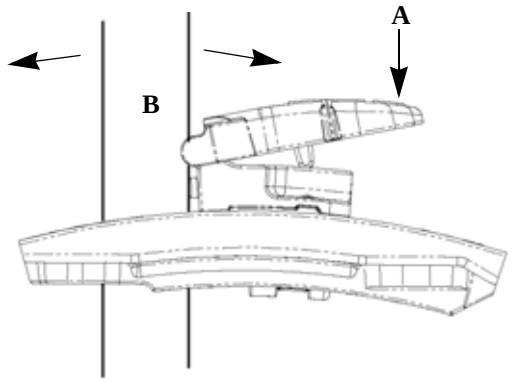
HANDLEBAR ROTATING ADJUSTMENT

⚠ WARNING

Improper adjustment of the handlebars, or incorrect torquing of the of the adjuster block can cause limited steering or loosening of the handlebars resulting in a loss of control situation.

1. Remove the handle bar cover slides (A) and then the dart clips (B) that holds on the handle bar cover (C).
2. Remove the handle bar cover.
3. Remove the console covers (D) if equipped.
4. Loosen the handle bar block bolts (E) and nuts (F).
5. Rotate the handle bar (G) in the desired position.
6. While holding the handlebar in the desired position tighten the handle bar block bolts and torque to 12 ft-lb (16Nm) starting with the front bolts.
7. Replace the console covers (if equipped), handle bar cover, handle bar cover slides, and dart clips.

Rider Select Adjustment



IQ RIDING ADJUSTMENT

WARNING

Do not attempt to adjust the riding position while vehicle is in motion. Loss of steering may result in personal injury or death.

1. While sitting in the riding position on the vehicle, press down on the lever (A).
2. Adjust the handle bar (B) position to the desired position and let go of the steering lever.
3. Push handle bars forward and then pull backward on them to verify that the position is locked.

Throttle Lever Freeplay

The throttle cable features an in-line adjuster. The adjuster controls the amount of throttle lever free play.

Throttle lever free play must be set so that the engine idle speed remains constant (does not rise) when the handlebars are set in any Rider Select-position and turned to the full-right or full-left positions.

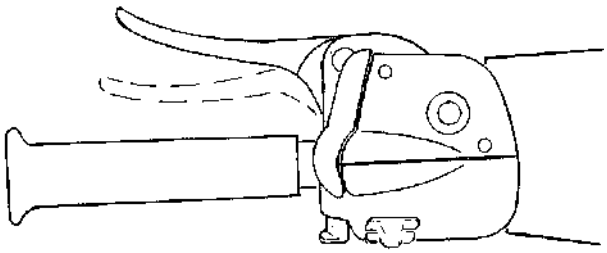
Increase free play by turning the inline adjuster clockwise (inwards). Decrease free play by turning the inline adjuster counter-clockwise (outwards).

NOTE: The inline throttle cable adjuster is not intended to adjust the throttle body TPS and baseline settings.

CAUTION

Always verify the engine idle speed after setting the inline throttle cable adjuster. Verify the engine idle speed does not increase when the handlebars are turned left-to-right in any Rider Select position.

Brake Lever



The brake lever travel should have a clearance no less than 1/2" (1.27cm) from the handlebar grip. Inspection should be made with the lever firmly depressed. If the lever has less than this amount you may need to bleed the brake system.

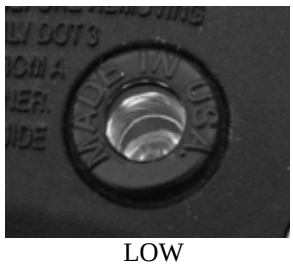
Brake Fluid

WARNING

Do not over fill the master cylinder. Fluid expansion could cause brakes to lock, resulting in serious injury or death. Once a bottle of brake fluid is opened, use what is necessary and discard the rest. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture from the air. This causes the boiling temperature of the brake fluid to drop, leading to early brake fade and the possibility of serious injury

Inspect the reservoir to be sure it contains the correct amount of fluid. Use only Polaris DOT 4 high temperature brake fluid. Change fluid every 2 years or whenever the fluid is dark or contamination is suspected.

NOTE: A low brake fluid level can be indicated through the sight glass on the cover. If the fluid is low this sight glass will glow a brighter. color.



LOW

FULL

Brake Fluid Bleeding See "BRAKE FLUID REPLACEMENT & BLEEDING" on page 7.10.

OFF SEASON STORAGE

Storage Procedures

The following table outlines specific maintenance procedures that must be performed prior to “summerizing” or storing the snowmobile.

COMPONENT ITEM	PROCEDURE
Engine Oil	Change the engine oil and oil filter.
Fuel System	Top-off the tank with fresh fuel. Add Polaris Premium Fuel Stabilizer, PN 2870652. Follow the mixing instructions on the bottle’s label.
Cooling System	Use a coolant tester (commercially available) designed for Propolyne Gylcol to test the freeze temperature of the engine coolant. A 60/40 mixture will yield a -54F freeze temperature.
Suspension	Remove any road salt residue from the suspension components using mild detergent and clean water. After washing the components, grease all rear suspension pivot shafts with Polaris Premium All Season grease.
Chaincase and Driveshaft	Change the chaincase oil. Lubricate the driveshaft bearing retainer flange with Polaris Premium All Season grease.
Chassis	Clean the chassis with a mild detergent and clean water. Remove any foreign material from the engine compartment (sticks, debris, etc.). Verify the engine compartment is dry. Polish the hood with wax or furniture polish.
Battery	Remove the battery from the snowmobile and store in a cool, dry place. Connect a battery tender to the battery to maintain the charge.
Corrosion Protection	Verify the snowmobile is dry. Spray metallic objects with T-9 Metal Protectant, or equivalent.
PVT System	Remove the belt and store in a cool, dry place. Remove any belt residue from the clutch faces
Cover	Protect the snowmobile with a durable cover.

CHAPTER 4

EFI / Ignition Systems

BOSCH M-MOTRONIC ELECTRONIC FUEL INJECTION

System Overview

The Bosch M-Motronic engine management system implements the engine's operational status in-line with the operator's demands. The microprocessor responds to the operators' demands by translating the throttle flipper travel into a specified engine output.

The operator controls the charge density via the throttle flipper. The Engine Control Unit (ECU) responds to the operator's throttle input by controlling and monitoring the density of each cylinders' air charges, the mass of injected fuel, and ignition timing.

In order to accomplish these tasks, the ECU relies on the following sensors, actuators, and feedback systems:

- Throttle Position Sensor (TPS)
- Wide Band Lambda Sensor
- Turbo Boost Pressure Sensor (FST Only)
- Ambient Pressure Sensor (FST Only)
- Intake Manifold Pressure / Temperature Sensor
- Roll Over Sensor
- Engine Speed Sensor (CPS)
- Camshaft Phase Sensor
- Knock Sensor (FST Only)
- Coolant Temperature Sensor
- Idle Air Control Actuator (Stepper Motor)
- Vehicle Speed Sensor
- Battery Voltage
- Reverse Switch (PERC Button)
- FWD / REV Chaincase Switches

The ECU has direct control over the following components:

- Wastegate Solenoid (Pulse Valve) (FST Only)
- Wide Band Lambda Sensor Heater Element / Pump Control
- Fuel Injectors
- Ignition Coils
- Relay Control (EFI, Fuel Pump, Intercooler Fan, Chassis, Ignition, Start)
- Idle Air Control Actuator (Stepper Motor)
- MFI (Multi-Function Instrument) MIL (Malfunction Indicator Lamp)

Safety Information

Always read and follow safety and caution warnings when working with the fuel and ignition system.

⚠ WARNING

PROPOSITION 65 WARNING
Snowmobile engines discharge fuel and exhaust, which contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm, onto the snow on which they operate. Keep this engine properly tuned and avoid unnecessary idling and spillage during fueling.

Gasoline is highly flammable and explosive under certain conditions.

Always refuel outdoors or in a well ventilated area.

Do not overfill the gas tank or fill up to the filler neck.

Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is present.

If gasoline spills on your skin or clothing, immediately wash if off with soap and water and change clothing.

Never start the engine or let it run in an enclosed area.

⚠ CAUTION

Never work within the engine compartment when the engine is running. Always close the side doors before starting the engine.
Exhaust and turbocharger components can generate extreme heat. Always allow the engine and exhaust / turbocharger components to completely cool before performing service.
The ignition system is capable of generating high voltages presenting a serious shock hazard. Use caution to avoid injury from electrical shock. Do not handle primary or secondary ignition components while the engine is turning-over or running.

Bosch M7.4.4 System Specifications

M7.4.4 Specifications (FS / FST Models)

COMPONENT	SPECIFICATION
Fuel Injection / Ignition Type	Bosch Sequential Motronic M7.4.4
2006* - 2007 ECU - Flash PN** -FS ECU Number -FST ECU Number * = All 2006 ECU part numbers are revved-up to the 2007 part numbers. ** = Flash PNs are subject to change.	 4011701** 4011702**
FS Throttle Body Type FS Throttle Body Marking FS Throttle Body Bore Size FS TPS Voltage @ Idle FS TPS Baseline Voltage FST Throttle Body Type FST Throttle Body Marking FST Throttle Body Bore Size FST TPS Voltage @ Idle FST TPS Baseline Voltage	Mikuni 1253520-01 46mm 0.56 vDC 0.5 vDC Mikuni 1253519-01 39mm 0.585 vDC 0.5 vDC
FS Spark Plug Type FST Spark Plug Type Gap -FS -FST	Champion RC7YC Champion RC7PYCB 0.031″ (.80mm) 0.029 ″(.75mm)
Fuel Requirement FST Maximum Performance FST Reduced Performance (FS Recommended)	 91, 92, 93 Octane (Pump Octane Number) 87 non-oxygenated (Pump Octane Number)
Idle Speed (Engine Warm) FS FST	 1450 ± 200 RPM 1550 ± 200 RPM
FST Operational (Target) Boost Pressure 2006 / 2007	 Boost = 14.5 psi (1 BAR / 1000 millibar) Absolute Charge Air Pressure (Atmosphere + Boost) = 29.0 psi (2 BAR / 2000 millibar)
Fuel Rail Pressure FS FST	 43 - 44 psi (3 Bar) 43 - 44 psi + Boost Pressure (3 Bar + Boost Pressure)
Ignition Coil Type Primary Resistance Secondary Resistance	Bosch ZS-L-1 0.73Ω ± 10% N/A - Diode Protected
Fuel Injector Type Resistance	Bosch EV-6E 10 - 15Ω
Throttle Position Sensor (TPS) Resistance	Function and idle speed setting tested and set using TPS test tool PN: 2201519. Resistance between pins 1 and 3 = 4 - 6 kΩ
Wastegate Solenoid Pulse Valve Resistance (FST Models)	23Ω@ 68°F (20°C)
Air Temperature Circuit (Pins 1 & 2) Pressure Circuit (Pins 1 & 4) Pressure Circuit (Pins 3 & 4) FST = Ambient Pressure, Intake Temp. / Pressure, and Boost Pressure Sensors FS = Intake Temp. / Pressure Sensor	2.5 kΩ ± 5% @ 68°F (20°C) 2.4 - 8.2kΩ 3.4 - 8.2kΩ
Engine Speed Sensor (CPS) Resistance (Pins 1 & 2) AC Voltage: (Pins 1 & 2) AC Voltage: (Pins 1 & 3) AC Voltage: (Pins 2 & 3) Gap	860Ω ± 5% @ 68°F (20°C) 1.5 - 1.7 vAC 0.63 Vac (AC voltage readings taken while turning engine over with key switch). 0.63 Vac (AC voltage readings taken while turning engine over with key switch). 0.8mm
Cam Phase Sensor Gap	Tested using Digital Wrench Diagnostic Software 0.8mm

M7.4.4 Specifications (FS / FST Models)

COMPONENT	SPECIFICATION
Coolant Temperature Sensor Resistance	2.5 kΩ ± 5% @ 68°F (20°C)
Knock Sensor Resistance (FST Models)	4.9 MΩ ± 20%
Lambda (O2) Sensor - Heater Coil Resistance (Pins 3 &4) - Resistance between any pin and sensor housing. - Resistance between Pin 2 and housing @ 530° C temperature	2.4 - 4Ω @ 68°F (20°C) ≥ 30MΩ @ 68°F (20°C) ≥ 1MΩ
Idle (Stepper) Air Control	30Ω between the following pins 1 and 2, 2 and 3, / 4 and 5, 5 and 6
Roll Over Sensor	Tested using Digital Wrench Diagnostic Software

EFI - Engine Harness Repair Kits

Several EFI - engine wiring harness repair kits have been developed so that only sensor-specific sections of the main engine wiring harness can be replaced without having to replace the entire wiring harness.

Each kit contains installation instructions. Part numbers are always subject to change.

EFI-Engine Harness Repair Kits

SENSOR	PART NUMBER
Boost Pressure	2203160
Crank Position Sensor	2203161
Air Intake Pressure / Temp. Sensor	2203162
Knock Sensor	2203163
Ignition Coils	2203164
Throttle Position Sensor	2203165
Fuel Injectors	2203166
Cam Phase Sensor	2203167

Diagnostic Trouble Codes (DTCs)

NOTE: All P codes except for P0234, P1234, P1651, P1652, and P1653 will illuminate the check engine MIL lamp on the MFD display gauge. The MIL lamp will stay lit without blinking.

M7.4.4 Trouble Codes (FS / FST Models)

P CODE	DESCRIPTION	CODE SUMMARY
P0030	Heated Oxygen Sensor Circuit: Open Load	ECU Pin 323 circuit is disconnected.
P0031	Heated Oxygen Sensor Circuit: Short to Ground	ECU Pin 323 circuit is shorted to ground.
P0032	Heated Oxygen Sensor Circuit: Short to Battery	ECU Pin 323 circuit is shorted to battery voltage.
P0105	Intake Manifold Pressure: Plausibility Error	Intake manifold pressure outside expected range.
P0107	Intake Manifold Pressure: Short To Ground	ECU Pin 106 circuit is shorted to ground.
P0108	Intake Manifold Pressure: Short to Battery	ECU Pin 106 circuit is shorted to battery voltage or O.L.
P0112	Intake Air Temp.: Short to Ground	ECU Pin 317 circuit is shorted to ground.
P0113	Intake Air Temp.: O.L. or Short to Battery	ECU Pin 317 circuit is shorted to battery voltage or O.L.
P0117	Coolant Temp. Sensor: Short to Ground	ECU Pin 305 circuit is shorted to ground.
P0118	Coolant Temp. Sensor: O.L. or Short to Battery	ECU Pin 305 circuit is shorted to battery voltage or O.L.
P0122	TPS: O.L. or Short to Ground	ECU Pin 302 circuit is O.L. or shorted to ground.
P0123	TPS: Short to Battery	ECU Pin 302 circuit is shorted to battery voltage or TPS is disconnected.
P0130	Oxygen Sensor Circuit: Signal Error	ECU Pin 124 circuit is O.L., shorted to battery voltage, shorted to ground, or there is an internal short within the O2 sensor.
P0135	Heated Oxygen Sensor: Plausibility Error	ECU Pin 323 circuit malfunction.
P0171	Fuel System: Maximum adaptation Level Reached	Fuel mixture is too lean, maximum adaptation reached. ECU cannot continue to en-richen fuel mixture. Can be caused by faulty O2 sensor, induction - pressure/temp. sensors, fuel pump (system), fuel tank venting, or anything else that would cause a lean fuel mixture.
P0172	Fuel System: Minimum Adaptation Level Reached	Fuel mixture is too rich, minimum adaptation reached. ECU cannot continue to lean fuel mixture. Can be caused by faulty O2 sensor, induction - pressure/ temp. sensors, fuel pump (system), fuel tank venting, or anything else that would cause a rich fuel mixture.
P0230	Fuel Pump Driver Circuit: O.L.	ECU Pin 119 circuit is disconnected.
P0231	Fuel Pump Driver Circuit: Short to Ground	ECU Pin 119 circuit is shorted to ground.
P0232	Fuel Pump Driver Circuit: Short to Battery	ECU Pin 119 circuit is shorted to battery voltage.
P0234	Turbocharger Overboost Condition	Actual boost pressure exceeds targeted pressure. Can be caused by a defective wastegate, wastegate solenoid, disconnected boost reference hose between compressor housing and wastegate solenoid, or performance modifications. **Check engine MIL lamp will blink.**
P0237	Boost Pressure Sensor: O.L. or Short to Ground	ECU Pin 103 circuit is shorted to ground or O.L.
P0238	Boost Pressure Sensor: Short to Battery	ECU Pin 103 circuit is shorted to battery voltage or sensor is disconnected.
P0243	Wastegate Solenoid: O.L.	ECU Pin 307 circuit is disconnected.
P0245	Wastegate Solenoid: Short to Ground	ECU Pin 307 circuit is shorted to ground.
P0246	Wastegate Solenoid: Short to Battery	ECU Pin 307 circuit is shorted to battery voltage.
P0261	Fuel Injector (PTO): Short to Ground	ECU Pin 109 circuit is shorted to ground.
P0262	Fuel Injector (PTO): Short to Battery	ECU Pin 109 circuit is shorted to battery voltage.
P0264	Fuel Injector (MAG): Short to Ground	ECU Pin 110 circuit is shorted to ground.

M7.4.4 Trouble Codes (FS / FST Models)

P CODE	DESCRIPTION	CODE SUMMARY
P0265	Fuel Injector (MAG): Short to Battery	ECU Pin 110 circuit is shorted to battery voltage.
P0326	Knock Signal Internal Fault	Replace ECU.
P0327	Knock Sensor Signal Low	Knock sensor disconnected, loose, ECU Pin 311 circuit disconnected, shorted to ground or battery voltage.
P0328	Knock Sensor Signal High	Indicates noisy engine, mechanical problem with engine.
P0335	Loss of Synchronization	Extra / Missing Timing Gear Tooth CPS sensor, harness, or timing gear is damaged.
P0336	Engine Speed Sensor: Signal Error	No engine signal from CPS sensor. Indicates a faulty sensor, incorrect wiring, circuit is O.L., or circuit is shorted to ground or battery voltage.
P0340	Camshaft Sensor Circuit: Plausibility Error	Indicates there is an intermittent signal, voltage spike, or short to ground.
P0341	Camshaft Sensor Circuit: Signal Error	Sensor is not connected correctly.
P0342	Camshaft Sensor Circuit: Short to Ground	ECU Pin 314 circuit is shorted to ground, or sensor is loose or not mounted correctly.
P0343	Camshaft Sensor Circuit: O.L. or Short to Battery	ECU Pin 314 circuit is shorted to battery voltage or O.L.
P0500	Vehicle Speed Sensor Circuit Malfunction	ECU Pin 231 circuit is shorted to battery voltage, shorted to ground or O.L.
P0506	Idle Speed Too Low	Engine idle speed is lower than desired.
P0507	Idle Speed Too High	Engine idle speed is higher than desired.
P0560	Battery Voltage: Plausibility Error	Indicated battery voltage is too low.
P0562	Battery Voltage: Low	Battery voltage is <12 vDC for two minutes after engine start up phase.
P0563	Battery Voltage: High	Battery voltage is too high.
P0605	ROM Memory Failure	Replace ECU.
P0606	ECU: EEPROM Memory or Checksum Error	Replace ECU.
P0615	Starter Relay Circuit Open	ECU Pin 117 circuit is disconnected.
P0616	Starter Relay Circuit Grounded	ECU Pin 117 circuit is shorted to ground.
P0617	Starter Relay Circuit Short to Battery	ECU Pin 117 circuit is shorted to battery voltage.
P1234	Target Boost Level Not Achieved	Targeted boost pressure not reached. Can be caused by loose induction plumbing, connectors, defective wastegate / turbocharger, wastegate solenoid, dump valve, boost reference hoses, intercooler leaking, or anything else that would allow air to escape induction system. **Check engine MIL lamp will blink.**
P1260	Fuel Injector (PTO) O.L.	ECU Pin 109 circuit is O.L. PTO fuel injector is disconnected.
P1263	Fuel Injector (MAG) O.L.	ECU Pin 110 circuit is O.L. MAG fuel injector is disconnected.
P1325	Knock Control @ Limit (PTO)	Maximum timing retard reached.
P1326	Knock Control @ Limit (MAG)	Maximum timing retard reached.
P1501	Roll Over Sensor: Malfunction	Sensor malfunction. 1.4 vDC < Input < 3.7 vDC
P1502	Roll Over Sensor: Short to Ground	ECU Pin 217 is shorted to ground. Input < 0.3 vDC.
P1503	Roll Over Sensor: Short to Battery	ECU Pin 217 circuit is shorted to battery voltage or O.L. Input > 4.6 vDC.
P1505	Idle Stepper Motor	Signal Interruption
P1508	Idle Stepper Motor	Output shorted to ground.
P1509	Idle Stepper Motor	Output shorted to battery voltage.
P1552	Throttle Safety Switch: Throttle Stuck	Throttle is stuck.

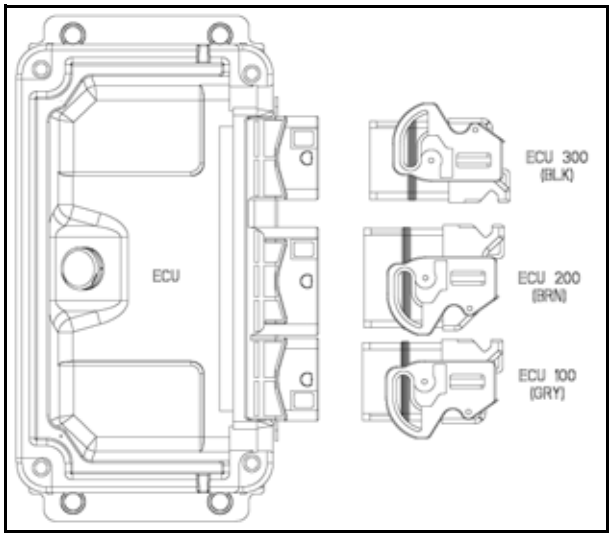
M7.4.4 Trouble Codes (FS / FST Models)

P CODE	DESCRIPTION	CODE SUMMARY
P1553	Throttle Safety Switch: Signal Error	Code set if ECU Pin 306 circuit is: 0.3 vDC < Input < 0.65 vDC 1.0 vDC < Input < 1.25 vDC 1.45 vDC < Input < 1.85 vDC 2.25 vDC < Input < 4.7 vDC
P1554	Throttle Safety Switch: Short to Ground	ECU Pin 306 circuit is shorted to ground. Input is less than 0.3 vDC.
P1555	Throttle Safety Switch: Short to Battery	ECU Pin 306 circuit is shorted to battery voltage. Input is greater than 5 vDC.
P1611	Chassis Relay Circuit: Open	ECU Pin 215 circuit is O.L.
P1613	Chassis Relay: Short to Ground	ECU Pin 215 circuit is shorted to ground.
P1614	Chassis Relay: Short to Battery	ECU Pin 215 circuit is shorted to battery voltage.
P1621	Ignition Relay Circuit: Open	ECU Pin 118 circuit is disconnected.
P1622	Ignition Relay Circuit: Short to Ground	ECU Pin 118 circuit is shorted to ground.
P1623	Ignition Relay Circuit: Short to Battery	ECU Pin 118 circuit is shorted to battery voltage.
P1651	Check Engine Lamp (MIL) Circuit: Open	ECU Pin 203 circuit is disconnected. **Check engine MIL lamp cannot illuminate.**
P1652	Check Engine Lamp (MIL) Circuit: Short to Ground	ECU Pin 203 circuit is shorted to ground. **Check engine MIL lamp cannot illuminate.**
P1653	Check Engine Lamp (MIL) Circuit: Short to Battery	ECU Pin 203 circuit is shorted to battery voltage. **Check engine MIL lamp cannot illuminate.**
P1655	Temperature Lamp Output: Open	ECU Pin 222 circuit is disconnected.
P1656	Temperature Lamp Output: Short to Ground	ECU Pin 222 circuit is shorted to ground.
P1657	Temperature Lamp Output: Short to Battery	ECU Pin 222 circuit is shorted to battery voltage.
P1659	Intercooler Fan Driver Circuit: Short to Battery	ECU Pin 320 circuit is shorted to battery voltage.
P1660	Intercooler Fan Driver Circuit: Short to Ground	ECU Pin 320 circuit is shorted to ground.
P1672	Intercooler Fan Driver Circuit: Open	ECU Pin 320 circuit is disconnected.
P1675	Temperature PWM Output: O.L.	ECU Pin 209 circuit is disconnected or O.L.
P1676	Temperature PWM Output: Short to Ground	ECU Pin 209 circuit is shorted to ground.
P1677	Temperature PWM Output: Short to Battery	ECU Pin 209 circuit is shorted to battery voltage.
P1701	Reverse Switch Circuit: Short to Ground	ECU Pin 303 circuit is shorted to ground. Circuit has been closed or shorted to ground for more than three minutes.
P1702	Forward Limit Switch: Open	Power supply to FWD and REV switches is disconnected.
P1703	Forward Limit Switch: Voltage Low	ECU Pin 216 circuit is shorted to ground, or switch is stuck open.
P1704	Forward Limit Switch: Voltage High	ECU Pin 216 circuit is shorted to battery voltage, or switch is stuck in the FWD (closed) position.
P1705	Reverse Lamp Circuit: Open	ECU Pin 210 circuit is disconnected or has been interrupted.
P1706	Reverse Lamp Circuit: Short to Ground	ECU Pin 210 circuit is shorted to ground.
P1707	Reverse Lamp Circuit: Short to Battery	ECU Pin 210 circuit is shorted to battery voltage.
P1801	Reverse Command Not Completed	ECU reverse command executed but shift not completed. Indicates a mechanical problem with the gear shifting mechanism.
P1802	Forward Command Not Completed	ECU forward command executed but shift not completed. Indicates a mechanical problem with the gear shifting mechanism.
P1924	Reverse Shift Circuit: Open	ECU Pin 303 circuit is disconnected.

M7.4.4 Trouble Codes (FS / FST Models)

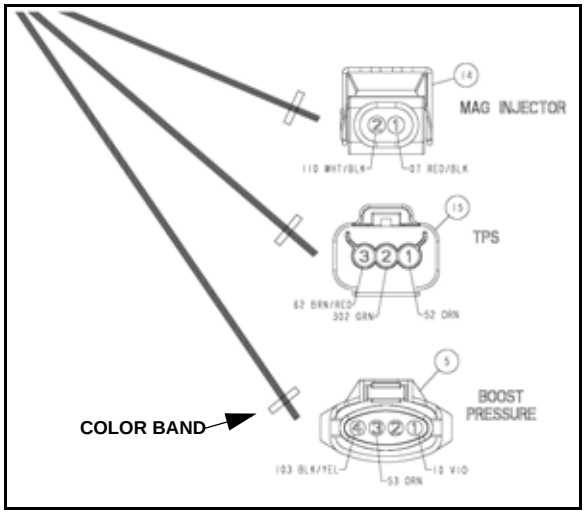
P CODE	DESCRIPTION	CODE SUMMARY
P1926	Reverse Shift Circuit: Short to Ground	ECU Pin 303 circuit is shorted to ground.
P1927	Reverse Shift Circuit: Short to Battery	ECU Pin 303 circuit is shorted to battery voltage.
P1997	Reverse Limit Switch Circuit: Open	Power supply to FWD and REV switches is disconnected.
P1998	Reverse Limit Switch Circuit: Voltage Low	ECU Pin 229 circuit is shorted to ground, or switch is stuck open.
P1999	Reverse Limit Switch Circuit: Voltage High	ECU Pin 229 circuit is shorted to battery voltage, or switch is stuck in the FWD (closed) position.
P2228	Ambient Pressure Sensor Circuit: O.L. or Grounded	ECU Pin 214 circuit is shorted to ground or O.L.
P2229	Ambient Pressure Sensor: Short to Battery	ECU Pin 214 circuit is shorted to battery voltage or sensor is disconnected.
P2530	Switched Ignition Supply: Open	ECU Pin 202 circuit is disconnected.
P2532	Switched Ignition Supply: Short to Battery	ECU Pin 202 circuit is shorted to battery voltage.
P2535	Ignition Start Switch: Short to Battery	ECU Pin 206 circuit is shorted to battery voltage.

ECU Connector Orientation



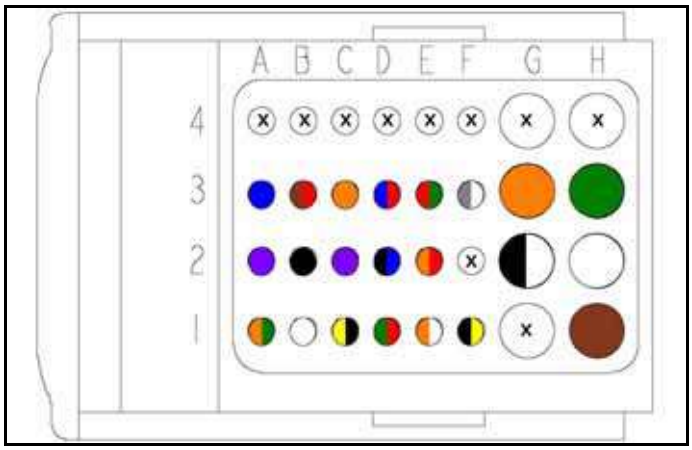
Wiring Harness Connector Identification

Some engine component wiring harnesses have a color band to aid in connecting each harness lead to the correct sensor or EMS component.



HARNESS	BAND COLOR
Ambient Pressure	None
Lambda Sensor	None
Intake Air CTRL	Yellow
MAG Coil	Red
PTO Coil	White
Phase Sensor	Blue
Intake Pressure	None
Coolant Temp.	None
PTO Injector	White
MAG Injector	Red
TPS	Yellow
Boost Pressure	Blue
Crank Position	None
Knock Sensor	None
Wastegate CTRL	None

ECU 100 Harness Connector (Gray Color)

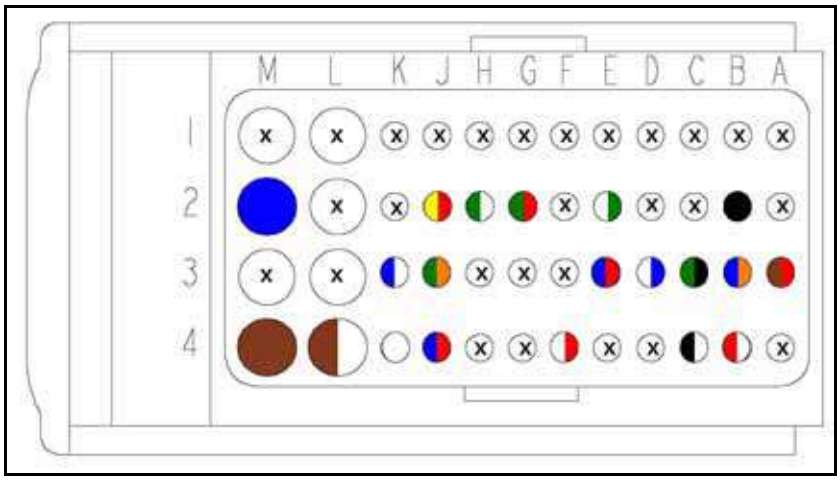


NOTE: Viewed from terminal-side of connector.

ECU 100 Connector Pin Identification

PIN	WIRE COLOR	FUNCTION	GOES TO:
A1 (108)	ORN/GRN	Lambda Sensor Compensation (Input)	Wideband Lambda Sensor (Pin 2)
B1 (107)	WHITE	Engine Speed Sensor (CPS) Signal (Input)	Engine Speed Sensor (Pin 1)
C1 (106)	YEL/BLK	Intake Manifold Pressure Signal (Input)	Intake Manifold Pressure / Temp. Sensor (Pin 4)
D1 (105)	GRN/RED	IAC Stepper Motor Phase D (Output)	Idle Air Controller (Pin 1)
E1 (104)	ORN/WHT	5Vdc Sensor Voltage (Output)	Splice - Intake (Pin 3) and Ambient Pressure (Pin 3) Sensors / Rollover Sensor
F1 (103)	BLK/YEL	Boost Pressure Signal (Input)	Boost Pressure Sensor (Pin 4)
H1 (101)	BROWN	Power Ground (Ground)	Splice - Engine / Chassis Connector 2 - Battery Ground
A2 (116)	PURPLE	Sensor / Engine Stop Signal (Ground)	Engine / Chassis Connector 2 - Boost Pressure Sensor (Pin 1) / Throttle Flipper Safety Switch
B2 (115)	BLACK	Engine Speed Sensor (CPS) Signal (Input)	Engine Speed Sensor (Pin 2)
C2 (114)	PURPLE	Intake Manifold Pressure Sensor (Ground)	Intake Manifold Pressure / Temp. Sensor (Pin 1)
D2 (113)	BLU/BLK	IAC Stepper Motor Phase B (Output)	Idle Air Controller (Pin 4)
E2 (112)	OR/RED	Lambda Sensor Pump Current (Input)	Wideband Lambda Sensor (Pin 6)
G2 (110)	WHT/BLK	Fuel Injector Control - MAG (Output)	MAG Fuel Injector (Pin 2)
H2 (109)	WHITE	Fuel Injector Control - PTO (Output)	PTO Fuel Injector (Pin 2)
A3 (124)	BLUE	Lambda Sensor Signal (Input)	Wideband Lambda Sensor (Pin 1)
B3 (123)	BRN/RED	Lambda Sensor (Ground)	Wideband Lambda Sensor (Pin 5)
C3 (122)	ORANGE	5Vdc Sensor Voltage (Output)	Splice - TPS (Pin 1) / Boost Pressure Sensor (Pin 1)
D3 (121)	BLU/RED	IAC Stepper Motor Phase C (Output)	Idle Air Controller (Pin 6)
E3 (120)	RED/GRN	IAC Stepper Motor Phase A (Output)	Idle Air Controller (Pin 3)
F3 (119)	GRY/WHT	Fuel Pump Relay Control (Output)	Engine / Chassis Connector 1 - Fuel Pump Relay
G3 (118)	ORANGE	KL 15 (Ignition) Relay Control (Output)	Engine / Chassis Connector 1 - Ignition Relay
H3 (117)	GREEN	Starter Relay Control (Output)	Engine / Chassis Connector 1 - Starter Relay

ECU 200 Harness Connector (Brown Color)

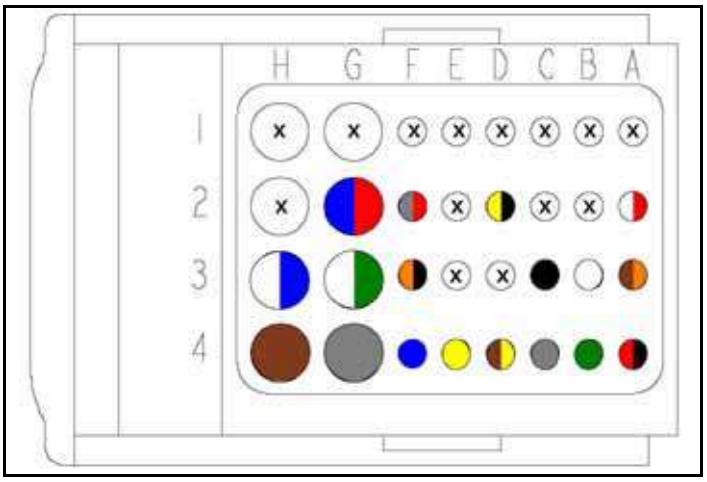


NOTE: Viewed from terminal-side of connector.

ECU 200 Connector Pin Identification

PIN	WIRE COLOR	FUNCTION	GOES TO:
M4 (212)	Brown	Fuel Injection Ground	Splice - Engine / Chassis Connector 2 - Battery Ground
L4 (211)	BRN/WHT	Electronic Ground	Splice - ECU Ground Ring - Knock Sensor / CPS Shield Grounds
K4 (210)	White	MFI Reverse Lamp (Output)	Engine / Chassis Connector 2 - MFI Reverse Lamp
J4 (209)	BLU/RED	MFI Engine Temperature Signal (Output)	Engine / Chassis Connector 2 - MFI Engine Temp. Display
F4 (206)	WHT/RED	Start Switch (Input)	Engine / Chassis Connector 1 - Ignition Switch - Start Diode - Starter Solenoid
C4 (203)	BLK/WHT	MFI - MIL Lamp (Output)	Engine / Chassis Connector 2 - MFI-MIL Lamp (Check Engine)
B4 (202)	RED/WHT	Ignition Switch (Input)	Engine / Chassis Connector 1 - Ignition Diode - Ignition Relay
K3 (222)	BLU/WHT	MFI Engine Temperature Lamp (Output)	Engine / Chassis Connector 2 - MFI Hot Lamp
J3 (221)	GRN/ORN	MFI Boost Pressure Signal (Output)	Engine / Chassis Connector 2 - MFI Boost Level Display
E3 (217)	BLU/RED	Roll Over Switch (Input)	Engine / Chassis Connector 2 - Roll Over Switch
D3 (216)	WHT/BLU	Chaincase FWD Limit Switch Signal (Input)	Engine / Chassis Connector 1 - FWD Switch
C3 (215)	GRN/BLK	Chassis Relay Control (Output)	Engine / Chassis Connector 1 - Chassis Relay
B3 (214)	BLU/ORN	Ambient Pressure Signal (Input)	Ambient Pressure Sensor (Pin 4)
A3 (213)	BRN/RED	Sensor Ground	Engine / Chassis Connector 1 - Roll Over Switch
M2 (236)	Blue	Reverse Controller - Control (Output)	Engine / Chassis Connector 2 - Reverse Controller (Pin 3)
J2 (233)	YEL/RED	Engine Speed Signal (Output)	Engine / Chassis Connector 2 - MFI Tachometer Signal
H2 (232)	GRN/WHT	Diagnostic K Line (Input / Output)	Diagnostic Connector (Pin 2)
G2 (231)	GRN/RED	Vehicle Speed Signal (Input)	Engine / Chassis Connector 2 - Speed Sensor (Pin B)
E2 (229)	WHT/GRN	Chaincase REV Limit Switch Signal (Input)	Engine / Chassis Connector 1 - REV Switch
B2 (226)	Black	Engine Stop Signal (Input)	Engine / Chassis Connector 2 - Ignition Switch - Tether - Throttle Flipper Safety Switch

ECU 300 Harness Connector (Black Color)



NOTE: Viewed from terminal-side of connector.

ECU 300 Connector Pin Identification

PIN	WIRE COLOR	FUNCTION	GOES TO:
H4 (308)	Brown	Ignition Ground	Splice - Engine / Chassis Connector 2 - Battery Ground
G4 (307)	Gray	Wastegate Control (Output)	Wastegate Solenoid Pulse Valve (Pin 2)
F4 (306)	Blue	Throttle Flipper Safety Switch (Input)	Engine / Chassis Connector 2 - Throttle Flipper Safety Switch
E4 (305)	Yellow	Engine Coolant Temperature Signal (Input)	Coolant Temperature Sensor (Pin 1)
D4 (304)	BRN/YEL	Engine Coolant Temperature Sensor Ground	Coolant Temperature Sensor (Pin 2)
C4 (303)	Gray	Reverse (PERC) Switch Signal (Input)	Engine / Chassis Connector 2 - PERC Switch
B4 (302)	Green	Throttle Position Sensor (TPS) Signal (Input)	Throttle Position Sensor (Pin 2)
A4 (301)	RED/BLK	Switched Power - EFI Relay - 20A (Input)	Splice - Engine / Chassis Connector 2 - Wastegate Solenoid (Pin 1) / Camshaft Phase Sensor (Pin 3)
H3 (316)	WHT/BLU	Ignition Coil Driver - MAG (Output)	Ignition Coil - MAG (Pin 1)
G3 (315)	WHT/GRN	Ignition Coil Drive - PTO (Output)	Ignition Coil - PTO (Pin 1)
F3 (314)	ORN/BLK	Cam Phase Sensor Signal (Input)	Camshaft Phase Sensor (Pin 2)
C3 (311)	Black	Knock Sensor Signal (Input)	Knock Sensor (Pin 1)
B3 (310)	White	Knock Sensor Ground (Input)	Knock Sensor (Pin 2)
A3 (309)	BRN/ORN	Sensor Ground	Ambient Pressure Sensor (Pin 1)
G2 (323)	BLU/RED	Lambda Heater Control (Output)	Wide Band Lambda Sensor (Pin 4)
F2 (322)	GRY/RED	EFI Relay Control (Output)	Engine / Chassis Connector 1 - EFI Relay Coil
D2 (320)	YEL/BLK	Intercooler Fan Relay Control (Output)	Engine / Chassis Connector 1 - Fan Relay Coil
A2 (317)	WHT/RED	Intake Air Temperature	Intake Manifold Temp. / Pressure Sensor (Pin 2)

Engine RPM / Vehicle Speed Limit Modes

The engine management system will limit engine RPM or vehicle speed if the following conditions are encountered.

RPM / Vehicle Speed Limit Modes

CONDITION	RPM / VEHICLE SPEED LIMIT
Idle Speed (Engine @ Operating Temperature)	1450± 200 RPM (FS) 1550± 200 RPM (FST)
Recommended Operating RPM (WOT - Shift Out Speed)	8000 - 8100 RPM
Maximum Engine Speed (Fuel Cutoff)	8800 RPM
Perc 4 Reverse Upper RPM Engagement Limit	2500 RPM / 0 MPH
Perc 4 Reverse Engaged - Vehicle Speed Sensor Working	11 MPH (18 km/h)
Perc 4 Reverse Engaged - Vehicle Speed Sensor Not Working	5300 RPM
Rollover Switch Error - Vehicle Speed Sensor Working	37 MPH (60 km/h)
Rollover Switch Error - Vehicle Speed Sensor Not Working	6000 RPM
Throttle System Stuck - Lever @ Idle (Closed) Position	2400 RPM
Throttle System Stuck - Lever @ Off Idle Position - Vehicle Speed Sensor Working	18 MPH (30 km/h)
Throttle System Stuck - Lever @ Off Idle Position - Vehicle Speed Sensor Not Working	5450 RPM

Turbo Boost Reduction Modes

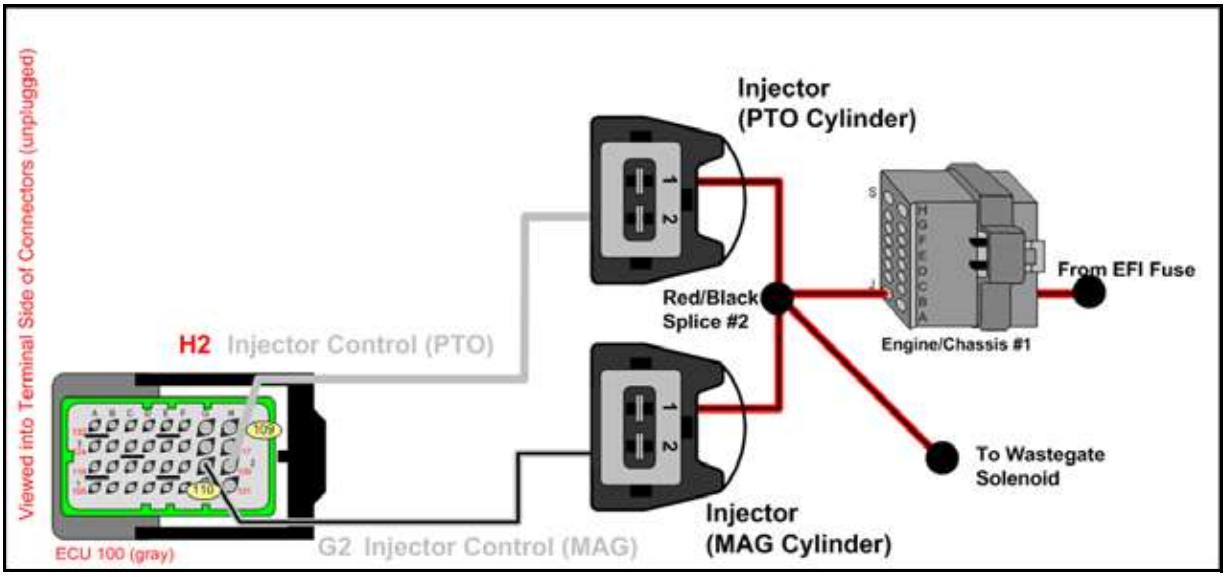
The engine management system will reduce turbo boost to *base boost* (ambient pressure + 400 mbar) if the following condition(s) are encountered:

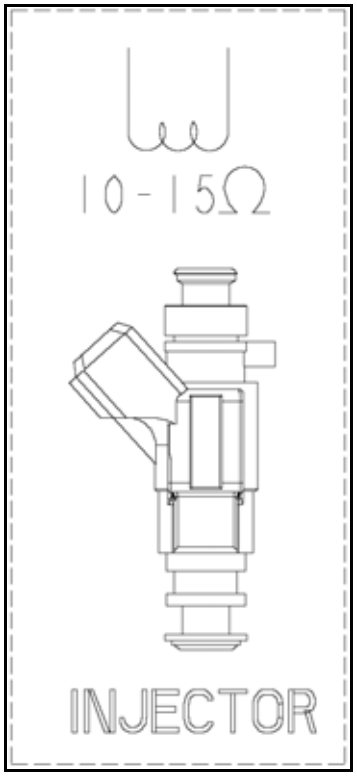
- The engine temperature overheat MIL lamp is illuminated.
- Engine coolant temperature is at or below 122° F (50° C) OR at or above 203° F (95° C).
- Intake manifold air temperature is at or below 32° F (0° C) OR at or above 158° F (70° C).
- ECU knock control reduces ignition timing by -6° above 5000 RPM.
- Over-boost condition occurs.
- Fuel Pump Octane Number (PON) is not adequate. Use Premium 91, 92, 93 PON fuel for maximum engine performance.

Fuel Injection Circuit

The fuel injection circuit and fuel injectors are responsible for delivering fuel to each combustion chamber. Power to each injector is supplied by the EFI relay and protected by a 20A fuse. The ECU controls each injector by switching each circuit to ground. The time and duration the ECU grounds each circuit determines the injection timing and pulse width.

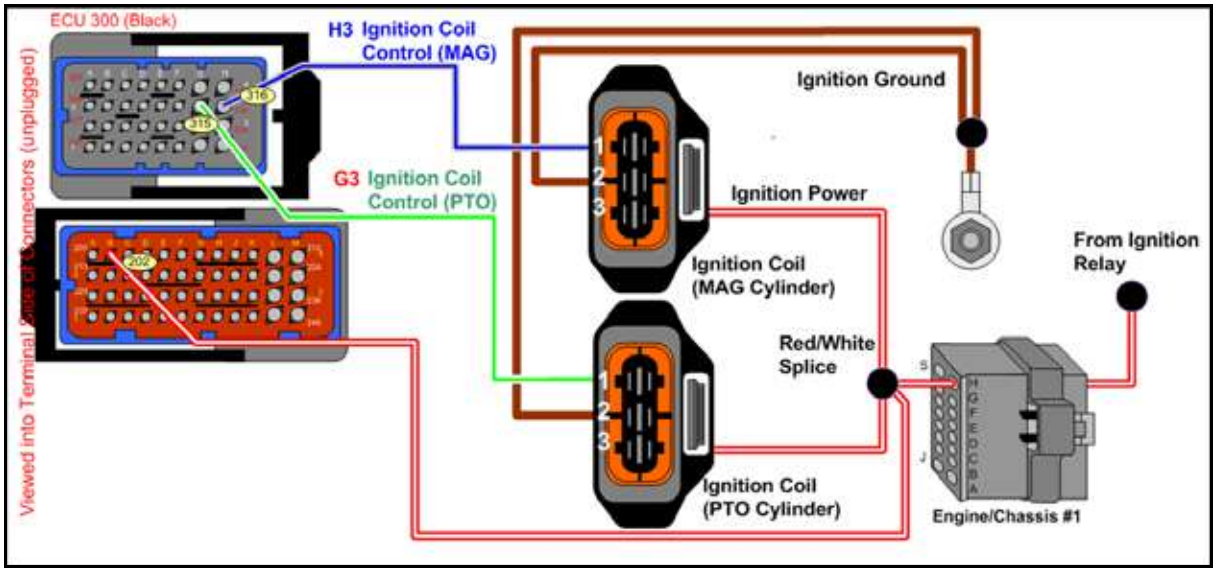
NOTE: FS Fuel Injector Color = Orange
FST Fuel Injector Color = Black

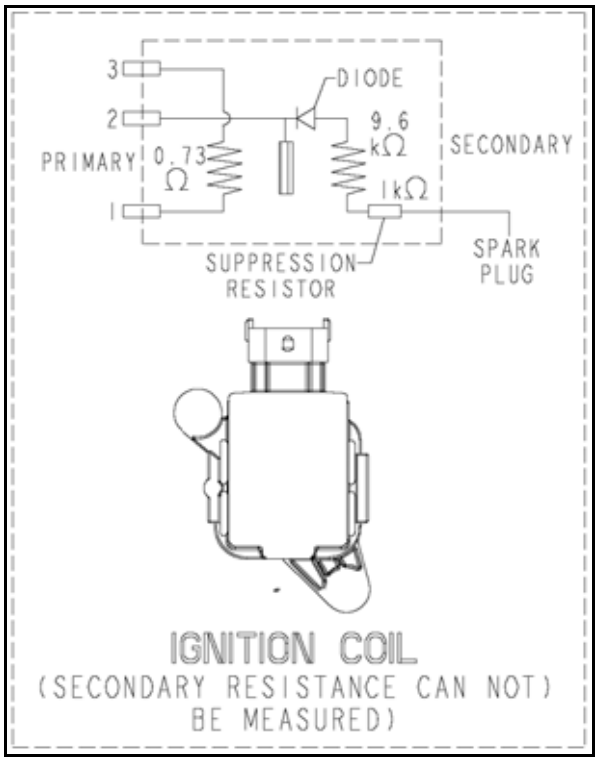




Ignition Coil Circuit

The ignition coil circuit and ignition coils are responsible for providing spark energy to the spark plugs. Power to each ignition coil is supplied by the ignition relay. The EFI relay supplies power to the ignition relay via a 20A fuse-protected circuit. The ECU controls each ignition coil by opening each control circuit, thus collapsing the field inside each coil. The secondary coil within each coil pack is diode protected to prevent activation arcing when the ECU closes each control circuit. The diode prevents testing the secondary coil with an ohmmeter.

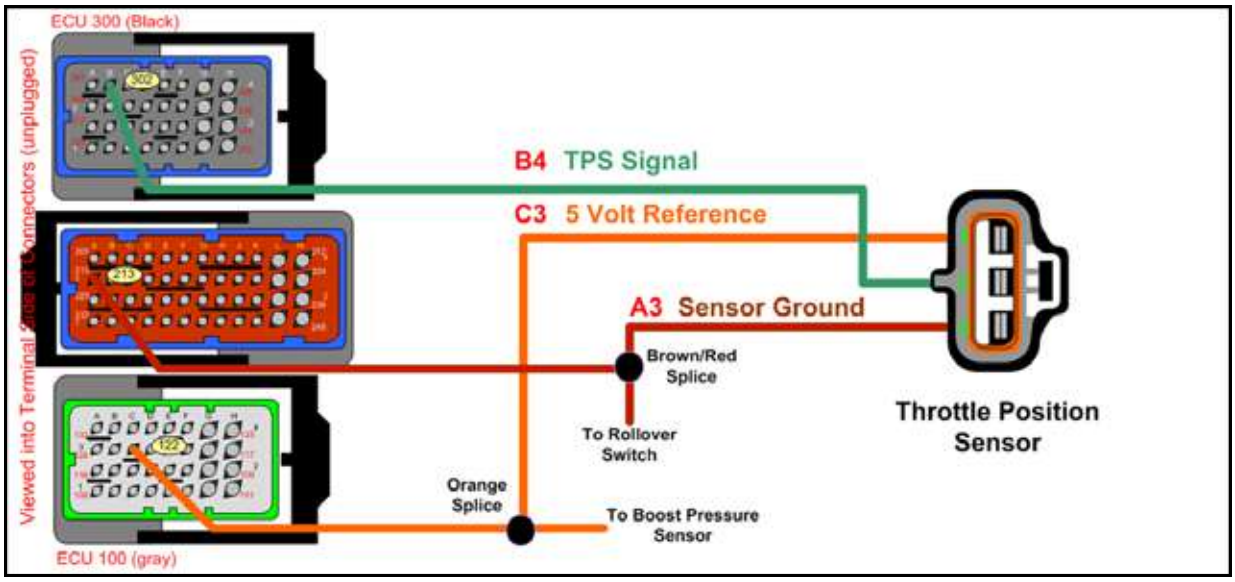


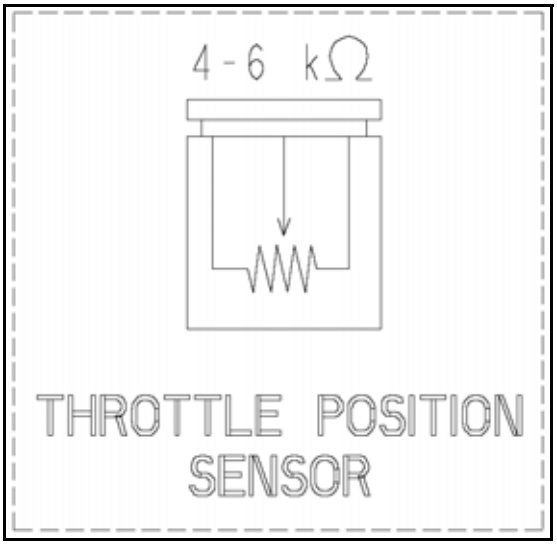


Throttle Position Sensor Circuit (TPS)

The throttle position sensor (TPS) is responsible for converting the mechanical action of the throttle plates into an analog signal. The ECU uses this signal to determine the position of the throttle plates and therefore the operator's demand for more or less engine torque.

All three circuits that connect to the TPS are supplied and monitored by the ECU. The TPS is located on the throttle body assembly.





Throttle Position Sensor (TPS) Baseline Setting

When inspecting, adjusting, or replacing the TPS, the baseline voltage must be set in relation to the throttle plates. This also involves verifying that both throttle plates are synchronized with each other. To set the baseline TPS voltage and synchronize the throttle plates, follow these procedures:

1. Loosen the idle speed set screw, and allow the throttle plates to close.
2. Loosen the throttle plate synchronization screw enough so that the tip of the screw no longer contacts the tab.
3. Verify the PTO throttle plate is completely closed.
4. Disconnect the TPS connector and connect the TPS test tool, PN 2201519 to the TPS.
5. Using a multi meter, insert the probes into the test tool.
6. The displayed voltage should read 0.5Vdc.
7. If the voltage is not 0.5Vdc, loosen the TPS screws and rotate the TPS until 0.5Vdc is displayed on the multi meter.
8. Tighten the TPS screws while maintaining 0.5Vdc.
9. Slowly tighten the synchronization screw until the screw tips makes contact with the tab.
10. Visually inspect the throttle plates, making sure the plates are even when at wide open throttle.

NOTE: Do not over-tighten the screw as spring damage may occur.

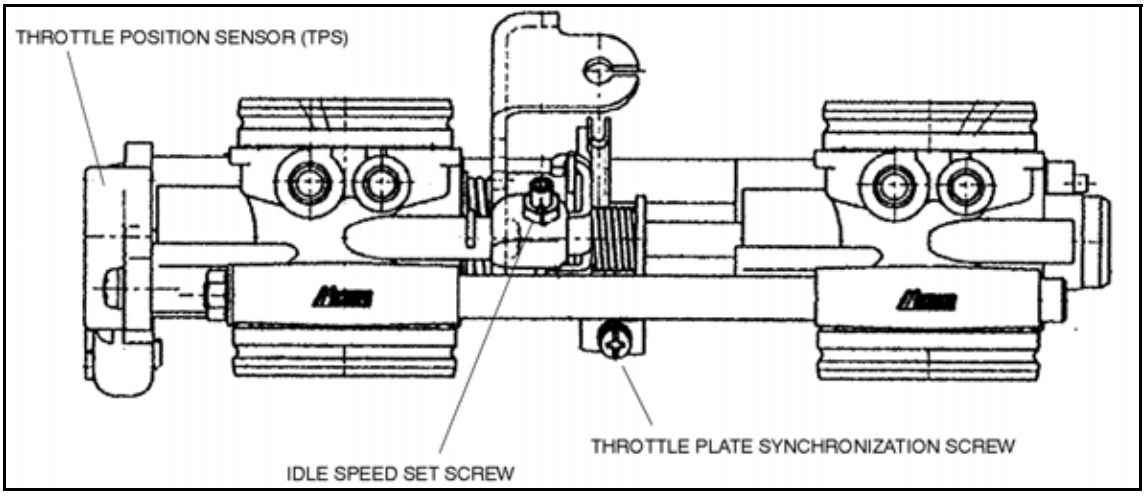
The TPS and throttle plates are now properly synchronized to the baseline voltage setting.

Throttle Plate Air Gap Voltage Setting

Once the TPS baseline voltage is set and the throttle plates are synchronized, the throttle plate air gap can be set.

1. Verify the baseline TPS voltage is 0.5Vdc.
2. Slowly turn the idle speed set screw clockwise until the following voltages are observed:
   - FS MODELS: 0.560Vdc
   - FST MODELS: 0.585Vdc
3. Lock the jam nut while maintaining the correct voltage.

The throttle plate air gap voltage has now been set. No further adjustments are required as the intake air controller (IAC) will control the engine idle speed.

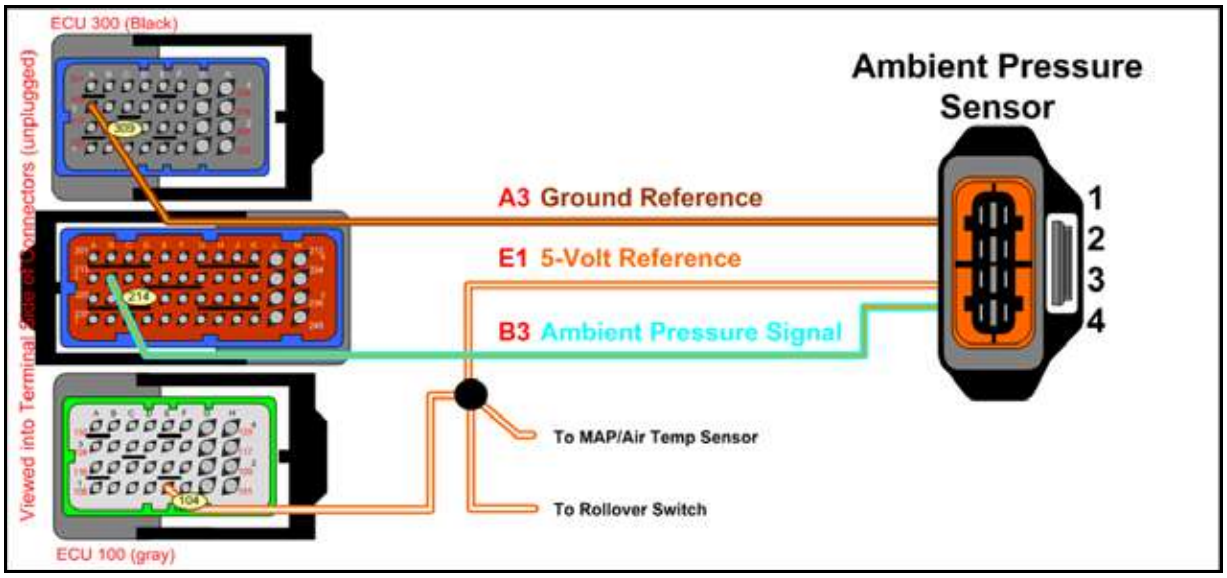


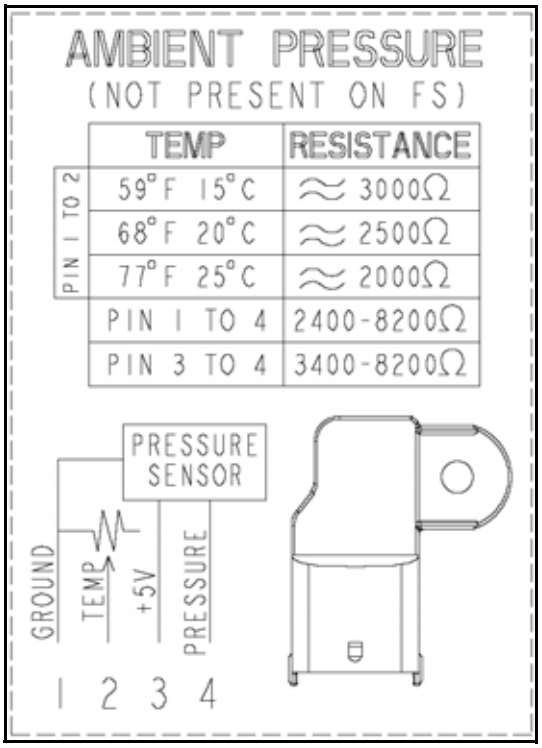
Ambient Pressure Sensor Circuit (FST Only)

The ambient pressure sensor relays the absolute outside air pressure to the ECU. The ECU uses this information to determine the snowmobile's operating altitude. The absolute outside pressure is also used by the ECU as a function for several other operating parameters such as wastegate solenoid pulse valve control.

All three circuits that connect to the sensor are supplied and monitored by the ECU. The sensor is located on the air box facing the engine.

NOTE: Bosch PN 261 230 099 stamped on cover.



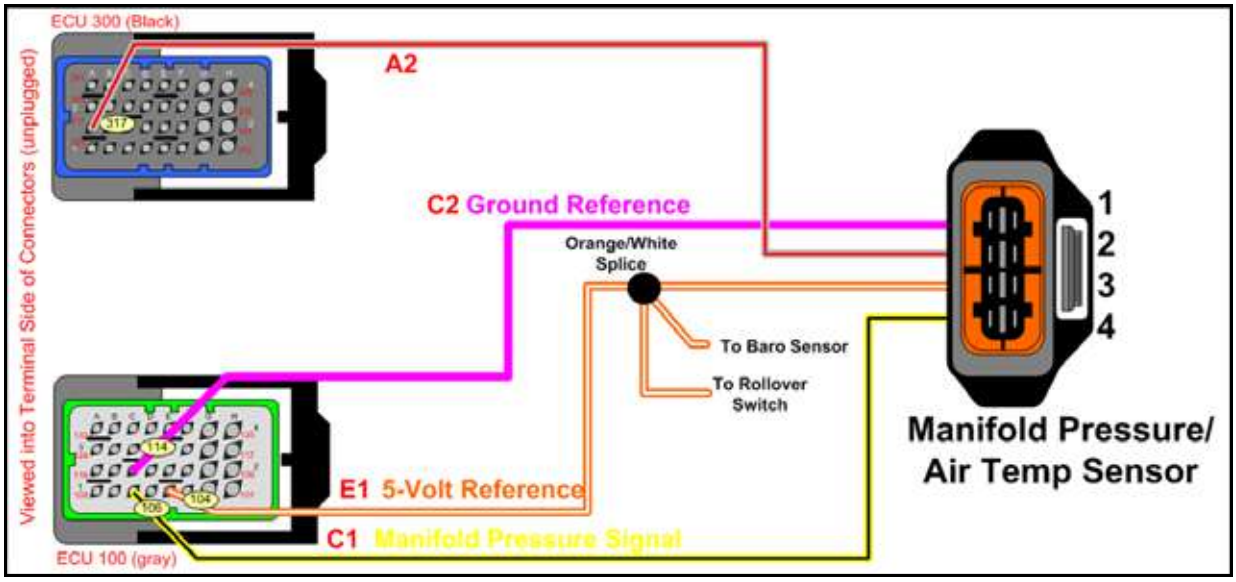


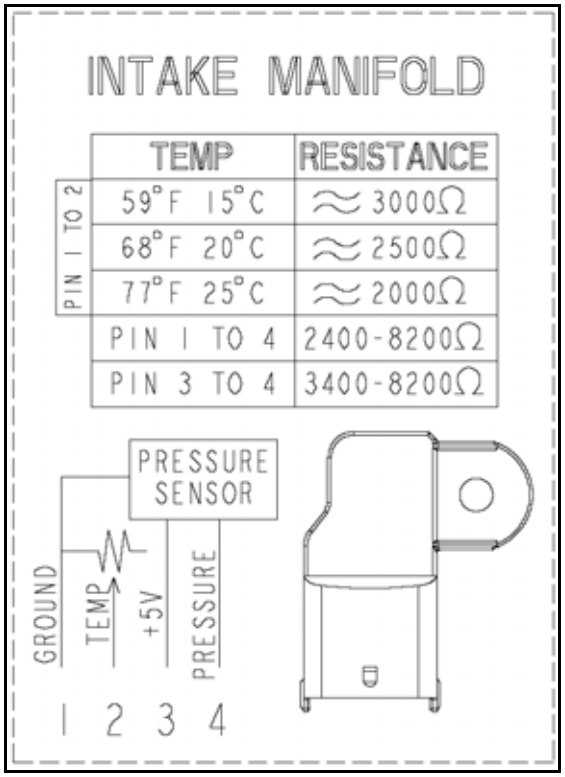
Intake Manifold Pressure / Temperature Sensor Circuit

The intake manifold pressure (MAP) / temperature sensor circuit is responsible for relaying the current manifold intake air charge pressure and temperature. The sensor is located on the PTO intake tube after the throttle plates.

All four circuits that connect to the sensor are supplied and monitored by the ECU.

NOTE: FS = Bosch PN 261 230 030
FST = Bosch PN 261 230 042
Numbers stamped on cover.



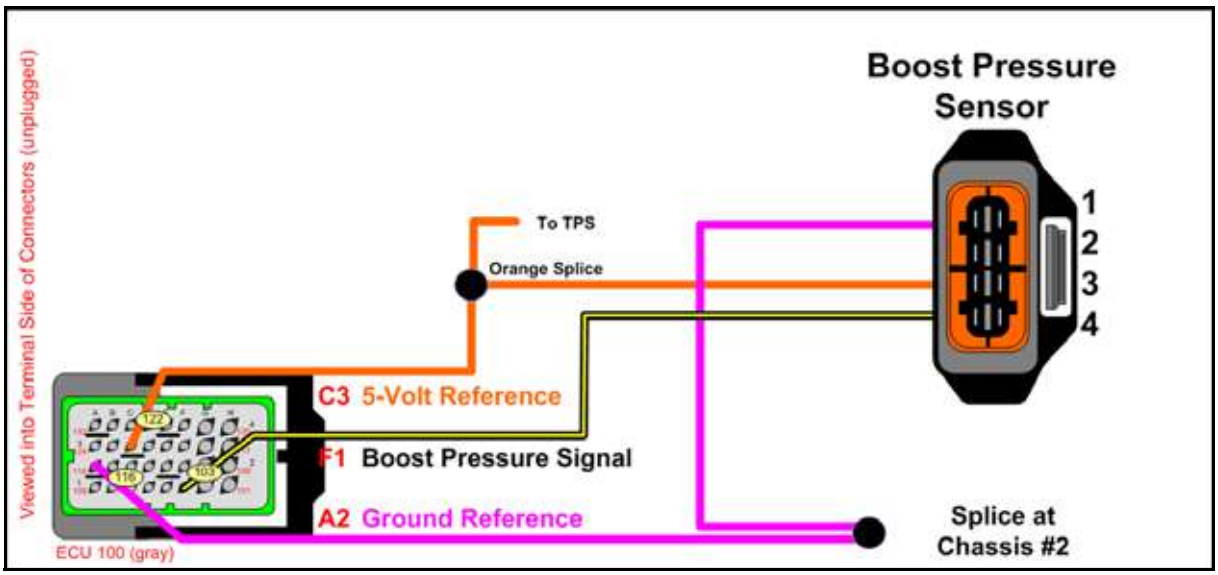


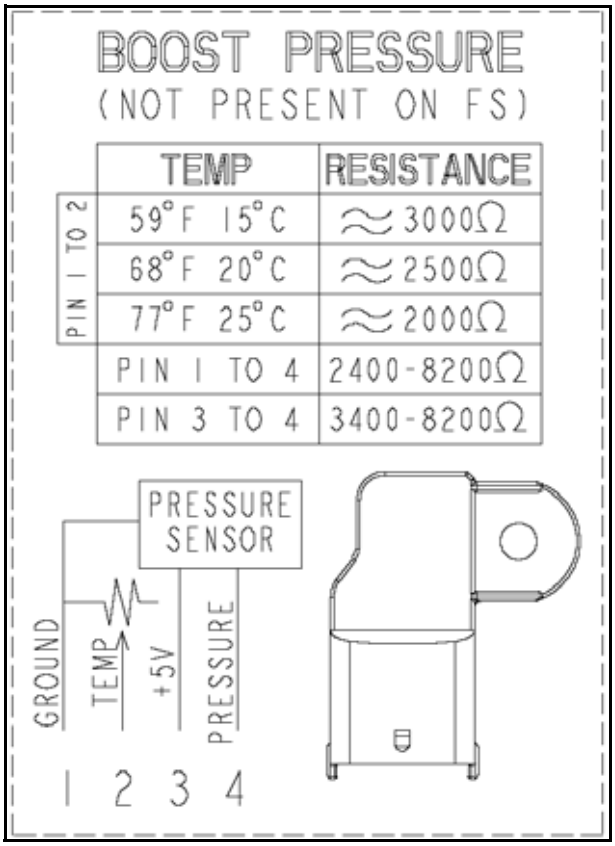
Boost Pressure Sensor Circuit (FST Only)

The boost pressure sensor is located on the boost box just before the throttle bodies. The ECU uses this sensor to determine the actual absolute charged air pressure within the intake system.

The sensor is located on the FST's boost box underneath the fuel tank.

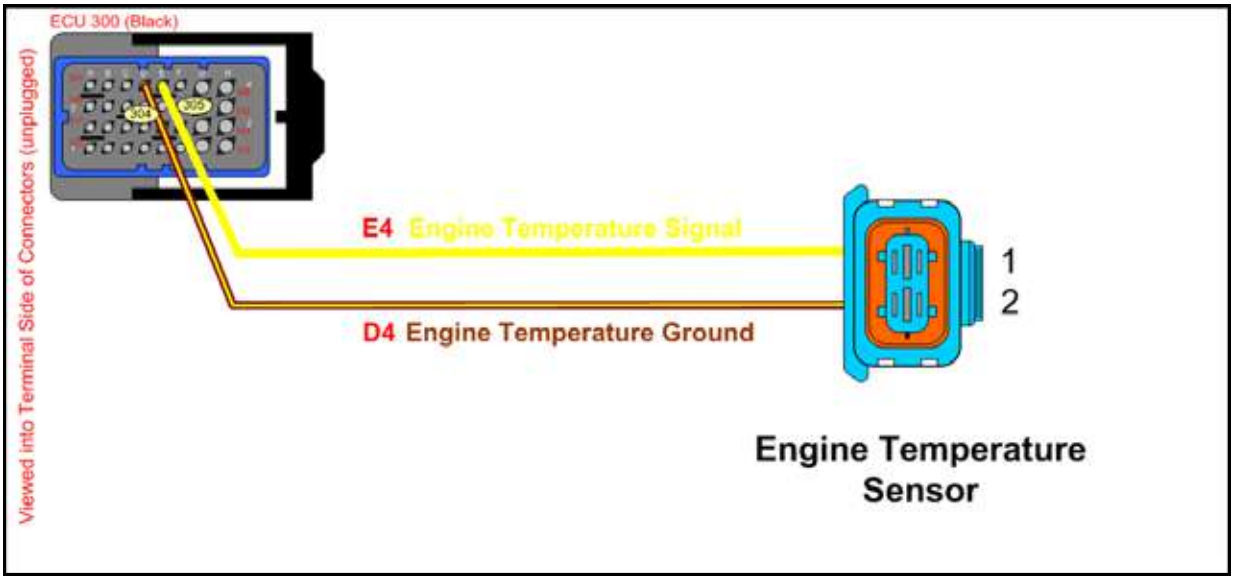
NOTE: Bosch PN 261 230 042 stamped on cover.

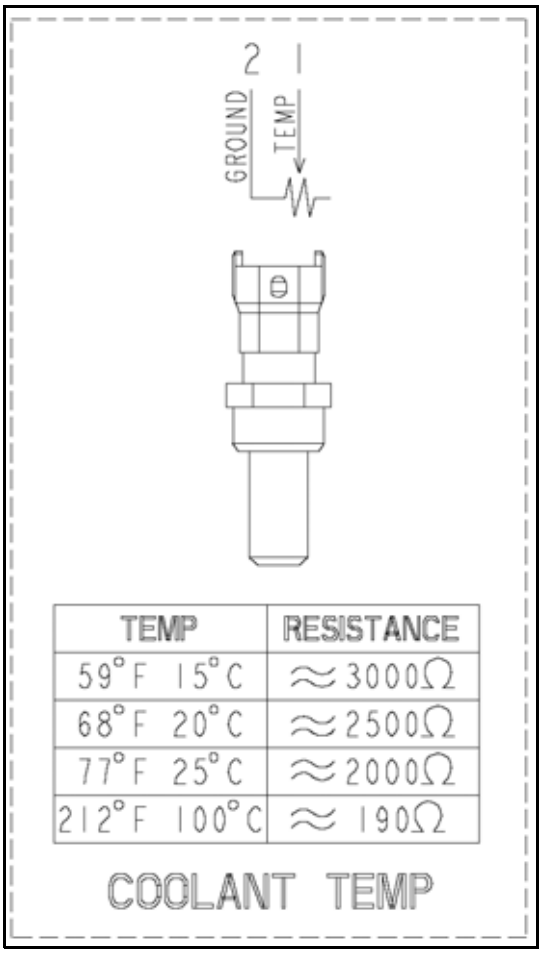




Coolant Temperature Sensor Circuit

The engine coolant temperature sensor is responsible for relaying the engine's internal temperature to the ECU. The sensor is located on the intake-side of the engine, near the water outlet manifold.

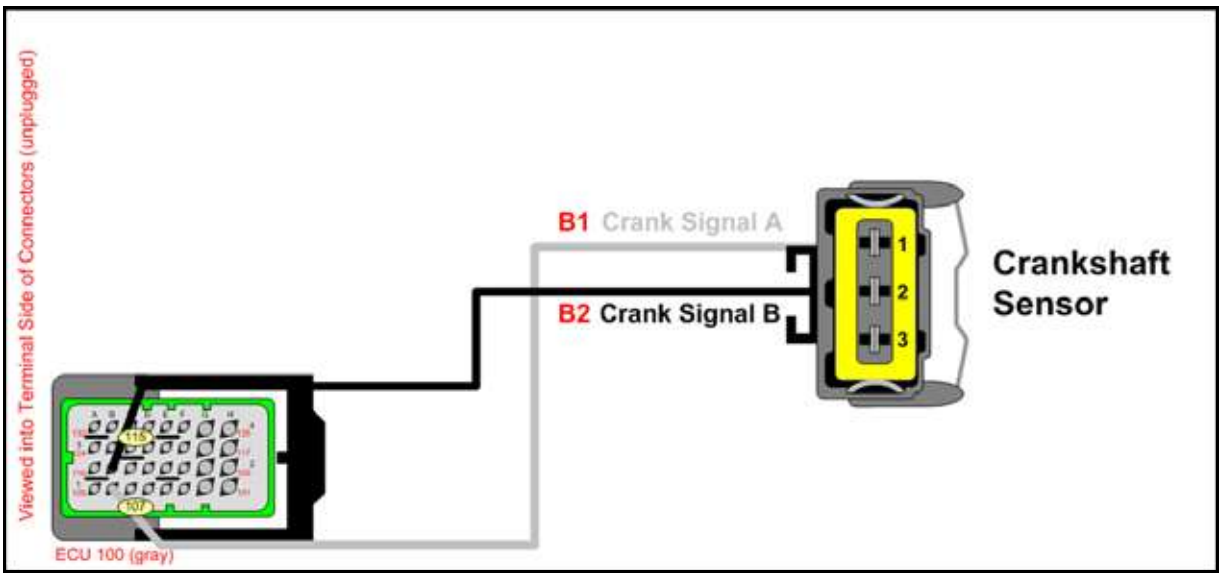


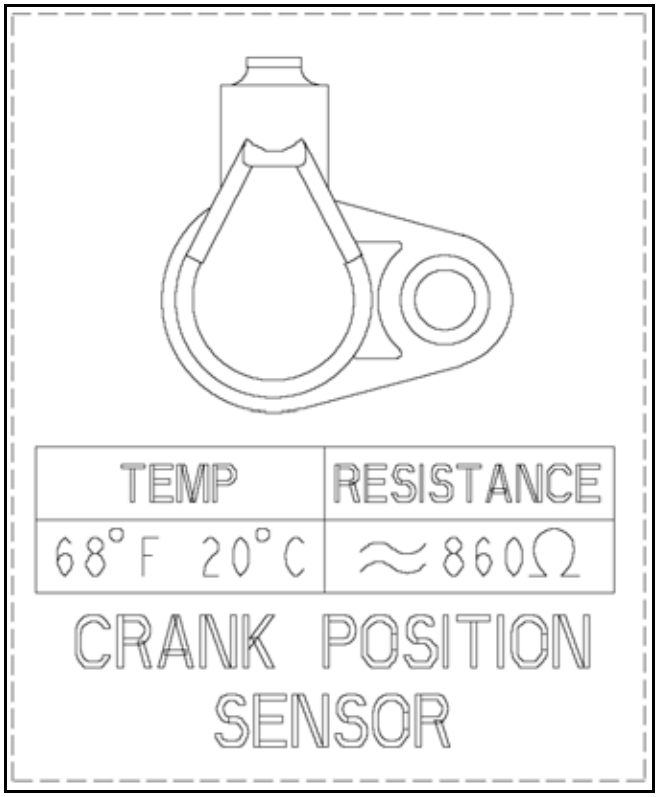


Crank Position Sensor (CPS) Circuit

The crank position sensor (CPS) is an AC signal generator that tells the ECU how fast the crankshaft is rotating and when the crankshaft is at TDC-MAG cylinder.

The sensor is located on the intake-side of the engine, next to the gear cover housing.

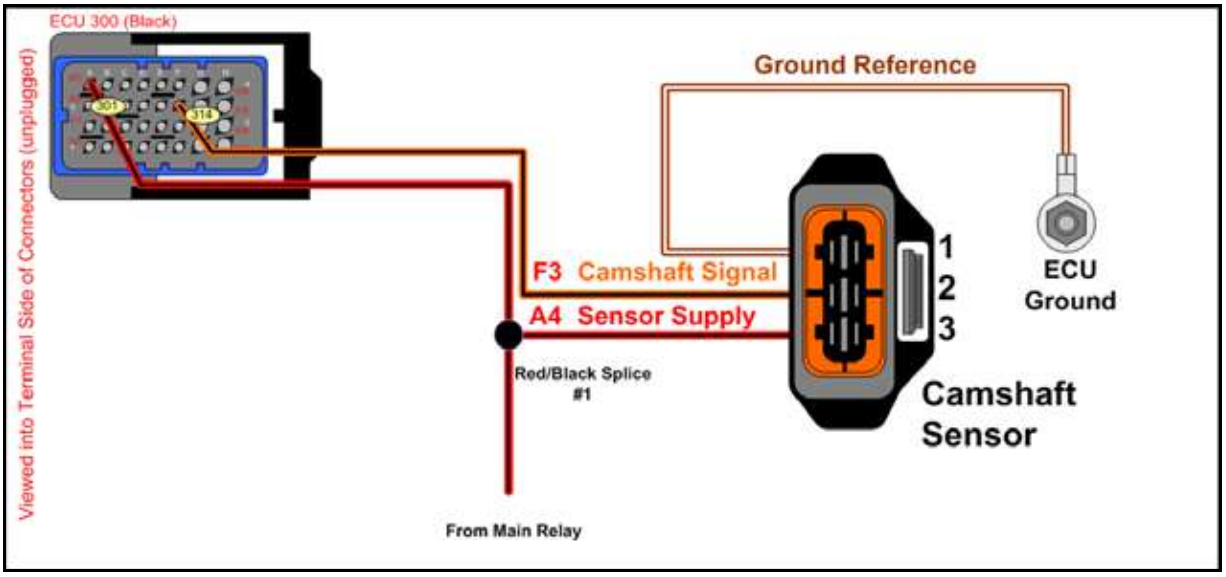


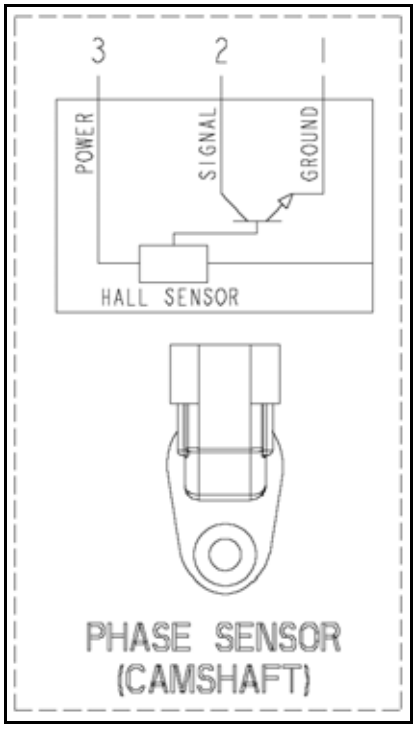


Camshaft Phase Sensor Circuit

The camshaft phase sensor is a Hall Effect type sensor that tells the ECU the position of the MAG-exhaust rocker arm. With this information, the ECU knows the position of the camshaft and thus, which cylinder is on its compression stroke. If the sensor is damaged or inoperable, there a 50/50 chance of starting the engine each time the key is turned to start.

The sensor is located on the exhaust-side of the valve cover over the MAG cylinder.

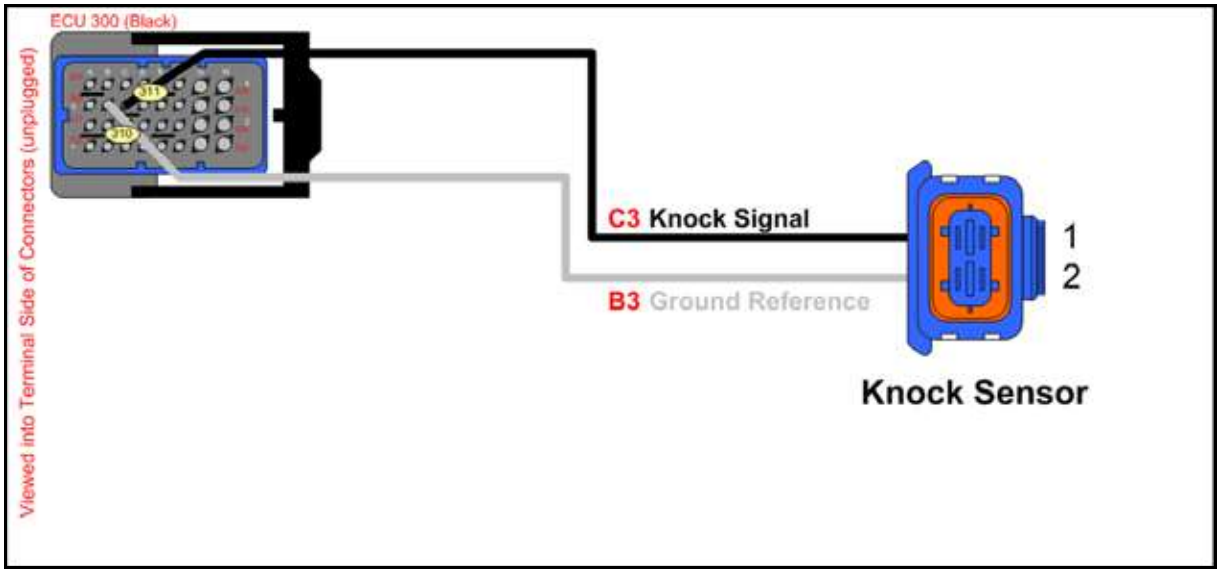


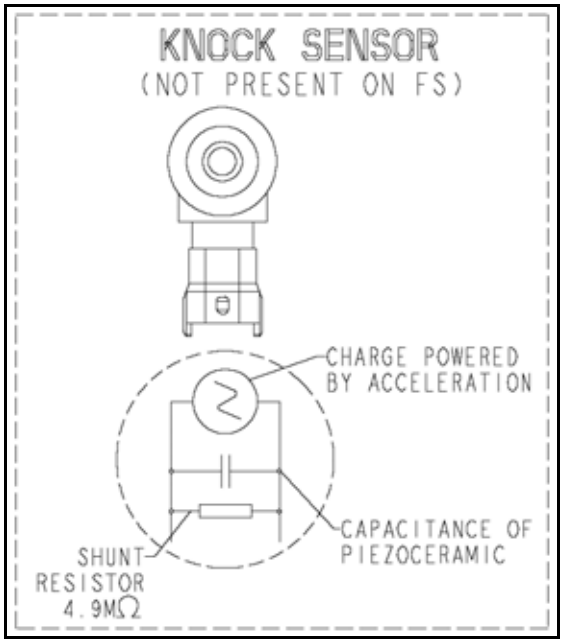


Knock Sensor Circuit (FST Only)

The knock sensor is a piezoceramic type sensor that transforms the internal engine acoustic information into an electrical signal. The ECU uses this information to determine the level of combustion knock inside each cylinder.

The knock sensor is located on the intake-side of the engine underneath the water outlet manifold.



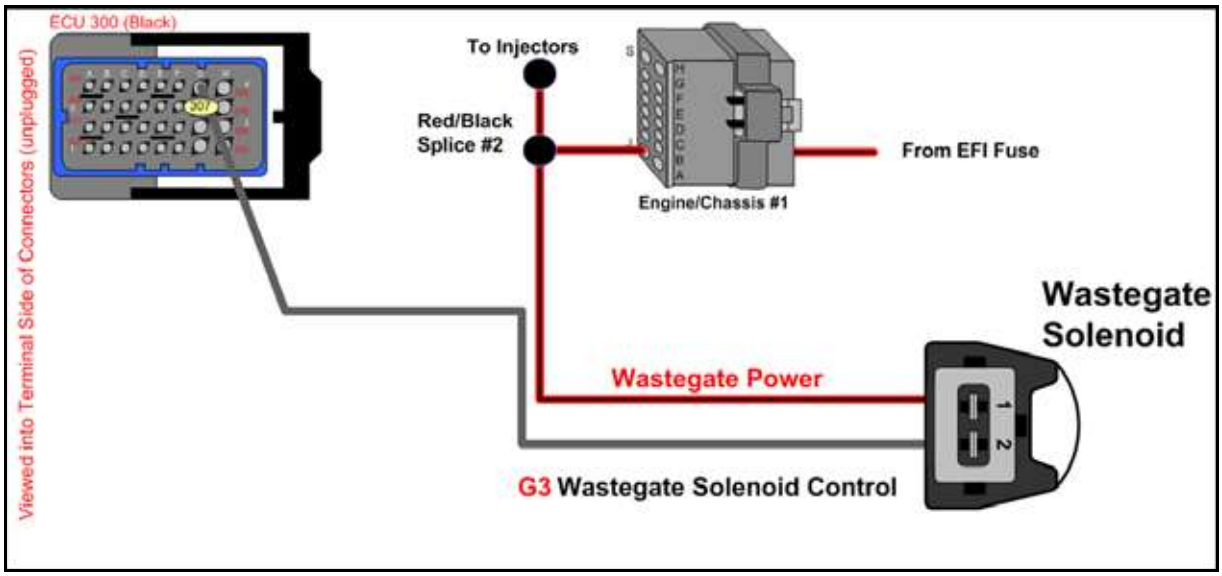


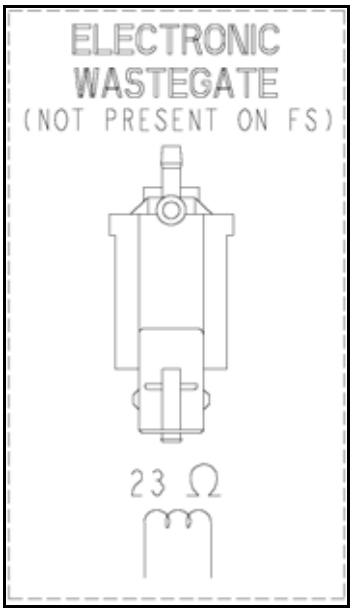
Wastegate Solenoid Pulse Valve Circuit (FST Only)

The wastegate solenoid pulse valve allows the ECU to control the amount of boost pressure within the induction system. Boost control is accomplished by pulsing the valve at different frequencies depending on the amount of boost pressure within the induction system. If the ECU determines that the targeted boost pressure has been obtained, the ECU will trigger the pulse valve so that a certain level of compressor pressure is routed to the wastegate actuator. Doing so activates the wastegate so that a proportion of exhaust gas bypasses the turbine.

In the event that power to the wastegate solenoid is lost, the solenoid defaults so that all of the compressor pressure is routed to the wastegate actuator. When this occurs, maximum boost pressure will be limited to the wastegate's internal spring pop-off pressure of 6 - 6.5 lbs. (413 - 448 milliBAR)

The wastegate solenoid is located on the front of the air box next to the turbocharger.

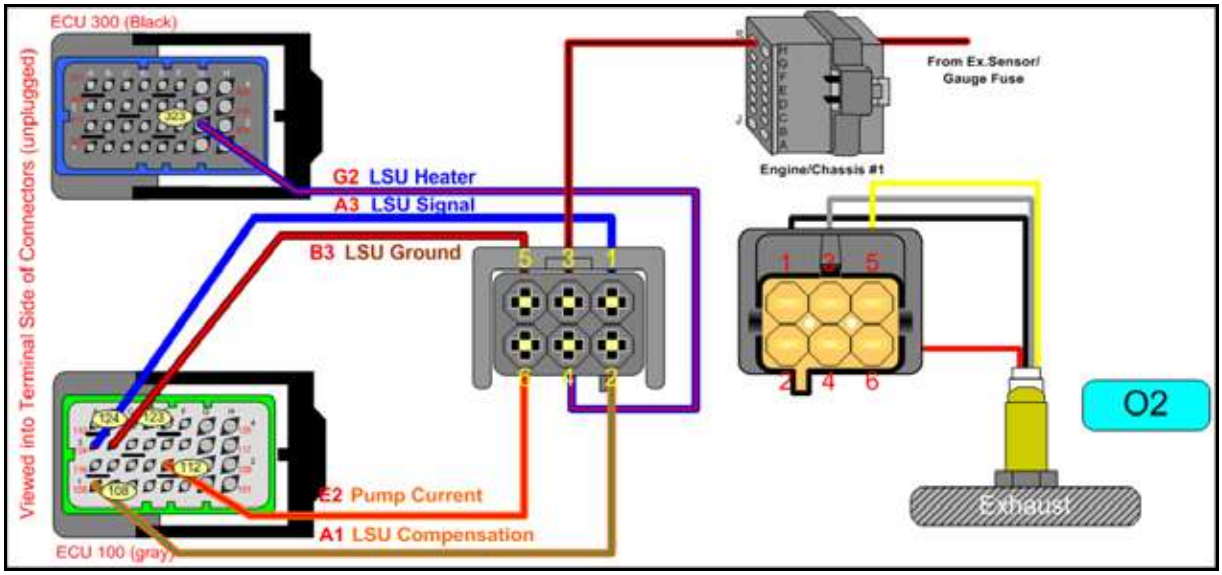


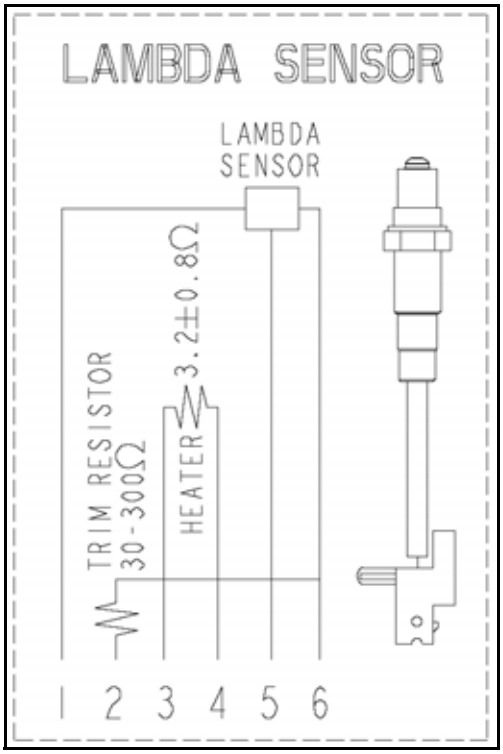


Wide Band Lambda Sensor Circuit

The wide band lambda sensor (O2) is responsible for measuring the amount of oxygen within the exhaust stream and the actual deviation from lambda = 1. A heater element within the sensor allows the sensor to quickly reach the desirable sensor operating temperature after the engine is started.

The lambda sensor is located on the exhaust pipe after the turbocharger on FST models. On FS models, the sensor is located on the manifold. It is important not to contaminate the sensor probe with engine coolant or solvents.

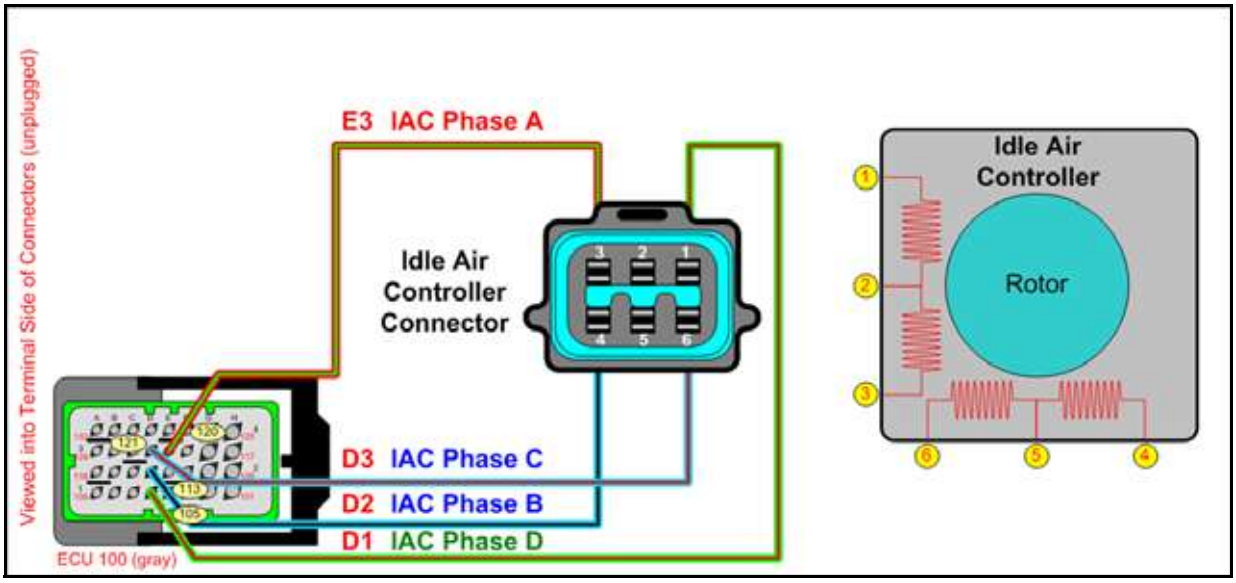


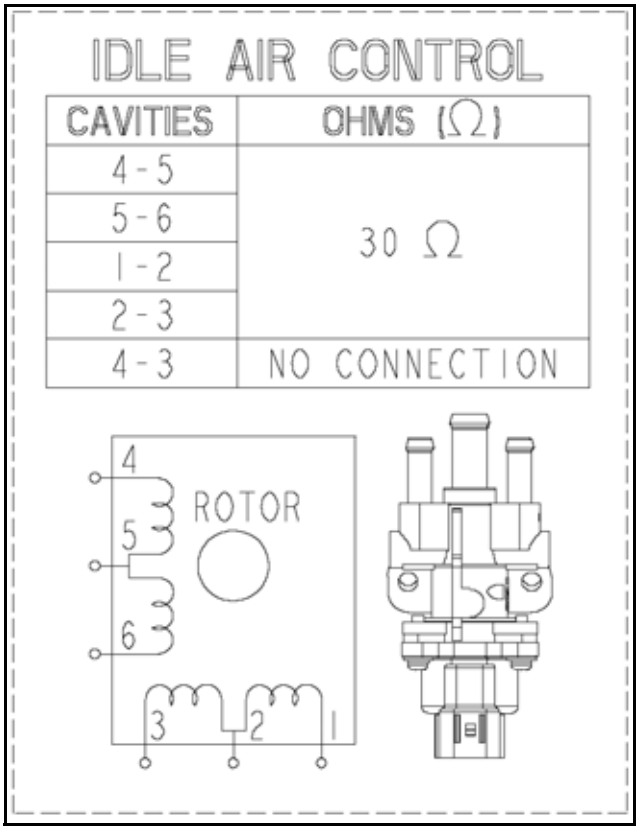


Idle Air Control Actuator Circuit

The idle air control actuator (IAC) is a stepper motor that varies the amount of air bypassed around the throttle plates when the engine is idling. The IAC allows the ECU to compensate for changes in ambient temperature, altitude and engine temperatures without having to re-set the throttle plate gap.

The IAC is located underneath the console. Two hoses attach to the throttle body, while one large hose connects to the airbox on the FST. FS models has two hoses attached to the throttle body with a foam filter on the IAC inlet..

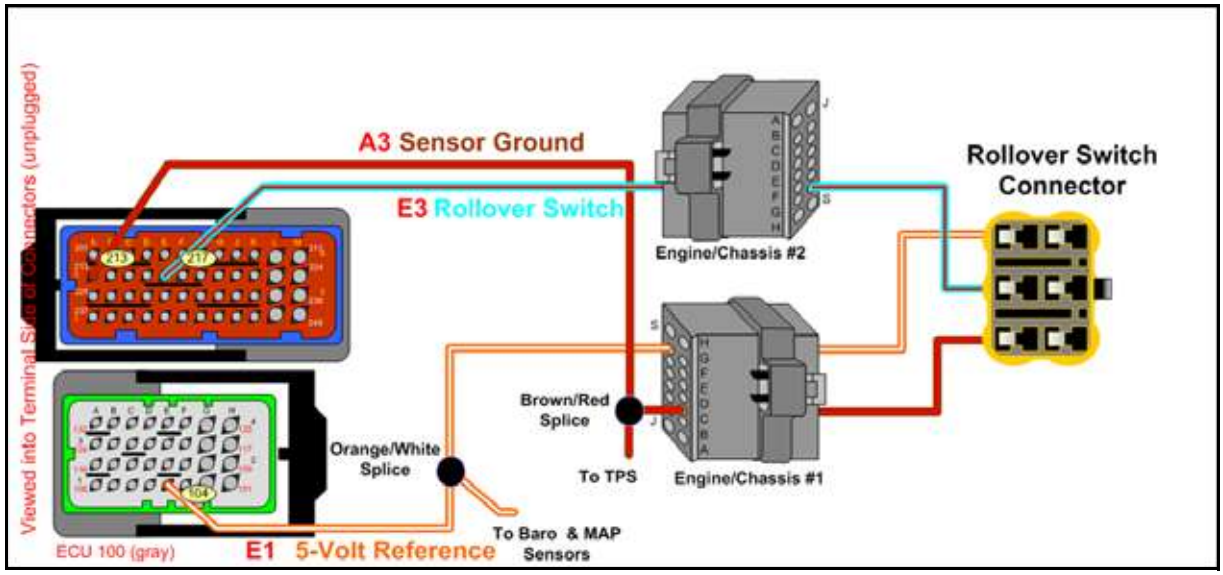




Roll Over Sensor Circuit

The roll over sensor or “tilt switch” is a Hall Effect type sensor that tells the ECU when the vehicle has rolled more than 65 degrees left or right. The arrow and “UP” labels on the sensor must be followed as sensor orientation is critical to proper operation.

The sensor is located on the bulkhead in the right-front nose of the snowmobile.

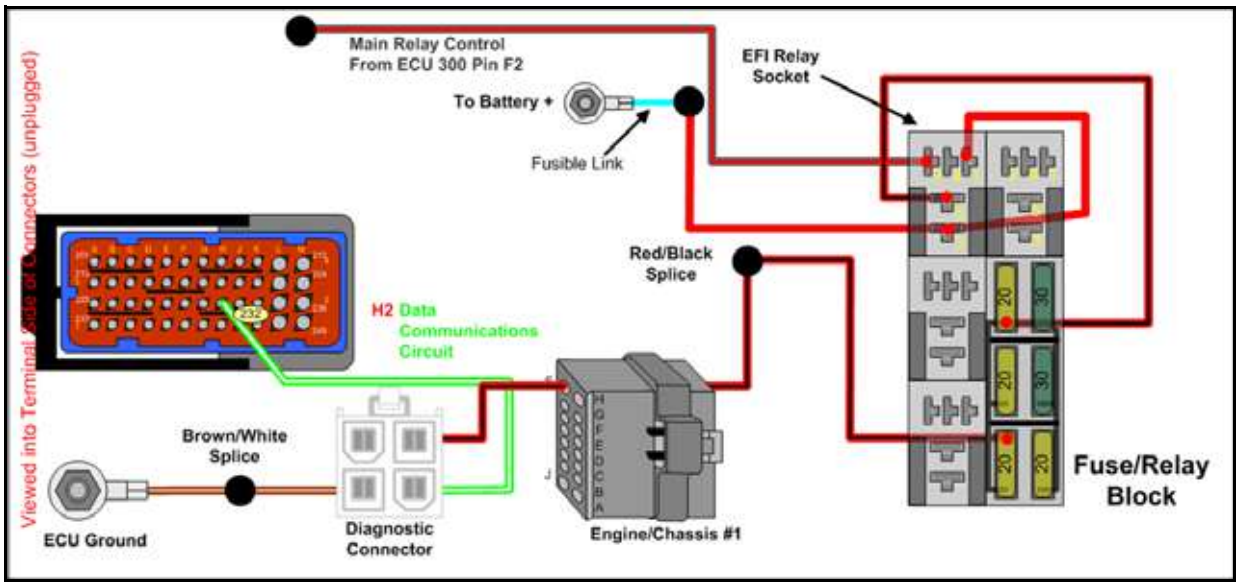


Diagnostic Communications Circuit

The diagnostic connector allows a technician to connect the Digital Wrench diagnostic software to the ECU. The connector is located underneath the console.

The ECU will go into a diagnostic mode when the diagnostic software is connected to the system and stay awake for ten minutes. The key switch must be turned to the "start" position with the safety slap switch down to re-fresh the ECU data information and to extend the diagnostic on-time mode.

When connected, the laptop or PC supplies power to the fuse panel.



Digital Wrench Diagnostic Cable Connection

1. Verify the safety slap switch is down.
2. Connect the communication cable, PN PU-47151, to the four-pin (WHITE) diagnostic connector. The connector is located under the steering loop bracket in the engine compartment.
3. Start the Digital Wrench diagnostic software program.
4. Verify that the correct snowmobile has been picked (Model year as well as FS or FST) using the "CHOOSE VEHICLE" button.
5. Turn the ignition key to the "START" position and release. Communications between the ECU and software should initiate.

NOTE: The ECU will remain active for approximately two minutes when the diagnostic cable is connected to the system. After two minutes, the key will have to turned to the "START" position momentarily to re-establish communication and re-fresh the data stream. To bypass the shut down mode, install the ignition switch jumper tool, PN PS-48463

Ignition Switch Jumper Tool

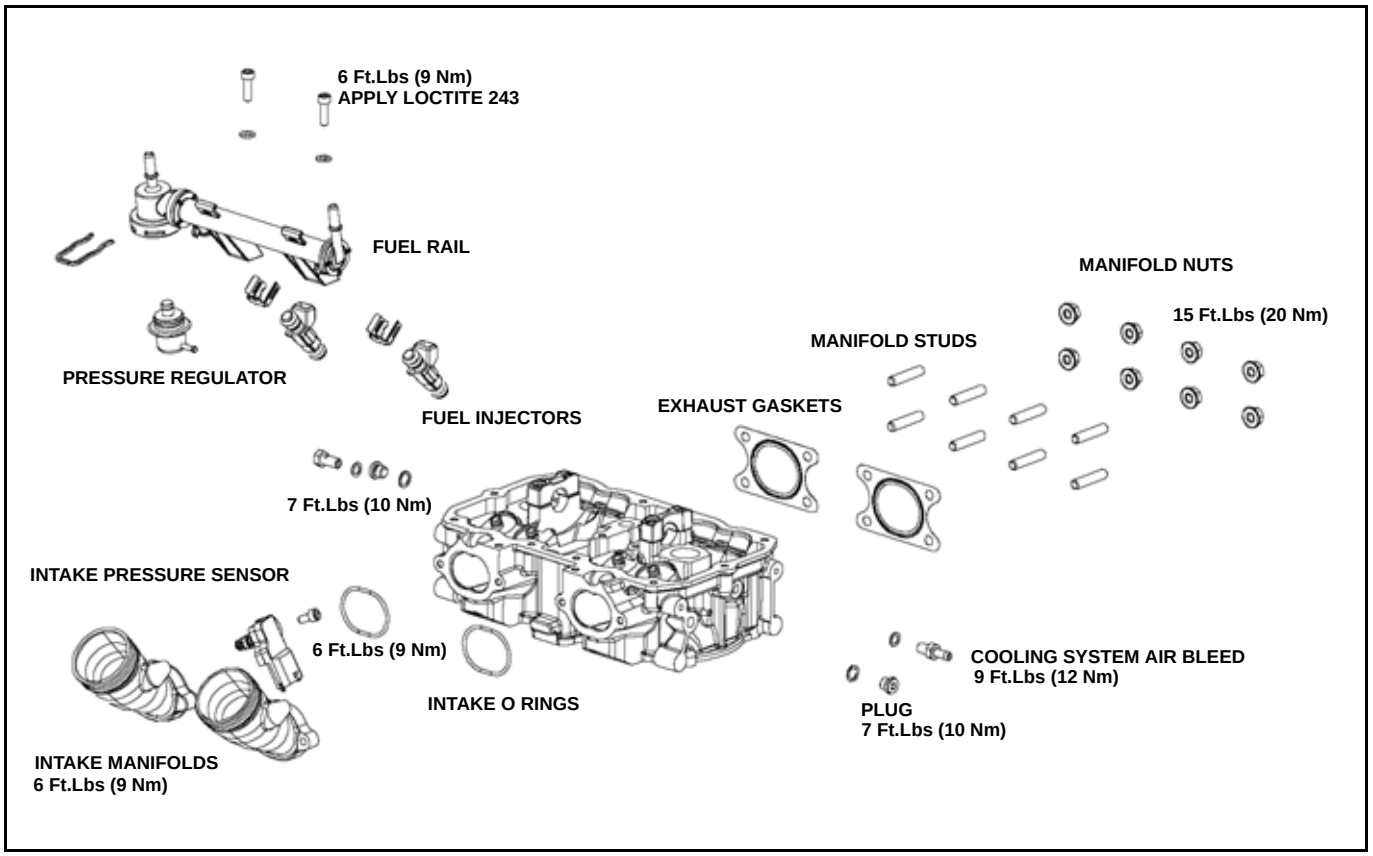
CAUTION

Pulling up on the safety slap switch when the jumper is installed on the ignition switch connector will initiate the START command and engage the starter motor.

1. Carefully remove the ignition switch harness connector from the switch.
2. Verify the safety slap switch is DOWN.
3. Install the PS-48463 jumper.

NOTE: The ECU will remained powered as long as the jumper is installed. When finished, always remember to remove the jumper, and reconnect the ignition switch connector!

Fuel Rail / Intake / Exhaust Cylinder Head Components



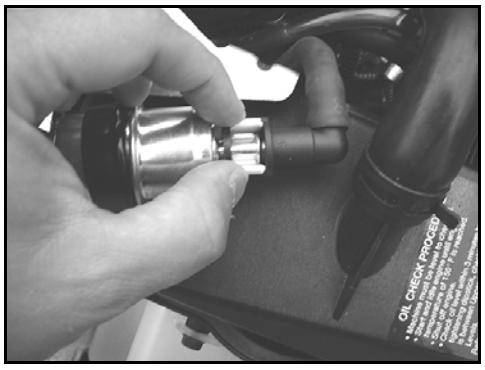
Posi-Lock Fuel Hose Connectors

⚠ CAUTION

Failure to properly remove and install a fuel hose may cause fuel to leak from the fitting.

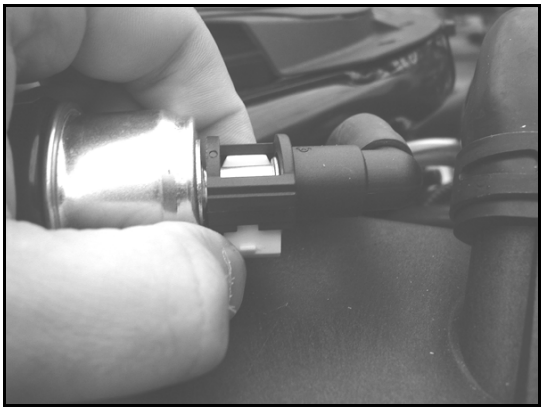
To disconnect a Posi-Lock connector from a fitting:

1. Press the connector tabs inwards, then push the lock out.
2. Wrap the connector and fitting with a clean shop towel.

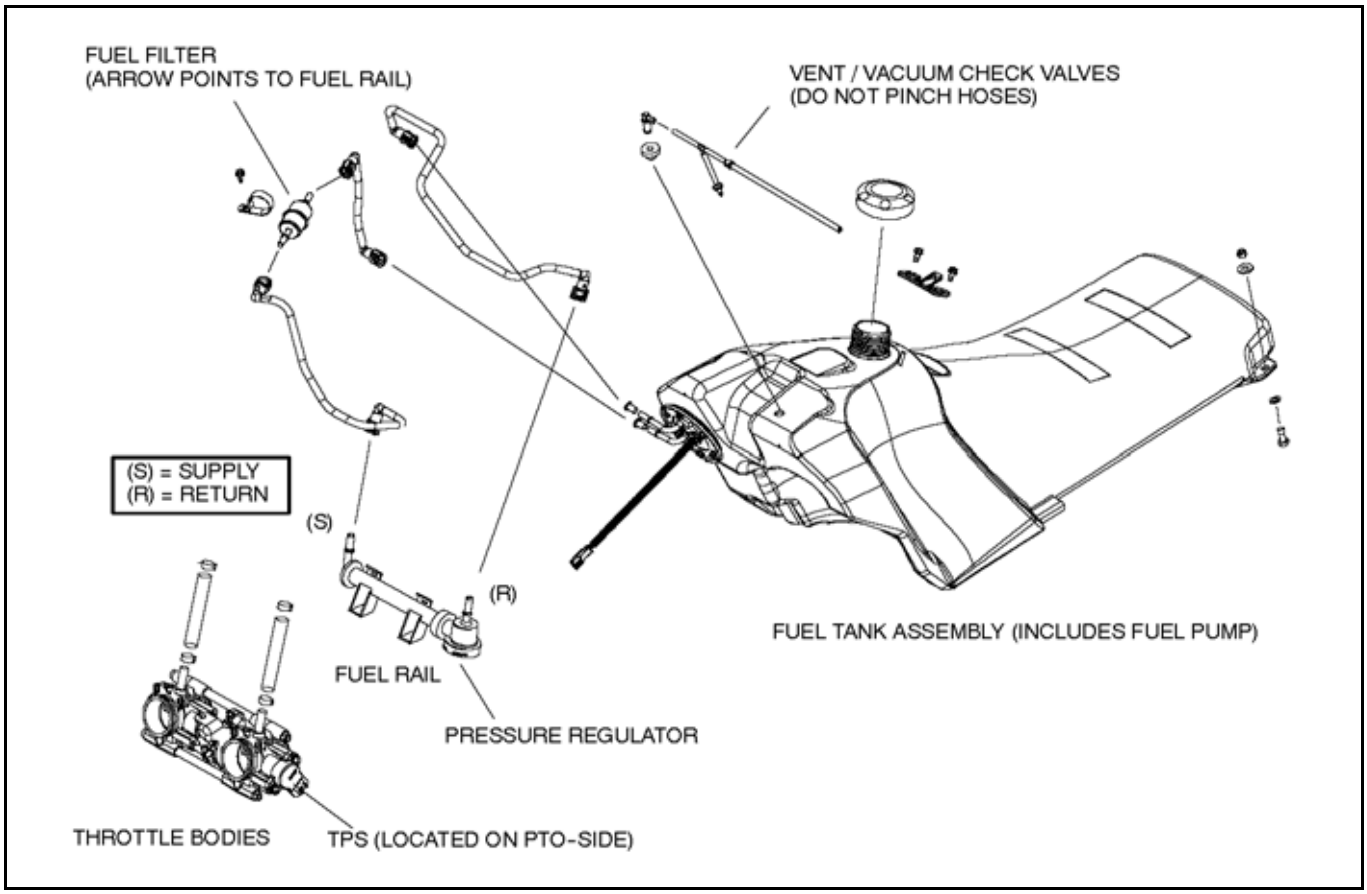


To reinstall a Posi-Lock connector:

1. Slide the Posi-Lock connector onto the fitting past the flange until an audible “click” is heard.
2. Engage the tab behind the flange. Carefully pull the connector to verify it is securely attached.

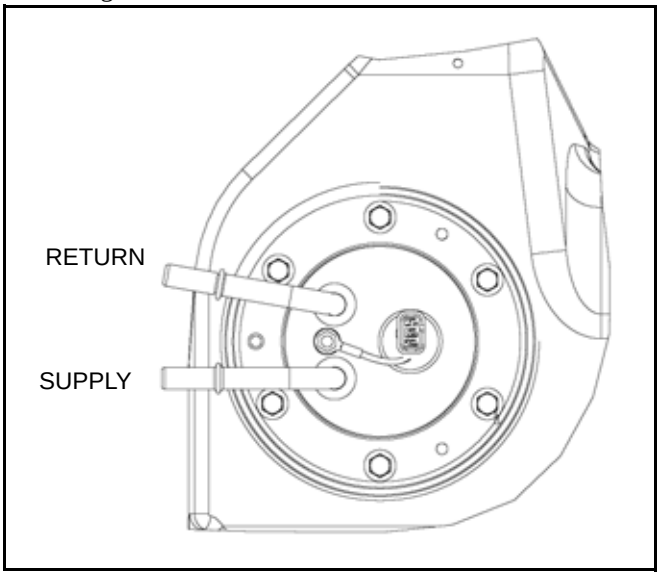


2006 Fuel Tank / Fuel Supply



2006 Fuel Pump Supply / Return Fittings

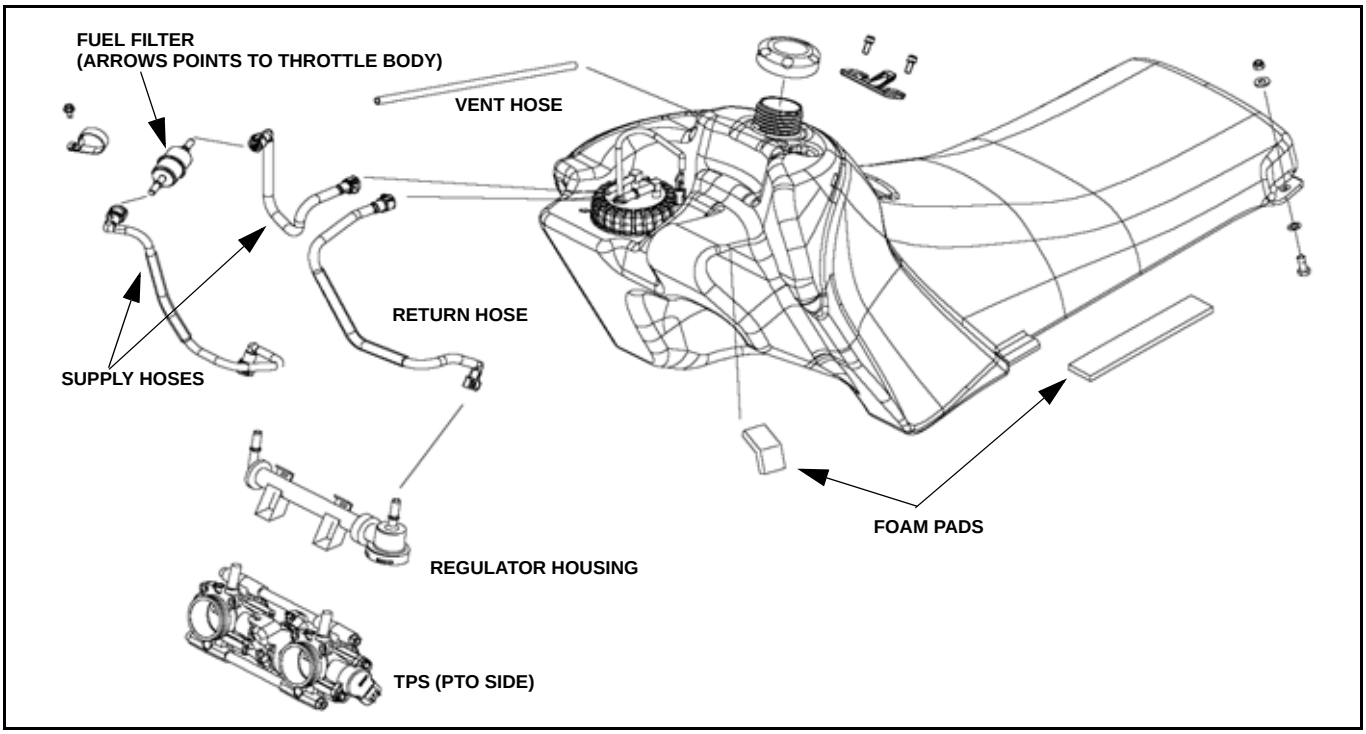
Install the fuel pump supply and return hoses to the correct fuel tank fittings.



2006 Pump / Sender Specifications

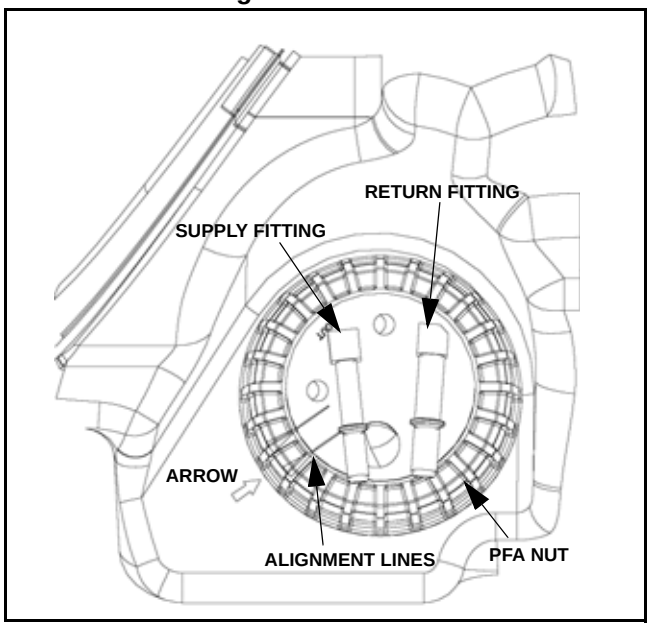
	Ω Resistance	Pins	Color	Function
Full	3.0 +/- 5	A	Red	Pump PWR
Empty	90 +/- 20	B	PUR/WHT	Sender
		C	Brown	Ground

2007 Fuel Tank / Fuel Supply



2007 Fuel Supply / Return Fittings

NOTE: Align pump flange so that the arrow is between the two alignment lines.



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PFA Nut Torque
21 Ft.Lb. (28 Nm)

2007 Pump / Sender Specifications

	Ω Resistance	Pins	Color	Function
Full	≤ 8	A	Red	Pump PWR
1/2	40.7 +/-1.5	B	WHT/BLU	Sender
Empty	91.5 +/- 1.5	C	Black	Ground

Fuel Pump Replacement (Drop-In Style)

WARNING

2006 models do not feature the drop-in style fuel pump. Do not attempt to remove the fuel pump from a 2006 model.

1. Siphon the fuel out of the fuel tank into a suitable container.
2. Remove the console and the seat assembly.
3. Disconnect the positive (+) battery cable from the battery.
4. Remove the fasteners securing the fuel tank to the tunnel.
5. Remove the fuel supply and return hoses from the top of the tank. Reference the Posi Lock Connector information in this chapter.
6. Disconnect the wiring harness, then remove the tank from the snowmobile. Place in a well-ventilated area.

7. Using the PFA spanner wrench (PS-48459-1) and nut socket (PS-48459-2), carefully remove the PFA nut.
8. Carefully extract the PFA out of the tank making sure the float and fuel hoses do not become kinked or bent.
9. Remove the old gasket and destroy.

⚠ WARNING
Never re-use a used PFA gasket.

10. Clean the tank's gasket mating surface with Isopropyl Alcohol. Allow the surface to dry completely.
11. Install a new gasket ensuring the inside portion of the gasket hooks onto the bead on the inside diameter of the neck.
12. Remove any containments from the gasket with Isopropyl Alcohol.
13. Carefully drop the PFA back into the tank. Push the float assembly against the hoses to fit it into the hole.
14. Hand tighten the PFA nut keeping the arrow between the PFA alignment marks.
15. Using the PFA spanner wrench and nut socket (PS 48459-1 and -2), tighten the PFA to specification.

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PFA Nut Torque = 21 Ft.Lbs. (28 Nm)

16. Fuel tank installation is the reverse of removal. Always test the PFA gasket seal before tank installation by performing a pressure check.

Fuel Tank Pressure Test

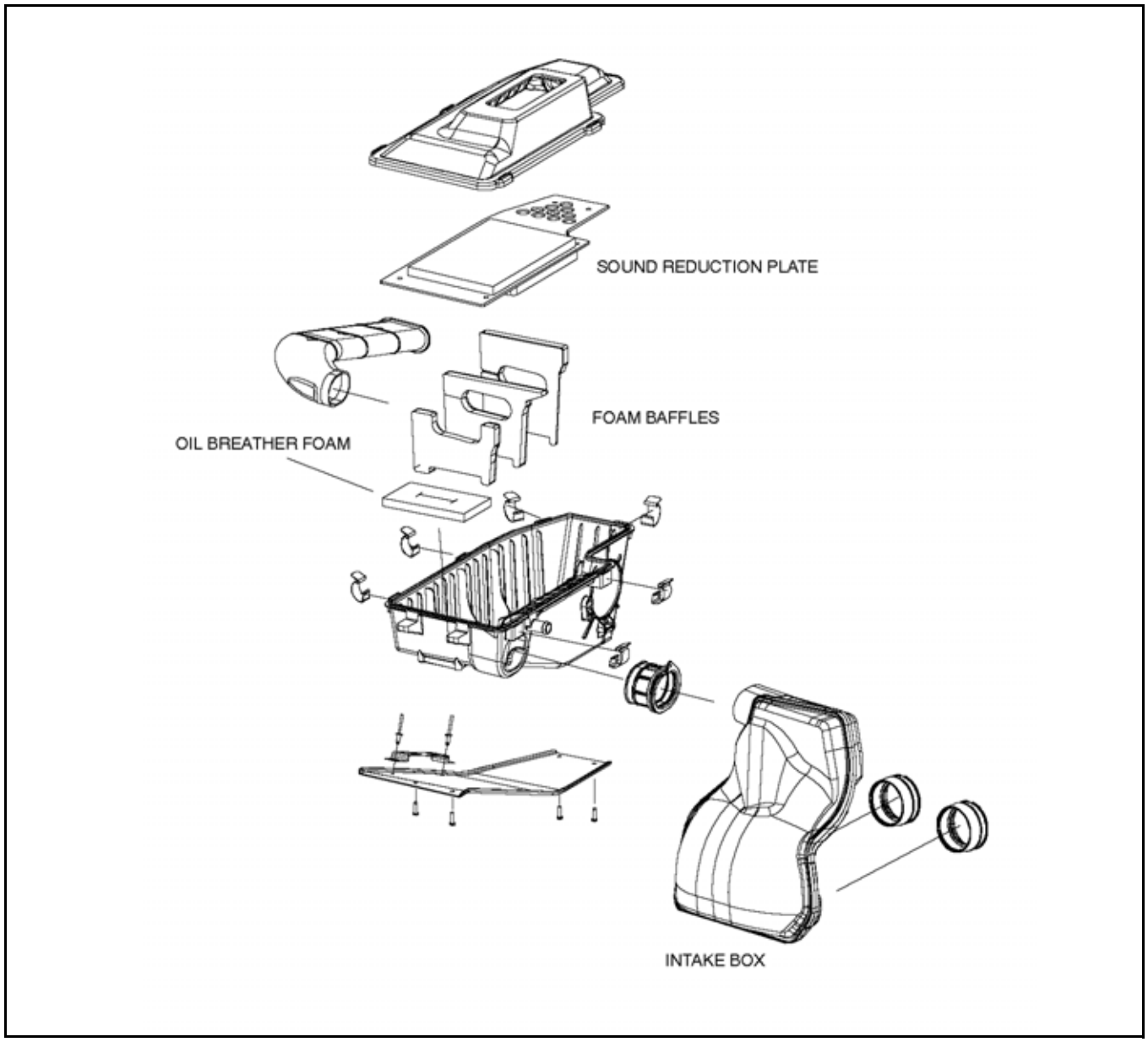
1. Connect a Mity Vac hand pump to the fuel tank vent fitting. Seal the fuel supply and return fittings.
2. Pressurize the tank to 5 PSI.

⚠ WARNING
Do not over-pressurize the fuel tank past 6 PSI.

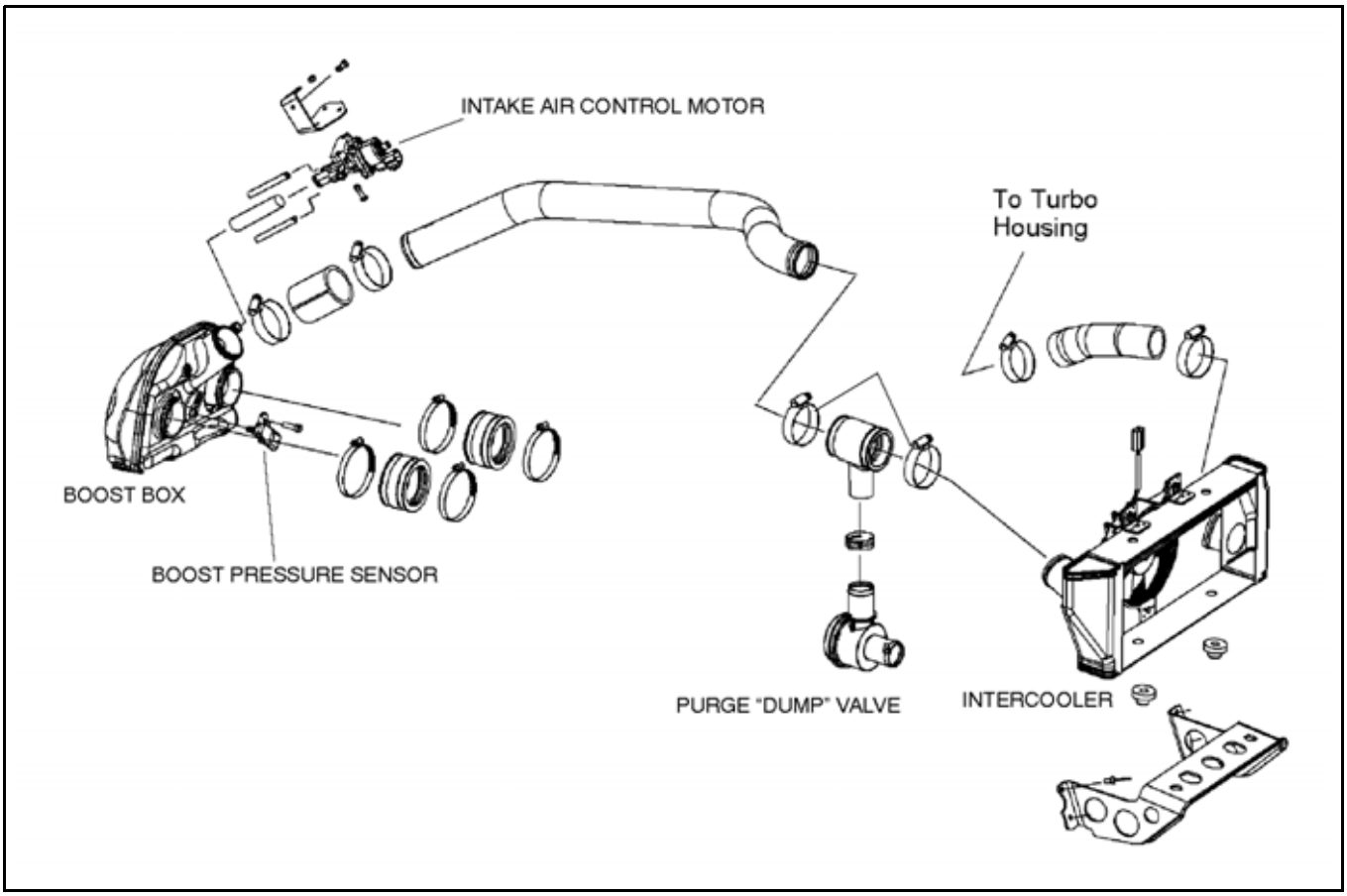
NOTE: Using a hand pump to pressurize the fuel tank may take a very long time. The installation of an inline Schrader Valve (PN: 2872602) and the use of a low pressure pump (bicycle tire pump) is recommended.

3. Once the tank is pressurized, spray the area around the PFA gasket with a mixture of water and mild detergent.
4. If any bubbles form, re-check the PFA nut torque. If bubble formation continues, the PFA gasket will have to be replaced, or tank replacement is required.

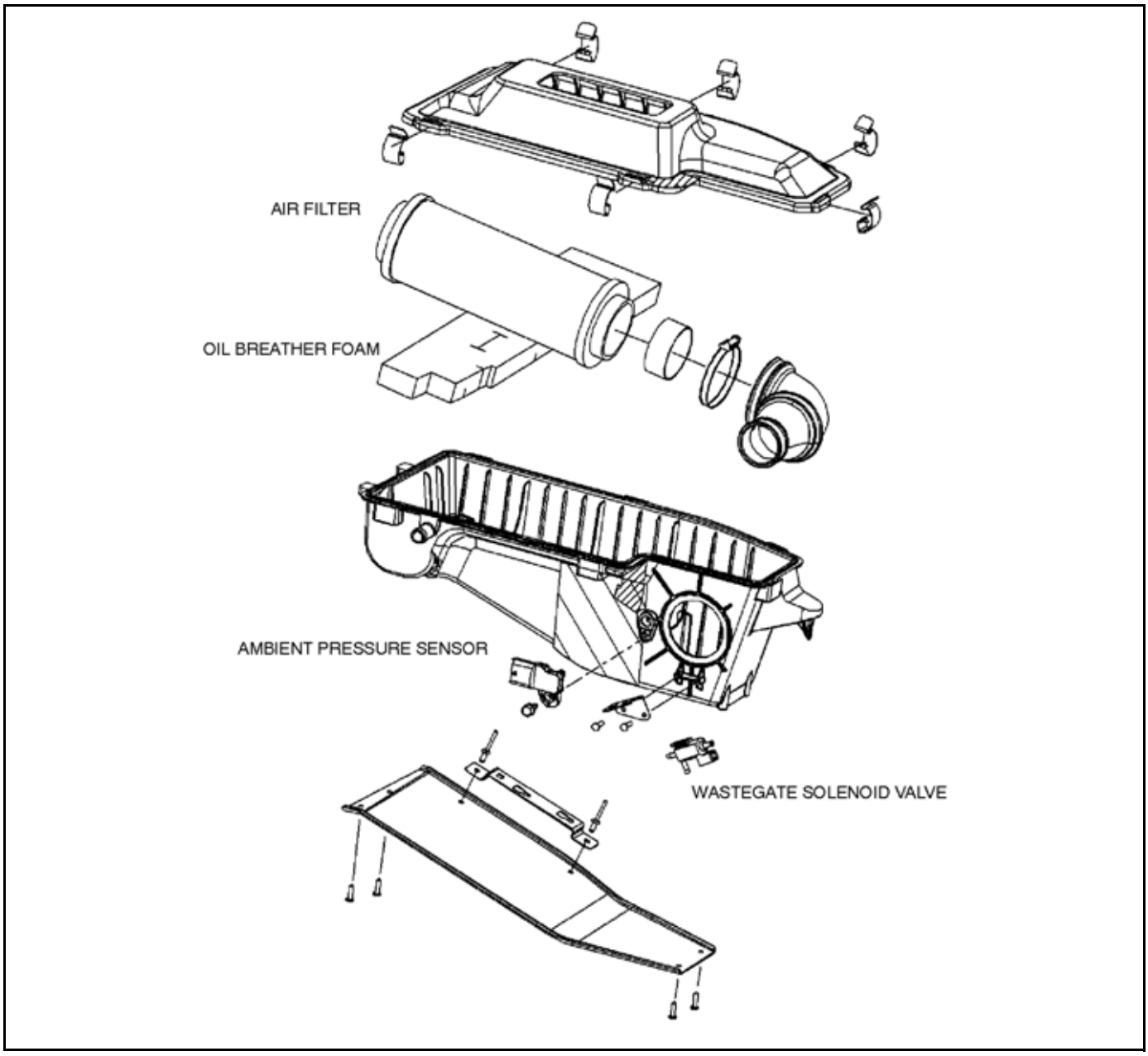
FS Induction System



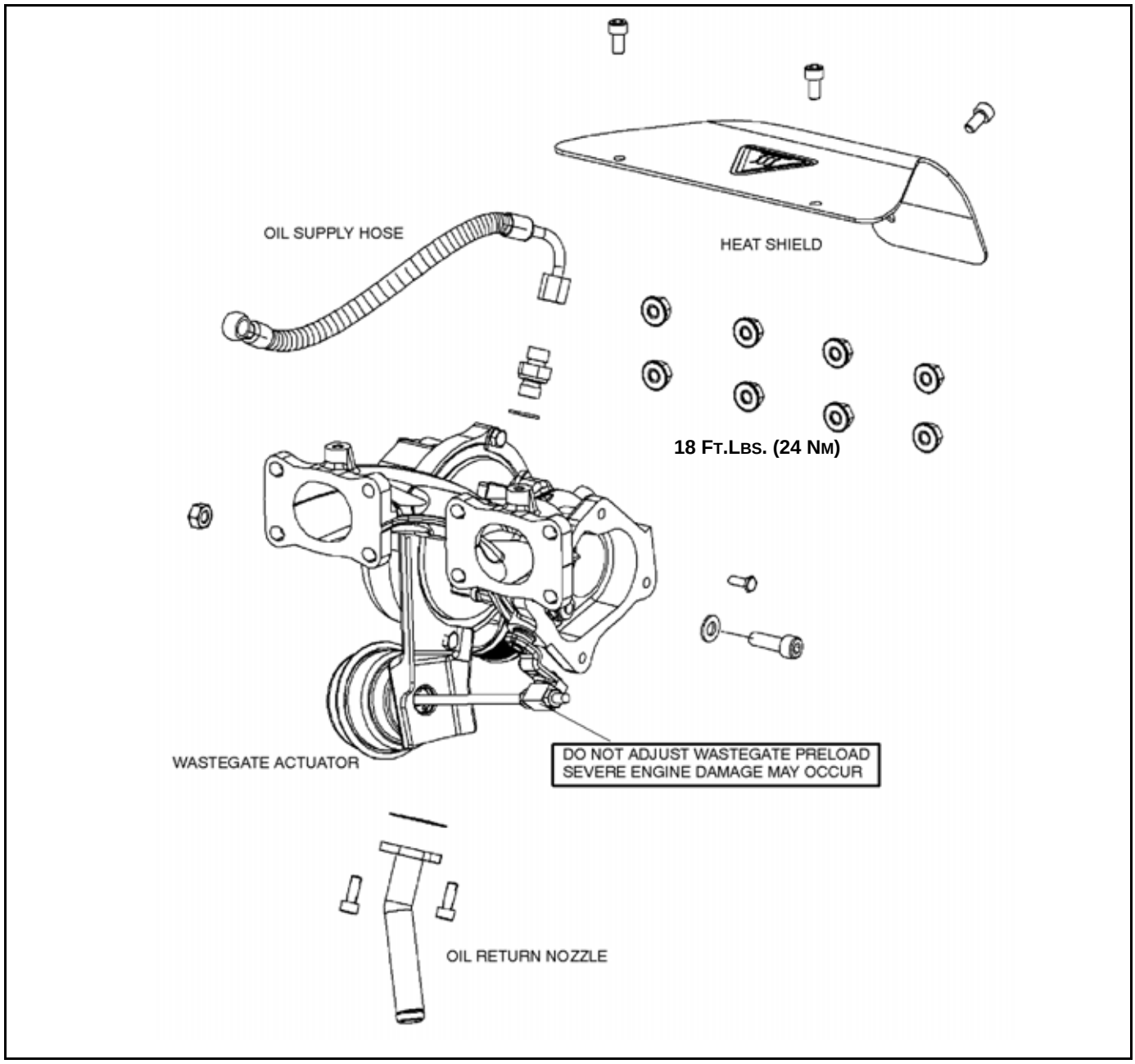
FST Induction System



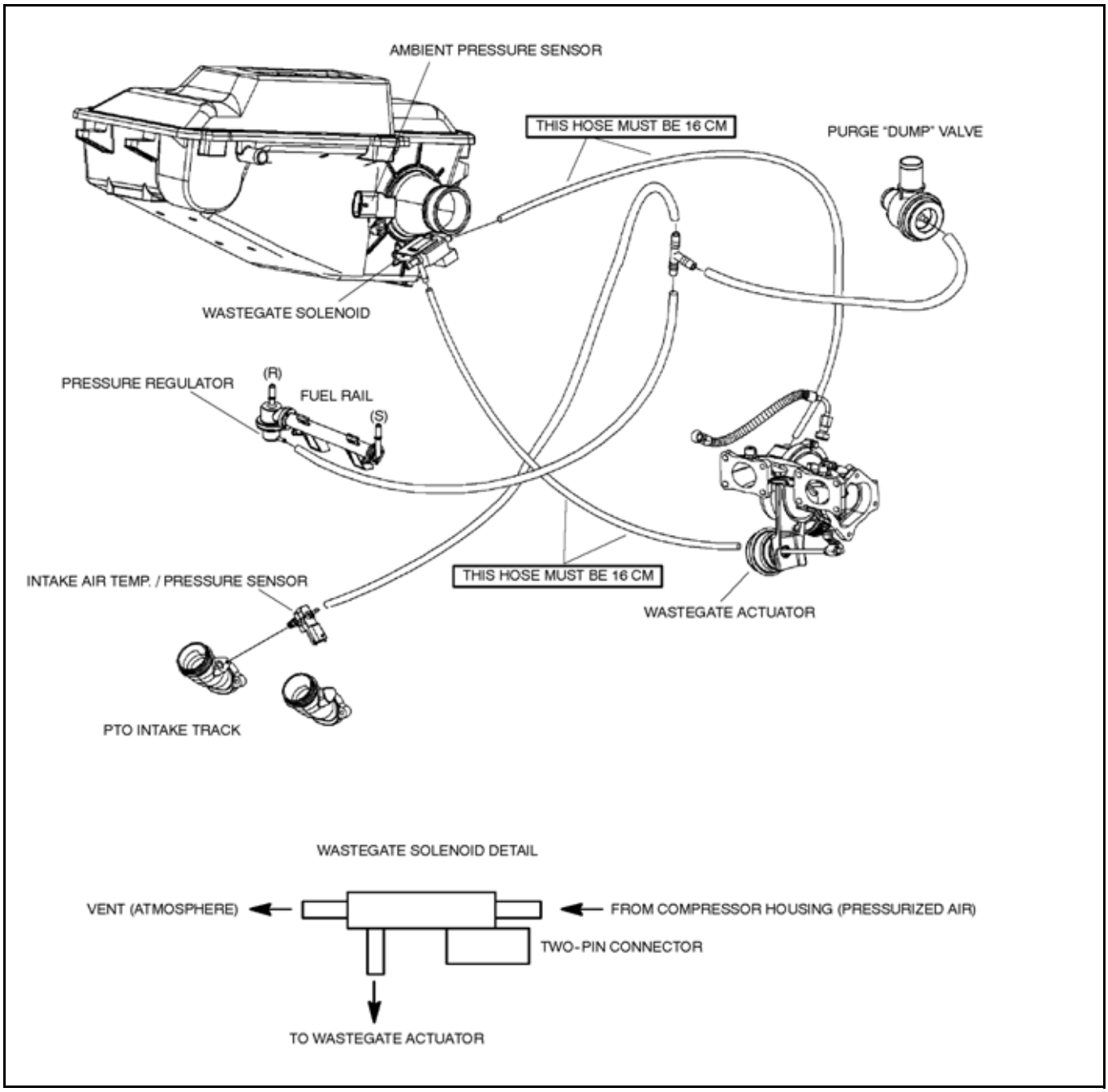
FST Airbox


AIR FILTER
OIL BREATHER FOAM
AMBIENT PRESSURE SENSOR
WASTEGATE SOLENOID VALVE

Turbocharger Assembly



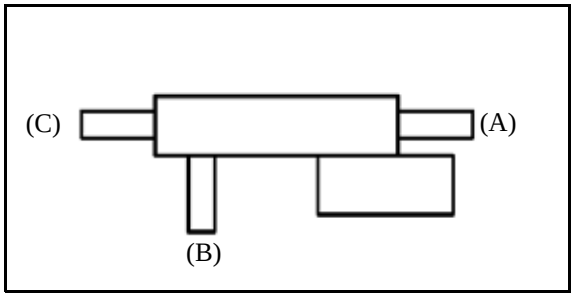
FST Boost / Vacuum Reference Hose System



Wastegate Solenoid Pressure Testing

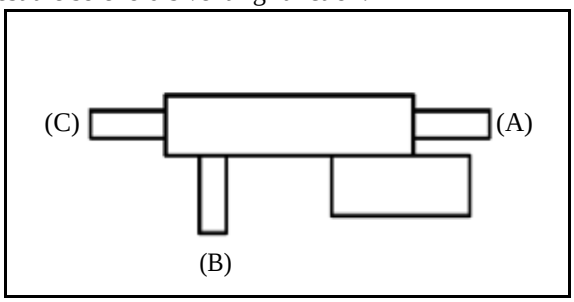
The wastegate solenoid allows the ECU to control the amount of boost pressure routed to the wastegate actuator. In the event where power to the solenoid is lost, the solenoid defaults so that all of the boost pressure generated by the turbocharger is routed to the wastegate actuator.

To test the solenoid's function:



1. Connect a Mity Vac™ tool to nozzle (A).
2. Apply pressure to the solenoid with the Mity Vac™ hand pump.
3. Air should exit nozzle (B). No air should escape at (C). Replace solenoid if functions do not pass test.

To test the solenoid's venting function:



1. Apply 12 Vdc to the electrical connector. An audible "click" should be heard when voltage is connected and disconnected. Replace solenoid if "click" is not heard.
2. Apply pressure to (B) using a Mity Vac™ hand Pump.
3. Air should exit the (C) nozzle. No air should exit (A). Replace solenoid if function does not pass test.

Wastegate Actuator Pressure Testing

The wastegate actuator is a mechanical device that houses a bellows, pre-load spring, and actuator arm. The wastegate actuator is responsible for opening and closing the turbocharger's internal wastegate door. When the door is closed, all of the engine's exhaust gases are routed to the turbine. This action increases turbine speed and boost pressure. When the door is opened, some exhaust gas is allowed immediately exit into the exhaust system, bypassing the turbine. This action decreases turbine speed and boost pressure.

⚠ CAUTION

Do not tamper with the length of the actuator arm. The factory setting is critical to engine performance. Changing the length may cause poor engine performance or severe engine damage.

To test the wastegate actuator's function:

NOTE: Verify the condition and that the length of the hose connected to the compressor housing and wastegate solenoid and the hose connected to the wastegate solenoid and wastegate actuator are 16cm.

1. Attach a Mity Vac™ hand pump to the inlet nozzle on the top of the actuator housing.
2. Apply pressure.
3. The actuator arm should begin moving at 6 - 6.5 psi.(41 - 45 kPA)

Turbocharger Inspection

WARNING

The turbocharger / exhaust system generates extreme heat and house rotating parts which can cause severe injury and burns. Never touch any part of the turbocharger / exhaust system while the engine is running or until the engine has been shut off and been allowed to sufficiently cool. Do not allow objects such as clothing, hair or body parts to come into contact with or enter the compressor or turbine housing while the engine is running.

The turbocharger uses the energy of expanding exhaust gases exiting the engine to power a turbine and compressor. Intake air is drawn into the compressor impeller and pre-compressed before entering the combustion chamber. The intake compressor is connected by a common shaft with the exhaust turbine. The shaft's bearings are lubricated with engine oil. The turbocharger on the FST is not liquid-cooled. Maximum turbine / compressor RPM can reach 200,000 RPM.

Because of the precise manufacturing tolerances and shaft balancing, turbocharger disassembly is never recommended. Never attempt to remove carbon build-up from the turbine blades.

Replace the turbocharger assembly when:

- Damage to the compressor and/or turbine blades is found.
- The turbine/compressor shaft seal failure (Burning oil)
- The turbocharger makes a "howling" or "whining" sound when engine RPM is increased or decreased. (Bearing failure or compressor / turbine blade damage)

Charge Air Cooler (Intercooler) Inspection

The charge air cooler (CAC) is responsible for removing the heat created by compressing the intake air charge. Removing heat from the intake air charge creates a denser charge with more oxygen molecules. This action increases power and decreases the chance for pre-ignition.

Replace the CAC when:

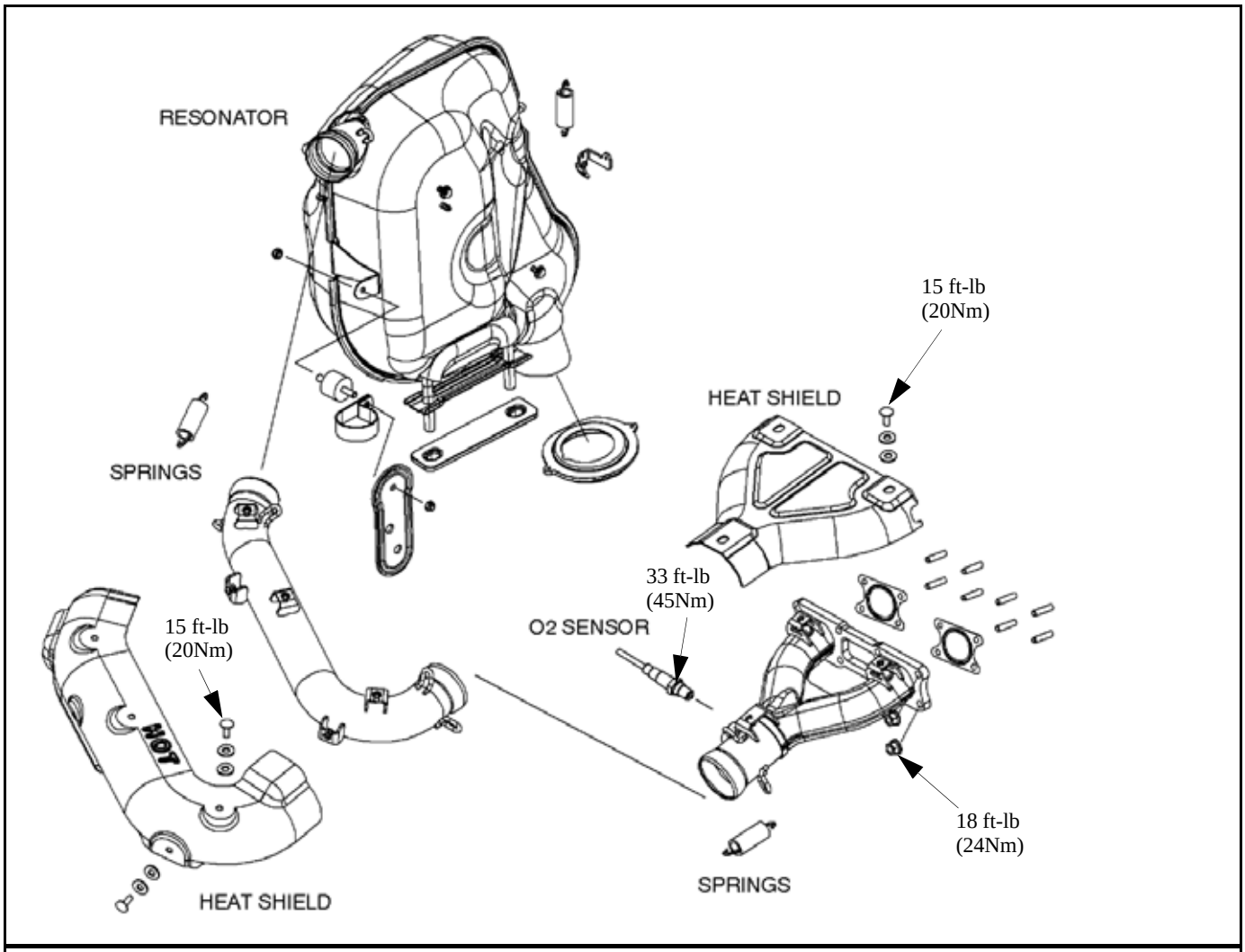
- Damage to the fins or core is found.
- The CAC leaks or is plugged with foreign material.

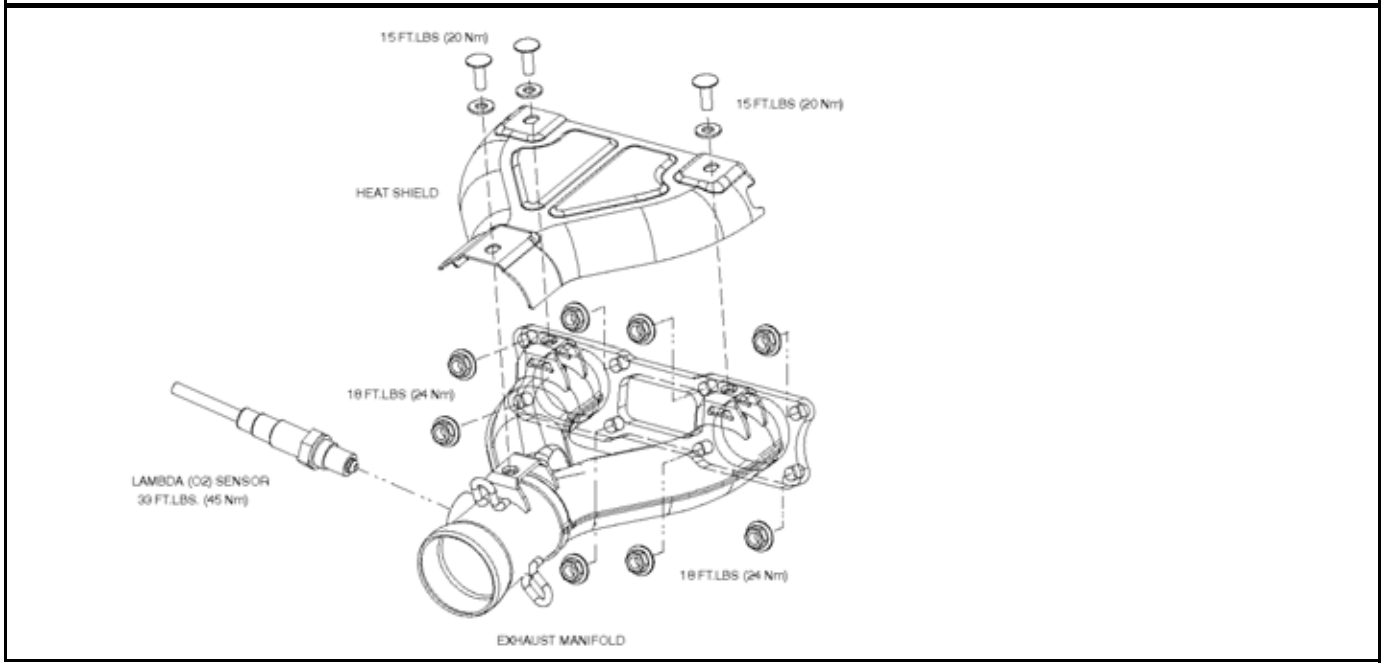
Boost / Vacuum Reference Hose System (FST)

The reference system routes either boost or vacuum from the port on the PTO intake track to the fuel pressure regulator and purge valve. It is critical for engine performance that these hoses are securely connected and not compromised (leaking or kinked). A blocked, leaking or kinked reference hose may cause an overboost trouble code.

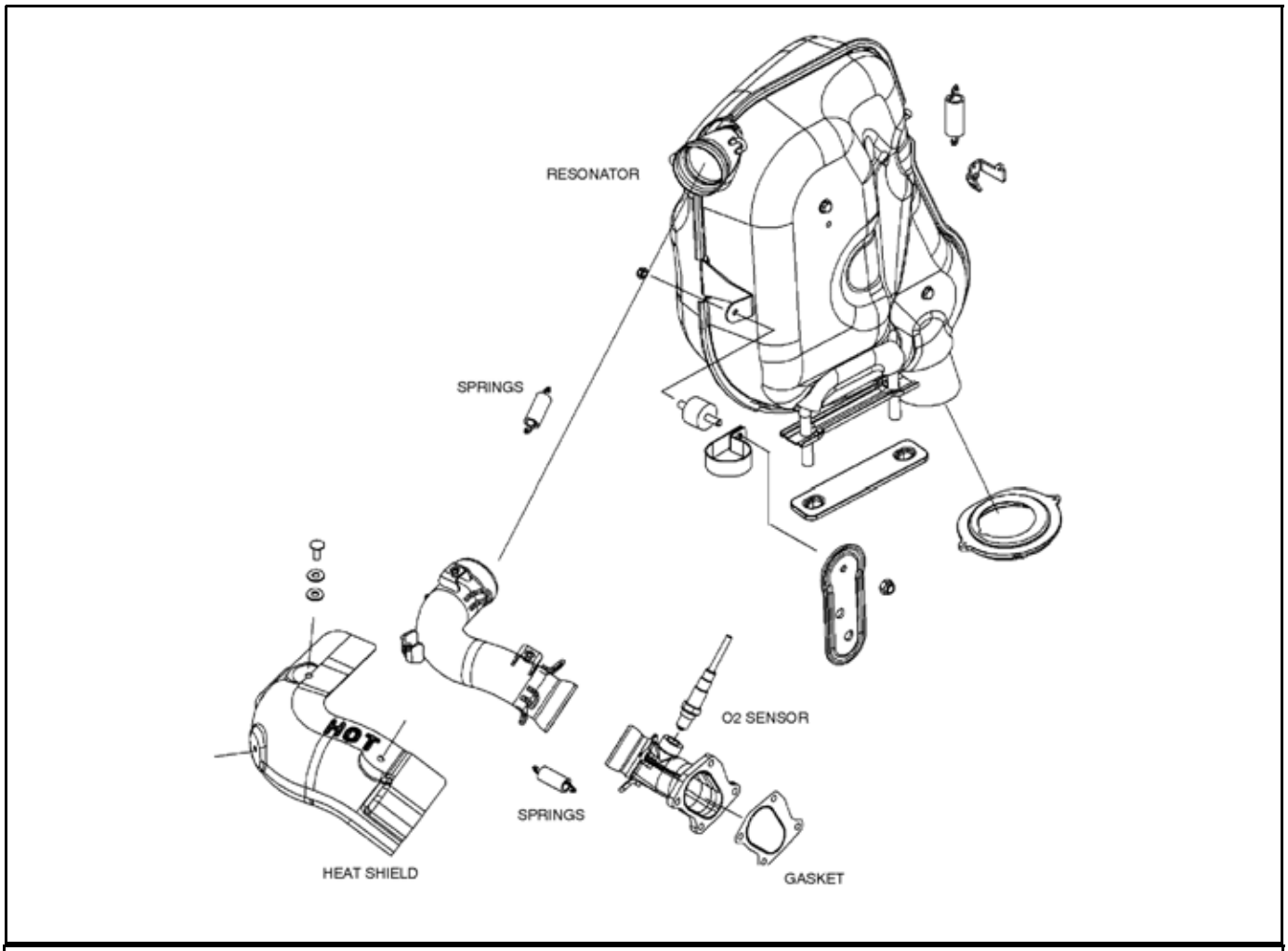
A mechanical boost / vacuum gauge can provide better detail than the boost gauge on located on the MFD gauge. When installing a mechanical boost / vacuum gauge, replace the three-port tee connector in the reference hoe system with a four-port tee connector of the same size. Always verify that each hose is securely connected.

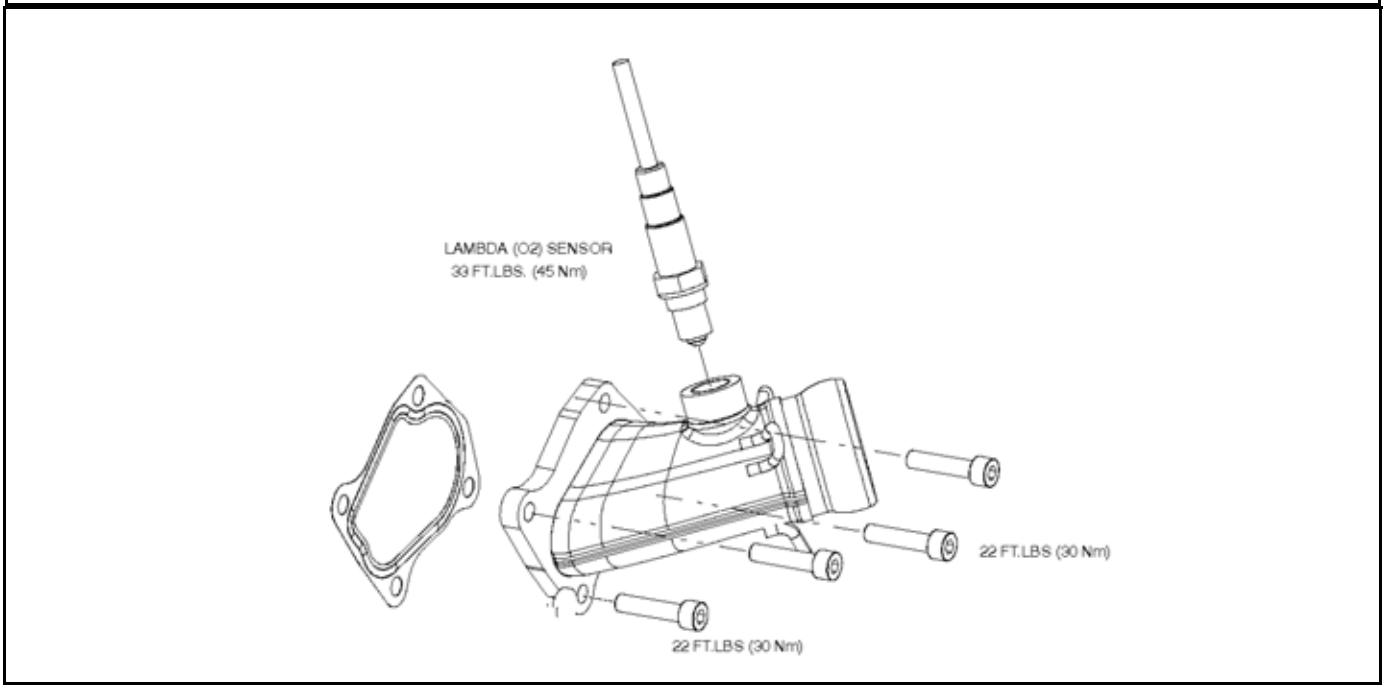
FS Exhaust System





FST Exhaust


RESONATOR
SPRINGS
HOT
O2 SENSOR
SPRINGS
HEAT SHIELD
GASKET


LAMBDA (O2) SENSOR
33 FT.LBS. (45 Nm)
22 FT.LBS (30 Nm)
22 FT.LBS (30 Nm)

Troubleshooting

EFI / Ignition System Troubleshooting

SYMPTOM / ISSUE	POSSIBLE CAUSE	POSSIBLE SOLUTION
Engine Will Not Turn-Over	Battery	Check condition of battery. Re-charge battery if possible or replace. Verify battery electrical connections are intact, clean and tight.
	Engine (Mechanical Problem)	Verify engine is not jammed by moving the drive clutch back and forth. Check oil filter for metal fragments and signs of mechanical damage.
	Starter Motor / Starter Solenoid	Check condition of starter motor. Verify power wire is connected to post. Check starter solenoid for proper operation.
	Service Bulletins	(2006 Models Only) Verify either S-06-01 or S-06-02 have been completed.
	Ignition Switch / Slap Switch	Check ignition switch function. Check slap switch function.
	Relays, Fuses, and Fusible Links	Verify fuses are not blown. Check EFI (Main) and starter relay function. Verify condition of fusible links.
	ECU	Use Digital Wrench to view any trouble codes. Perform “no start” test using Digital Wrench.
Engine Turns- Over, Will Not Start	Battery	Check condition of battery. Re-charge battery if possible or replace. Verify battery electrical connections are intact, clean and tight.
	Fuel System	Verify there is fuel in the tank. Verify the fuel pressure meets specification. Check if fuel filter is obstructed.
	ECU / Sensors	Use Digital Wrench to view any trouble codes. Verify the Cam Phase, CPS, and Roll Over Sensors are connected. Perform “no start” test using Digital Wrench.
	Relays, Fuses, and Fusible Links	Check the ignition relay. Check the 20A ignition fuse. Check the fuel pump relay. Look for blown fuses or blown fusible links.
	Engine	Check condition of spark plugs. Verify engine compression.

EFI / Ignition System Troubleshooting

SYMPTOM / ISSUE	POSSIBLE CAUSE	POSSIBLE SOLUTION
Engine Stalls, Poor Idle	Battery / Charging System	Check battery condition. Re-charge battery if possible or replace. Verify alternator field coils activate. (Headlights turn-on)
	Ignition / Safety Slap Switch / Throttle Switch	Verify wire connections. Test safety slap switch function. Verify throttle flipper function.
	ECU / Sensors	Use Digital Wrench to view any trouble codes.
	Fuel System	Inspect: Fuel Filter Fuel Level Fuel Pump Pressure Fuel Hoses Fuel Tank Vent System Fuel Pump / Fuse Box Connections
	Air Intake System	Verify there are no obstructions. Clean breather foam. Check FST air filter. Check Intake Air Controller (IAC) Operation Verify there is no fuel/oil residue, pooling within intake system. Check hose and pipe connections.
Poor Acceleration / Poor Performance	ECU / Sensors	Use Digital Wrench to view any trouble codes.
	Air Intake System	Verify there are no obstructions. Clean breather foam. Check FST air filter. Check Intake Air Controller (IAC) Operation Verify there is no fuel/oil residue, pooling within intake system. Check hose and pipe connections.
	Fuel System	Inspect: Fuel Filter Fuel Level Fuel Pump Pressure Fuel Hoses Fuel Tank Vent System Fuel Pump / Fuse Box Connections FST Boost / Vacuum Reference Hoses Dump Valve Fouled, Worn Out Spark Plug
	Turbocharger / Intercooler	Verify Function, hose connections. Verify wastegate arm moves freely, is not stuck. Check wastegate solenoid function. Verify intercooler is not plugged, loose connections.

CHAPTER 5

Engine Removal and Installation

5

ENGINE REMOVAL AND INSTALLATION

Before You Begin

The following procedures and/or components can be performed or removed with the engine installed in the chassis:

- Engine Oil / Filter Change
- Engine Coolant Change
- Valve Lash Adjustment
- Exhaust System
- Charge Air Cooler (Intercooler) / Charge Air Pipe - FST Models
- Alternator / Alternator Belt
- Cooling System Radiator
- Engine Oil Cooler
- Air Intake Box (Air Filter - FST Models)
- Oil Storage Tank
- Chaincase Assembly / Reverse System
- All Engine Management Sensors (Excluding: Crank Position, Knock, and Coolant Temperature Sensors)
- Intake Manifold / Throttle Body Assembly
- Chassis Wiring Harness (Located Underneath Engine)
- Oil Supply Hose (Storage Tank-to-Engine)
- Coolant Hose (Water Outlet Manifold-to-Oil Cooler (Bypass Route))

The following procedures and/or components can be performed or removed with the engine suspended inside the engine compartment or completely removed from the chassis using a lifting hoist:

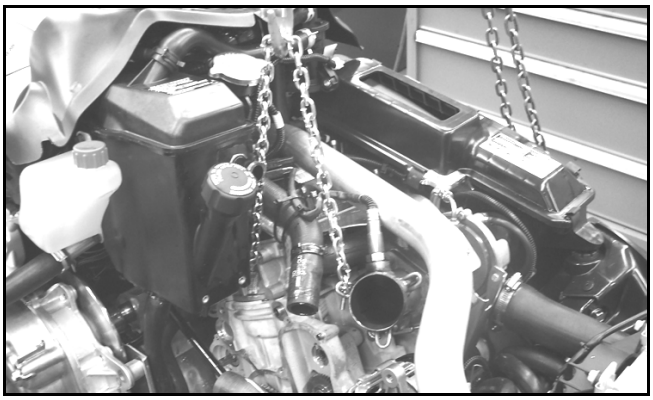
- Crank Position, Knock, and Coolant Temperature Sensors
- Oil Separator Drain Hose
- Starter Motor
- Rubber Engine Mounts
- Bulkhead - Engine Mount Support Plates
- Steering Linkage (Tie Rods, Pitman Arms, etc.)

NOTE: The use of an overhead or portable engine lifting hoist is the only recommend method for removing and installing the engine assembly. The hoist must be capable of lifting a minimum of 200 lbs. (91 Kg.) Have an assistant (other than hoist operator) help guide the engine in and out of the engine compartment when using the lifting hoist.

Suspending Engine

Several procedures can be accomplished when the engine is suspended with an overhead or portable engine lifting hoist.

1. Remove the exhaust silencer.
2. Insert a screw into the cylinder head, then attach the lifting chain.
3. Secure the other end of the lifting chain with a screw around or through one of the exhaust manifold spring eyelets.



4. Slowly lift the hoist just enough to suppor the weight of the engine.

Engine Removal

⚠ WARNING

Always disconnect the positive (RED) and then negative (BLACK) battery cables from the battery after removing the engine oil from the engine.

Never operate the engine in an enclosed environment. Always operate engine in a well-ventilated area.

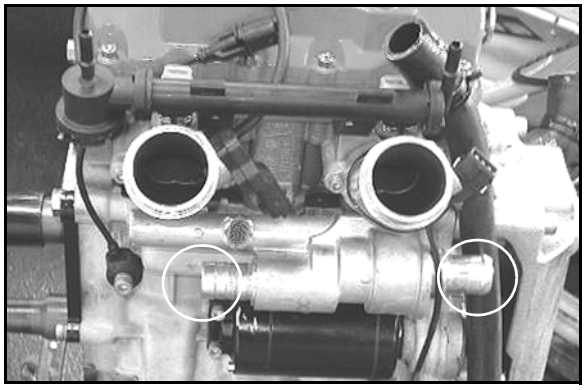
Keep fuel and fuel vapors away from open flame and extreme sources of heat. Extinguish cigarettes prior to working with any part of the fuel system.

Always dispose of excess fuel, engine oil, and engine coolant in appropriate containers.

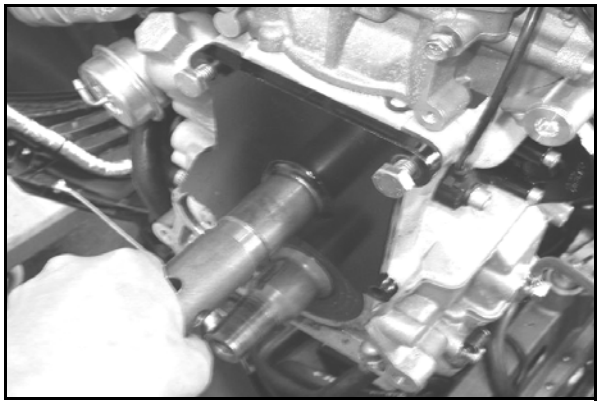
NOTE: The use of a digital camera is highly recommended in aiding the identification of components during re-assembly. Always label wiring, cooling system, and oil system hoses and connectors.

1. Remove the engine oil from the engine and storage tank. (Reference oil change procedure in maintenance chapter.)
2. Remove the battery by first removing the positive (RED) cable, then the negative (BLACK) cable from the battery.
3. Disconnect the RED wire from the alternator.

4. Remove the engine coolant from the engine.
5. Remove the air intake plenum assembly.
6. Remove the drive belt, drive and driven clutch assemblies.
7. Remove the seat / storage bucket assemblies from the tunnel.
8. Remove the console.
9. Remove the fuel tank assembly.
10. Remove the exhaust system. (The exhaust manifold and turbocharger assembly can remain on the engine.)
11. Remove the oil storage tank / coolant recovery bottle assembly.
12. Remove the boost box (FST) or intake air box (FS). Remove the charge air pipe connecting the boost box to the intercooler (FST).
13. Disconnect the engine wiring harness from the sensors and actuators on the engine. Take digital photos or label each connector to aid in the reassembly process.
14. Wrap the ends of the fuel hoes with a clean shop towel. Remove the fuel supply and return hoses from the fuel rail.
15. Attach an engine lifting hoist to the engine assembly. Support the engine weight so the engine remains stationary when the engine mounts are removed from the engine.
16. Remove the MAG-side rubber engine mount bolt. The bulkhead support plate can remain attached to the bulkhead.
17. Remove the PTO-side rubber engine mount bolt located in the middle of the bulkhead support plate.
18. Remove the bulkhead support plate.
19. Remove the front PTO-side rubber engine mount bolt.
20. Remove the steering linkage rod from the bottom of the steering post and bulkhead pivot.
21. Carefully and slowly lift the engine upwards until access can be gained to the thermostat housing inlet and outlet hoses.
22. Remove the engine cooling inlet and outlet hoses from the thermostat housing.



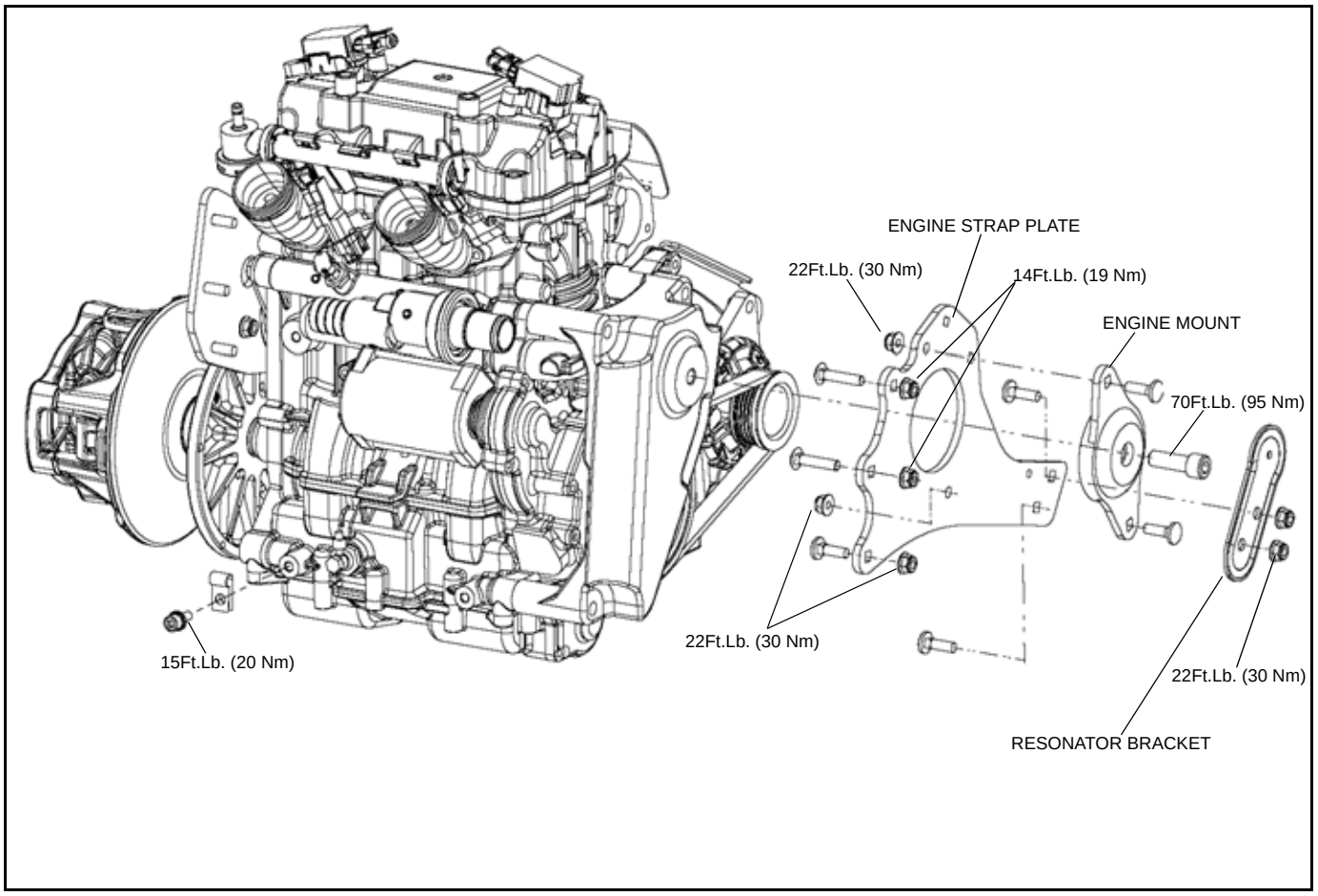
23. Locate the power cable attached to the starter motor and remove it from the post.
24. Remove the cyclone oil return hose from the crankcase banjo fitting.
25. Continue lifting the engine out of the engine compartment making sure the intake-side of the engine clears under the console frame.
26. With the engine removed from the snowmobile, attach the engine stand adapter plate, PW-46984, to the PTO-side of the engine.



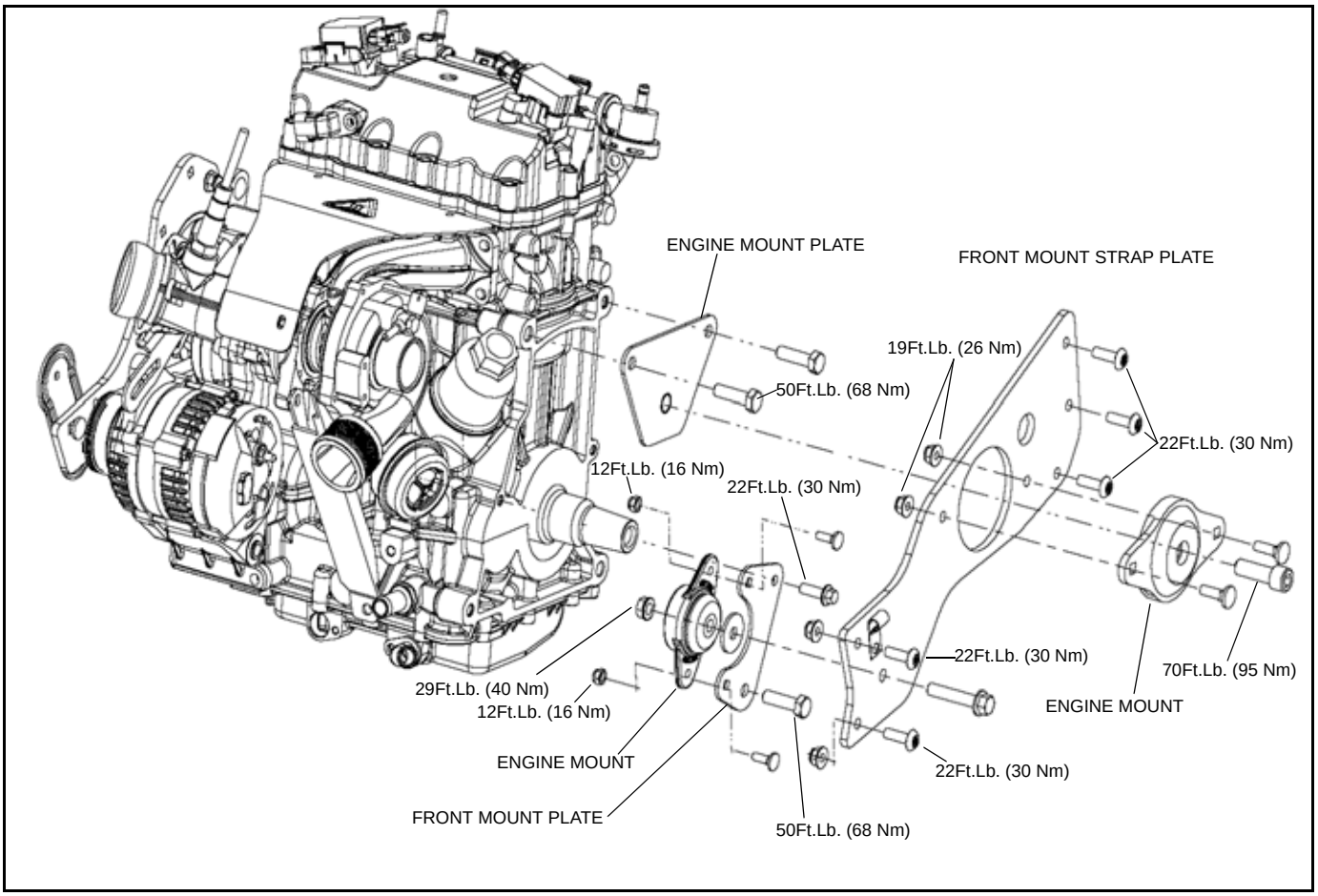
Engine installation is the reverse of removal. Reference the following installation notes:

- Verify the position of the engine cooling hoses will not be pinched when the engine is installed back into the bulkhead.
- The fuel supply and return hoses must be connected to the fuel rail before the wiring harness is connected to the engine. (The harness lays over the fuel hoses).
- Position the thermostat housing inlet and outlet hose clamps so the open-ends face upwards.

MAG-Side Engine Mounting



PTO-Side Engine Mounting



NOTES

CHAPTER 6
FS / FST Engine

ENGINE OVERVIEW

Engine Specifications

FS / FST Engine Specifications

COMPONENT	SPECIFICATION
Engine Model Number 2006 - Naturally Aspirated (NA) - Intercooled Turbo 2007 -Naturally Aspirated (NA) -Intercooled Turbo	 S3032-7575-PS7E S3033-7575-PS7F S3295-7575-PS7E S3176-7575-PS7F
Engine Type	8 Valve - SOHC - Parallel Twin Cylinder w/ Counter Balancer
Displacement	749 cc
Bore x Stroke (Inches)	85 x 66mm (3.346″ x 2.598″)
Compression Ratio - NA - Turbo	 11.5:1 9.0:1
Cranking Cylinder Compression @ Sea Level (Approximate) - NA - Turbo	 11.5 Bar (166 psi) 9.5 Bar (137 psi)
Lubrication System Specifications - Recommended Engine Oil - Capacity (Dry Engine) - FS Models - FST Models - Capacity (Oil Change) - FS Models - FST Models - Oil Filter Type	 0W-50 Synthetic / Minimum Rating = SJ 3.3 - 3.7 US Quarts 3.95 - 4.2 US Quarts 2.125 - 2.5 US Quarts 2.75 - 3.0 US Quarts Cartridge
Cooling System Specifications - Recommended Coolant - Capacity - FS / FST Classic - FST Switchback - FST Touring - Thermostat Opening Temperature - System Pressure (Cap Pressure) - Maximum System Pressure - Engine Operating Temperature	 60% Propolyne Glycol / 40% Distilled Water 6.0 US Quarts + 10oz. In Expansion Tank 6.0 US Quarts + 10oz. In Expansion Tank 6.7 US Quarts + 10oz. In Expansion Tank 68° - 72°C (154° - 161°F) 1 Bar (14.6 psi) 1.2 Bar (17.4 psi) 70° - 100°C (161° - 212°F)
Valve Clearance (Cold Engine) - NA - Intake - Exhaust - Turbo - Intake - Exhaust	 .08 -.15mm (.003″ -.006″) .15 -.22mm (.006″ -.008″) .08 -.15mm (.003″ -.006″) .18 -.25mm (.007″ -.009″)
Valve Timing (1mm Valve Lift) - EV Opens - EV Closes - IV Opens - IV Closes	 52° BBDC 2° ATDC 15° BTDC 50° ABDC
Valve Face Width	2mm (.078″)
Valve Seat Contact Width - EV - IV	 1.3 - 1.4mm (.051″ -.055″) 1.1 - 1.2mm (.043″ -.047″)
Valve Head Diameter - IV - EV	 32.3 - 32.7mm (1.27″ - 1.28″) 29.3 - 29.7mm (1.15″ - 1.16″)
Valve Margin Thickness	.8mm (.031″)

FS / FST Engine Specifications

COMPONENT	SPECIFICATION
Valve Seat Angle Valve Outer Correction Angle Valve Inner Correction Angle	45° 30° 75°
Valve Stem Diameter - IV - EV	 5.465 - 5.479mm (.215″) 5.456 - 5.470mm (.214″)
Valve Guide I.D.	5.5mm (.216″)
Valve Guide O.D.	6.535 - 6.546mm (.2572″ -.2577″)
Valve Guide Exposed Height	8.1mm (.318″)
Valve Stem-To-Valve Guide Clearance - IV - EV	 .021 -.044mm (.0008″ -.0017″) .030 -.053mm (.0011″ -.0020″)
Valve Stem Runout	.006mm (.0002″)
Valve Lash Adjustment Shims - Thinnest - Thickest -Increment Steps	 2.5mm (.098″) 3.7mm (.145″) .05mm (.002″)
Valve Spring Free Length	38.2mm (1.5″)
Valve Spring Installed Length	32mm (1.26″)
Cylinder Head Warpage Limit	.04mm (.0015″)
Cylinder Specifications - Bore - Taper Limit - Out-Of-Round Limit - Wear Limit	 85 - 85.01mm (3.346″) .008mm (.0003″) .008mm (.0003″) Not Applicable - Nicasil Plated

Camshaft Specifications
- Width
- Intake Cam Lobe Height
- Exhaust Cam Lobe Height
- Camshaft Runout
  - At Sprocket
  - At Bearing Surface
- Radial Play
- Axial Play
- Bearing bore I.D.
- Camshaft Axle O.D.
- Distance Between Axle Clamps
	
	108.85 - 109mm (4.28″ - 4.29″)
	48.553mm (1.911″)
	48.209mm (1.897″)
	
	.05mm (.0019″)
	.02mm (.0007″)
	.020 -.050mm (.0008″ -.0019″)
	.1 -.35mm (.0039″ -.0137″)
	25.9mm (1.019″)
	19.991 - 20mm (.787″)
	19.9 - 19.98mm (.7834″ -.7866″)
	109mm (4.291″)

Rocker Arm Specifications - Rocker Arm I.D. - Rocker Arm Axle O.D. - Rocker Arm Axle Holder Bore I.D. - Rocker Arm Axial Play - Rocker Arm Length	 10.025 - 10.040mm (.395″) 9.994 - 10mm (.393″) 10mm (.393″) .16 -.26mm (.0006″ -.0010″) 77.4 - 77.5mm (3.04″ - 3.05″)
Crankshaft Specifications - Crankcase Bearing Bore I.D. - Main Bearing Journal O.D. - Connecting Rod Pin O.D. - Crankshaft Deflection - Main Bearing Clearance - Bearing Codes	 52 - 52.013mm (2.04″) 47.96 - 47.98mm (1.888″) 45.508 - 45.528mm (1.79″) .02 -.04mm (.0008″ -.00015″) .05 -.06mm (.002″ -.0023″) Yellow 1.995 - 2.000mm / Blue 2.000 - 2.005mm / Green 2.005 - 2.010mm
Connecting Rod Specifications - Big End Oil Clearance - Small End I.D. - Bearing Codes - Big End I.D. (Without Bearings) - Big End Outside Width	 .024 -.053mm (.0009″ -.0021″) 20.995 - 21.011mm (.82″ -.82″7) Yellow 1.726 - 1.731mm / Blue 1.731 - 1.736mm / Green 1.736 - 1.741mm 49mm 23.8 - 23.9mm

FS / FST Engine Specifications

COMPONENT	SPECIFICATION
Balance Shaft Specifications	
- Crankcase Bearing Bore I.D.	28 - 28.013mm (1.102″ - 1.103″)
- Axial Play	.4 -.6mm (.0157″ -.023″)
- Radial Play	.014 -.066mm (.00055″ -.0025″)
- Bearing Diameter	24.975 - 24.990mm (.983″)
- Runout	.014 -.066mm (.00055″ -.0025″)
Piston Specifications	
- Piston Orientation	Piston Pin C-Clip Notch Faces Intake-side of Engine
- Piston-To-Cylinder Clearance	.017 -.052mm (.0006″ -.002″)
- Piston Diameter	84.935 - 84.965mm (3.34″)
- Wear Limit	.04mm (.0015″)
- Piston Pin Boss I.D.	21mm (.826″)
- Piston Pin O.D.	20.9 - 21mm (.822″ -.826″)
- Piston Wear Limit	
- At Piston Mating Surface	.004 -.016mm (.00015″ -.0006″)
- At Connecting Rod Mating Surface	.005 -.016mm (.00019″ -.0006″)
Piston Ring Specifications	
- Top Ring Installed Gap	.25 -.50mm (.009″ -.019″)
- Top Ring Groove Clearance	+/-.25mm (+/-.009″)
- Middle Ring Installed Gap	.20 -.35mm (.007″ -.013″)
- Middle Ring Groove Clearance	.22 -.26mm (.008″ -.010″)
- Oil Control Ring Installed Gap	.15 -.30mm (.005″ -.011″)
- Oil Control Ring Groove Clearance	.39 -.47mm (.015″ -.018″)
Oil Pump Specifications	
- Oil Pump Type	Scavenge (Low) and High Pressure Pumps
- Pressure Pump Rotor Tip Clearance	Not Measurable
- Oil Pressure	
- Idle Speed	1.2 Bar (17.4 psi)
- Maximum	5.5 Bar (80 psi)
Oil Pressure Relief Valve	
- Spring Free Length	69mm (2.71″)
- Piston O.D.	10.9mm (.429″)
- Piston Length	27.7 - 28mm (1.09″ - 1.10″)

Fastener Torque Specifications

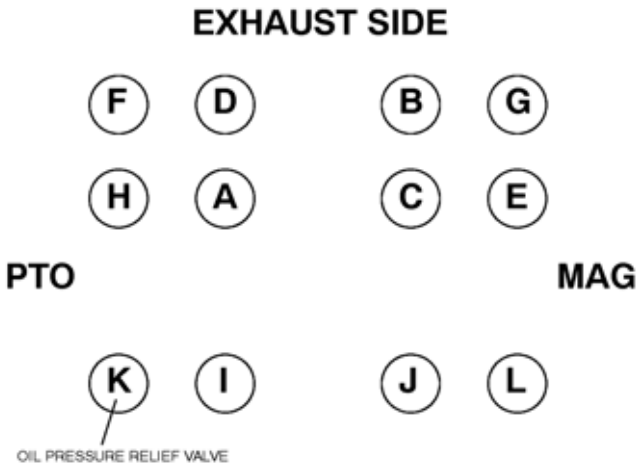
FS / FST Engine Fastener Torque Specifications

COMPONENT	FT.LBS.	NM	NOTES
Valve Cover	6	9	
Cylinder Head Nuts - Step 1 - Step 3 - Step 4 Lower Crankcase Bolts - Step 2 - Step 5	 15 30 Turn 180° 12 18	 20 40 Turn 180° 16 25	Apply Engine Oil to Crankcase Stud Threads Apply Engine Oil to Lower Crankcase Fasteners
Camshaft Axle Clamps	7	10	
Rocker Arm Towers	9	13	
Fuel Rail	6	9	
Intake Manifolds	6	9	
Exhaust Manifold Nuts (NA and Turbo)	18	24	
Water Outlet Manifold	7	10	
Oil Filter Cover	18	24	
Chain Guide (Fixed)	7	10	Apply Loctite® 243 (BLUE)
Chain Tensioner Plug	51	70	
Chain Guide (Tensioner / Pivot)	17	23	Apply Loctite® 243 (BLUE)
Starter Motor	6	9	
Water Pump Cover / Inlet Manifold	7	10	Apply Loctite® 577 Thread Sealant
Water Pump Impeller	Hand Tight		
Connecting Rod Caps - Step 1 - Step 2 - Step 3	 7 15 Turn 90°	 10 20 Turn 90°	Apply Engine Oil to Threads
Balance Shaft Gear	51	70	Apply Loctite® 272 (RED)
Engine Gear Cover	7	10	
MAG Cover Panel	7	10	
Upper Alternator Bracket / Pivot	15	20	
Alternator Pulley	60	80	Apply Loctite® 640 (GREEN) to flywheel taper.
MAG Engine Mount	30	40	
PTO Engine Mounting Plates			
Lower Alternator Mount - Short Fastener - Long Fastener	 15 30	 20 40	
Lower Alternator Pivot Bolt	15	20	
Scavenge Pump Filter Screen	7	10	Apply Loctite® 243 (BLUE)
Scavenge Pump	7	10	
Scavenge Pump Drive Gear	28	38	Apply Loctite® 272 (RED)
Bed Plate	7	10	
Ignition Coil Packs	6	9	

FS / FST Engine Fastener Torque Specifications

COMPONENT	FT.LBS.	NM	NOTES
Spark Plugs	20	27	Apply Anti-Seize Grease to Threads
Cam Phase Sensor	6	9	
Intake Air Pressure Sensor	6	9	
Coolant Temperature Sensor	13	18	
Knock Sensor (Turbo)	14	20	Clean Fastener Threads and Leave Dry
Crank Position Sensor	7	10	
Cylinder Head Plugs	7	10	
Cylinder Head Air Bleed Nozzle	9	12	Apply Loctite® 542 Thread Sealant
Turbo-to-Crankcase Oil Return Nozzle	30	40	Apply Loctite® 577 Thread Sealant
Crankcase Plug	30	40	
Bedplate-to-Oil Cooler Oil Nozzle	7	10	
Cyclone Drip Return Banjo Bolt	13	18	

Cylinder Head / Crankcase Torque Patterns



Special Tools

The following list of special tools is recommended for use when disassembling and re-assembling the engine. Polaris special tools are available for purchase through Polaris's authorized tool distributor.

FS / FST Engine Special Tools

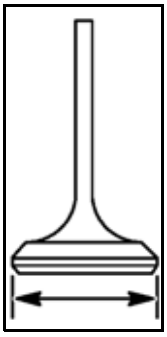
PART NUMBER	NAME / DESCRIPTION
PW-46982	Gear Removal Tool Used to remove the balance shaft drive gear when used with tool, PN PW-46989.
PW-46989	Gear Removal Bolt Used with tool, PN PW-46982.
PW-46991	Valve Compressor Tool Used to remove the valves from the cylinder head.
PW-47163	Valve Lash Guillotine Tool Used to remove and install valve clearance adjustment shims.
PW-46984	Engine Stand Adapter Plate Attaches to the PTO-side of engine and allows engine to be mounted to either a table mount or rolling engine stand.
PW-46985	Timing Chain Link Breaker / Installation Tool Used to "break" the timing chain and reinstall a new master link.
PW-47079	Timing Chain Installation Tool Guides the timing chain through the engine during chain installation.
PW-47108	Timing Chain Wedge and Hook Used to aid in the installation of the timing chain.
PS-48040	Water Pump Seal Installation Tool Used to install the water pump seals into the front cover.
PS-48042	Crankshaft Seal Installation Tool Used to install the PTO-side crankshaft seal.
PS-48043	Front Cover Seal Installation Tool Used to install the MAG-side cover seal.
PS-48039	Crankshaft Arrestor Used to the hold the PTO-end of crankshaft stationary.
PW-46981	Crankshaft Barring Tool Used to rotate the engine when installing the camshaft timing chain.
PW-46983	Piston Installation Tool Used to compress the piston rings when installing the pistons.
PS-48047	Curved Box Wrench Used to install the turbocharger exhaust manifold nuts.
PS-48041	Flywheel Remover Tool Used to remove the flywheel.

ENGINE INSPECTIONS

Components

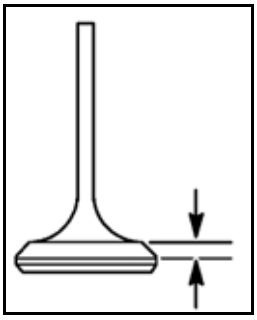
Measure Valve Diameter

- Out of specification: Replace valve.



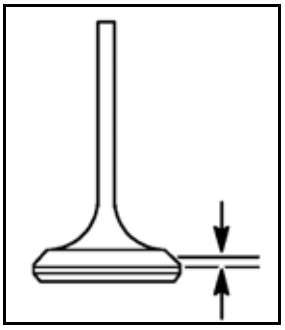
Measure Valve Face Width

- Out of specification: Replace valve.

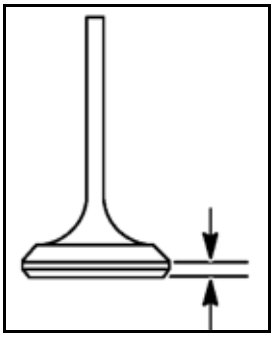


Measure Valve Seat Contact Width

- Out of specification: Replace valve.



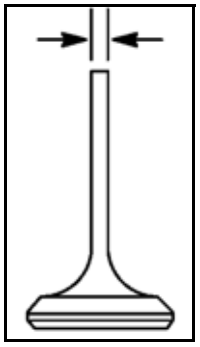
Measure Valve Margin Thickness



- Out of specification: Replace valve.

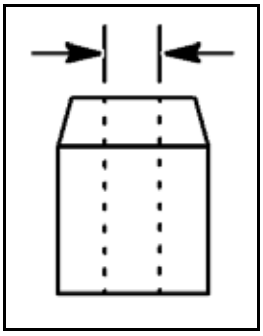
Measure Valve Stem Diameter

- Out of specification: Replace valve.



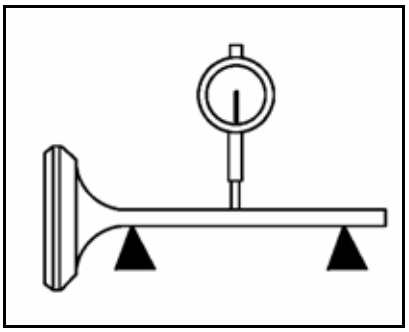
Measure Valve Guide Inside Diameter

- Out of specification: Replace cylinder head.



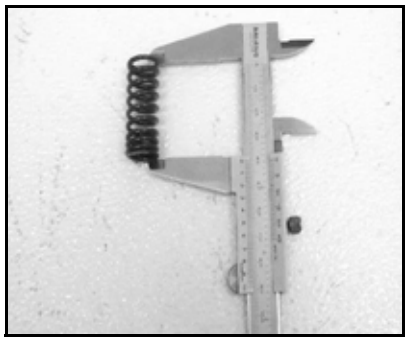
Measure Valve Stem Runout

- Out of specification: Replace valve.



Measure Un-Installed Spring Length

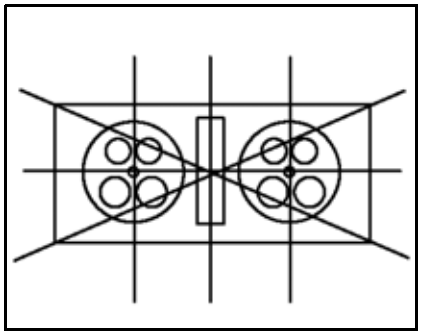
- Out of specification: Replace spring.



Measure Cylinder Head Flatness

- Out of specification: Replace cylinder head.

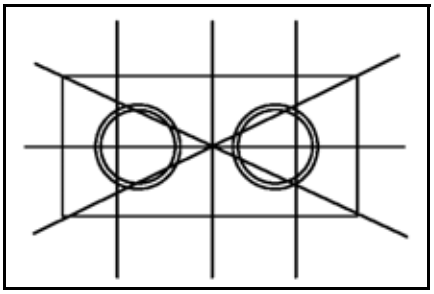
NOTE: Do not re-surface (shave) cylinder head.



Measure Cylinder Block Flatness

- Out of specification: Replace cylinder block.

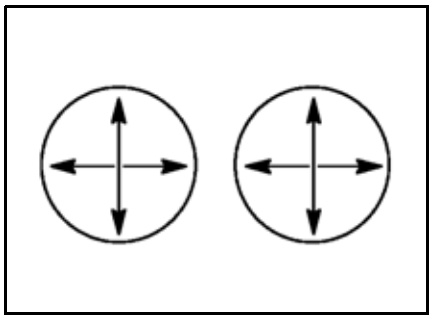
NOTE: Do not re-surface (shave) cylinder block.



Measure Cylinder Bore Diameter

- Out of specification: Replace cylinder block.

NOTE: Do not re-bore cylinders. Cylinders are lined with Nicasil.

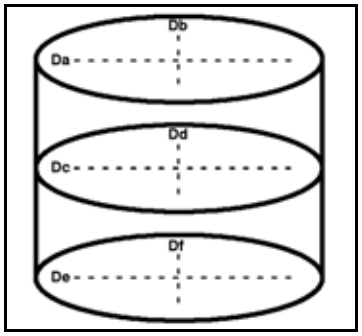


Measure Cylinder for Taper and Out-of-Round Limits

- Out of specification: Replace cylinder block.

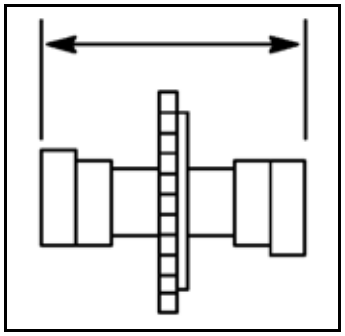
NOTE: Do not re-bore cylinders. Cylinders lined with Nicasil.

1. Bore: Maximum diameter of Da - Df.
2. Taper: Maximum of Da - De and Db - Df.
3. Out-of-Round: Maximum of Da - Db and De - Df.



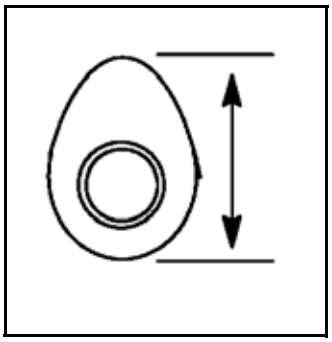
Measure Camshaft Width

- Out of specification: Replace camshaft.



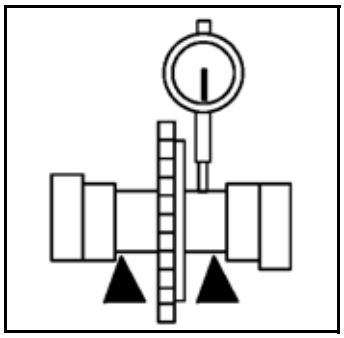
Measure Intake and Exhaust Cam Lobe Heights

- Out of specification: Replace camshaft.



Measure Camshaft Runout at Center and End of Shaft

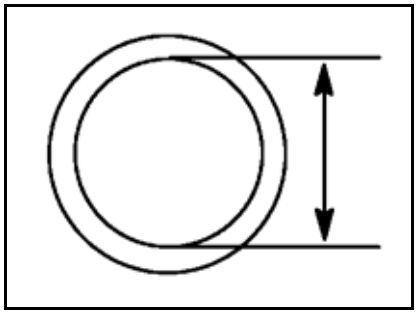
- Out of specification: Replace camshaft.



Measure Camshaft Bearing Hole I.D.

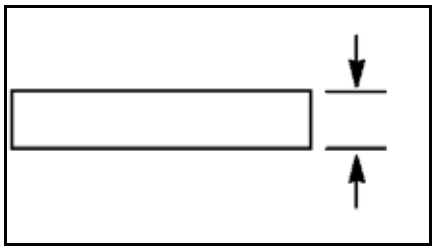
- Out of specification: Replace camshaft.

NOTE: Needle bearings must be removed to measure I.D.



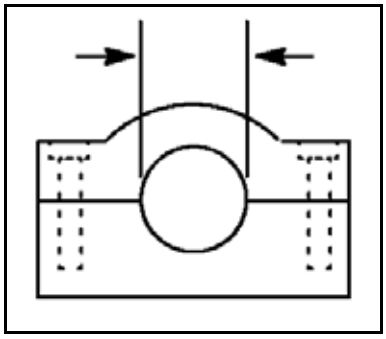
Measure Camshaft Axle O.D.

- Out of specification: Replace axle.



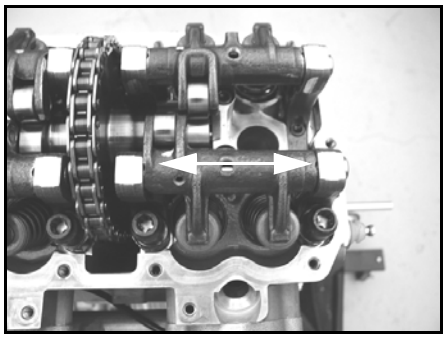
Measure Camshaft Axle Clamp I.D.s

- Out of specification: Replace cylinder head.



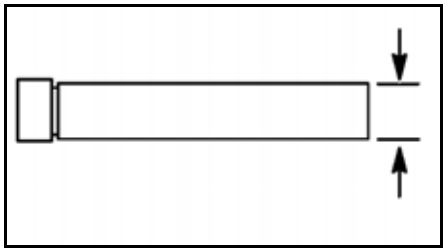
Measure Rocker Arm Axial Play

- Out of specification: Replace rocker arm, rocker arm tower.



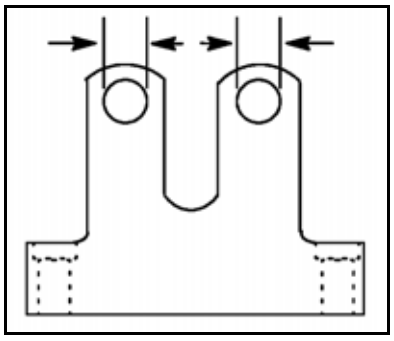
Measure Rocker Arm Axle O.D.

- Out of specification: Replace rocker arm axle.



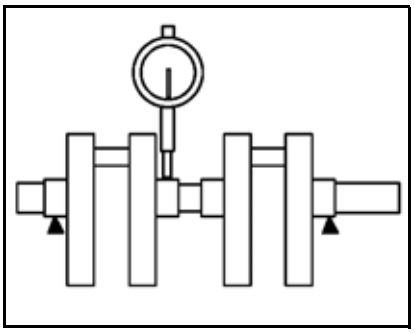
Measure Rocker Arm Tower Bore I.D.

- Out of specification: Replace rocker arm tower.



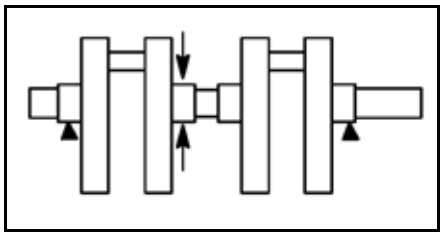
Measure Crankshaft Deflection at Several Locations

- Out of specification: Replace crankshaft.



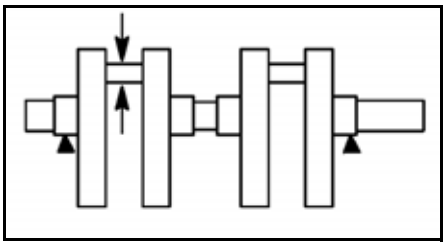
Measure Crankshaft Main Bearing Journal Diameters

- Out of specification: Replace crankshaft.



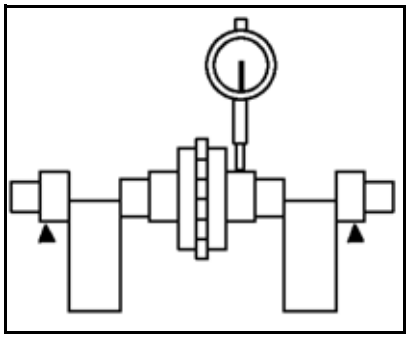
Measure Crankshaft Connecting Rod Journal Diameters

- Out of specification: Replace crankshaft.



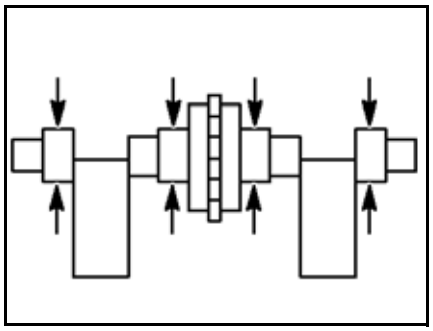
Measure Balance Shaft Deflection at Several Locations

- Out of specification: Replace balance shaft.



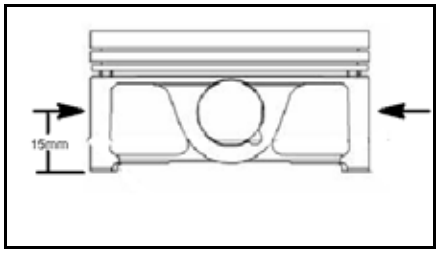
Measure Balance Shaft Bearing Diameters

- Out of specification: Replace balance shaft.



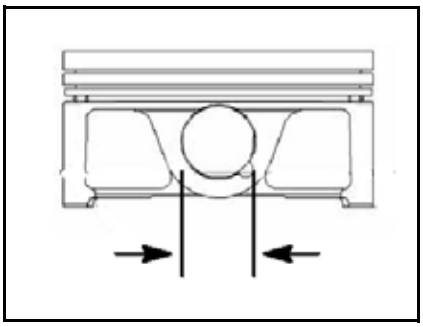
Measure Piston Diameter

- Out of specification: Replace piston.



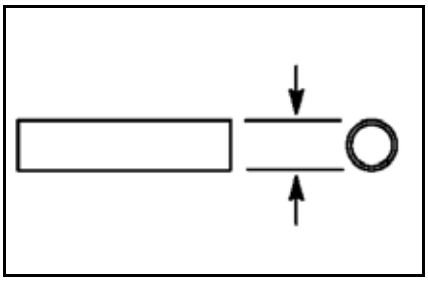
Measure Piston Pin Boss I.D.

- Out of specification: Replace piston.



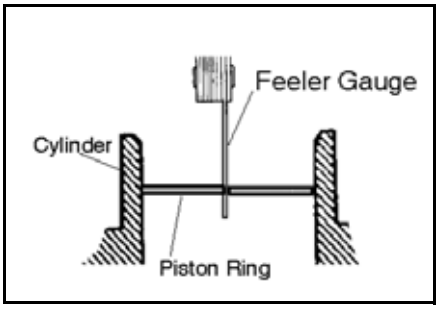
Measure Piston Pin O.D.

- Out of specification: Replace pin.



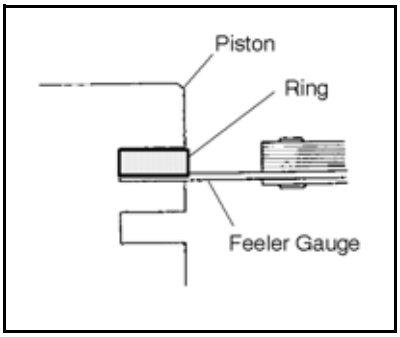
Measure Installed Ring End Gap

- Out of specification: Replace ring(s), measure cylinder bore.



Measure Piston Ring Groove Clearance

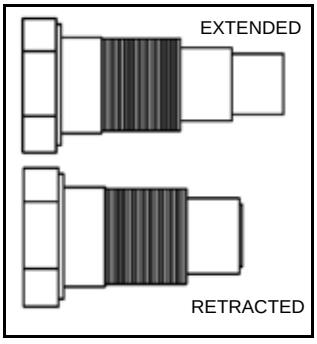
- Out of specification: Replace ring(s) and/or pistons.



Chain Tensioner Operation

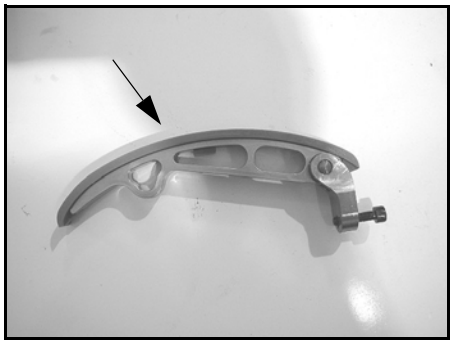
1. Push tensioner into housing until flush with housing end. Tensioner should lock into place.
2. Six (6) audible “clicks” should be heard and felt as tensioner is pushed into housing.
3. Once locked, push tensioner inward. Tensioner should activate and spring outwards.

- Replace tensioner assembly if clicking is not heard/felt, tensioner will not lock, or does not activate.



Inspect Chain Guides

- Replace wear pad/tensioner assembly if material is unevenly worn or guide is damaged.

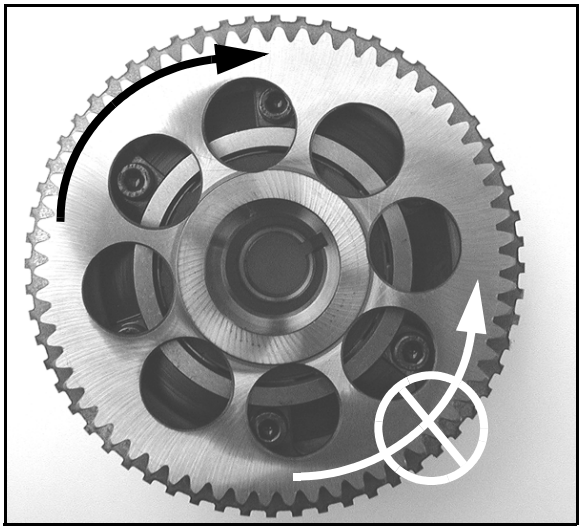


Verify Starter Motor Clutch Operation

1. Starter gear / clutch must move smoothly when rotated clockwise.
2. Starter gear / clutch cannot move when rotated counter-clockwise.

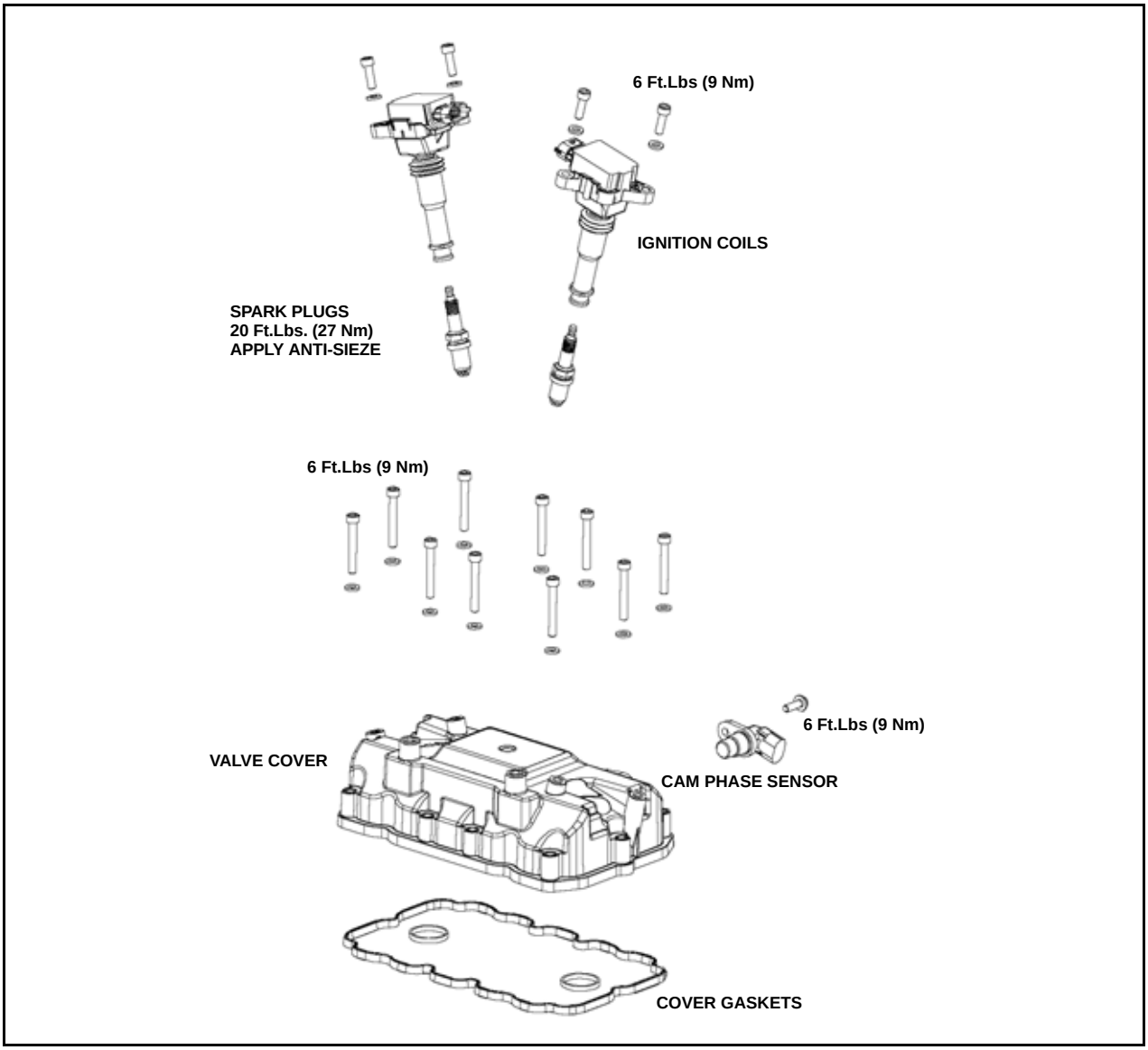
- Replace assembly if clutch does not operate correctly or if rotation is rough.

3. Inspect starter gear and timing rotor teeth for damage. Replace assembly if damage is found.

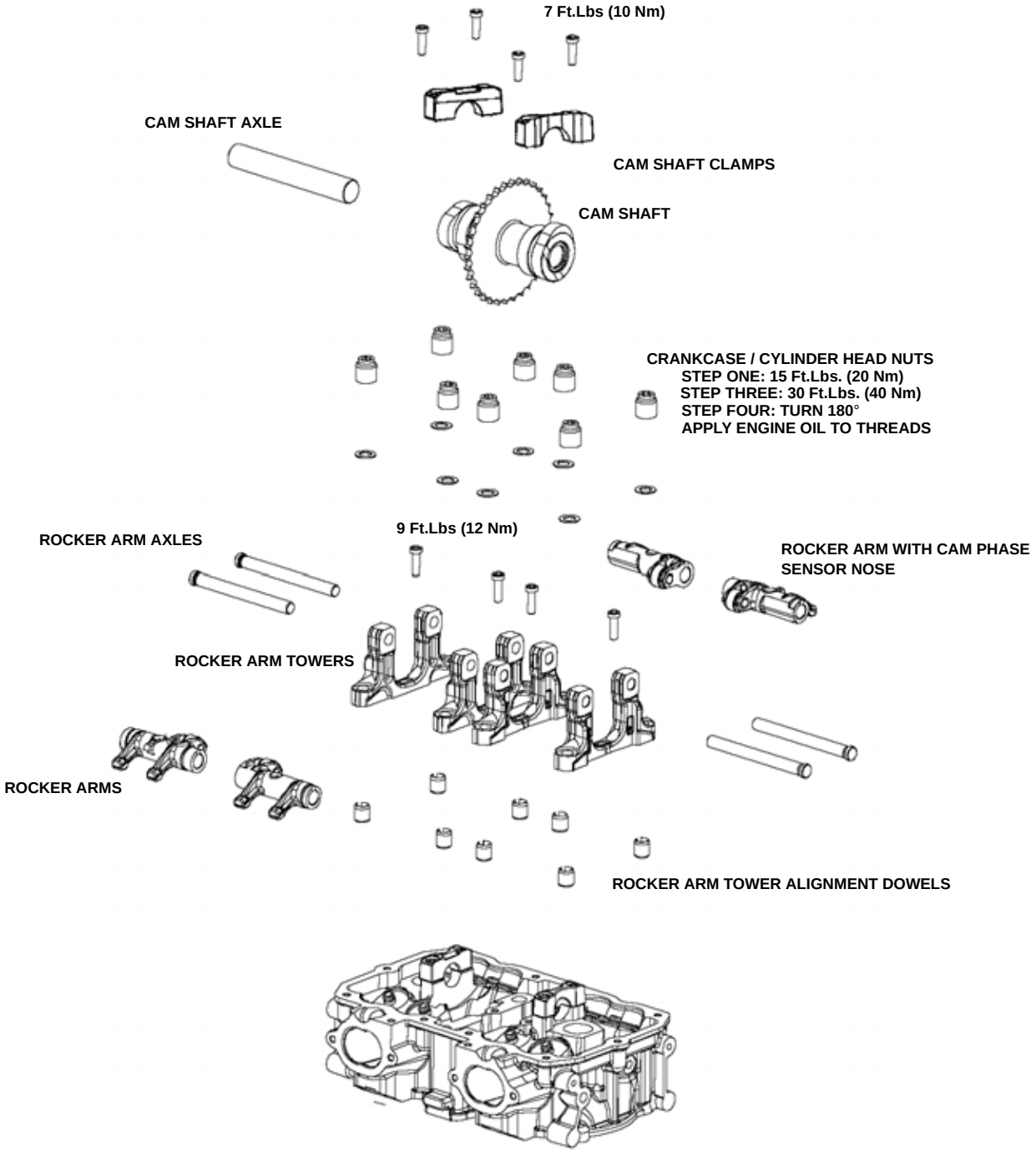


ASSEMBLY EXPLODED VIEWS

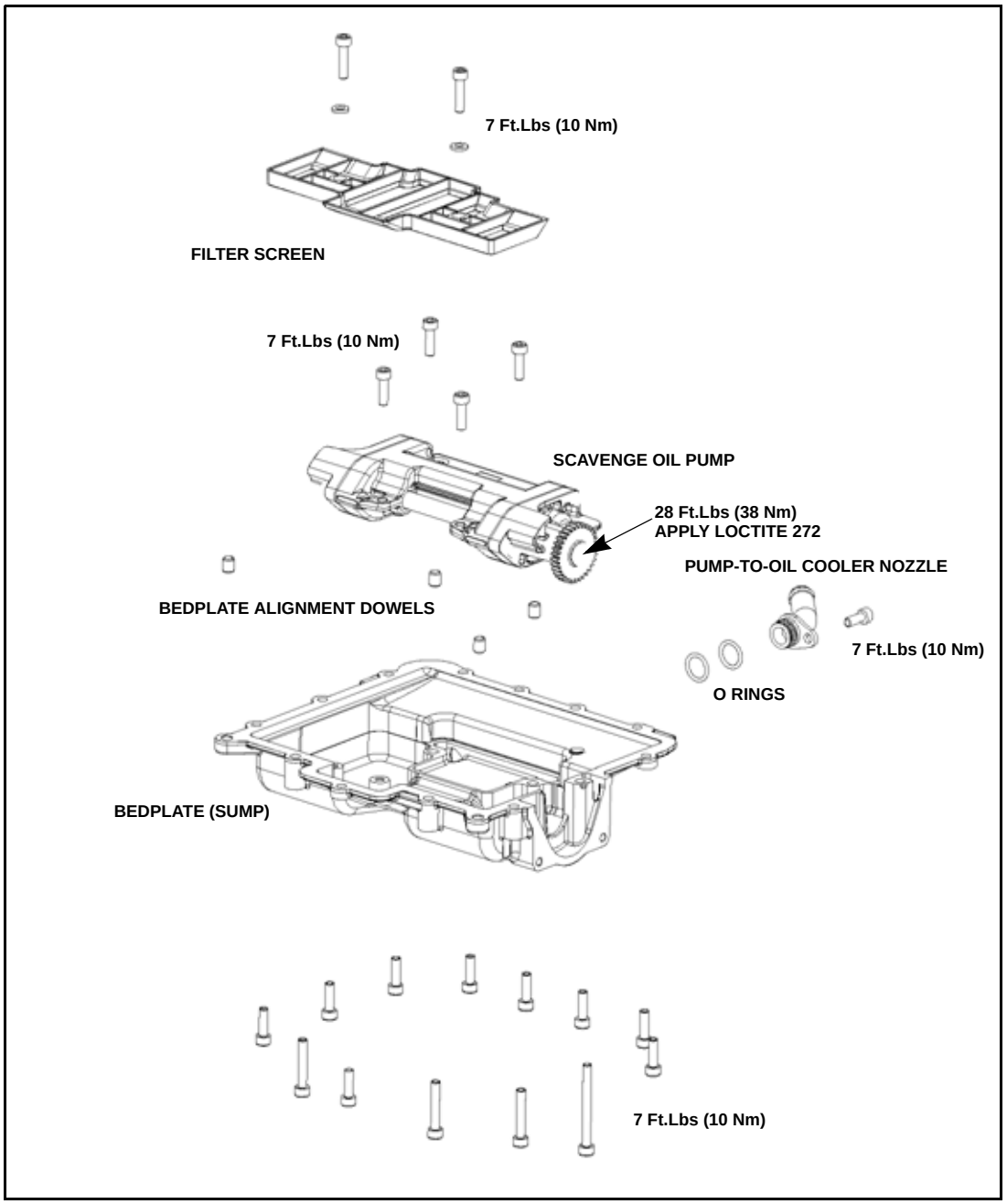
Valve Cover Assembly



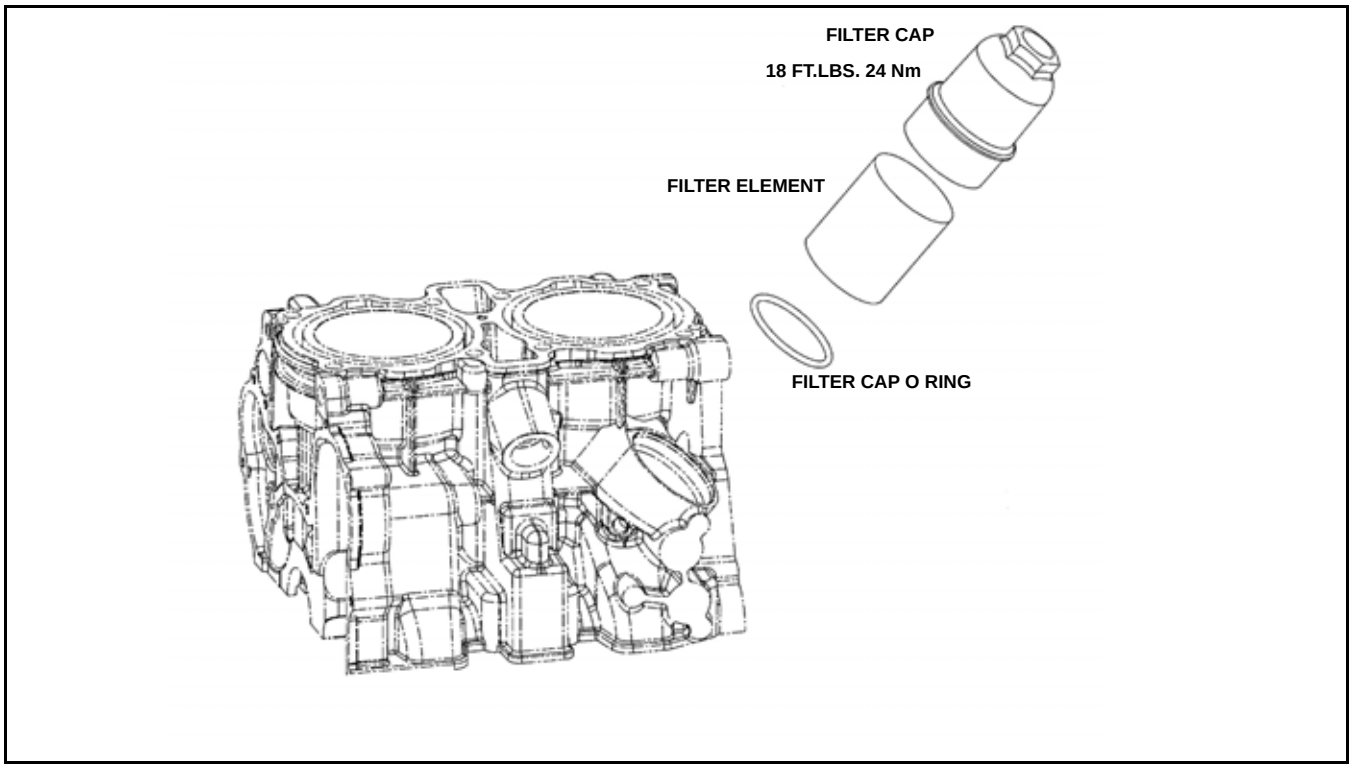
Valve Train Assembly



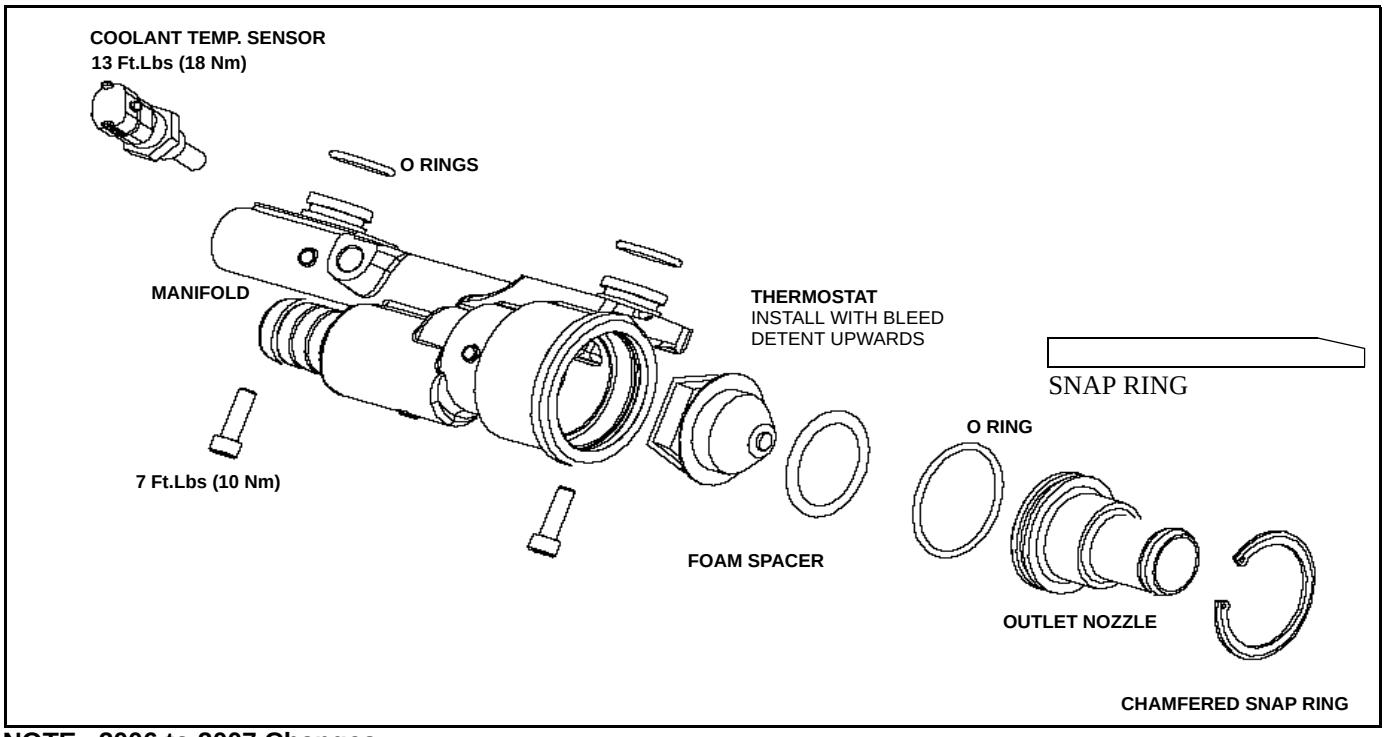
Bed Plate / Scavenge Oil Pump Assembly



Oil Filter Assembly



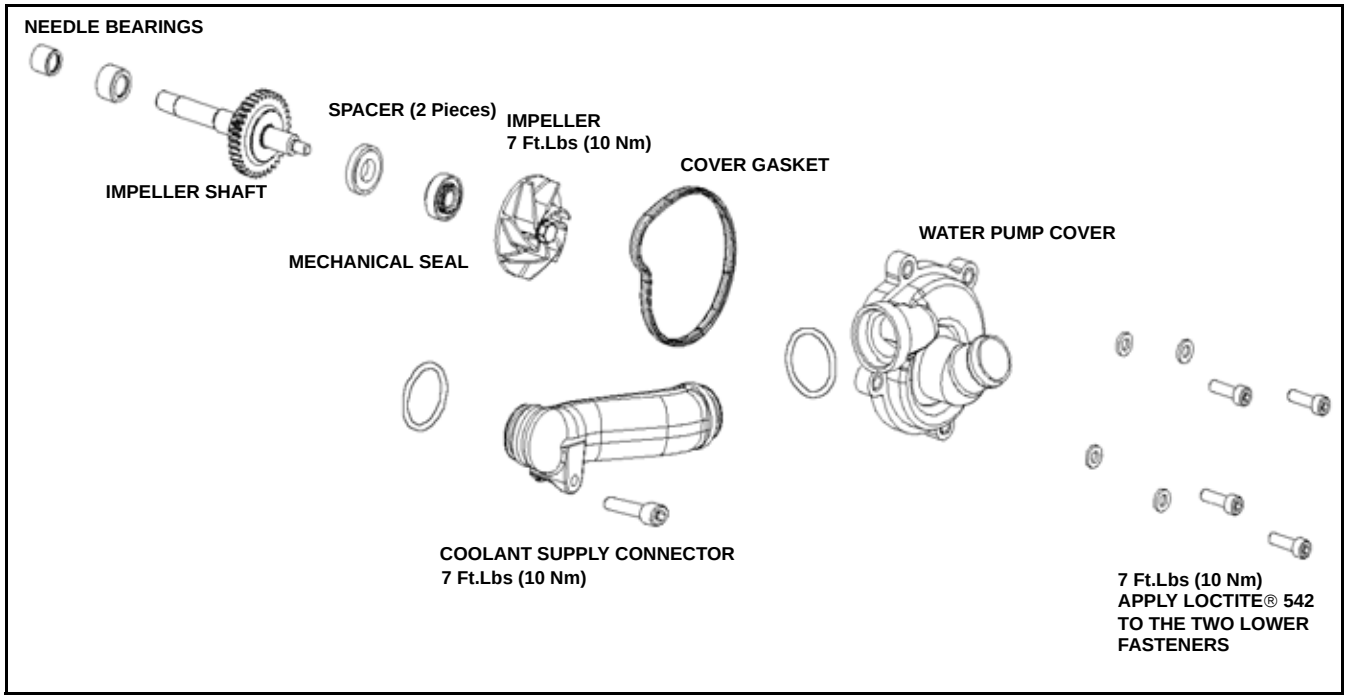
Water Outlet Manifold Assembly



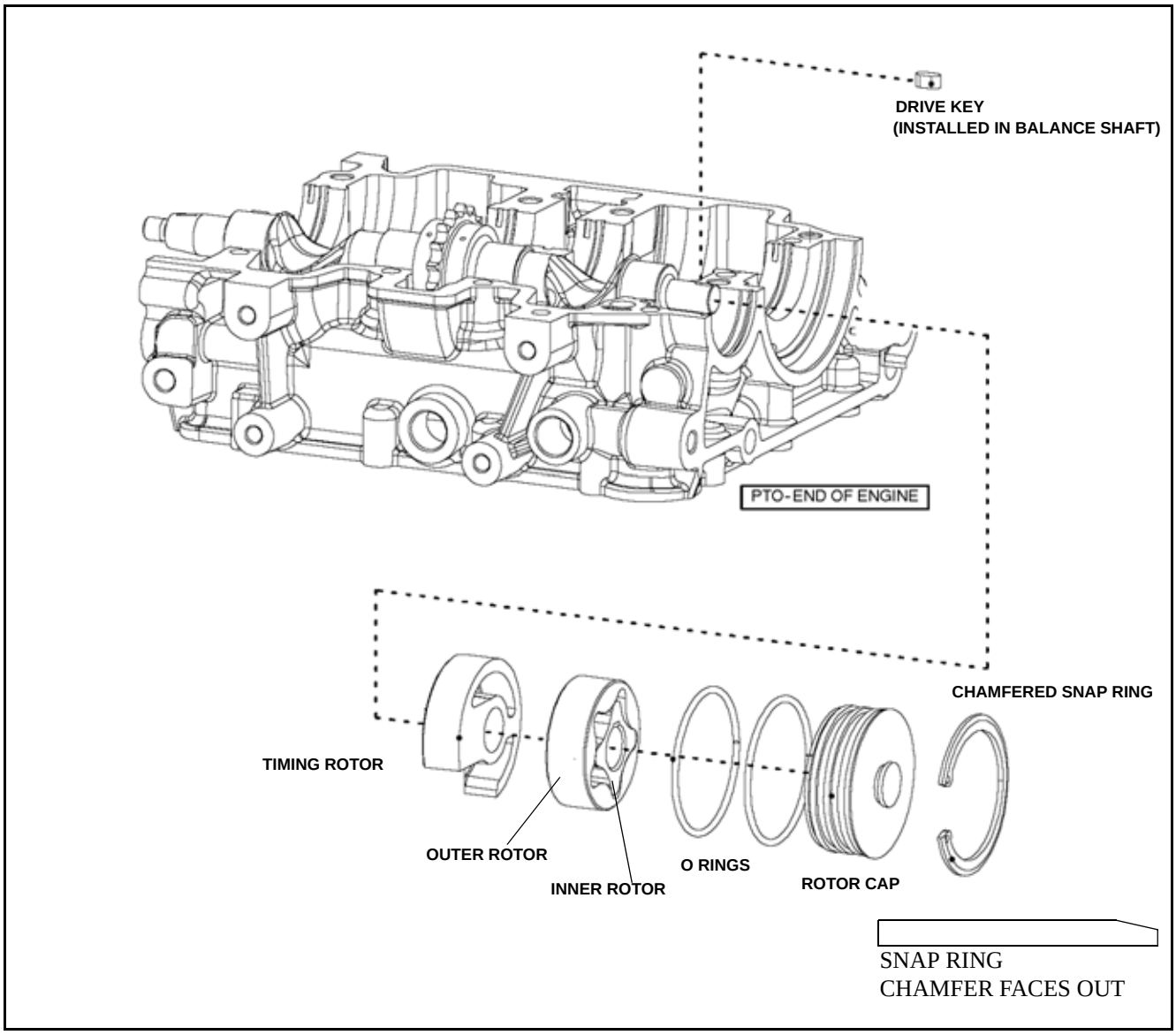
NOTE: 2006 to 2007 Changes

- Addition of foam spacer between thermostat and outlet nozzle on 2007 engines. Spacer can be installed on 2006 engines.
- Manifold plug and o ring service parts no longer available.

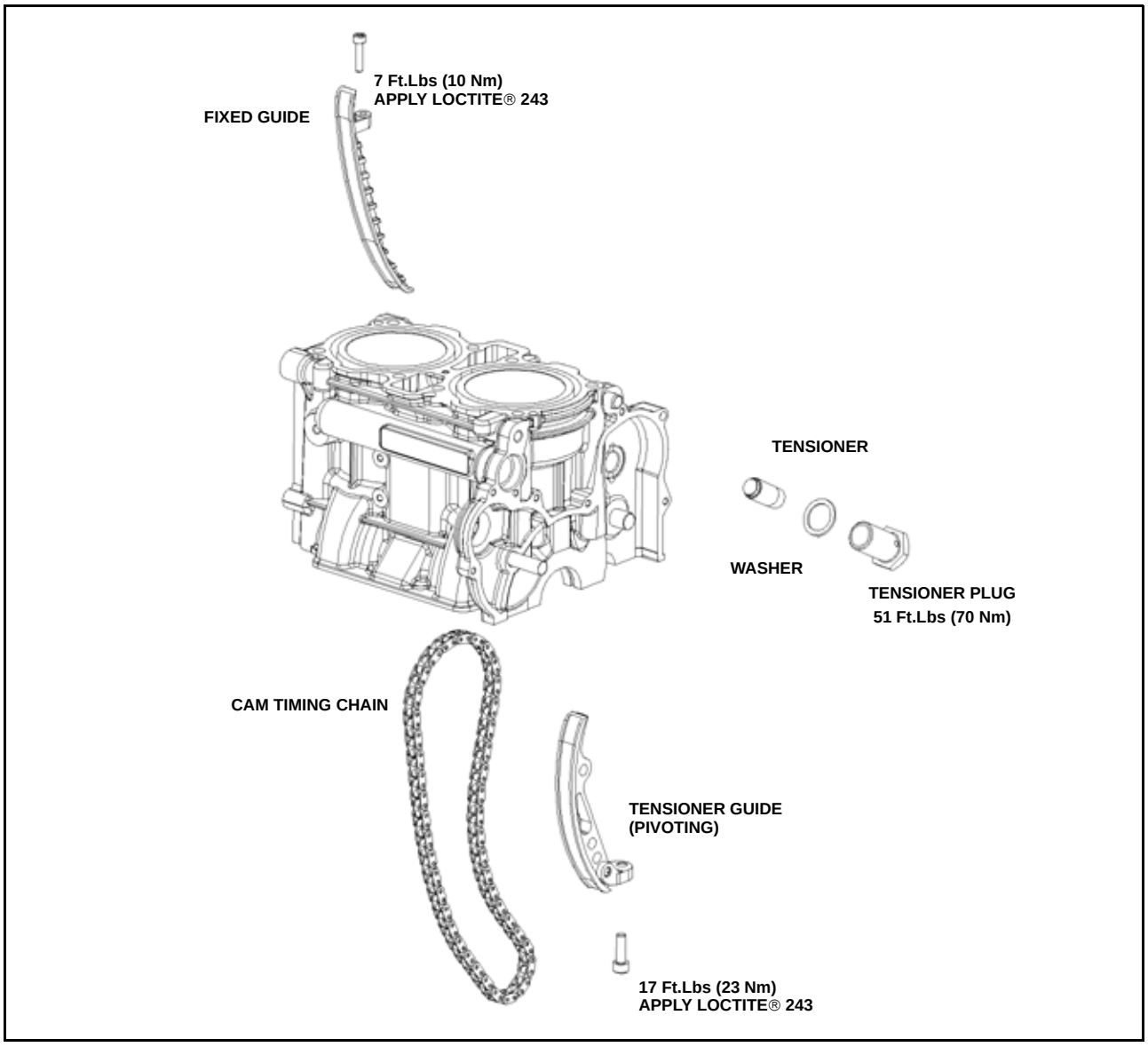
Water Pump Assembly



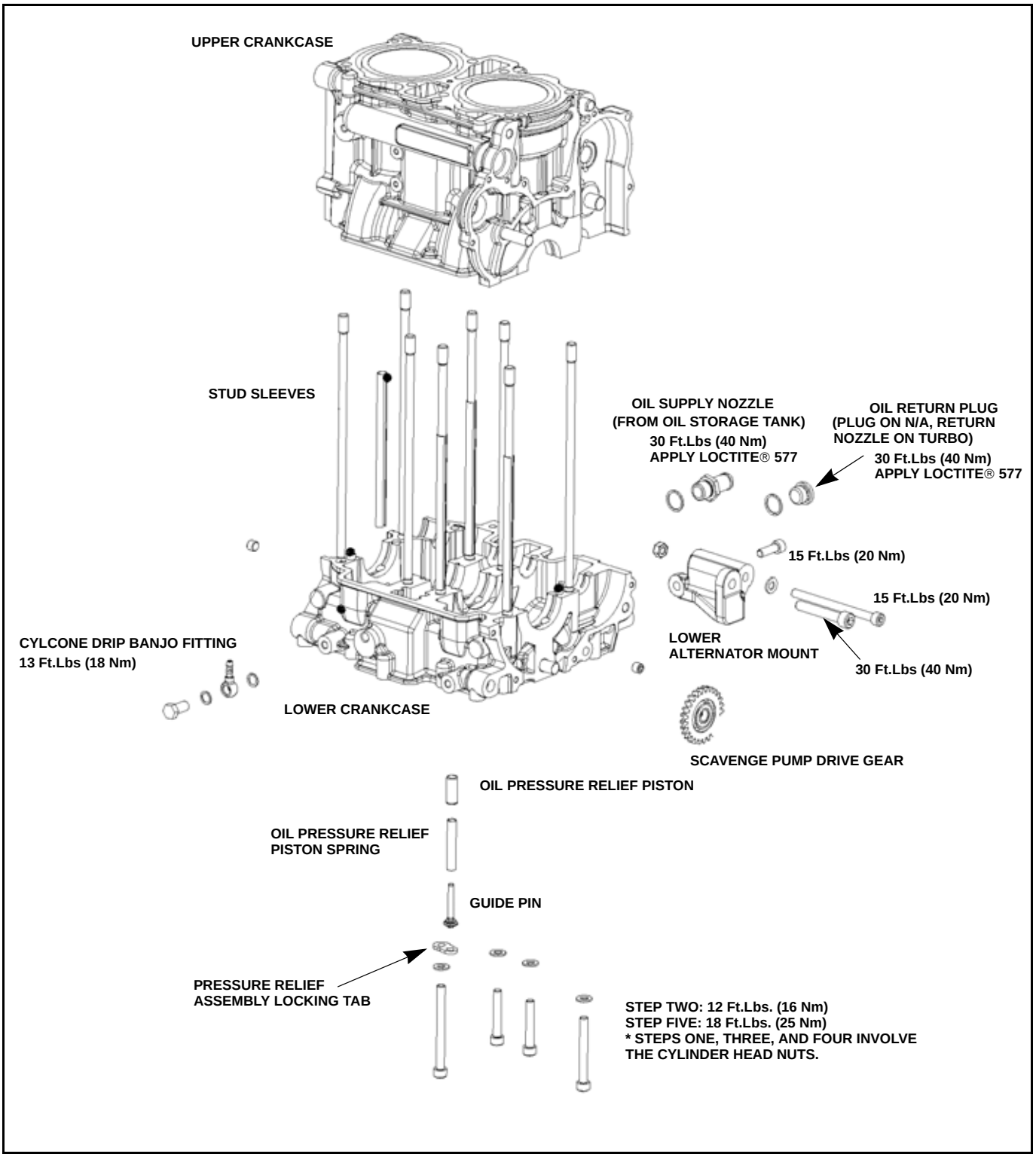
High Pressure Oil Pump Assembly



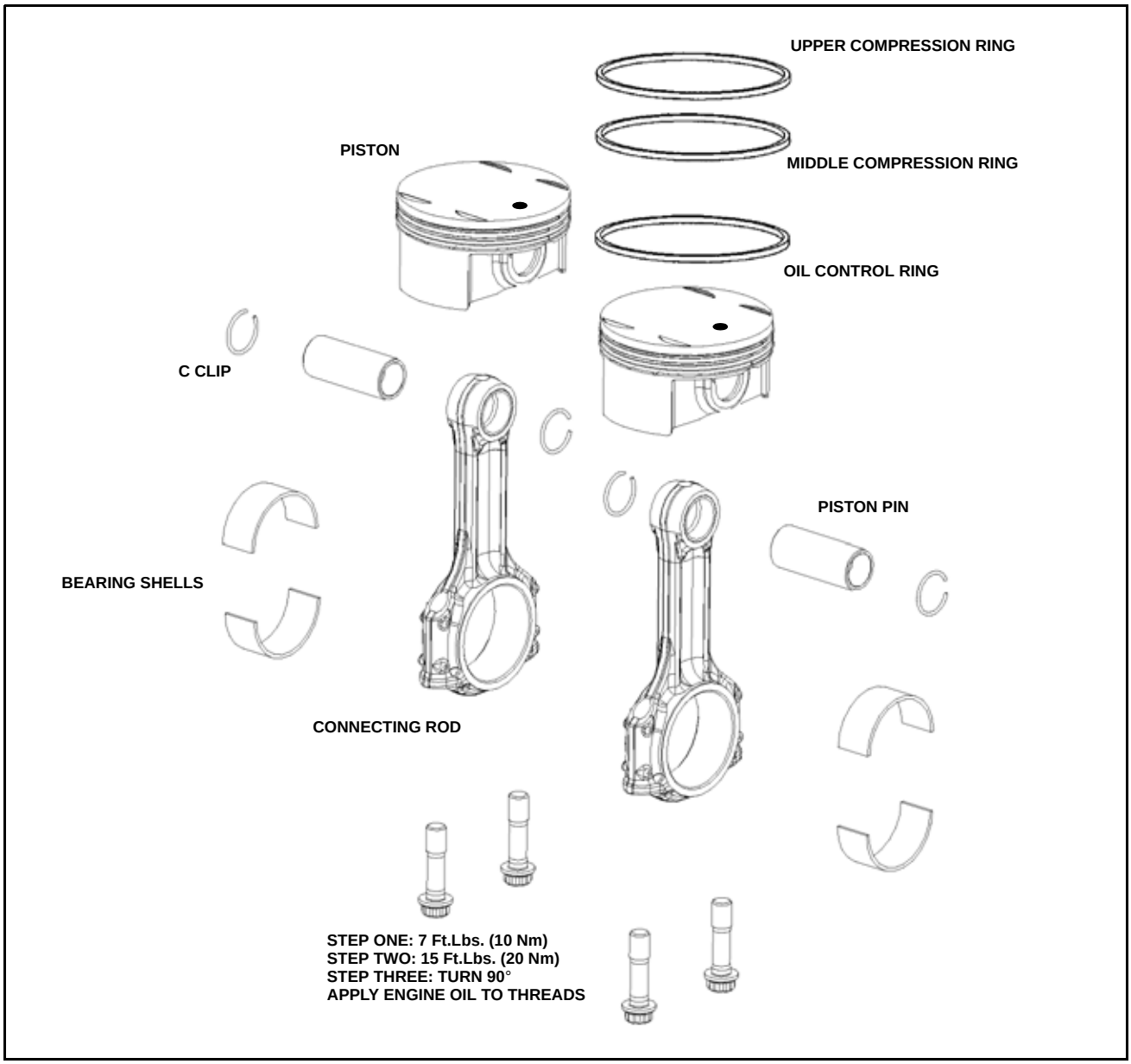
Chain Tensioner / Chain Guide Assembly



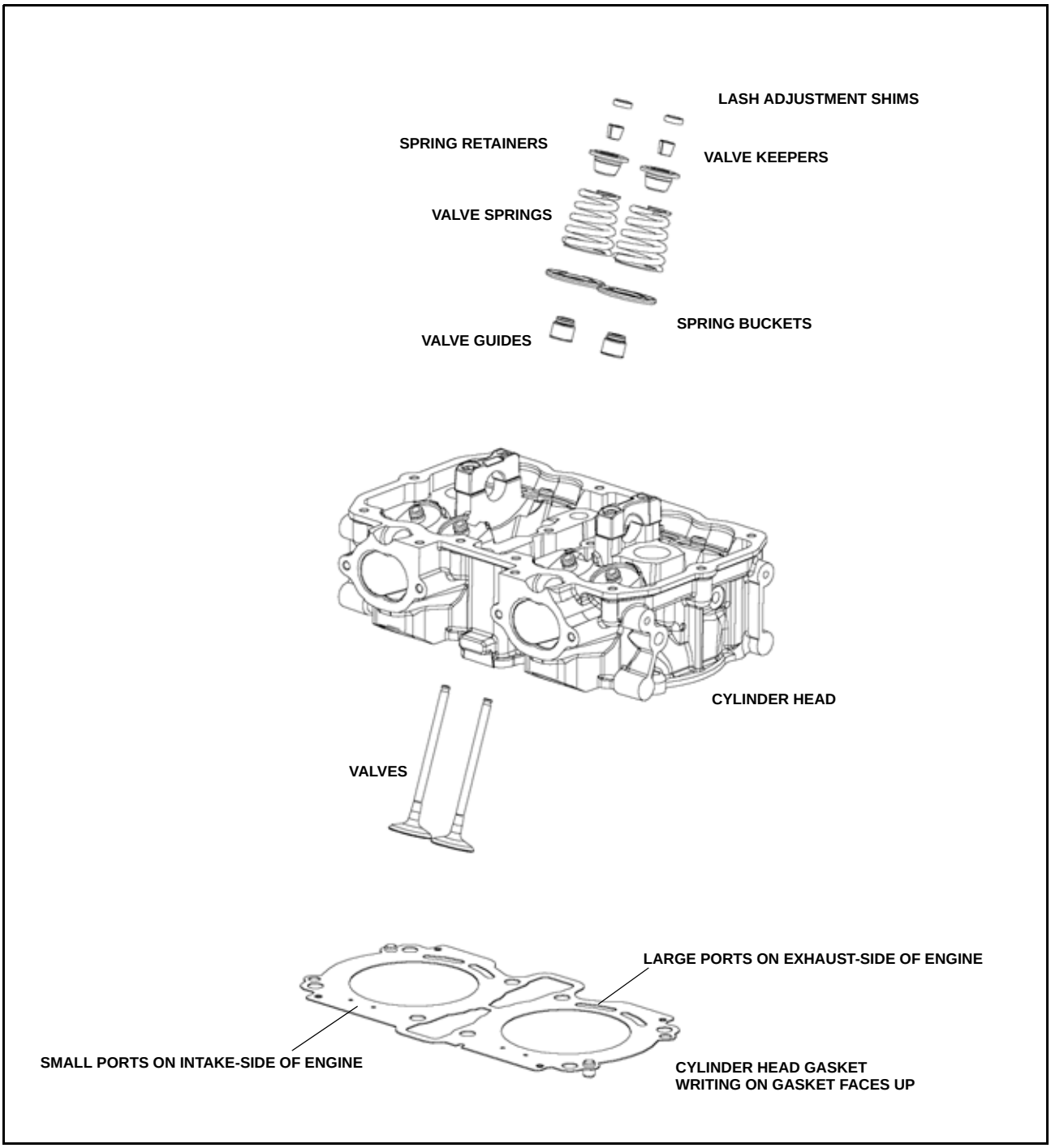
Crankcase Assembly



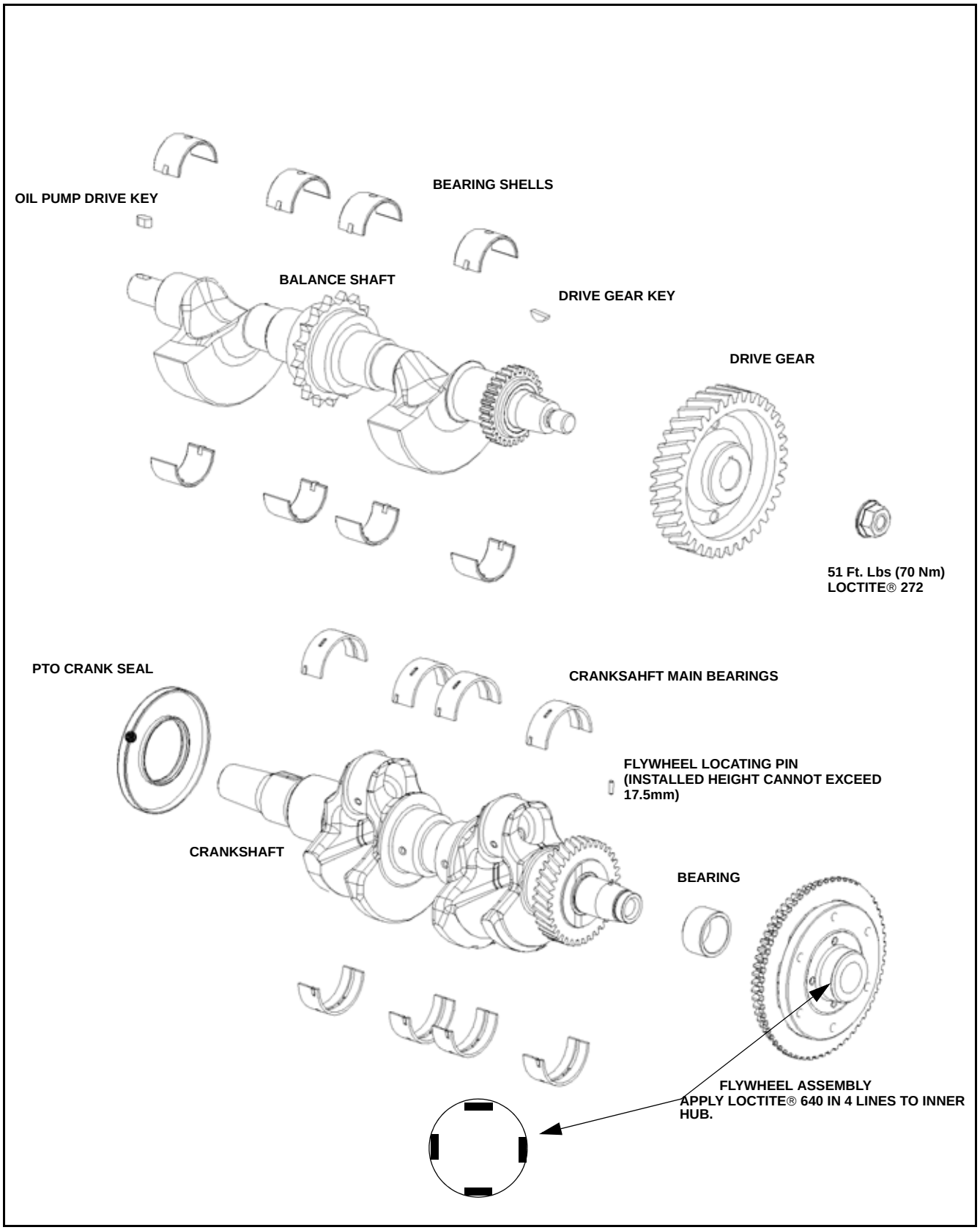
Piston Assembly



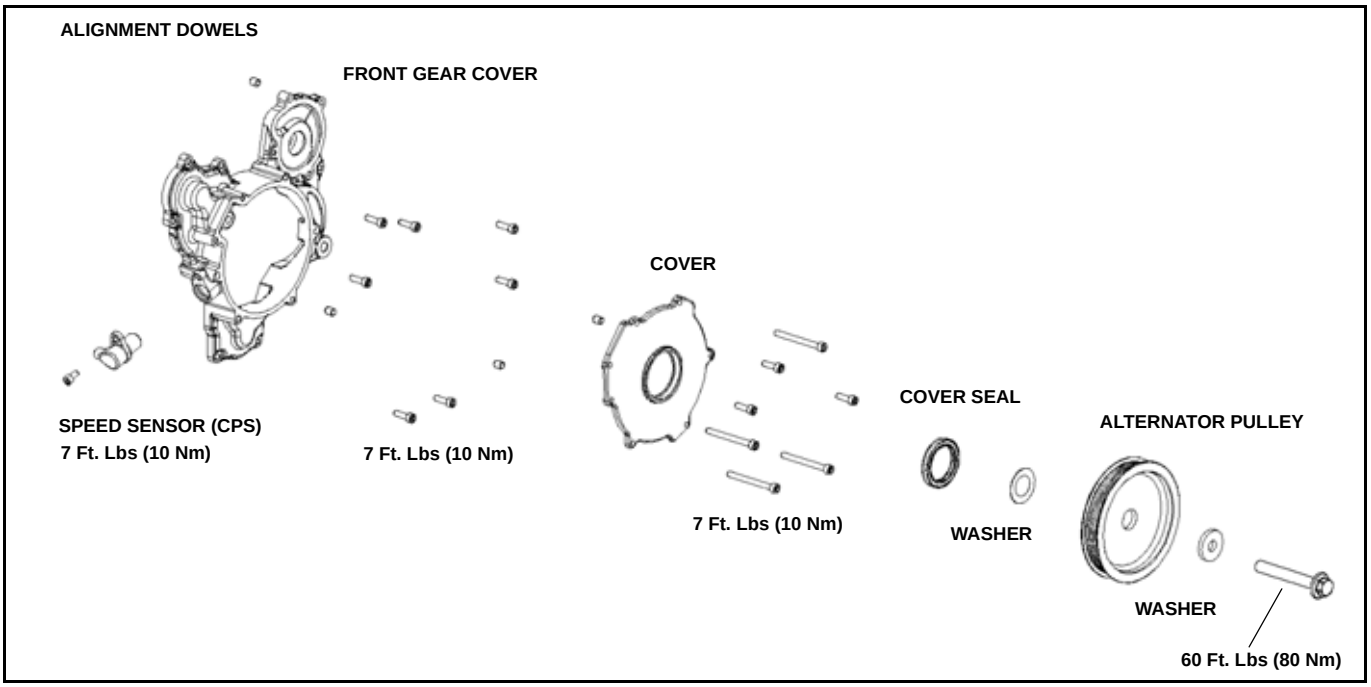
Valve Assembly



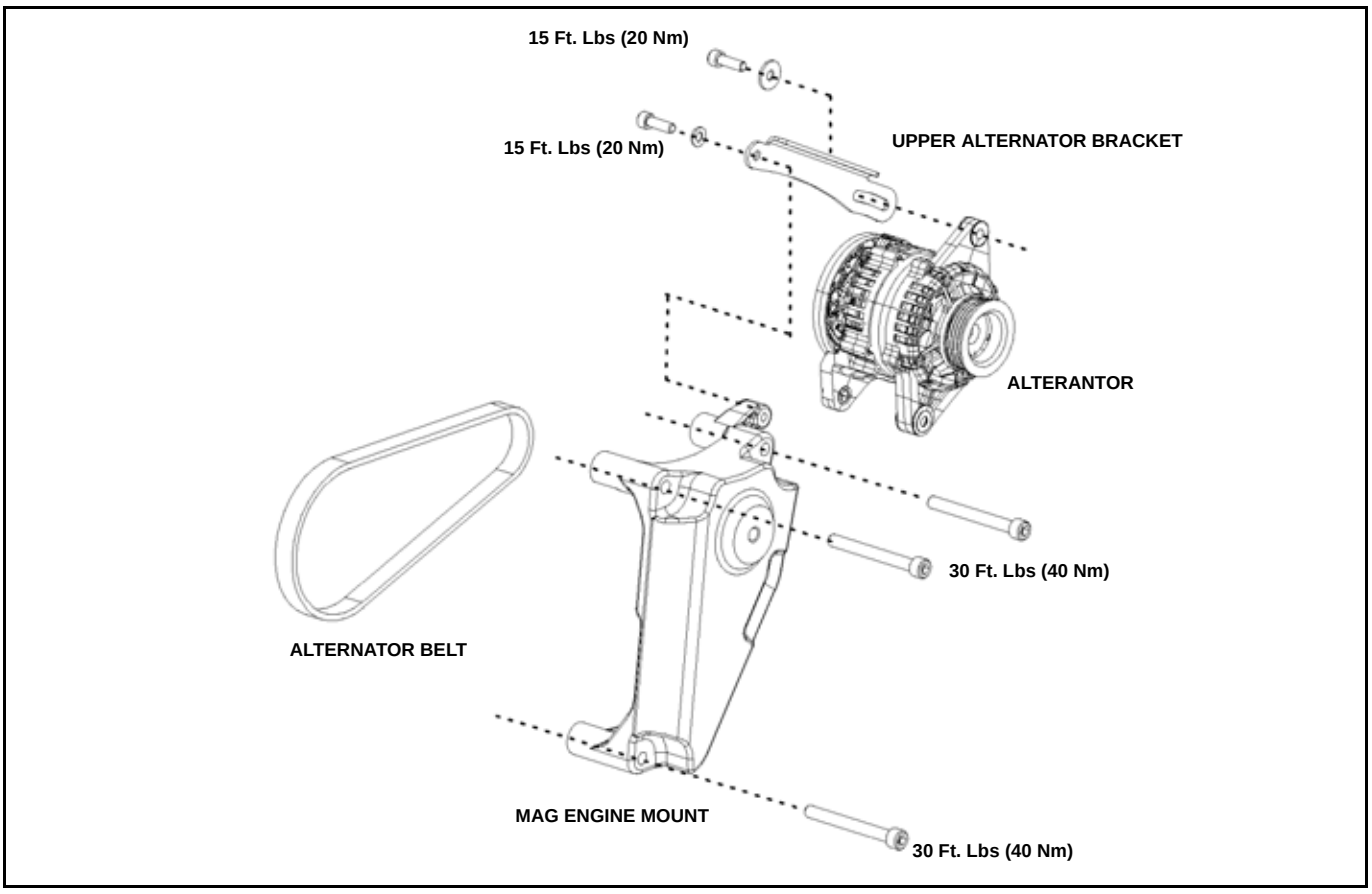
Crankshaft / Balance Shaft Assemblies



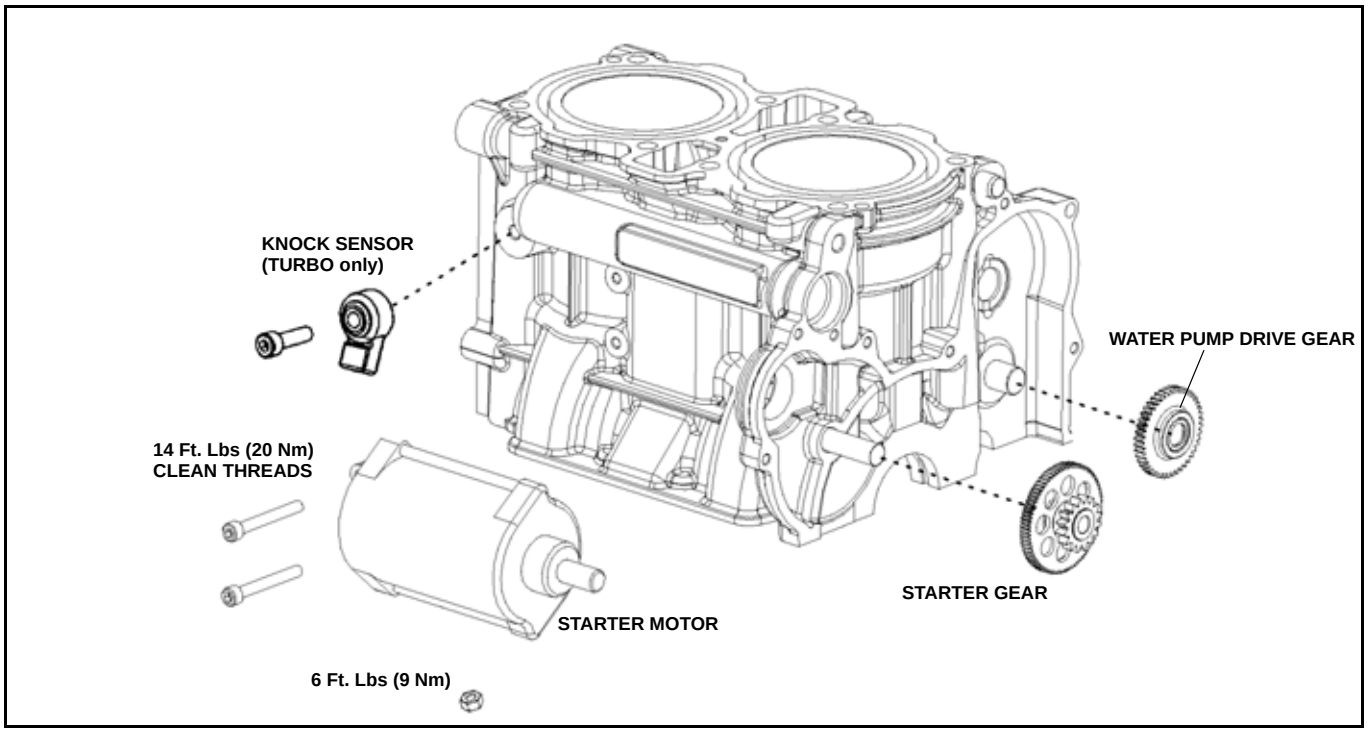
Front (MAG-END) Gear Cover Assembly



MAG Engine Mount / Alternator Bracket



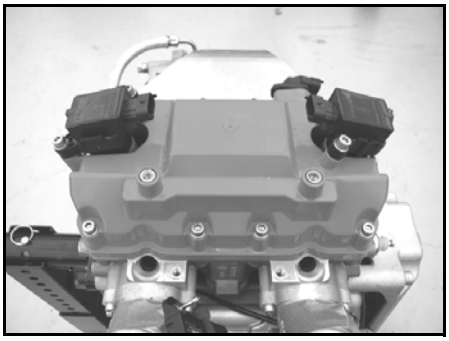
Starter Motor Assembly



DISASSEMBLY / ASSEMBLY

Valve Cover

1. Remove the ignition coils. Replace packs if damage or corrosion is found.

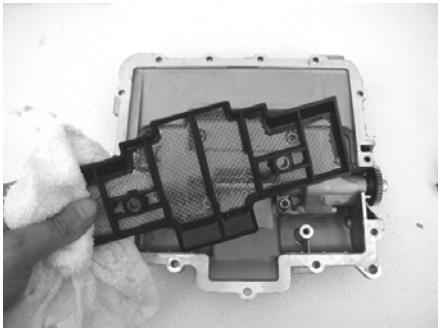


2. Remove the valve cover.
3. Inspect cover gasket, and spark plug hole gaskets for wear. If gaskets are in good condition, replacement is not required.
4. Assembly is reverse of disassembly. Torque fasteners to specifications listed in beginning of chapter.

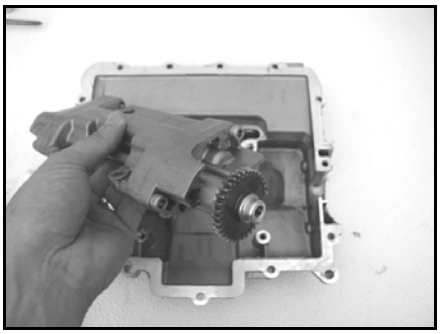
Bedplate / Scavenge Pump

1. Remove the engine from the engine compartment.
2. Remove the fasteners that secure the bedplate to the lower crankcase.
3. Carefully pry the bedplate away from the lower crankcase.

4. Remove the screen. Replace screen if damage is found.



5. Remove the four fasteners securing the scavenge pump to the bedplate.

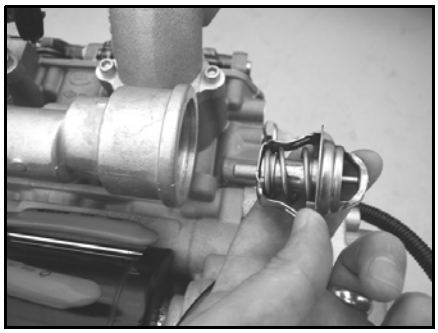


NOTE: The scavenge oil pump is not serviceable. Inspect the pump by rotating the drive gear in both directions. Motion should be smooth and never bind. Inspect each rotor tip for abnormal wear. Replace pump assembly if rotors bind or show signs of abnormal wear.

6. Prior to assembly, clean the crankcase and bedplate mating surfaces.
7. Apply a thin bead of Three Bond 1215 to the bedplate mating surface.
8. Assembly is the reverse of disassembly. Torque fasteners to specification listed in beginning of chapter.

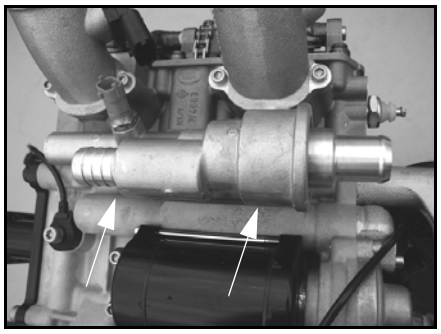
Water Outlet Manifold-Thermostat Assembly

1. To remove the thermostat from the outlet manifold, remove the c-clip with a pair of snap ring pliers.



2. Inspect the thermostat for any signs of damage and replace if found.
3. Test the thermostat by bathing component in a hot water bath. Reference thermostat opening temperature specification listed in the beginning of the chapter. Replace if thermostat does not open at specified temperature.

4. To remove the water outlet manifold, remove the two screws securing the manifold to the cylinder head.

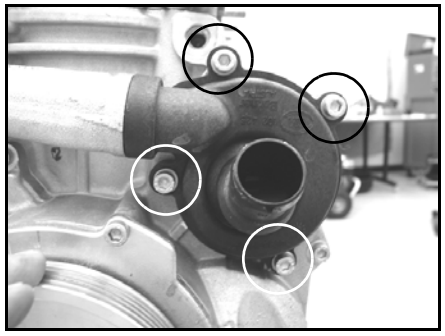


5. Prior to reassembly, replace o-rings with new. Coat the new o-rings with a film of grease.
6. Assembly is the reverse of disassembly. Torque fasteners to specification listed in the beginning of this chapter.
7. Verify thermostat cover snap ring is installed with the chamfer facing out.

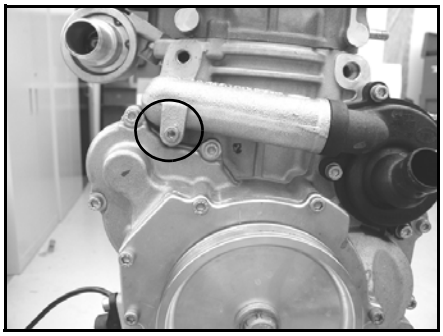
Water Pump Assembly

NOTE: Only the water pump cover, impeller, mechanical seal, and water intake pipe can be removed without removing gear cover.

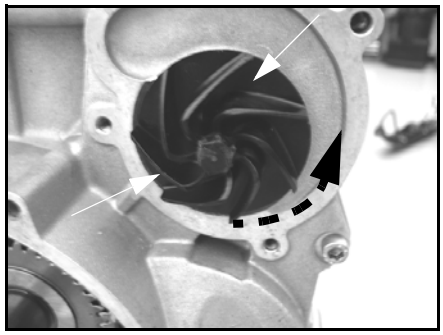
1. Suspend the engine inside the engine compartment. See “Suspending Engine” on page 5.2.
2. Siphon the coolant out of the main fill tube.
3. Remove the hose connection the tee fitting to the radiator.
4. Tip the tee fitting into a bucket. Pour out as much coolant as possible.
5. Remove the hose connection the tee fitting to the water pump cover.
6. Insert the siphon into the water pump cover and remove any remaining coolant.
7. Remove the oil tank bracket.
8. Remove the MAG-side engine support plate.
9. Remove the four screws securing the plastic cover to the gear cover.



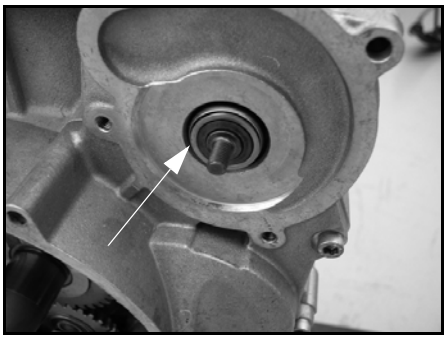
10. Remove the screw securing the intake pipe to the crankcase.



11. Discard the o-rings and cover gasket. Use new o-rings and gasket during assembly.
12. To remove the impeller, insert the blades of two standard screwdrivers into the impeller fins 180° apart from each other. Carefully turn the impeller counter-clockwise to loosen while supporting the impeller fins with your fingers.



13. Remove the mechanical seal from the gear cover by carefully pulling it out with a needle nose pliers. Discard mechanical seal.



NOTE: Reference Front Gear Cover Assembly section for water pump drive shaft, spacer, and washer removal.

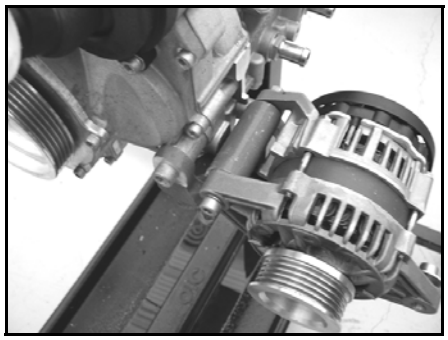
14. Assembly is the reverse of disassembly.
15. Install a new mechanical seal by carefully pressing the seal evenly around the water pump drive shaft. Once seated, firmly press inwards to set the seal.
16. Install the impeller by hand. DO NOT OVERTIGHTEN! Tools are not required as the impeller rotates counter-clockwise during operation.
17. Install a new water pump cover gasket into the cover, and

new o-rings on the intake pipe. Push the intake pipe into the cover and seat firmly.

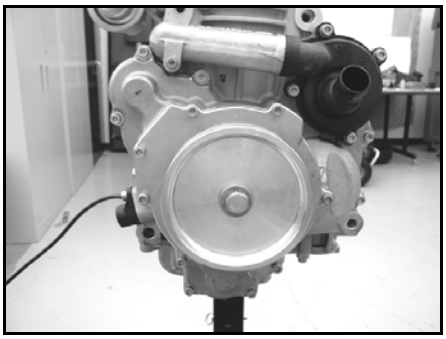
18. Apply Loctite 542 to the two lower cover fasteners. Torque cover and intake pipe fasteners to specification.
19. Reinstall the MAG engine mounting / alternator assembly.

MAG Gear Cover Assembly / Water Pump Driveshaft Removal and Installation

1. Suspend the engine inside the engine compartment. See “Suspending Engine” on page 5.2.
2. Remove the water pump assembly. See “Water Pump Assembly” on page 6.19.
3. Remove the MAG-side engine mount bracket and upper alternator support bracket.
4. Remove the upper alternator support. Remove the heat shield. Loosen the lower alternator pivot bolt. Push the alternator towards the engine to relieve tension on the alternator belt.



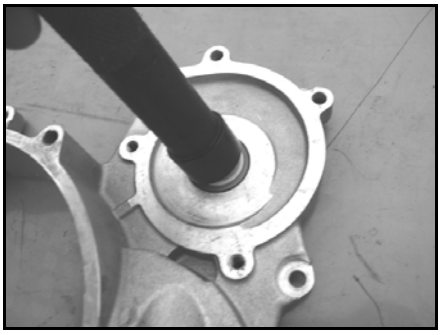
5. Remove the alternator belt.
6. Install the crank arrestor tool, PN: PS-48039 on to the PTO shaft.
7. Remove the pulley fastener while holding the crankshaft stationary with the crank arrestor tool.
8. Carefully tap the pulley off of the crankshaft using a soft-face hammer.

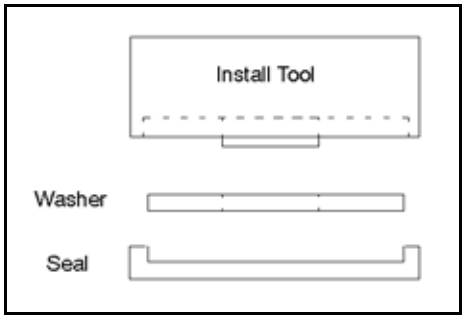


9. Remove the fasteners securing the gear cover to the engine.

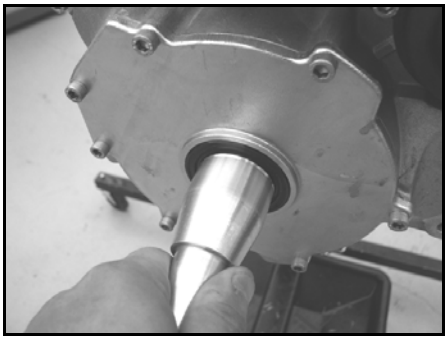
NOTE: Front cover removal is not required when removing the gear cover assembly. If removed, clean mating surfaces and apply Three Bond 1215 to cover mating surfaces during assembly.

10. Carefully tap the gear cover off of the engine using a soft-face hammer.
11. Remove the water pump driveshaft from the front gear cover. Using a small pick, remove the two gaskets located inside the gear cover. Discard the gaskets.
12. Clean the gear cover and crankcase mating surfaces. Remove all residual sealant from components.
13. Inspect the front cover seal. Replace seal if unevenly worn or damaged.
14. To install new water pump driveshaft seals, use the seal installation tool, PN:PS-48040.



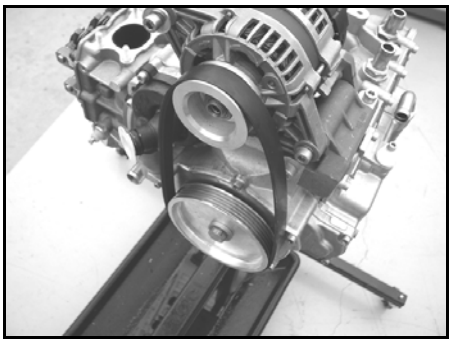


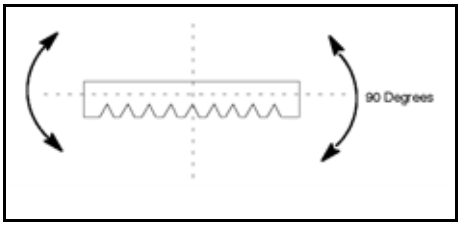
15. To install a new front cover seal, use the front cover seal installation tool, PN:PS-48043.



16. Assembly of the front gear cover / water pump drive shaft is the reverse of disassembly.
17. Apply a thin bead of Three-Bond 1215 to the entire gear cover-to-crankcase mating surfaces.
18. Torque fasteners to specifications listed in beginning of this chapter.

19. Insert a pry bar between the crankcase and alternator. Pull until the drive belt cannot be twisted more than 90 degrees in either direction. Torque alternator pivot bolt and upper alternator support bolt to specification listed at beginning of chapter.



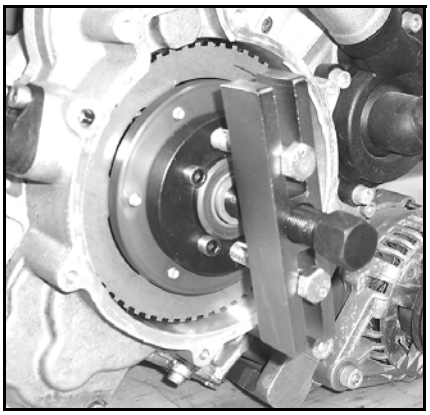


Flywheel Removal and Installation

1. Suspend the engine inside the engine compartment. See “Suspending Engine” on page 5.2.
2. Follow the procedures for removing the MAG-side engine support plate, removing the engine mount, remove the pulley, and moving the alternator, found in the MAG Gear Cover Assembly / Water Pump Driveshaft Removal and Installation section. See “MAG Gear Cover Assembly / Water Pump Driveshaft Removal and Installation” on page 6.30.

NOTE: Only the flywheel cover plate requires removal, not the complete gear cover.

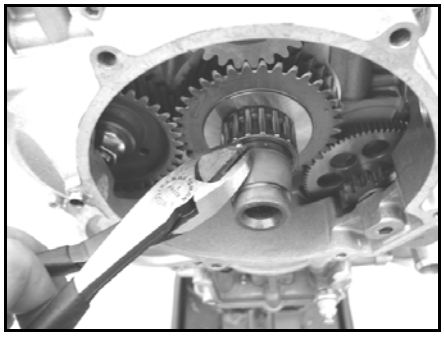
3. Install the flywheel puller into the flywheel, PN: PS-48041.



NOTE: Do not thread the puller screws into the clutch rollers on the backside of the flywheel.

4. Slowly tighten the puller bolt while applying heat to the flywheel outer bearing surface. Hold the crankshaft stationary with the crankshaft arrestor. Remove the flywheel.
5. Verify the flywheel locating pin is not sheared or damaged. To remove the pin, either carefully grasp the pin with a pair of wire cutters, or push the pin into the crankshaft bore.

NOTE: When using heat, do not dis-color the flywheel bearing surface.

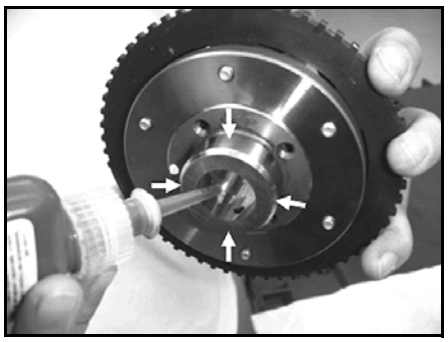


NOTE: The crankshaft locating pin is used only to locate the flywheel position during flywheel installation.

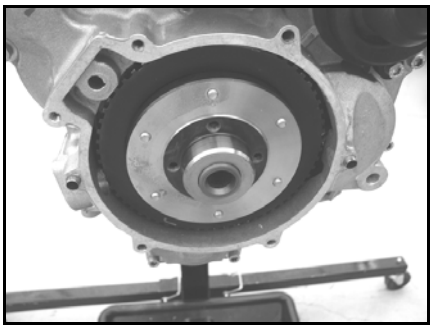
6. With the flywheel removed, inspect the following items:
   - Starter clutch overrun clutch. The starter gear should rotate freely counter-clockwise, but not rotate when turned clockwise as viewed from the back of the flywheel. Replace flywheel if clutch function damaged, or motion binds when rotated counter-clockwise.
   - Inspect the timing rotor teeth. Replace flywheel if teeth are missing or damaged.
   - Inspect the flywheel needle bearings. Replace if damaged or binding.
7. Assembly is the reverse of disassembly. Clean the flywheel taper with Loctite® cleaner spray.
8. Install the flywheel needle bearings before inserting locator pin into crankshaft.
9. Coat needle bearings with engine oil.
10. Press location pin into crankshaft so that bottom of pin is flush with the inside diameter of the crankshaft bore.

NOTE: Exposed pin height cannot exceed 17.5mm.

11. Apply a thin coat of Loctite 640® (GREEN) in four lines to the inside diameter of the flywheel taper.

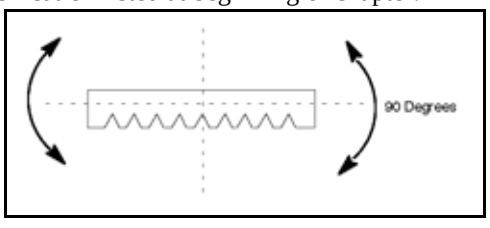


12. Install flywheel onto crankshaft and rotate until flywheel is seated on the locating pin.



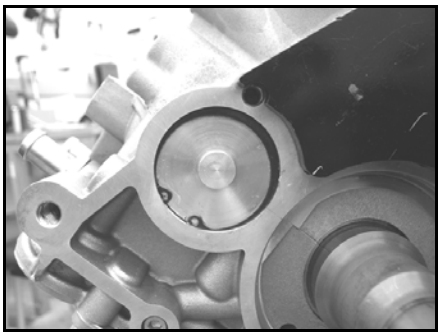
NOTE: When the flywheel is properly seated on the locating pin, turning the flywheel will turn the crankshaft.

13. Apply a thin bead of Three Bond 1215 to the front cover mating surface.
14. Install front cover making sure cover seal lips do not fold over.
15. Tighten fasteners to specification listed at beginning of chapter.
16. Reinstall alternator pulley. Secure crankshaft PTO-end with arrestor tool, and torque pulley bolt to specification listed at beginning of chapter.
17. Install MAG engine mount / alternator assembly.
18. To tension the alternator belt, insert a pry bar between the crankcase and alternator and pull until the drive belt cannot be twisted more than 90 degrees in either direction. Torque alternator pivot bolt and upper alternator support bolt to specification listed at beginning of chapter.

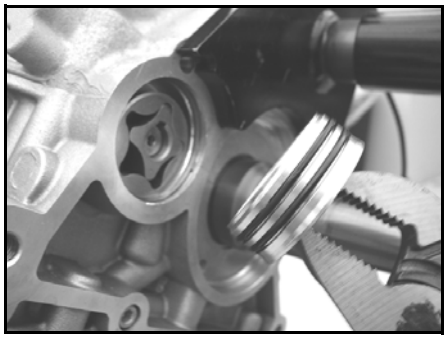


High Pressure Oil Pump

1. Remove the engine from the engine compartment.
2. Remove the c-clip from the oil pump bore.

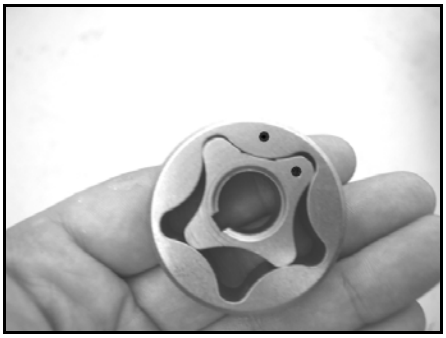


3. Remove the oil pump cap. Discard both o-rings.

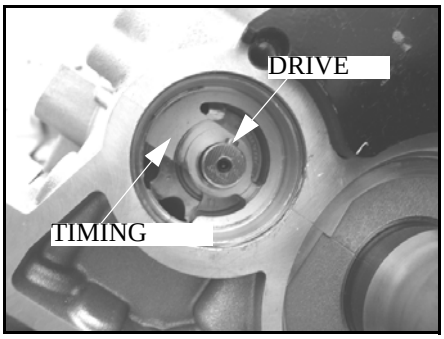


4. Remove the inner and outer rotors. Inspect the rotors for abnormal wear and tear. Replace rotors if worn.

NOTE: Dots must face the same direction.



5. Remove the timing rotor and drive key from the pump bore. Verify the locking pin is in intact and that there is no abnormal wear found on the rotor.



6. Inspect the drive key for damage.
7. Assembly is the reverse of disassembly.
8. Install the timing rotor, and verify the locking pin is engaged in its designated bore.
9. Install the inner and outer rotors with the orientation dots facing outwards.
10. Install two new o-rings on the pump cap.
11. Verify the snap ring chamfer faces out during installation.

Gear Train

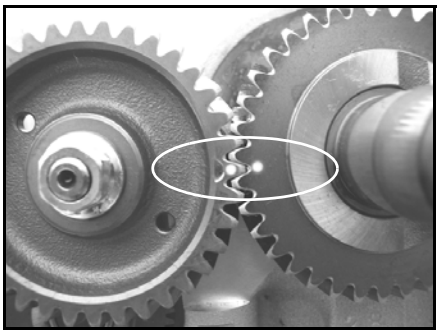
NOTE: The following gears can be replaced without crankcase disassembly:

- Starter Motor Pinon Gear
- Balance Shaft Drive Gear
- Water Pump Pinon Gear
- Water Pump Driveshaft / Gear Assembly
- Scavenge Oil Pump Pinon Gear
- Scavenge Pump Drive Gear

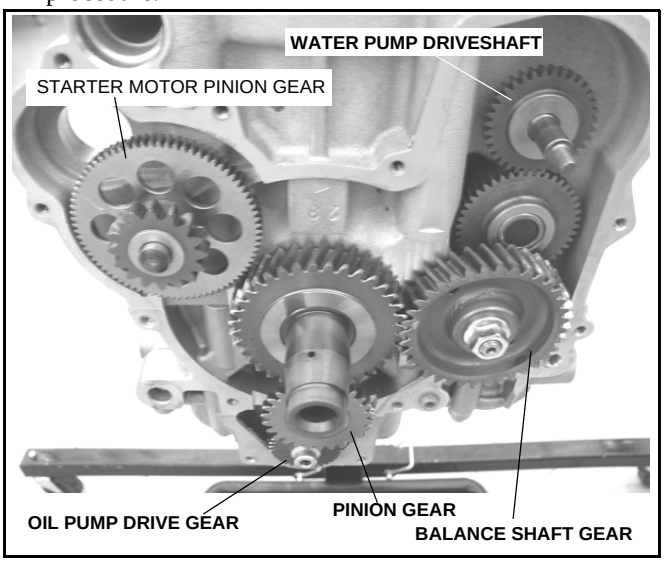
NOTE: The following gears require component replacement and crankcase disassembly:

- Crankshaft Timing Gear - Requires crankshaft replacement.
- Water Pump Pinon Drive Gear - Requires balance shaft replacement.

1. Follow the procedures for removing the gear cover and flywheel preceding this section in this chapter. See "MAG Gear Cover Assembly / Water Pump Driveshaft Removal and Installation" on page 6.30. And See "Flywheel Removal and Installation" on page 6.31.
2. The starter motor pinon gear and scavenge oil pump pinon gear can be removed by simply sliding the gears off of their respective shafts.
3. Remove the balance shaft drive gear by removing the nut, then install the gear removal tool, PN: PW-46982. Pull the gear off of the shaft.
4. The water pump pinon gear can be removed once the balance shaft drive gear is removed.
5. Inspect each gear as it is removed for signs of damage and improper function. Gear bearings should rotate smoothly without binding.
6. When installing the balance shaft drive gear, apply Loctite® 272 to shaft threads.
7. Position the gear / balance shaft so the single dot on the gear aligns with the single dot on the crankshaft drive gear.



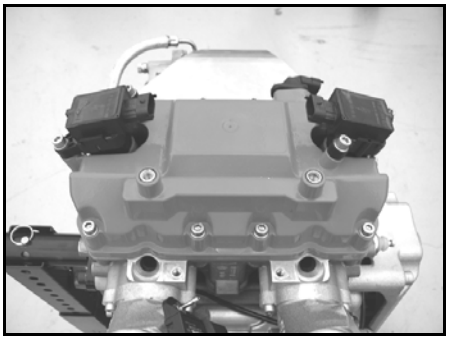
8. Torque nut to specification listed at beginning of chapter.
9. Reference the procedures for installing the gear cover, flywheel and MAG engine mount to complete reassembly procedure.



6

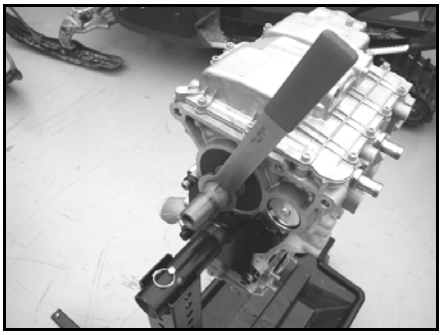
Cylinder Head / Valve Train

1. Remove the engine from the engine compartment.
2. Remove the valve cover.



3. Remove the exhaust manifold / turbocharger assembly.
4. Rotate the engine so the engine bedplate is up. Remove the bedplate from the crankcase.

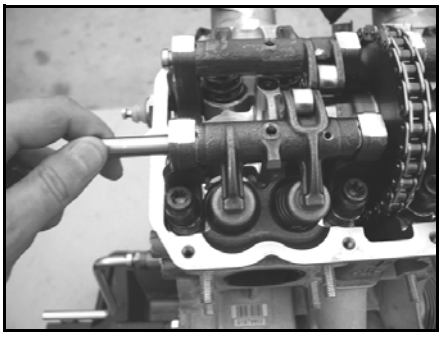
5. Install the crankshaft arrestor tool, PN: PS-48039, on to the PTO shaft. Turn the engine so the cylinder head is up.



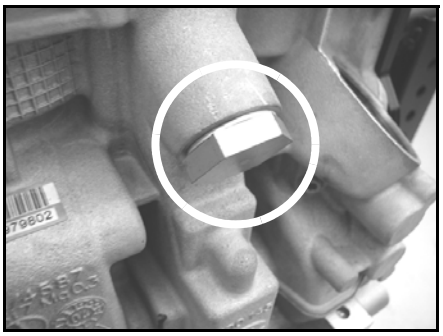
6. Turn the crankshaft arrestor tool in the direction of forward engine rotation until the MAG cylinder is at TDC-compression stroke.

NOTE: TDC-compression stroke can be identified as when the piston is at its maximum upwards travel and BOTH rocker arms are loose revealing that the valves are closed.

7. Push the rocker arm pins out and remove the MAG rocker arms.

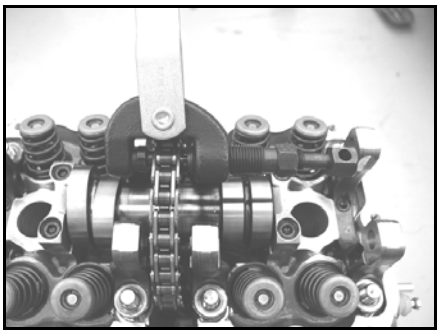


8. Rotate the engine in the direction of forward engine rotation until the PTO cylinder is at TDC-compression stroke.
9. Push the rocker arm pins out and remove the PTO rocker arms.
10. Remove the valve shims from each valve assembly. Collect each rocker arm, pin and valve shims as they were removed from the engine. Place each set in a container or bag with accurate labeling noting where each component is used during assembly.
11. Remove the chain tensioner plug using a large pipe wrench.



NOTE: The chain tensioner plug is located on the exhaust-side of the crankcase.

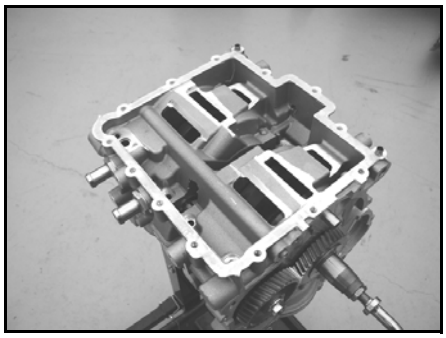
12. Attach the chain breaker tool, PN: PW-46985, to the chain. Verify that the pressing pin (pin with detent nose) and plate with a hole is installed in the tool before securing the tool to the chain links.



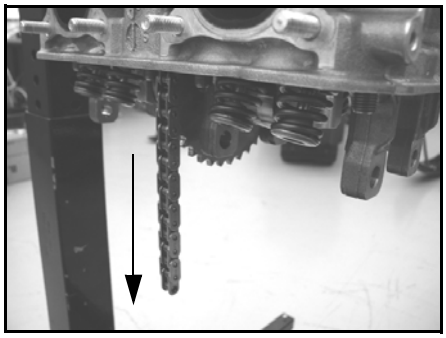
13. Tighten the threaded ram securely against the plate while keeping the pressing pin is square with the head of the chain pin. Carefully press the pin through the first set of link plates, but no further.
14. Release the tool, and perform procedure on the other end of the same plate.
15. With both pins pressed out, remove the tool, then remove the plate with chain pins and discard. Keep the chain wrapped around the sprocket.

NOTE: Do not drop the chain into the crankcase.

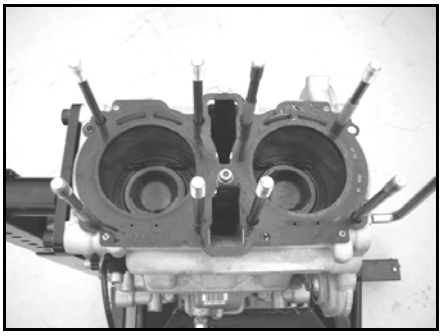
16. Hold the chain to the camshaft sprocket, then rotate the engine so the cylinder is pointed down.



17. Rotate the crank arrestor tool in the direction of normal engine travel until the chain is out of the crankcase.



18. Rotate the engine so that cylinder head is pointed up.
19. Loosen and remove the cylinder head nuts in even steps and in a criss-cross pattern.
20. Remove the cylinder head assembly. Remove the cylinder head gasket. Discard the gasket.

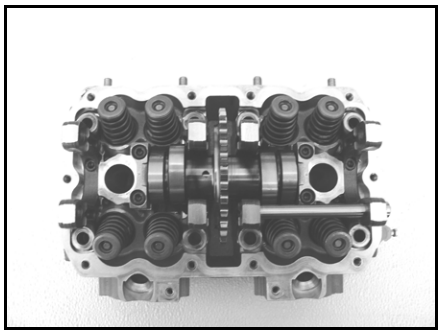


21. Perform the inspection procedures outlined in this chapter. If the cylinder head is damaged or warped, etc., replace the component.

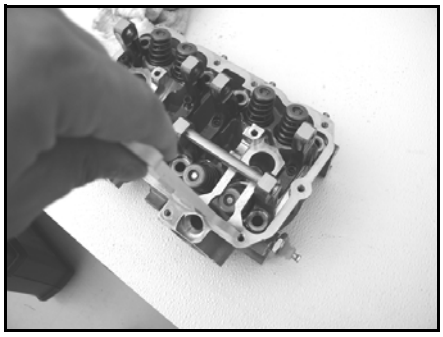
NOTE: Valve guide, valve seat or head reconditioning is not recommended. Repair options include: replacing the complete cylinder head assembly or, replacing the cylinder head casting and transferring the original parts to the new head. The cylinder head casting is fitted with new valve seats and valve guides.

NOTE: Do not re-surface the cylinder head or crankcase.

22. To remove the valves from the head assembly, reinstall the four rocker arm shafts back into the rocker arm towers.

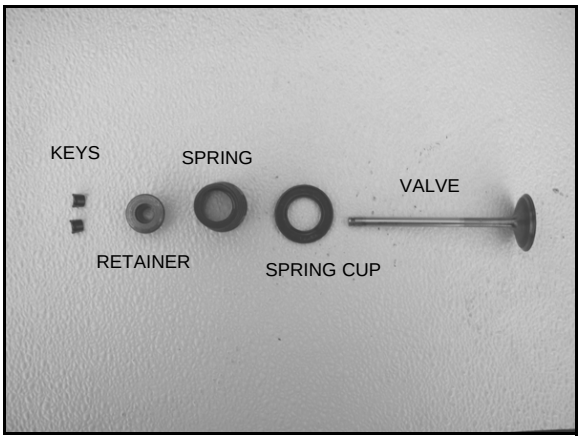


23. Using the valve compressor tool PN: PW-46991, compress each valve, and remove the valve keepers from around each valve stem.



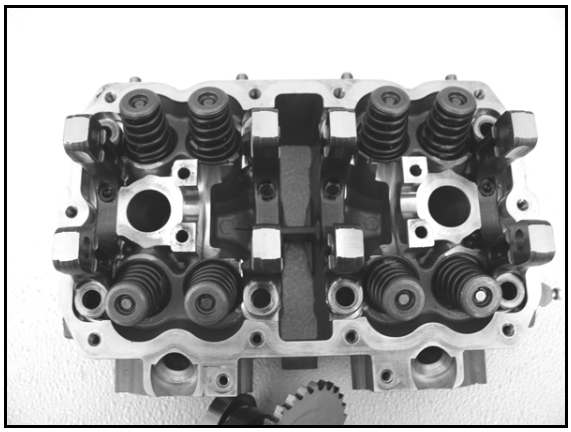
24. Extract each valve from the combustion chamber side.

25. Inspect each valve assembly for damage and abnormal wear and tear. Reference the inspection procedures outlined within this chapter.

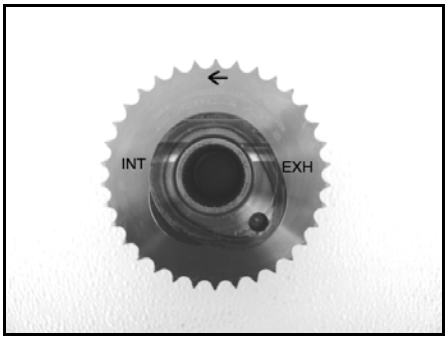


NOTE: Do not recondition valves. Replace worn valves with new parts.

26. Remove the camshaft assembly by loosening the four camshaft axle clamp fasteners

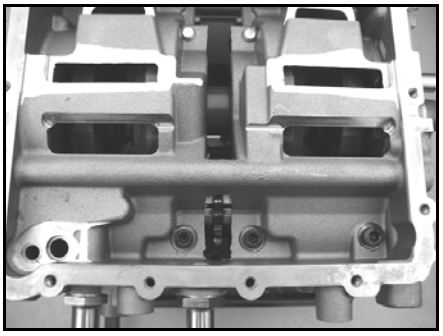


27. Tap the clamps softly with a rubber-faced hammer until they break free from the axle. Mark each clamp to identify original position during assembly.
28. Gently tap the axle and camshaft out of the cylinder head. Inspect the axle and camshaft as outlined within this chapter.
29. Remove the rocker arm towers by removing each fastener at the base of the towers. Gently tap on the towers with a rubber-faced hammer to remove.
30. Cylinder assembly is the reverse of disassembly. Tighten fasteners to specified torque as outlined within this chapter. Always use a new cylinder head gasket whenever the cylinder head is removed from the engine.
31. Always install the camshaft so the arrow points in the direction of camshaft rotation, not normal-operational crankshaft rotation. The INTAKE and EXHAUST direction of the camshaft are inscribed on the sprocket face.



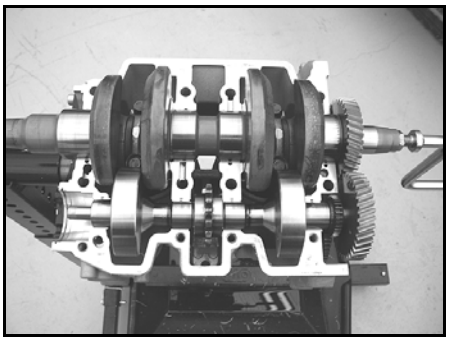
Crankcase / Crankshaft / Pistons / Balance Shaft

1. Remove the engine from the engine compartment.
2. Remove the following components / assemblies from the engine:
   - Valve Cover
   - Sump / Bedplate
   - Water Pump / Pump Components / Thermostat Manifold
   - Gear Cover / Flywheel / Alternator Assembly
   - Cylinder Head / Timing Chain / Chain Tensioner
   - Starter Motor
   - High Pressure Oil Pump Assembly
3. With the bottom of the engine facing upwards on the engine stand, evenly remove the four lower crankcase fasteners.



NOTE: The PTO-side fastener includes a clamp plate for the oil pressure relief piston and spring assembly. When removed, the spring and piston can be extracted with a magnet.

4. Using a soft-faced hammer, carefully pound each cylinder head stud upwards in a criss-cross pattern. Doing so will separate the lower crankcase from the upper crankcase leaving the crank train and upper crankcase attached to the engine stand.
5. Remove the lower crankcase from the upper section.



NOTE: Note the location of each of the four plastic oil control stud jackets.

6. Remove the balance shaft. Balance shaft bearings should be replaced whenever the engine is disassembled due to the fact that there is only one bearing size available.
7. Remove the connecting rod fasteners. Carefully extract each piston from the cylinder bores.

NOTE: Make note of each connecting rod assembly. The connecting rods feature "cracked" bearing cap mating surfaces. No two connecting rod bearing cap mating surfaces will be alike.

8. Remove the crankshaft assembly from the crankcase.

NOTE: The timing gear is pressed on to the crankshaft. Gear damage requires crankshaft replacement.

With the engine completely dissembled, each part and component should be thoroughly cleaned with engine cleaner. Remove all sealants from mating surfaces using a razor blade or brush.

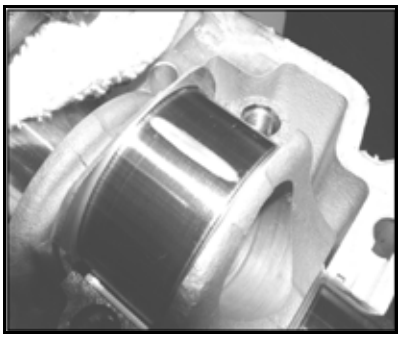
After the engine parts are cleaned, inspect each part as outlined within the "Engine Component Inspection" section within this chapter. Always replace parts that do not meet specification requirements with new parts.

Prior to re-assembling the engine, the connecting rod and crankshaft main bearing oil clearances must be measured and brought into specification as required.

Connecting Rod Bearing Oil Clearance Inspection

NOTE: Do not move the crankshaft or connecting rods until the measurement process is completed!

1. Using the original connecting rod bearings, install each piston back into the upper crankcase.



2. Install the crankshaft.
3. Wipe away any oil residue on the bearing surfaces.
4. Place a piece of Plastigauge across the crankshaft connecting rod journal surface.
5. Install the connecting rod bearing cap with original bearing installed. Torque fasteners to specifications.
6. Remove the bearing cap, and measure the compressed piece of Plastigauge at its widest point.
7. Follow the Connecting Rod Bearing Replacement Guide.

Bearing Replacement Guide

NOTE: The bearing color is imprinted on the side of each bearing shell.

- CONNECTING ROD SPECIFIED OIL CLEARANCE: **.024 - .053mm (.0009 - .0021in.)**
- MEASURED OIL CLEARANCE:_____
- ORIGINAL INSTALLED BEARING COLOR / THICKNESS:_____

REPLACEMENT BEARINGS (THICKNESS RANGE):

- RED (0451338): 1.721 - 1.726mm (.0677 - .0679in.)
- YELLOW (0451337): 1.726 - 1.731mm (.0679 - .0681in.)
- BLUE (0451339): 1.731 - 1.736mm (.0681 - .0683in.)
- GREEN (0451340): 1.736 - 1.741mm (.0683 - .0685in.)
- BROWN (0451341): 1.747 - 1.746mm (.0685 - .0687in.)

If the measured clearance is within specifications, replace bearings with new bearings with the same color code.

If the measured gap is larger than specified, replace bearings with the next larger bearing and re-measure.

If the measured gap is smaller than specified, replace bearings with the next smaller bearing and re-measure.

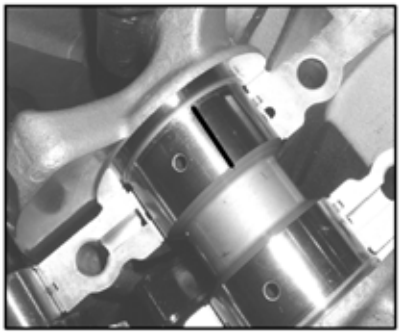
Always measure the crankcase main bearing and connecting rod big-end inside diameters and compare to specifications. Replace components that are outside of specification.

If the original bearings reveal an oil clearance of .04 - .05mm, install new bearings with the same color code as the originals.

Crankshaft Main Bearing Oil Clearance Inspection

NOTE: Do not move the crankshaft until the measurement process is completed. Do not place Plastigauge strips over oil holes in crank pins.

1. Replace the main bearings into the upper crankcase as they were positioned prior to removal.



2. Install the crankshaft. Install a piece of Plastigauge across each journal surface.
3. Install the lower crankcase with the main bearings already installed.
4. Loosely install the four lower crankcase fasteners.
5. Rotate the engine assembly on the engine stand. Install the original head gasket.
6. Install the cylinder head and nuts.
7. Torque the nuts and lower fasteners to specifications as outlined within this chapter.
8. Carefully disassemble the engine. Do not allow the crankshaft to rotate.
9. Measure each piece of compressed Plastigauge at its widest point and record.
10. Follow the Bearing Replacement Guide

Bearing Replacement Guide

NOTE: The color code is imprinted on the side of each bearing shell.

- Crankshaft Main Bearing Oil Clearance Specification: **.05 - .06mm (.002 - .0023in.)**
- Measured Oil Clearance:_____
- Original Bearing Color / Thickness:_____

REPLACEMENT BEARINGS (THICKNESS RANGE):

- RED (0451343): 1.990 - 1.995mm (.0783 - .0785in.)
- YELLOW (0451342): 1.995 - 2.000mm (.0785 - .0787in.)
- BLUE (0451344): 2.000 - 2.005mm (.0787 - .0789in.)
- GREEN (0451345): 2.005 - 2.010mm (.0789 - .0791in.)

If the measured clearance is within specifications, replace bearings with new bearings with the same color code.

If the measured gap is larger than specified, replace bearings with the next larger bearing and re-measure.

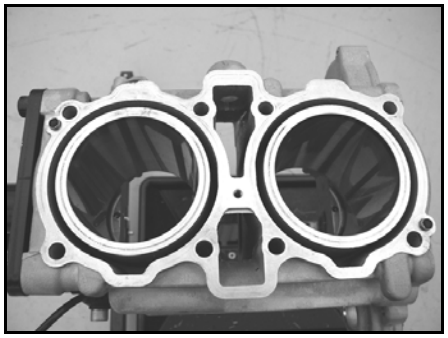
If the measured gap is smaller than specified, replace bearings with the next smaller bearing and re-measure.

Always measure the crankcase main bearing and connecting rod big-end inside diameters and compare to specifications. Replace components that are outside of specification.

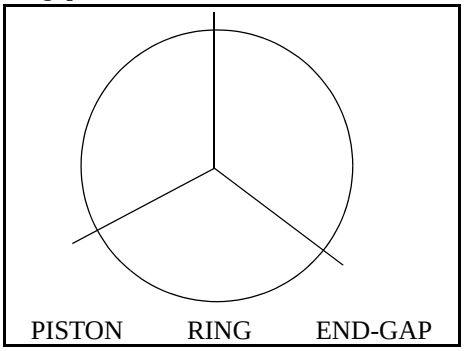
If the original bearings reveal an oil clearance of .04 - .05mm, install new bearings with the same color code as the originals.

Crankcase / Crank Train / Piston Assembly

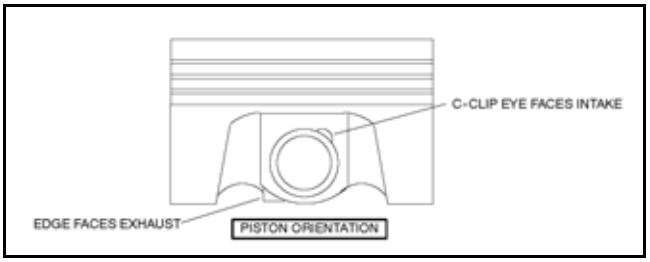
1. Position the upper crankcase as shown in the photo.



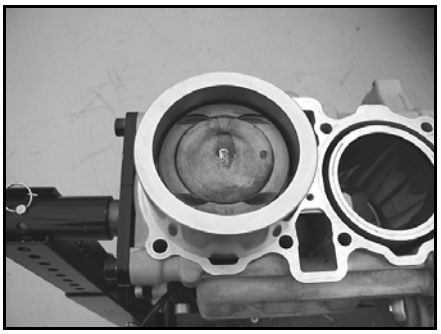
2. Prepare each piston assembly for installation into the crankcase. Lubricate each piston assembly with engine oil.
3. Place the piston installation tool, PN PW-46983, over one of the piston bores. Lubricate the inner diameter of the tool with engine oil.
4. Position one piston assembly inside the tool and align each ring end gap as illustrated.



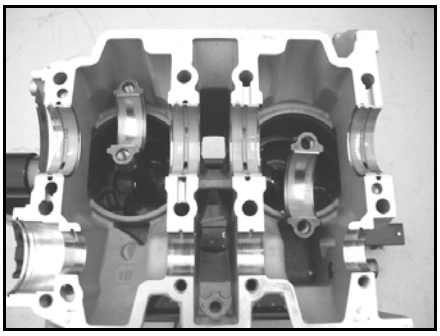
5. Install the piston assembly into the installation tool. Verify the piston pin c-clip eye is facing towards the INTAKE-SIDE of the engine. The piston pin boss edge faces the EXHAUST-SIDE of the engine.



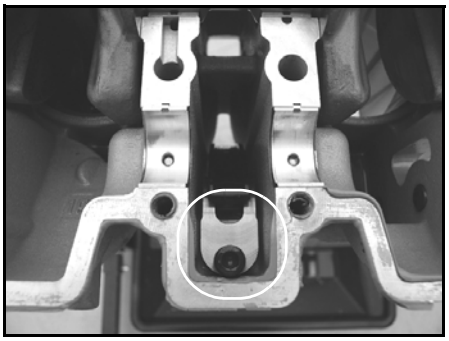
6. Carefully press the piston assembly into the cylinder bore.



7. Repeat process to install the second piston assembly. Wipe up any excess oil leftover from the piston installation process.
8. Position the upper crankcase as shown in the photo. Clean each bearing journal.



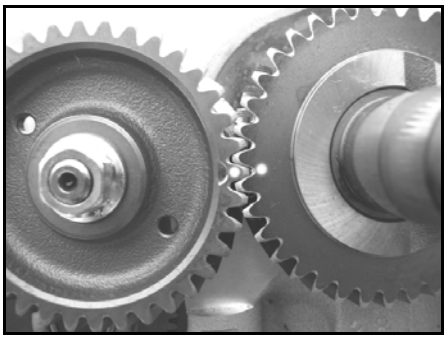
9. Lubricate each bearing journal with engine oil.
10. Install a new set of balance shaft bearings into the crankcase. Lubricate bearings with engine oil.
11. Install each crankshaft main bearing into the crankcase. Lubricate each bearing with engine oil.
12. Install each connecting rod bearing. Lubricate each bearing with engine oil.
13. Install the pivoting chain guide. Torque fastener to specification.



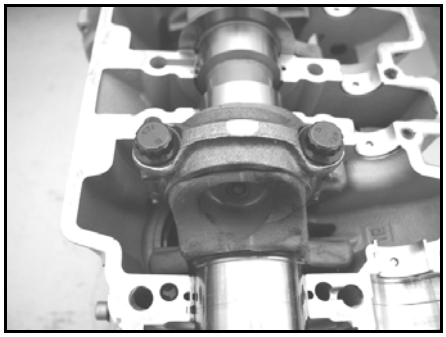
14. Install the crankshaft and balance shaft at the same time.

NOTE: The balance shaft drive gear must be at least loosely installed prior to installing the balance shaft in to the crankcase.

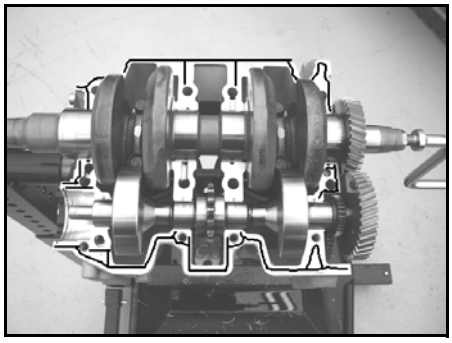
15. Align the timing dot on the balance shaft gear with the timing dot on the crankshaft gear.



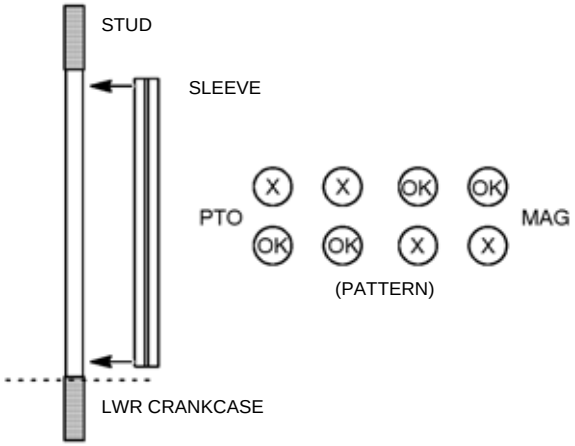
16. Carefully push each piston assembly towards the crankshaft and seat the connecting rods against the crankshaft journals.



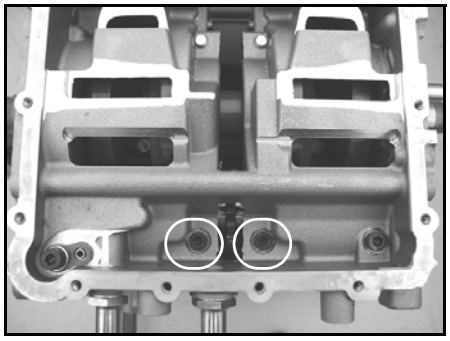
17. Verify the correct bearings are installed in each of the two connecting rod caps. Lubricate each bearing and crankshaft journal with engine oil.
18. Match each rod caps unique “cracked” mating surface with the matching connecting rod.
19. Loosely install the rod cap fasteners, then tighten evenly.
20. Torque fasteners to specifications.
21. Obtain the lower crankcase. Remove any foreign material and sealant from the mating and bearing surfaces. Install the balance shaft and crankshaft bearings into the crankcase. Verify each bearing is its correct location when matched to the upper crankcase bearings. Lubricate each bearing with engine oil.
22. Apply a thin bead of Three bond 1215 sealant as represented by the black line in the photo.



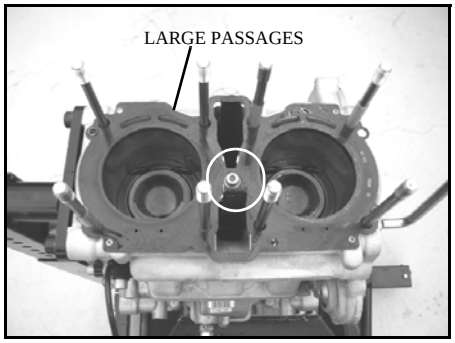
23. Verify the four plastic oil control stud jackets are installed in the middle of each stud.



24. Carefully lower the lower crankcase on to the upper crankcase.
25. Loosely install the two middle lower crankcase fasteners to keep the crankcases from separated when the engine is rotated.

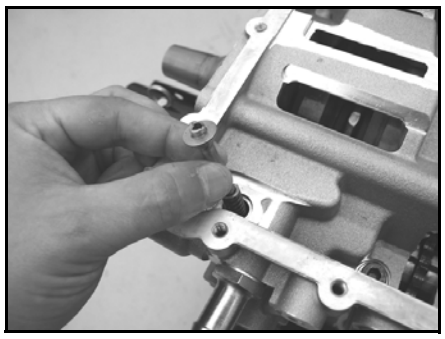


26. Rotate the engine so the cylinder head is pointed upwards.
27. Clean the cylinder head gasket mating surface.
28. Install a new cylinder head gasket making sure the writing on the gasket is visible, the small cooling passages are on the intake-side (starter motor side) of the engine and the large cooling passages are on the exhaust-side of the engine.

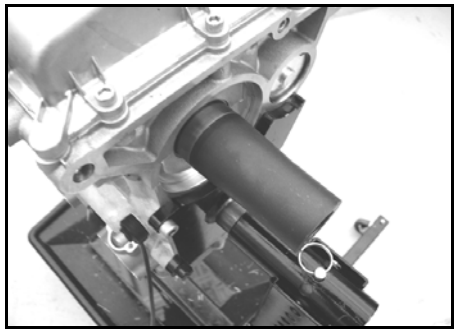


29. Install the fixed chain guide into the cylinder head. Torque fastener to specification.
30. Install the cylinder head assembly. Install each cylinder head nut and tighten securely.

31. With the cylinder head secured to the crankcase, rotate the engine so the cylinder head is pointed down.



32. Install the oil pressure relief piston, guide pin, and spring into the fastener bore. Insert the fastener with the relief clamp over the guide pin. Tighten the fastener, then install the remaining lower crankcase fastener.
33. Perform the five-step torque sequence procedure for tightening the cylinder head nuts and lower crank case fasteners. The sequence and torque values are outlined in the torque specification table and sequence illustration at the beginning of this chapter.
34. Rotate the engine to gain access to the PTO shaft. Slide the crank seal installation tool over the PTO shaft. Apply a light film of oil to the surface of the tool. Install the crankshaft seal by carefully tapping around the outside circumference of the seal.

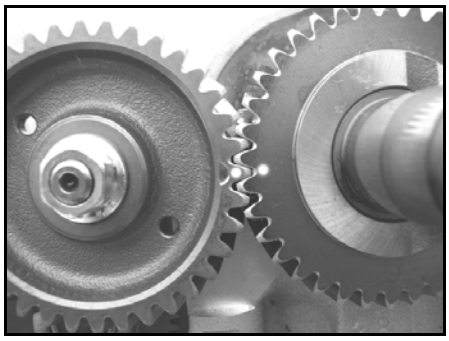


35. The following procedures must be completed to finish the re-assembly process:

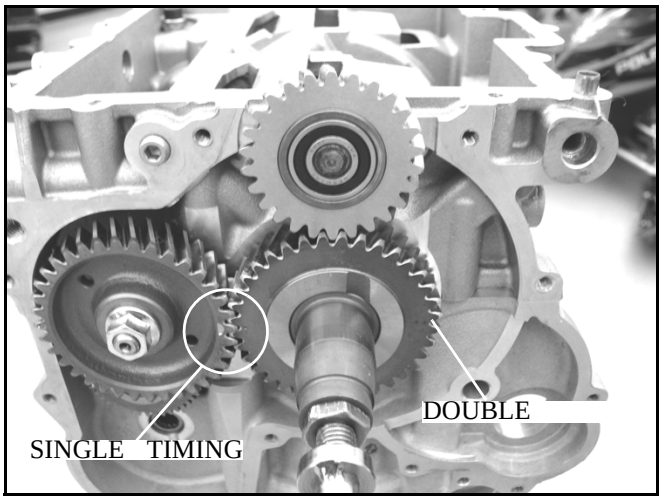
    - Timing Chain Installation / Locating TDC
    - Valve Cover Installation
    - Sump / Bedplate Installation
    - Water Pump / Pump Components / Thermostat Manifold Installation
    - Gear Cover / Flywheel / Alternator Assembly Installation
    - Cylinder Head / Timing Chain / Chain Tensioner Installation
    - Starter Motor Installation
    - High Pressure Oil Pump Assembly Installation
    - Valve Lash Adjustment

Timing Chain Installation / Locating TDC

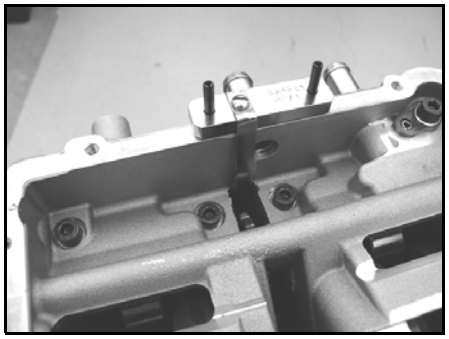
Timing chain installation requires setting the pistons to TDC (Top Dead Center).



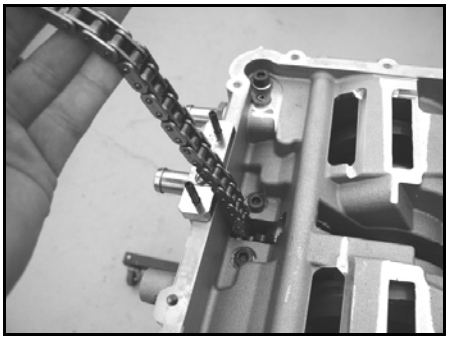
The pistons are at TDC when the set of SINGLE timing marks are aligned with each other, and the set of DOUBLE timing marks are aligned with the upper and lower crankcase parting line.



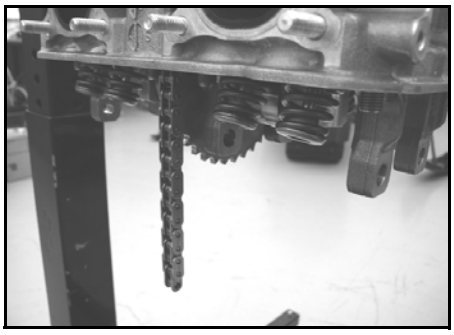
1. Install the timing chain installation tool, PN PW-47079, into the lower crankcase.



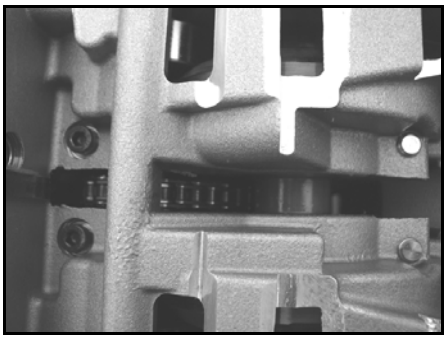
2. Insert the timing chain into the chain gallery. Wiggle the chain slightly until it falls down through the cylinder head.



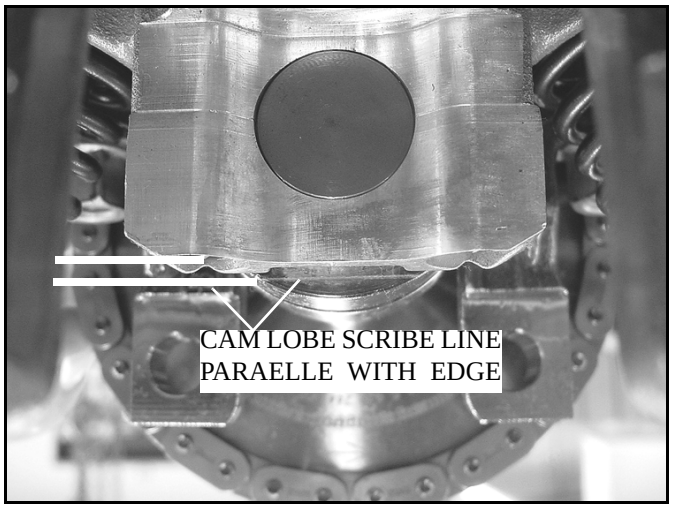
3. Allow about four to five chain links to protrude from the cylinder head.



4. Insert the soft-end of the timing chain hook tool, PN PW-47108, and jam the chain against the balance shaft sprocket. Verify the gear timing dots are still in alignment.
5. Guide the timing chain under the crankcase support, towards the chain guide, and around the crankshaft. Allow the chain to fall out through the cylinder head.



6. Position the camshaft from the MAG-side of the engine. Rotate the camshaft so the cam lobes are pointed towards the crankshaft and the alignment line on the cam lobe is parallel with the camshaft axle clamp edge. (See Photo)
7. Wrap the timing chain around the sprocket and temporarily secure with a new master link.



8. Verify timing dots on the crank train drive gears are in alignment and the camshaft alignment scribe line is parallel with the camshaft axle clamp edge.
9. Remove the installation tools from the crankcase and rotate the engine on the stand so the cylinder head is pointed up.
10. Install a new master link plate on the timing chain using the timing chain breaker tool, PN PW-46985. Press the pins and plates together using the rounded pin and fitting without a hole.

NOTE: Do not over-press and damage the chain pins and plates.

NOTES

CHAPTER 7

Final Drive and Brake Systems

7

GEAR AND DRIVE TRAIN

Optional Parts

A selection of gears and drive chains are available to lower or raise the final drive gear ratio.

8.42CD Chaincase Gears

PART NUMBER	DESCRIPTION
3221183	20T CM
3221143	21T CM
3222133	22T PM
3222136	23T CM
3222128	24T PM
3221180	25T PM
3222118	26T PM
3222116	38TCM
3222117	39T PM
3221184	40T CM
3222137	41T CM
3221181	42T CM
3221189	43TCM
3221186	44T PM
3221190	45T CM
3221191	46T PM

CM = CUT METAL
PM = POWDER METAL
CD = CENTER DISTANCE (IN INCHES)

8.42CD Drive Chains

PART NUMBER	DESCRIPTION
3222110	78P
3222134	80P

FINAL DRIVE GEAR RATIO

Speed Chart

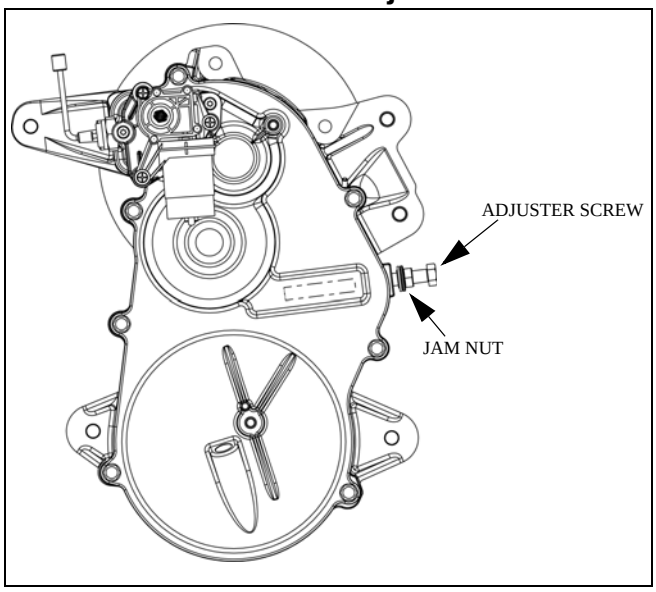
Reference the speed chart to determine which upper and lower gears can be installed in the chaincase, and to determine the mathematical vehicle speed for each ratio.

Chaincase Speed Chart

Top Gear	26	25	24	24	24	23	22	21	21
Bottom Gear	39	40	44	40	41	46	46	46	47
8.424	78	78	80	78	78	80	80	80	80
Gear Ratio	1.50	1.60	1.83	1.67	1.71	2.00	2.09	2.19	2.24
Jackshaft RPM @ 1:1 Drive Clutch / Driven Clutch Ratio (Clutches spinning at the same speed.)									
6000	86	81	71	77	75	64	62	59	58
6250	89	84	74	81	79	67	64	61	60
6500	93	87	76	84	82	70	67	64	62
6750	97	91	79	87	85	72	69	66	65
7000	100	94	82	90	88	75	72	69	67
7250	104	97	85	93	91	78	74	71	70
7500	107	101	88	97	94	81	77	74	72
7750	111	104	91	100	97	83	80	76	74
8000	115	107	94	103	101	86	82	78	77
8250	118	111	97	106	104	89	85	81	79
8500	122	114	100	110	107	91	87	83	82
8750	125	117	103	113	110	94	90	86	84
9000	129	121	106	116	113	97	92	88	86
9250	132	124	109	119	116	99	95	91	89
9500	136	128	112	122	119	102	98	93	91
9750	140	131	115	126	123	105	100	96	94
10000	143	134	118	129	126	107	103	98	96

FS / FST CHAINCASE

Drive Chain Deflection Adjustment



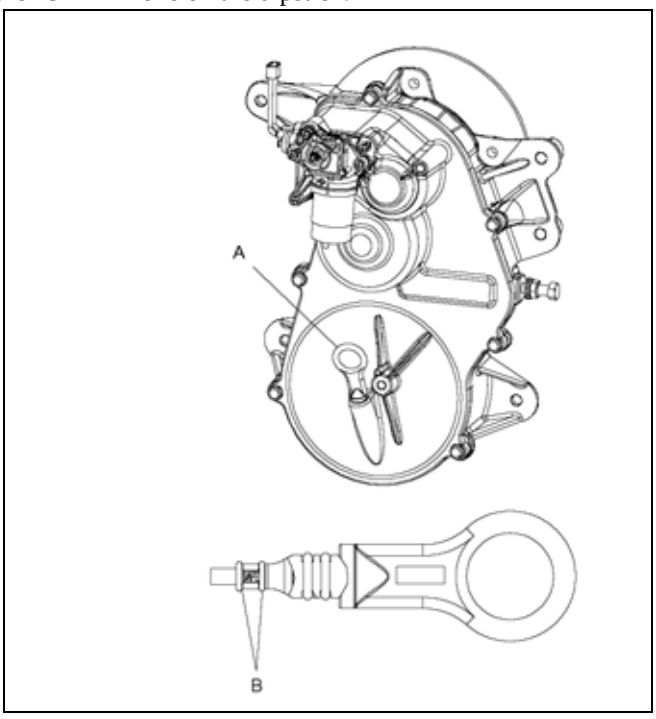
1. Raise the track up off of the ground using a track stand or similar stand.
2. Open hood, and clutch-side door panel.
3. Rotate the driven clutch in forward (counter-clockwise) direction.
4. While holding the driven clutch, lock the parking brake.
5. Open the exhaust-side door panel.
6. Remove the springs and nuts securing the exhaust silencer to the chassis, then remove the silencer.
7. Loosen the chain tensioner jam nut. Back the adjuster screw out a few turns, then turn the screw in, by hand, until it no longer can be turned.
8. Back-out the adjuster screw 1/4 turn, then lock jam nut.

= T
Chain Tensioner Jam Nut 18 - 23 Ft.Lb. (24 - 31 Nm)

9. Reinstall the exhaust silencer, springs, and retaining nuts.
10. Release the parking brake.
11. Close compartment doors, and hood. Place the track back on the ground.

Chaincase Oil Level

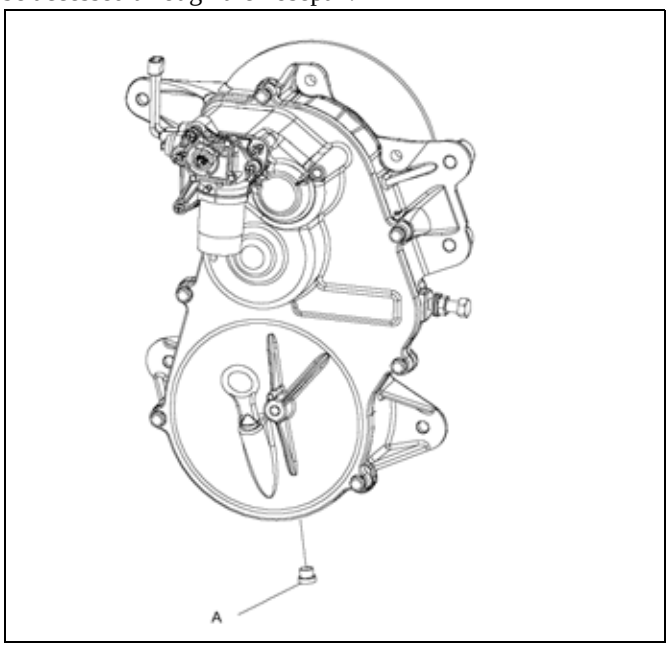
To ensure proper operation, the oil level must be maintained in the “SAFE” zone on the dipstick.



- A = Dipstick
- B = SAFE Level Marks

Chaincase Oil Drain

A drain plug is located on the bottom of the chaincase and can be accessed through the nosepan.

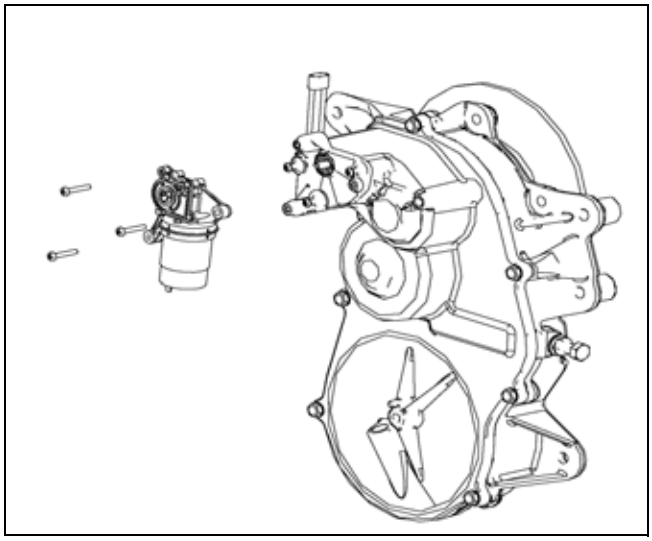


- A = Drain Plug

= T
Chaincase Drain Plug 8 Ft.Lb. (11 Nm)

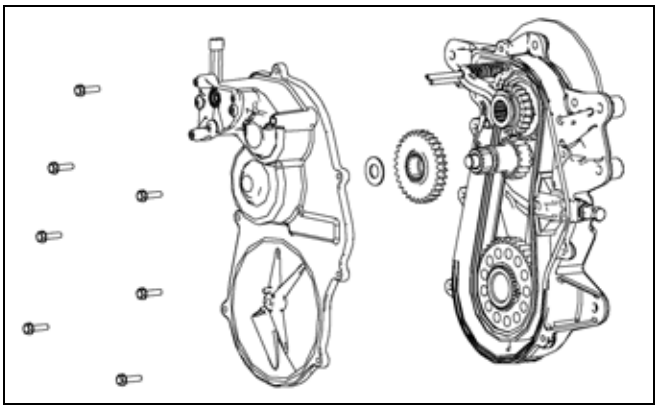
Chaincase Disassembly

1. Drain the oil from the chaincase. Reinstall the drain plug.
2. Remove the exhaust silencer.
3. Remove the reverse motor.

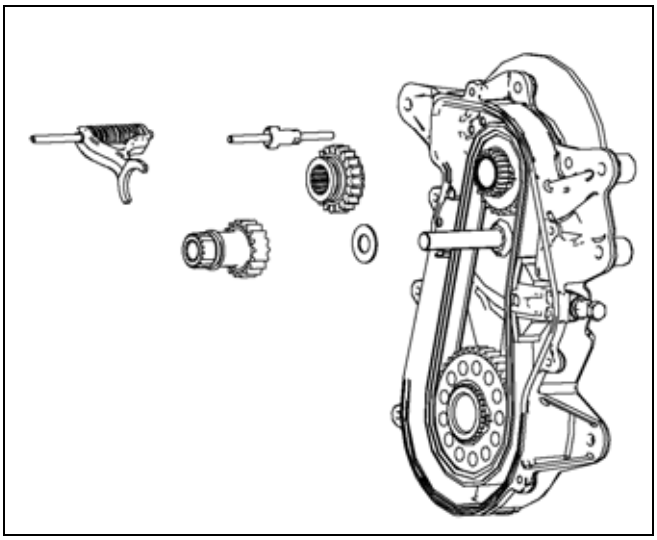


4. Disconnect the forward and reverse limit switches.
5. Remove the cover, washer, and spur gear from the chaincase.

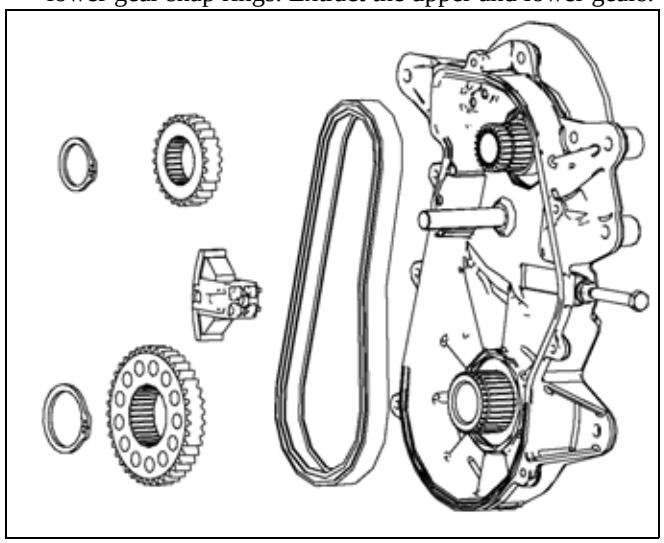
NOTE: The spur gear and washer may drop out with the chaincase cover.



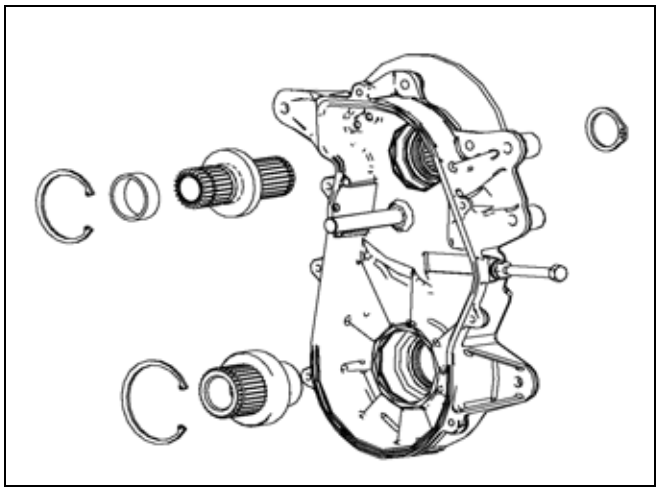
6. Extract the following parts from inside the chaincase:
   - Shift Fork Assembly
   - Pinion Gear
   - Indicator Hub w/Shift Shaft
   - Reverse Gear w/Washer



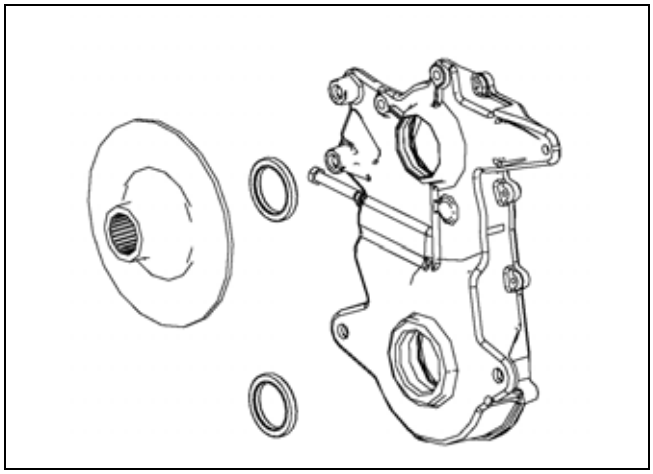
7. Loosen the chain tensioner jam nut, then back out the tensioner screw to allow for the removal of the tensioner pad.
8. To remove the gears and drive chain, remove the upper and lower gear snap rings. Extract the upper and lower gears.



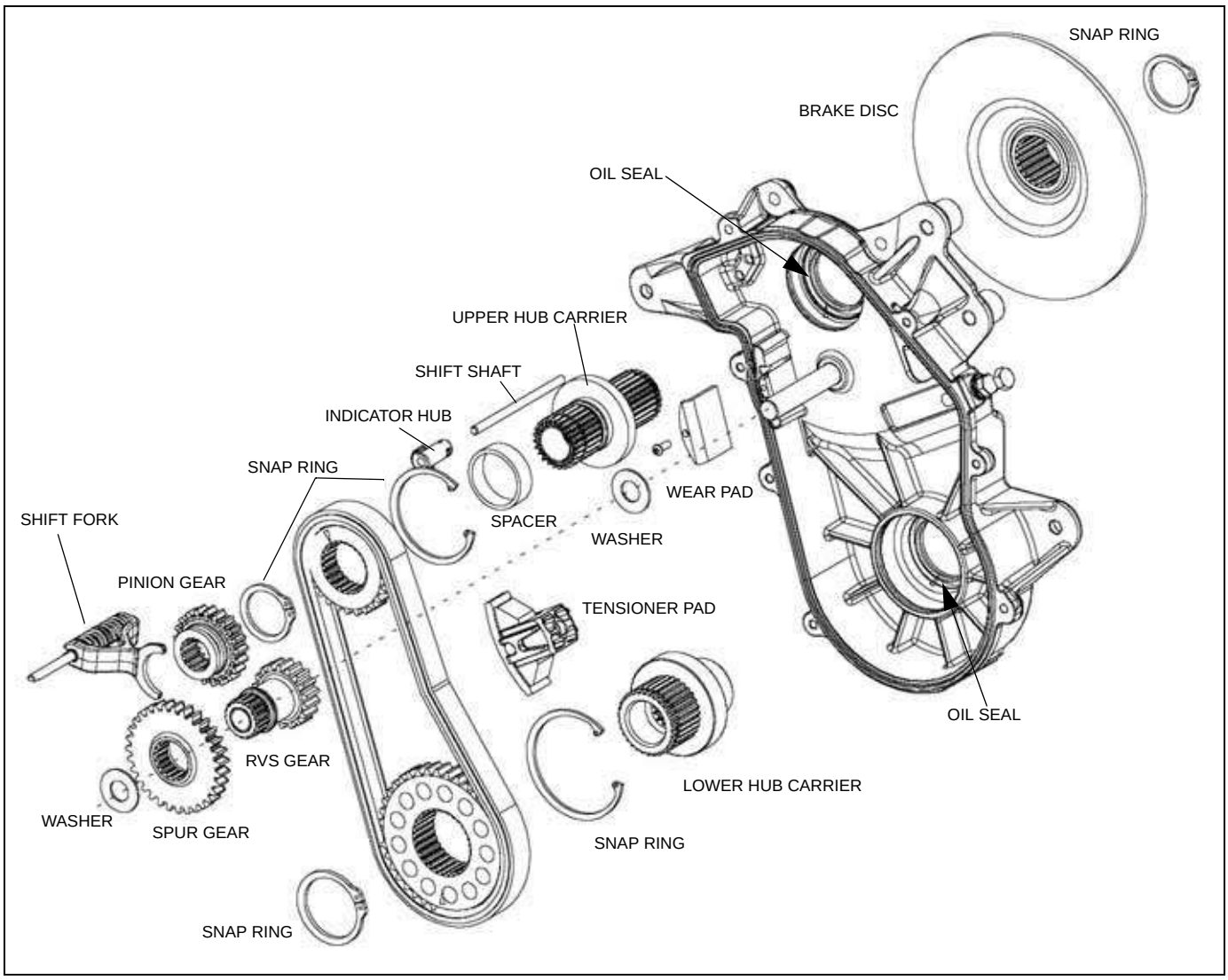
9. To remove the upper hub carrier:
   - Remove the console.
   - Remove the seat, seat assemblies, and fuel tank assembly.
   - Locate the snap ring on the backside of the brake disc. Remove the snap ring using a heavy duty, 90° snap ring pliers.
   - Remove the upper hub carrier snap ring.
   - Carefully slide the hub carrier out of the chaincase.
10. To remove the lower hub carrier:
    - Remove the snap ring, then extract the hub carrier from the chaincase.



11. To remove the chaincase housing:
    - Suspend the engine inside the engine compartment. See “Suspending Engine” on page 5.2.
    - Remove the fastener securing the housing to the bulkhead.
12. Remove the brake caliper assembly.
13. To remove the oil seals, use a pick or scribe to carefully extract each seal.

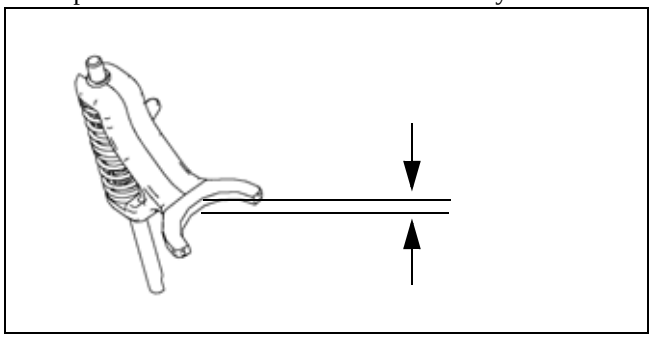


14. To reinstall a new seal, carefully press the outside diameter of the seal into the bore until it is fully seated.
15. Apply a small amount of grease to the inner seal lip.
16. To reinstall the chaincase housing:
    - Loosely install the 5 fasteners that secure the housing to the bulkhead.
    - Torque the lower 2 fasteners to 28 Ft.Lbs. (38 Nm).
    - Torque the upper-left fastener and the 2 upper-right housing/engine strap fasteners to 14 Ft.Lbs.(19 Nm).
    - Torque the lower housing/engine strap fastener to 22 Ft.Lbs. (30 Nm).
    - Torque the brake caliper mounting fasteners to 20 Ft.Lbs. (27 Nm).



Chaincase Component Inspections

1. Inspect gears and chain for missing teeth, or abnormal wear.
2. Inspect and measure the shift fork assembly.



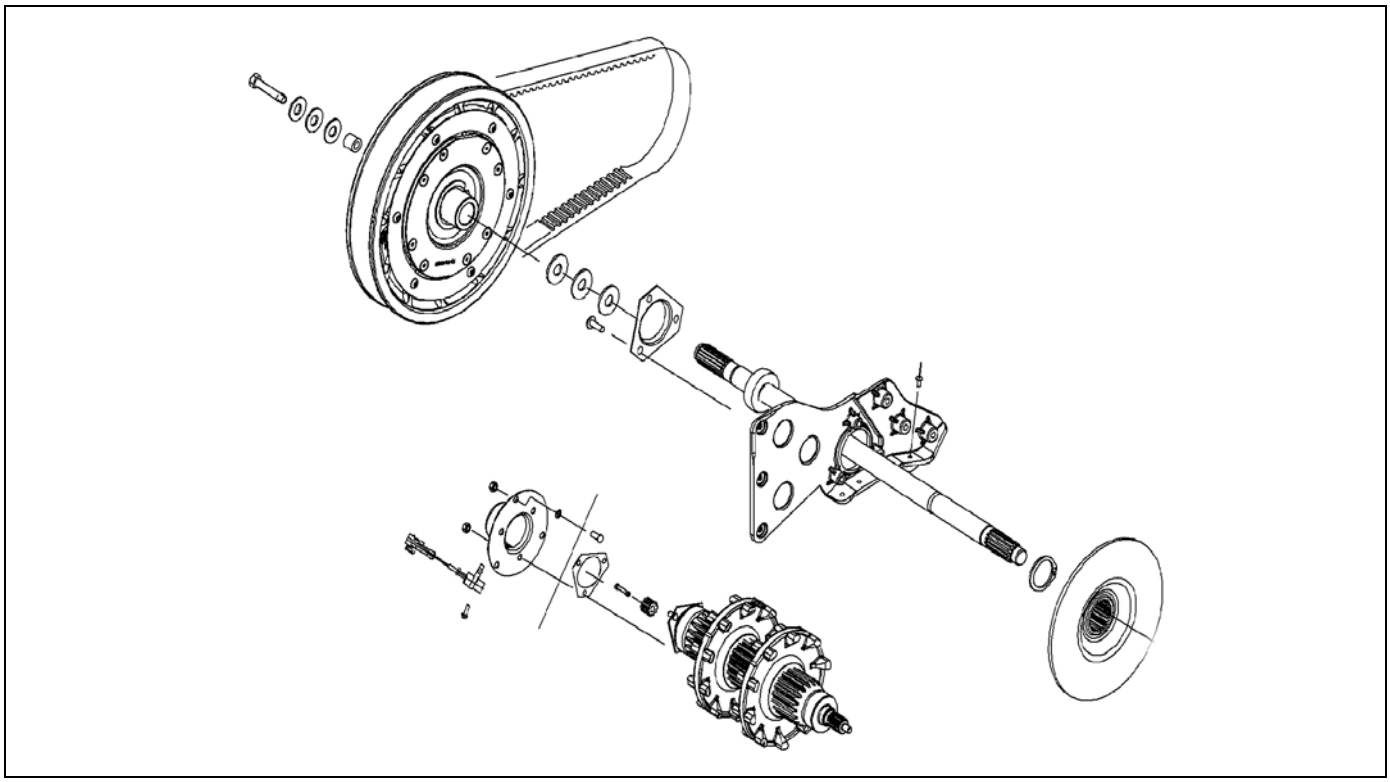
= In. / mm.

Shift Fork Minimum Thickness Service Limit
.135″ (3.34mm)

3. Inspect the chaincase oil seals for nicks or other damage. Replace seals if damage is found.
4. Inspect the indicator hub face and tensioner pad for abnormal wear.

7

JACKSHAFT / DRIVESHAFT



Jackshaft Removal

1. Remove the belt, and driven clutch.
2. Reference the chaincase disassembly procedures in this chapter, and remove the following components:
   - Chaincase Cover
   - Shift Fork Assembly
   - Pinion Gear
   - Upper Sprocket Snap Ring
3. Remove the jackshaft bearing retainer.
4. Extract the jackshaft from the clutch-side.

Jackshaft Installation

1. Reverse of removal procedure.

Driveshaft Removal

1. Remove the belt, and the driven clutch.
2. Remove the speed sensor housing.
3. Using a track stand or similar device, raise the track up and off the ground.
4. Loosen the rear idler adjustment screws and idler shaft screws. Dis-engage the rear suspension torsion springs.
5. Remove enough track tension on the drive shaft as possible.
6. Slide the driveshaft towards the clutch-side of the snowmobile until the end of the driveshaft drops out of the chaincase. Remove the driveshaft from the snowmobile.

Driveshaft Installation

1. Reverse of removal procedure.

BRAKE SYSTEM

Overview

The hydraulic brake system consists of the following components or assemblies: brake lever, master cylinder, hydraulic hose, brake caliper (slave cylinder), brake pads, and a brake disc.

When the hand activated brake lever is applied, it contacts a piston within the master cylinder. As the master cylinder piston moves inward it closes a small opening called a compensating port within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the pistons located in the brake caliper move toward the disc and applies pressure to the moveable brake pads. As the lever pressure is increased, the braking effect is increased.

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

Brake fluid level is critical to proper system operation. A low fluid level allows air to enter the system causing the brakes to feel spongy.

Compensation Port

Located within the master cylinder is a small compensating port which is opened and closed by the master cylinder piston assembly. The port is open when the brake lever is released and the piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion caused by heat, or contraction caused by cooling. During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for the brake fluid to expand. Master cylinder reservoirs should be filled to the top of the fluid level mark on the inside of the reservoir, 1/4" - 5/16" (.6 -.8 cm) below lip of reservoir opening.

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

GENERAL GUIDELINES

⚠ WARNING

Contaminated brake discs or brake pads greatly reduce braking performance and increase stopping distance. Do not attempt to clean contaminated pads. Replace them. clean the brake disc with brake cleaner.

Only use DOT 4 brake fluid. Never mix different types of brake fluids.

Never re-use brake fluid or fluid from an old, opened container.

Keep brake fluid in a tightly-sealed container and out of the reach of children. Brake fluid can absorb moisture, reducing its effectiveness.

A soft, spongy-feeling in the brake lever may indicate a hazardous condition within the brake system. Do not operate the snowmobile until the problem in the system is corrected.

An unsafe condition exists when air trapped in the hydraulic brake system. Air in the brake hydraulic system acts like a spring and absorbs a large percentage of the pressure developed by the master cylinder. Without this pressure, the braking system cannot develop full braking force to allow for safe, controlled stops. It is extremely important to bleed the brakes properly after any brake system work has been performed or when inspection reveals spongy brakes.

⚠ CAUTION

Pressure bleeding is not recommended. When fluid surges through the fittings, it is possible to cavitate the fluid and create air in the system. In addition, the fluid stored in a pressure bleeder may be contaminated. Always use fresh DOT 4 brake fluid from a sealed container.

Keep these points in mind when bleeding hydraulic brakes:

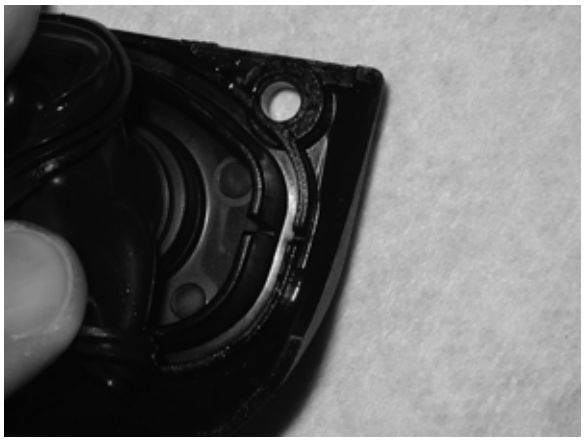
- The master cylinder reservoirs have limited capacities. It is easy to empty them during the bleeding procedure. This introduces air into the system which you are trying to purge. Watch the reservoir closely and add fluid when necessary to prevent air from entering the system.
- Apply only light to moderate pressure to the lever or pedal when bleeding the brake system. Extreme pressure will cause a surge of fluid through the small orifices of the brake system when the bleeder screw is opened and introduce air into the system by means of cavitation.

- Small amounts of air can become trapped in the banjo bolt fittings at the master cylinder(s) and junction points of brake lines. These fittings can be purged of air by following a standard bleeding procedure at these fittings (instead of the bleed screw on caliper) if necessary to speed the bleeding process. This is usually only needed if system was completely drained of fluid. Bleed each line connection, starting with the fitting closest to the master cylinder, working toward the caliper, and ending with the bleed screw.
- Always torque banjo bolts and other brake system fittings to specified torque.
- Change fluid every 2 years, or when fluid is dark or contamination is suspected.

BRAKE FLUID REPLACEMENT & BLEEDING

NOTE: This procedure should be used to change fluid or bleed brakes during regular maintenance, or after complete brake service. Brake fluid may damage painted or plastic surfaces. Take care not to spill, and wipe up any spills immediately. Cover parts to avoid damage.

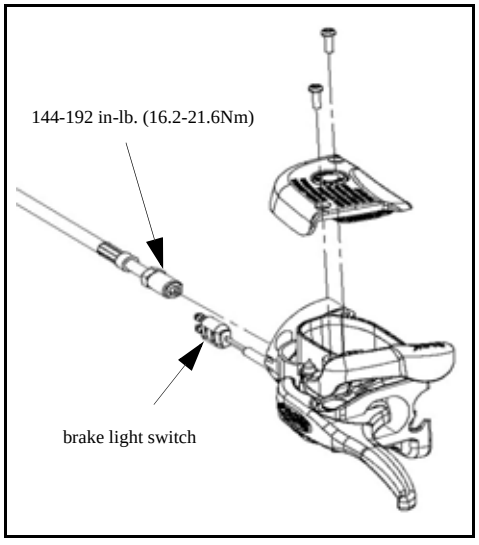
1. Clean the reservoir cover.



2. Remove the two T-15 Torx screws from the cover.
3. Carefully remove the cover and diaphragm assembly from the reservoir.
4. Under the cover, inspect the vent slots under the bellows and remove any debris or blockage.
5. Bleed or replace the fluid by attaching a clear hose from the caliper bleeder fitting to a clean container. Be sure the hose fits tightly on the bleeder fitting.
6. Pump the brake lever a few times and hold.
7. Slowly open the bleeder fitting and let the old fluid or air escape. You will feel the lever release as you let the fluid or air escape. Close the bleeder fitting.
8. Pump the brake lever a few times and hold it again.
9. Repeat steps 7 and 8 until you see new brake fluid coming from the caliper bleeder fitting or if you are bleeding the air, repeat this step until you see only fluid coming out. This may take several intervals.

10. Torque the bleeder screw to 8-11 ft.-lb. (11-15Nm).
11. When adding fluid, add DOT 4 brake fluid to 1/4-5/16” (.6-.8 cm) from the reservoir top.
12. Install cover and diaphragm assembly.
13. Tighten the cover screws to 16-20 in-lb. (1.8-2.3Nm).
14. Field test machine before putting into service. Check for proper braking action and lever reserve. Lever reserve is when the lever is firmly applied, the lever reserve should be no less than 1/2” (1.3 cm) from the handlebar.
15. Verify that the sight glass indicates a full reservoir.
16. Check brake system for any fluid leaks.

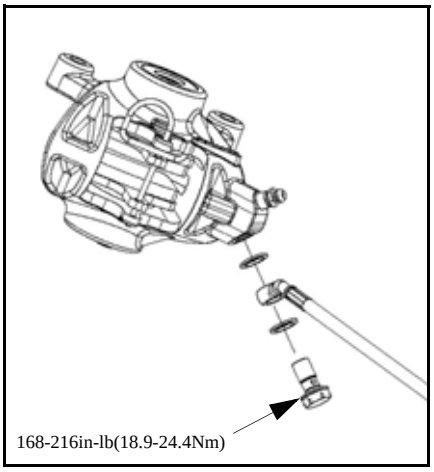
BRAKE LINE REPLACEMENT



Follow these steps if the brake line is to be replaced.

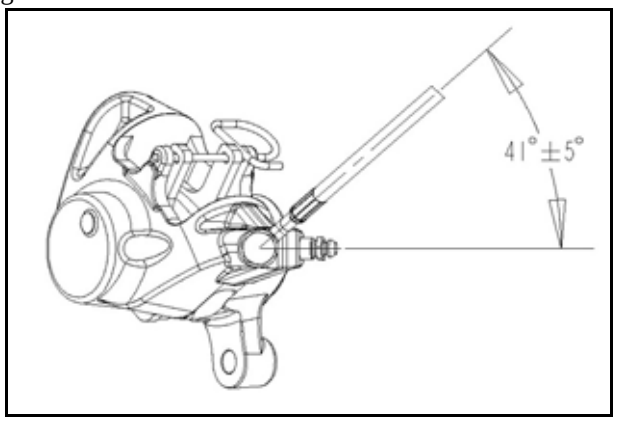
1. If needed bleed the brake system by attaching a clear hose to the caliper bleed fitting.
2. Attach the other end to a Mity Vac or similar vacuum tool.
3. Bleed the system of brake fluid.

4. Note the orientation of the brake line. The brake line will need to be replaced in the same orientation.
5. Remove the brake line from the caliper. Cap or cover the end to catch any brake fluid that may still be in the line.
6. Loosen the brake line from the master cylinder 1/4 to 1/2 turn.
7. Remove the 4 screws that hold the master cylinder to the handlebar. This will separate the master cylinder from the switch pack.



8. Unplug the brake light switch harness from the master cylinder.
9. Remove the brake line from the master cylinder.
10. Install new brake line on caliper and orientate it as noted in step 4.
11. Torque the caliper banjo bolt to 168-216 in-lb. (18.9-24.4Nm).
12. Insert the new brake line and install into the master cylinder. Torque the brake line to 144-192 in-lb. (16.2-21.6Nm).
13. Tighten the brake line into the master cylinder in an orientation so that the line does not have any sharp bends when it is installed on the handlebar.
14. Route the brake light switch in the harness correctly.
15. Place the switch pack with the master cylinder onto the handle bar. Two smaller screws should be placed on the top and the longest screw is placed on the lower right.
16. Fill and bleed the brake system.

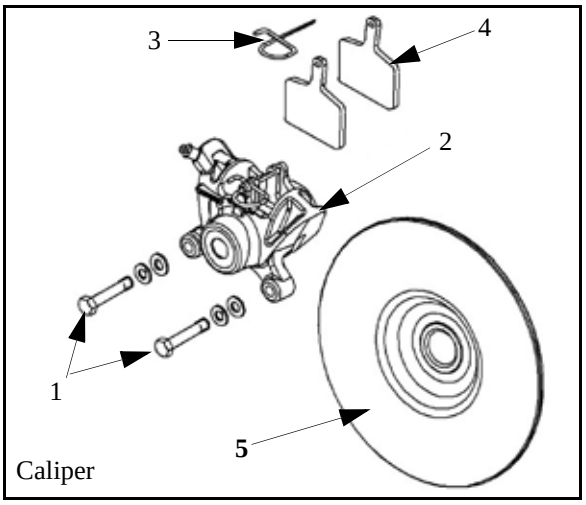
See “BRAKE FLUID REPLACEMENT & BLEEDING” on page 7.10.



BRAKE CALIPER

REMOVAL

1. Remove the two caliper bolts that hold the caliper to the chaincase.
2. Remove the caliper from the brake disc.



Caliper

ASSEMBLY

1. Replace caliper bolts (1) and torque them to 18-20 ft.-lb. (24-27Nm).
2. On a liquid cooled caliper, hook up the coolant lines.
3. Place the brake line on the caliper in the same orientation as it was before it was removed.
4. Clean the threads of the banjo bolt and the threads in the caliper.
5. Install banjo bolt into the caliper and torque it to 168-216 in-lb. (18.9-24.4Nm).
6. Bleed the brakes. See “BRAKE FLUID REPLACEMENT & BLEEDING” on page 7.10.
7. On a liquid cooled caliper you will need to bleed the cooling system of any trapped air.

PAD REPLACEMENT

Brake pads need to be replaced if the total thickness of the pads and backing are less than.250” (6.35mm).

1. Remove brake pad retaining pin (3).
2. Remove the brake pads (4).
3. Inspect the brake disc (5) for any wear.
4. Replace brake pads in reverse order of removal.

Brake Pad

BRAKE DISC REPLACEMENT

The brake disc should be replaced if the thickness of the disc is below .193”(.49cm).

1. Remove the chaincase.
2. Slide the brake disc from the jackshaft.
3. Check the jackshaft for any damage.
4. Replace the o-ring on the jackshaft
5. Replace the brake disk.
6. Assemble the chaincase.

CHAPTER 8
PVT System

PVT SYSTEM

Overview

> **⚠ CAUTION**
>
> Because of the critical nature and precision balance incorporated into the PVT system, it is absolutely essential that no attempt at clutch disassembly and/or repair be made without factory authorized special tools and service procedures. Polaris recommends that only authorized service technicians that have attended a Polaris-sponsored service training seminar and understand the proper procedures perform adjustments or repairs.

The Polaris drive system is a centrifugally actuated variable speed belt drive unit. The drive clutch, driven clutch, and belt make up the torque converter system. Each clutch comes from the factory with the proper internal components installed for its specific engine model. Therefore, modifications or variations of components at random are never recommended. Proper clutch setup and adjustments of existing components must be the primary objective in clutch operation diagnosis.

Drive Spring

The drive spring opposes the shift force generated by the clutch weights, and determines the neutral RPM, engagement RPM, and wether the engine RPM remains flat, rises, or falls during shift out. When changing only the drive spring, installing a spring with a lower pre-load rate will result in a lower engagement RPM speed, while installing a spring with a higher pre-load rate will result in a higher engagement RPM.

Clutch Weight

The clutch weights generate centrifugal force as the drive clutch rotates. The force generated changes in relation to the engine RPM and with specified weight of each clutch weight. When changing only the clutch weights, a lighter weight will result in a higher engagement RPM, lower shifting force, and higher shift out RPM. Installing heavier weights has the opposite effect

Neutral Speed

Engine RPM when the force generated by the clutch weights is less than the pre-load force generated by the drive spring. In this mode, the drive clutch is disengaged.

Engagement RPM

Engine RPM when the force generated by the clutch weights overcomes the drive spring pre-load force and the moveable sheave begins to close or “pinch" the drive belt. The engagement mode continues until no more belt slippage occurs in the drive clutch. Once 100% belt engagement is achieved, the sled will accelerate along the low ratio line until the drive clutch up shift force overcomes the opposing shift force generated by the driven clutch.

Shift Out Over-Rev

Engine RPM that spikes above the desired operating RPM speed. The shift out RPM should come down to the desired operating RPM, but never below, after the driven clutch begins to open.

Shift Out RPM

Engine RPM at which the up shift force generated by the drive clutch overcomes the shift force within the driven clutch. In this mode, the drive clutch will move the belt outwards, and the driven clutch will allow the drive belt to be pulled down into the sheaves.

During WOT operation, the shift out RPM can be seen as the maximum, sustained RPM displayed on the tachometer. The shift out RPM should be the same RPM as the recommended engine operating RPM. If the shift out RPM is above the recommended engine operating RPM, install heavier drive clutch weights. If the shift out RPM is below the recommended engine operating RPM, install lighter drive clutch weights.

The shift out RPM should remain constant during both the upshift and back shift modes.

Driven Spring

A compression spring (Team driven clutch) or torsional spring (Polaris P-85 driven clutch) works in conjunction with the helix, and controls the shift rate of the driven clutch. The spring must provide enough side pressure to grip the belt and prevent slippage during initial acceleration. A higher spring rate will provide more side pressure and quicker back shifting but decreases drive system efficiency. If too much spring tension exists, the driven clutch will exert too much force on the belt and can cause premature belt failure.

Back-Shifting

Back-shifting occurs when the track encounters an increased load (demand for more torque). Back-shifting is a function of a higher shift force within the driven clutch then within the drive clutch. Several factors, including riding style, snowmobile application, helix angles, and vehicle gearing determine how efficient the drive system back-shifts. The desired engine operating RPM should never fall below 200 RPM when the drive system back-shifts.

Final Gearing

The final drive gear ratio plays an important role in how much vehicle load is transmitted back to the helix. A tall gear ratio (lower numerical number) typically results in lower initial vehicle acceleration, but a higher top-end vehicle speed. A lower gear ratio (higher numerical number) typically results in a higher initial vehicle acceleration, but a lower top-end vehicle speed.

Choosing the proper gear ratio is important to overall drive system performance. When deciding on which gear ratio to use, the operator must factor in the decision where the snowmobile will be ridden, what type of riding will be encountered, and the level of performance the operator hopes to achieve.

Gearing a snowmobile too low for extended high-speed runs may cause damage to the drive belt and drive system, while gearing a snowmobile too high for deep-snow, mountain use may cause premature belt and clutch wear.

Typically, it is recommended to gear the snowmobile with a slightly higher ratio than the actual top speed the snowmobile will ever achieve.

1:1 Shift Ratio

A 1:1 shift ratio occurs when the drive clutch and the driven clutch are rotating at the same RPM.

The mathematical vehicle speed for a given gear ratio at a 1:1 shift ratio is represented in the chaincase gearing charts located in the Final Drive Chapter.

Low / High Ratio

Low ratio is the mechanical position when the drive belt is all the way down into the drive clutch, and all the way out on the driven clutch. High ratio represents when the drive belt is all the way out on the drive clutch, and all the way in on the driven clutch.

Driven Helix / Ramp

The helix cam is the primary torque feedback component within the driven clutch, regardless of driven clutch type. The beginning angle of the helix must transmit enough torque feedback to the moveable sheave in order to pinch the drive belt while minimizing belt slip. The flatter or lower the helix angle, the more side force will be exerted on the moveable sheave, while the steeper, or higher the helix angle, the less side force will be exerted on the moveable sheave.

GENERAL INFORMATION

Special Tools

Clutch Tools

Standard Offset Alignment Tool	PS-46998
Team LW Offset Alignment Tool	PS-47477
◆Engine Clutch Puller	2871855
Replacement Handle for ALL Clutch Pullers	5020326
◆Drive Clutch Holding Wrench	9314177-A
Strap Wrench	PU-45419
Replacement Strap	305085
Drive Clutch Spider Nut Socket	2870338
Drive Clutch Spider Removal and Spider Installation Tool	2870341-A
Pin Centering Tool	2870401
Clutch Pin Installation Tool	2870402
Clutch Pin Punch	2870507
◆Tapered Reamer for Drive Clutch Bore	2870576
◆Roller Pin Tool	2870910-A
◆Drive Clutch Button Removal Tool	2870985
◆Clutch Bushing Replacement Tool Kit	2871025
◆Primary Clutch Compression Tool	8700220
◆Clutch Holding Fixture	2871358
◆Clutch Compression Tool	8700220
◆Spider Assembly Tool	8700221
◆Clutch Compression Tool Extensions for TEAM driven	PS-45909
◆Clutch Pilot Tool (used with the 2871358 to compress the clutch)	PU-45779
Drive Clutch Compression Tool (Compresses drive clutch without removing clutch from engine.)	2871173

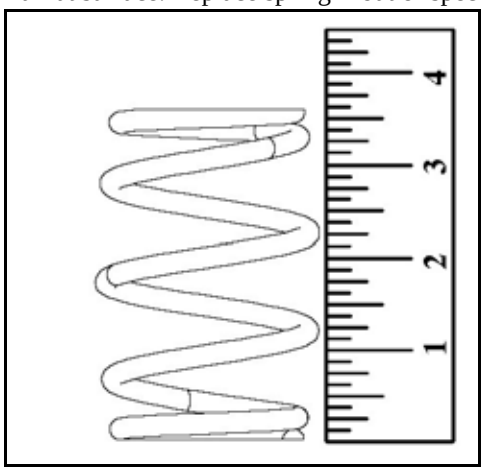
Drive Clutch Springs

Drive Clutch Springs

PART NUMBER	COLOR	WIRE DIAMETER (inches)	FREE LENGTH +/-.125”	FORCE LBS.@2.50” - 1.19” (+/- 12 LBS.)	LOAD RATE (lbs./ inch)
7041021	No paint color	.157”	4.14	70-130	44
7041022	Black	.140”	4.25”	44-77	25
7041063	Purple	.168	4.37	75-135	53
7041062	Silver	.207	3.12	75-243	151
7041065	Pink	.177	4.69	112-200	64
7041060	Orange	.196	3.37	70-199	98
7041083	Red	.192	3.77	120-245	94
7041102	Yellow	.192	2.92	44-185	105
7041061	Brown	.200	3.14	69-212	109
7041132	White	.177	2.92	34-141	81
7041168	Green	.177	3.05	42-142	76
7041148	Gold	.207	3.25	100-275	133
7041150	Red/White	.192	3.59	100-220	91
7041286	Silver/Gold	.218	3.05	77-240	163
7041080	Blue	.207	3.55	120-300	137
7041781	Dark Blue/White	.225	3.42	120-310	145
7041945	Almond	.218	3.65	140-330	145
7041645	Almond/Gold	.207	4.00	150-290	107
7041818	Black/White	.218	3.52	140-320	137
7041816	Almond/Black	.200	3.75	165-310	111
7041922	Almond/Blue	.218	3.75	150-310	122
7041988	Almond/Red	.207	4.27	165-310	110
7042083	Black/Green	.218	3.38	120-340	168
7043076	Black - 3076	.225	2.67	40-340	229
7043120	Black - 3120	.225	2.78	60-340	213
7043077	Black - 3077	.255	2.90	80-340	198
7043121	Black - 3121	.255	3.05	100-340	183
7042287	Black - 2287	.207	3.40	110-290	137

Spring Free Length

Measure the drive and driven spring free length with the spring resting on a flat surface. Replace spring if out of specification.



In addition to proper free length, the spring coils should be parallel to one another when placed on a flat surface. Distortion of the spring indicates stress fatigue. Replacement is required.

⚠ CAUTION

Never shim a drive clutch spring to increase its compression rate. This may result in complete stacking of the coils and subsequent clutch cover failure

Drive Clutch Weights

Full Tail Weights

WEIGHT	GRAMS	PART NUMBER
S43H	43	1321849
S45H	45	1321850
S47H	47	1321851
S49H	49	1321730
S51H	51	1321731
S53H	53	1321759
S55H	53	1322004

10 Series Weights

WEIGHT	GRAMS(+/- 1g)	PART NUMBER
10M-R Bushed	44	1321530
10M-W Bushed	46	1321527
10M Blue Bushed	47.5	1321529
10M Bushed	49.5	1321531
10 Bushed	51	1321531
10 AL Bushed	53	1321589
10-54	54	1321685
10-56	56	1321684
10-58	58	1321588
10-60	60	1321587
10-62	62	1321586
10-62M	61.5	1321614
10-64	64	1321585
10-64M	63.5	1321615
10-66	66	1321584
10-68	68	1322427
10-70	70	1322414
10-72	72	1322428
10-74	74	1322429
10-76	76	1322585
10-78	78	1322586

11 Series Weights

WEIGHT GRAMS(+/- .8g)	PART NUMBER
11-40	1322593
11-42	1322592
11-44	1322591
11-48	1322590
11-50	1322589
11-52	1322595
11-64	1322604
11-66	1322559
11-68	1322558
11-70	1322523
11-72	1322524
11-74	1322525
11-76	1322526

Non-ER LWT Driven Helixes

Non-ER LWT Driven Helixes

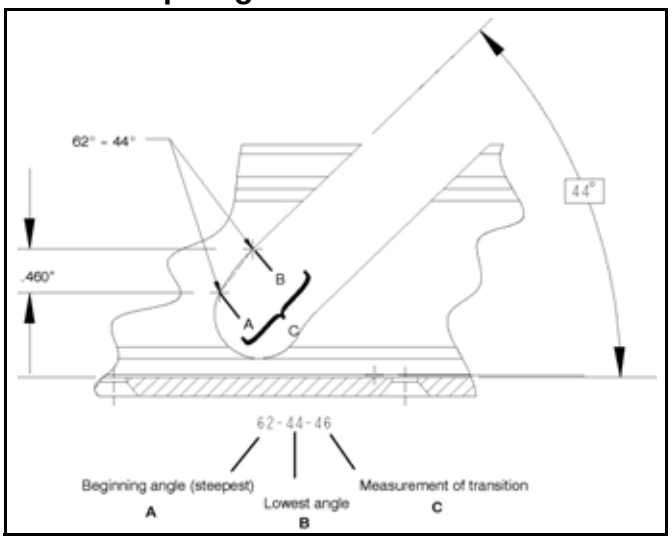
PART NUMBER	DESCRIPTION
5135438	70/44 - .46 / 66/44 - .46
5135480	64/38 - .65 / 64/38 - .46
5135486	62/40 - .46 / 64/40 - .55
5135521	74/50 - .46 / 74/48 - .46
5135522	74/44 - .46 / 74/40 - .46
5135523	70/50 - .46 / 70/48 - .46
5135524	70/44 - .46 / 70/40 - .46
5135525	66/50 - .46 / 66/48 - .46
5135526	66/44 - .46 / 66/40 - .46
5135537	64/38 - .65

Team Driven Springs

TEAM Driven Springs

PART NUMBER	COLOR	WIRE DIAMETER	LOAD @ 2.2″(lbs)	LOAD @ 1.1″(lbs)	Rate (Lbs. per inch)
7042181	Black/Yellow	.200	145	208	56
7043058	Red/Black	.218	140	240	90
7043059	Red/Green	.218	120	220	90
7042066	Green/Black	.200	135	198	56
7043061	Red/Silver	.207	125	175	45
7043062	Red/Yellow	.207	100	150	45
7043057	Red/Blue	.218	140	200	54
7043063	Black/Red	.218	155	222	65
7043064	Blue/Black	.218	123	203	73
7043060	Red/White	.218	100	200	91
7043069	Red/Pink	.235	140	260	110

Team Ramp Angles

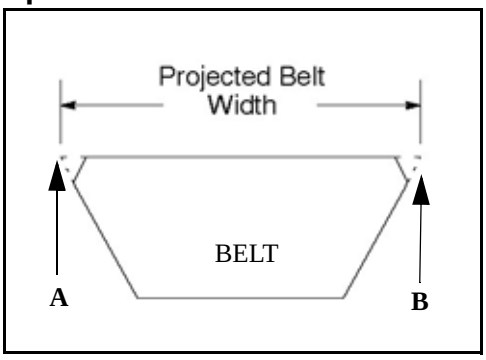


The Team helix is designated by the angle and length of the angle on the back side of the ramp. The first number (A) designates the starting angle of the ramp. The second number (B) designates the finish angle. The last number (C) is the transition distance (in inches) between the starting and finish angles.

CAUTION

Do not install a non-ER helix on a Perc-equipped snowmobile where the engine changes directions.

Belt Inspection



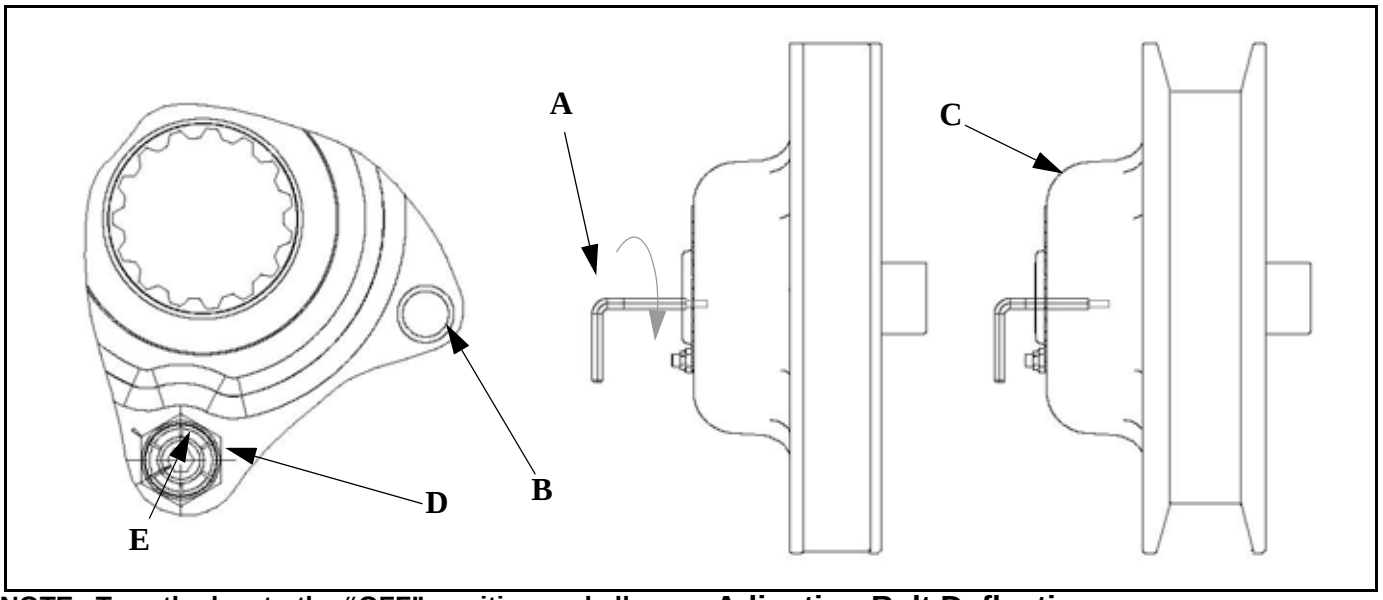
1. Measure the belt width and replace it if it is worn severely. Generally a belt should be replaced if the clutches can no longer be adjusted to provide the proper belt deflection.
   - Project the side profiles and measure from corner to corner.
   - Place a straight edge on each side of the drive belt and measure the distance where the straight edges intersect at the top (A,B).
2. Inspect the belt for loose cords. missing cogs, cracks, abrasions, thin spots or excessive wear spots. Replace if necessary.
3. Inspect the belt for hour glassing (extreme circular wear in at least one spot an on both sides of the belt). Hour glassing occurs when the drive train does not move and the drive clutch engages the belt. Example would be taking off while the track is frozen to the ground. Remember to always warm up the track and free it from the ground.

Belt Wear / Burn Diagnostics

Table 8-1: Belt Wear / Burn Diagnostics

POSSIBLE CAUSE	SOLUTION
Driving at or about engagement RPM for extended periods of time in any type of snow condition.	Drive at higher RPM if possible. Gear the machine down. Make sure belt deflection is at 1 1/4” to achieve optimum starting ratio.
Cold weather startups	Be patient. Warm up engine at least 5 minutes or until it readily responds to throttle input. For the quickest most efficient drive away in extreme cold weather, take drive belt off machine and bring it in to a warm environment. Break skis and track loose from the snow. Engage throttle aggressively for short durations for initial cold drive away
Towing another machine at or about engagement RPM	When possible, do not go in deep snow when towing another machine. Use fast, effective throttle to engage the clutch. Not all machines are intended for pulling heavy loads or other machines.
Spinning track while vehicle is stuck (high RPM, low vehicle speed, high ambient temp. Example: 8000 RPM, 10mph actual vehicle speed and 60 m.p.h. indicated on speedometer.	Lower the gear ratio. Remove windage plates from driven clutch. If possible, move to better snow conditions and reduce RPM. Avoid riding in very high ambient temperatures
Ice and snow piled up between track and tunnel overnight or after stopping for a long period of time (enough to re-freeze the snow).	Break loose snow and ice under tunnel. Allow longer than normal warm-up. Allow belt to warm sufficiently and increase grip ability on clutch sheaves. Use fast, effective throttle when engaging clutch.
Poor running engine (Bog, Miss, Backfire, etc.)	Maintain good state of tune including throttle and choke synchronization. Check for fouled spark plug(s). Check for foreign material in carbs. Make sure no water or ice is present in the fuel tank, lines, or carburetors.
Loading machine on trailer	Use caution when loading machine. Carbide skags may gouge into trailer and prevent drive train from spinning freely. Use enough speed to drive completely onto trailer. If machine cannot be driven completely onto trailer, it may need to be pulled or pushed to avoid belt wear / burning.
Clutch malfunction	Check for correct clutch components, or damage on the clutch
Slow, easy belt engagement - easing on the throttle	Use fast, effective throttle to engage the clutch.

Drive Belt Removal



NOTE: Turn the key to the "OFF" position and allow the engine to come to a complete stop.

Always install a used belt in the same direction as it was installed before removing. When installing a new belt, position the identification numbers so they can read when viewed from the left-side of machine.

1. Remove the clutch guard / air intake.
2. Insert the "L" wrench (A) into the threaded hole (B) located on the driven clutch, and turn it clockwise until the clutch sheaves are in the open position (C).

NOTE: L wrench PN 2874857

3. Remove the drive belt.

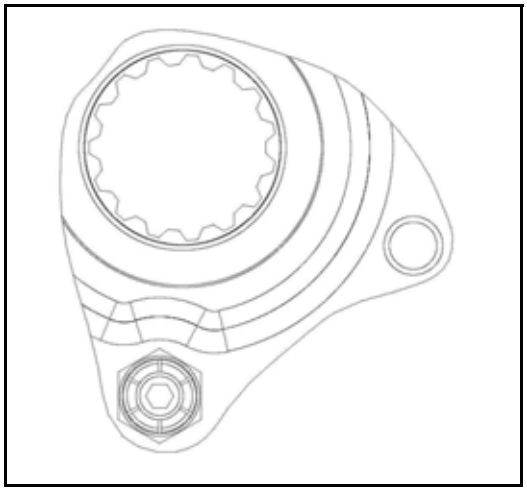
Drive Belt Installation

1. With the "L" wrench inserted into the threaded into hole (B) and the sheaves in the open position (C), install the drive belt.

NOTE: Install belt so that the numbers can be read correctly on the left side of the machine.

2. Turn the "L" wrench counter-clockwise until the driven clutch sheaves are in the closed position. "Wiggle" the belt to remove slack while removing the wrench.
3. Reinstall the clutch guard / air intake.

Adjusting Belt Deflection



1. Loosen the jam nut (E).
2. Using an 1/8" Allen head wrench, turn the stud (F) counter-clockwise to decrease belt deflection and clockwise to increase belt deflection.
3. When the proper belt deflection is achieved torque the lock nut (E) to 90-110 in-lb. (10-12Nm).

Drive Belts

Part Number	Belt Width (Projected)* in/mm	Side Angle Overall*	Center to Center in/ cm*	Outer Circumference in/cm	Notes
3211042	1.375/34.9	32_	12/30	47.25/120	Common production belt.
3211045	1.375/34.9	32_	12/30	47.125/ 119.7	Close tolerance version of 3211042
3211058	1.250/31.75	28_	11/28	43.313/110	P-90 belt
3211059	1.250/31.75	28_	12/30	45.125/ 114.6	Longer P-90 belt
3211061	1.375/34.9	32_	12/30	47.188/ 119.9	CVT version of 3211045
3211065	1.438/36.5	28_	12.5/31.75	48.375/ 122.9	CVT Double Cog Storm belt
3211066	1.375/34.9	28_	12/30	47.25/120	Double Cog-CVT- thicker than the 3211070.
3211067	1.375/34.9	28_	12/30	47.25/120	“Sticky compound” Good for low horsepower trail riding. Drag racing belt.
3211070	1.375 / 34.9	28_	12/30	47.25/120	Late model P-85 systems
3211073	1.438 / 36.5	28_	12.5/31.75	48.375/ 122.9	“Sticky compound” Good for low horsepower trail riding. Drag racing belt.
3211074	1.438 / 36.5	28_	12/30	47.625/121	“Sticky compound” Good for low horsepower trail riding. Drag racing belt.
3211075	1.438 / 36.5	28_	12/30	47.625/121	Double Cog CVT
3211080	1.438 / 36.5	28_	11.5/29.2	46.625/ 118.4	Double Cog CVT version of 3211078
3211078	1.438 / 36.5	28_	11.5/29.2	46.62 / 118.4	Standard Drive Belt
3211099	1.490 / 37.84	28_	11 / 27.9	46.06 / 116.9	Double Cog CVT
3211111	1.537 / 39	28_	11.5/29.2	47.67 / 121	Super Cog Belt
3211115	1.46 / 37.1	26_	11.5 / 29.2	46.77 / 118.8	MBL Drive Belt

*Belt dimensions are given in nominal dimensions. There is a +/- variance for all critical dimensions. Clutch set up must be inspected when a new belt is installed and, if necessary adjusted.

The drive belt is an important component of the converter system. In order to achieve maximum efficiency from the converter, drive belt tension (deflection), clutch offset, and alignment must be adjusted properly.

PVT SYSTEM ADJUSTMENTS

Clutch Alignment / Offset

The engine is mounted in the bulkhead so the drive and driven clutches self-align under high torque loads.

Offset is controlled by the number of washers installed on the jackshaft behind the driven clutch.

1. Remove drive belt.
2. Install the correct alignment tool depending on the type of driven clutch installed on the snowmobile.

TOOL PART NUMBER	APPLICATION
PS-46998	Standard Team Driven
PS-47477	Light Weight (LW) Team Driven

NOTE: A standard alignment tool will not work with a Team LW driven clutch. Likewise, a LW alignment tool will not work with a standard Team driven clutch. A Team LW driven clutch can be identified as having 24 cooling fins.

3. The optimum setup is when the front and rear of the tool touch the driven clutch. No gap should be present in the front, and the rear clearance should not exceed .060" (3mm).

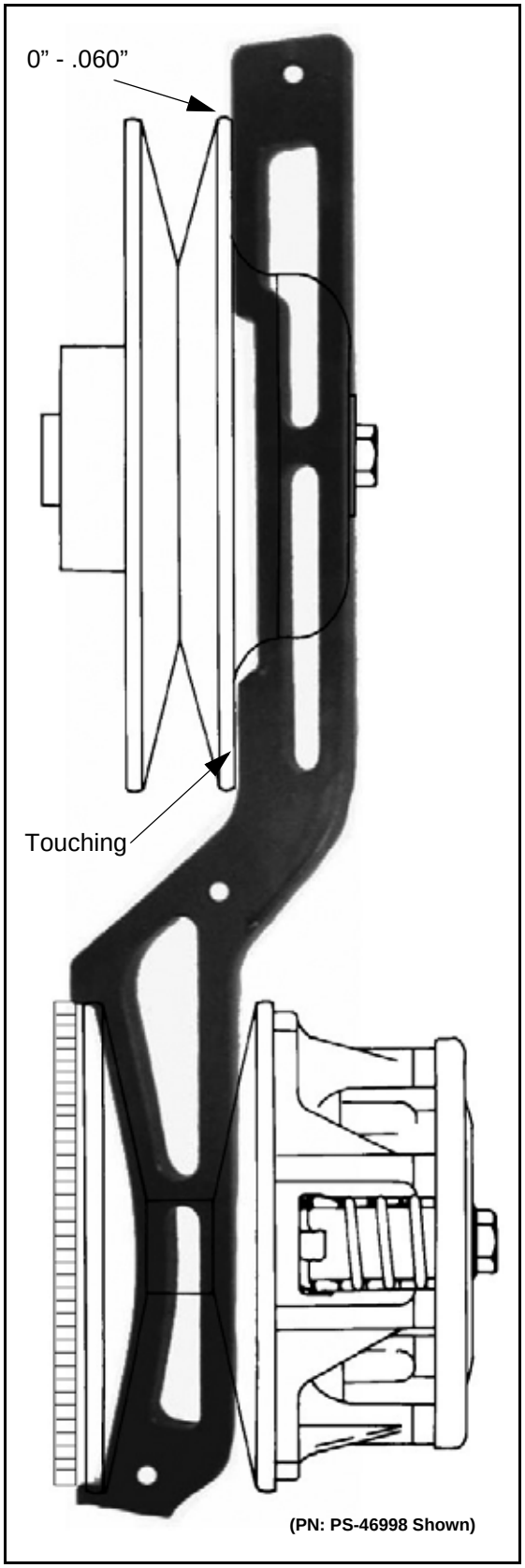
NOTE: If the front of the alignment bar does not touch the driven sheave, the maximum clearance cannot exceed .025″.

Offset Adjustment

1. Determine direction driven clutch needs to be adjusted.
2. Remove driven clutch retaining bolt, and remove driven clutch.
3. Add or remove washers from the jackshaft between the driven clutch and jackshaft bearing to achieve proper offset.
4. After adjusting offset, add or remove shim washers from the retaining bolt to provide a +/- 0.030” (.75mm) of float on the jackshaft.

⚠ CAUTION

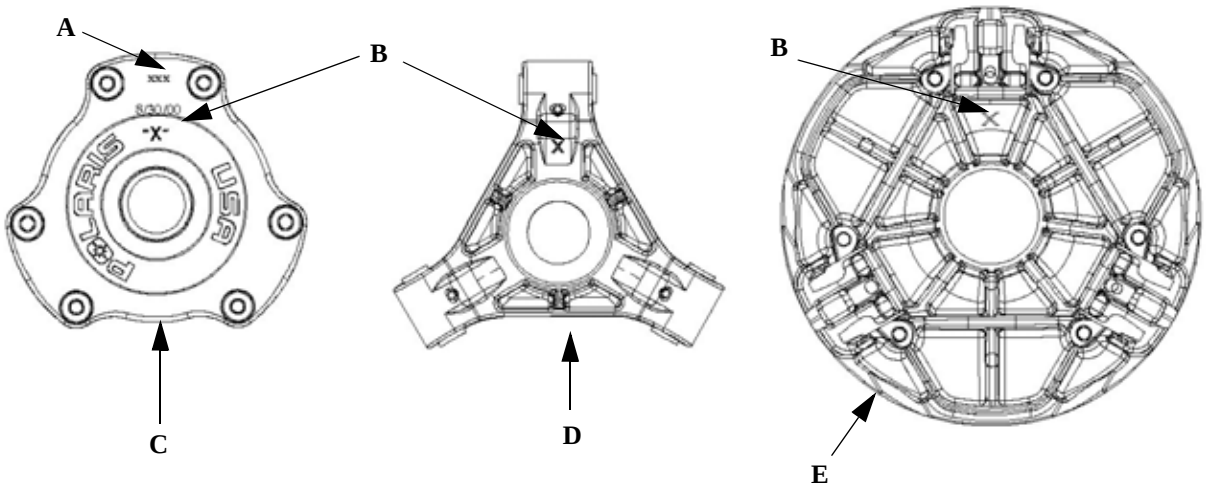
Always verify the driven clutch floats on the jackshaft after securing the fastener. The jackshaft bearing will fail due to side-loading if the driven clutch is not allowed to float.



(PN: PS-46998 Shown)

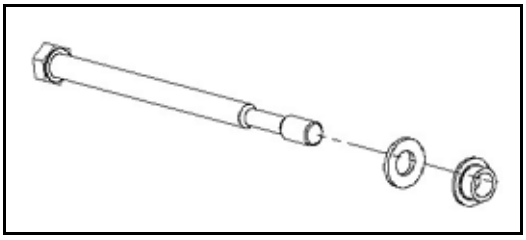
DRIVE CLUTCH

Identification



Every clutch will have the last three digits of the clutch part number etched on to the cover (A). The “X" (B) marking is an index mark where the clutch cover (C), clutch spider (D) and the stationary sheave (E) should line up when the clutch is assembled.

Drive Clutch Removal



NOTE: All clutch tools can be found at the beginning of this chapter.

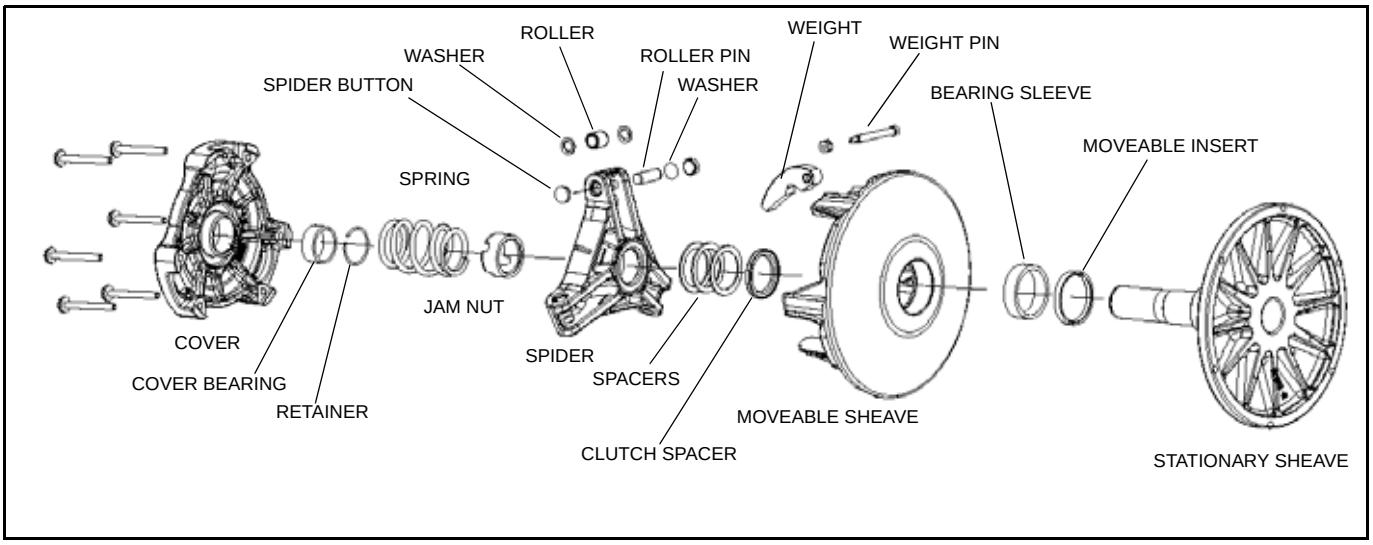
1. Remove the belt..
2. Place the clutch holding tool (PN 9314177-A) on the drive clutch.
3. Remove the drive clutch retaining bolt. Note the placement and number of washers on retaining bolt.
4. Insert the correct clutch puller into the retaining bolt hole.
5. Tighten the puller into the clutch. If the clutch does not come off, strike the clutch puller head with a hammer. If the clutch does not “pop” off, continue to tighten the clutch puller, and repeat this step.

⚠ CAUTION

Do not use an impact wrench to remove or install the clutch bolt or clutch puller. Damage to the clutch and/or crankshaft can occur.

8

Drive Clutch Disassembly



⚠ CAUTION

Wear eye protection when servicing the drive clutch. Sheaves must be marked to provide a reference point for dutch balance and spider indexing. If the sheaves are not marked and the spider washers are changed or misplaced, the clutch may be out of balance and damage to the clutch may result.

⚠ WARNING

Clutch spring is under extreme tension, use caution when disassembling the clutch.

1. In a straight line, mark the sheaves and the cover with a black marker or etched with a scribe.
2. Remove the clutch.
3. Place the drive clutch in the clutch compression tool (PN 8700220).
4. Compress the clutch in the compression tool, then secure the chain.
5. Evenly remove the cover fasteners. The cover bushing may be damaged if the cover is side-loaded or mis-aligned.
6. Carefully remove the tension from the compression tool.
7. Remove the cover and inspect the cover bushing. Replace if damaged or worn.

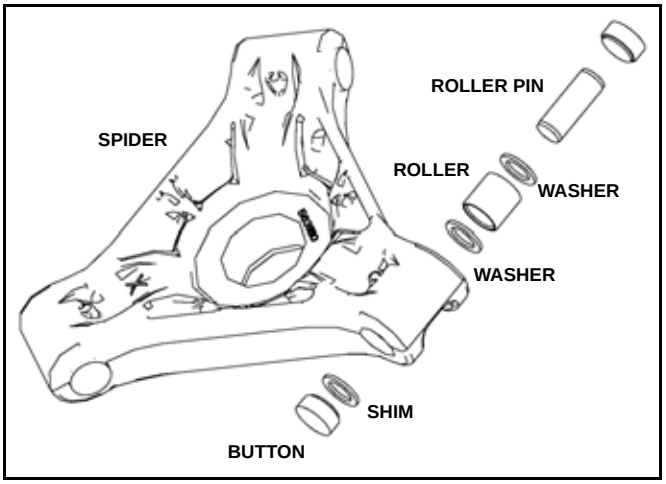
NOTE: Replace the cover bushing if the inside diameter is over 1.40″ (28.95mm)

8. Remove the spring.
9. Mount the drive clutch securely in a drive clutch holding fixture (PN 2871358).
10. Remove the jam nut in a counterclockwise direction (standard thread) using the drive clutch spider nut socket (PN 2871358).
11. Install the spider removal tool (PN 2870341), and remove the spider in a counterclockwise direction (standard thread).
12. Measure the total thickness of the spacer washers that are installed on top of the clutch spacer. Record the thickness of these spacer washers.
13. Inspect both sheave surfaces for wear or damage.
14. Inspect the moveable sheave bushing for wear or damage.
15. Remove all three drive clutch weights.
16. Inspect each weight. The surface should be smooth, with no waves or galling. Place bolt inside weight to check flyweight bushing and pin surface for wear by rocking the weight back and forth.
17. Inspect all the rollers, bushings and roller pins by pulling a flat metal rod across the roller.
18. Roller can also be inspected by rolling with a finger to feel for flat spots, roughness, or loose bushing.

NOTE: The flyweight bushing is not replaceable. If flyweight bushing is damaged both the flyweight, pin and nut will need to be replaced.

19. Inspect to see if the roller and bushing are separating.
20. Bushing must fit tightly in roller.
21. Replace roller and pin if roller fails to roll smoothly (no flat spots) or if the bushing is loose or worn.

Roller Removal

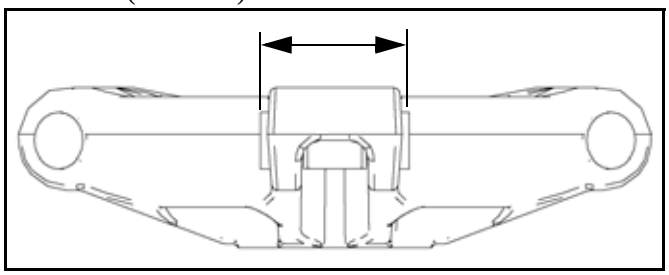


1. With the spider in a vise start removing the spider buttons by drilling a 0.18" hole in the center of a button on one side of the spider.
2. Place spider on a vise or in an arbor press.
3. Place a pin punch through the spider button hole and drive the opposite button and pin out.
4. Remove shims (if any are installed) and note their location.
5. Flip the spider over and tap out the holed button.

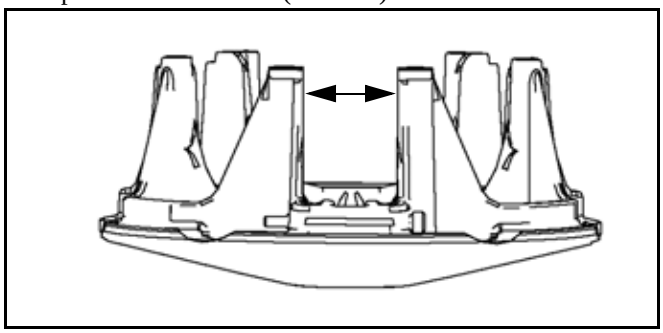
Roller Installation

NOTE: CAUTION: Use care to start the pin straight. Aluminum burrs could pass through into the roller bushing causing it to bind and stick. Also use care to make sure the roller remains aligned when the pin is driven through. The roller busing could be damaged causing premature wear and roller failure.

1. Drive pin into the spider leg.100" -.125" (0.25 - 0.32cm) beyond the first land of the spider leg.
2. Install one washer on the portion of the pin that is protruding from the spider leg.
3. Install new buttons into the spider
4. Place roller in spider leg and center it on the pin.
5. Place a second washer on the other side of the roller.
6. Place the spider on a vise.
7. Install pin centering tool (PN 2870401).
8. Drive the roller pin through the second land of the spider.
9. Repeat process for the other two rollers.
10. Measure the width of the spider leg with the buttons installed (9) and record the measurement. Specification is 1.496" (37.99mm).



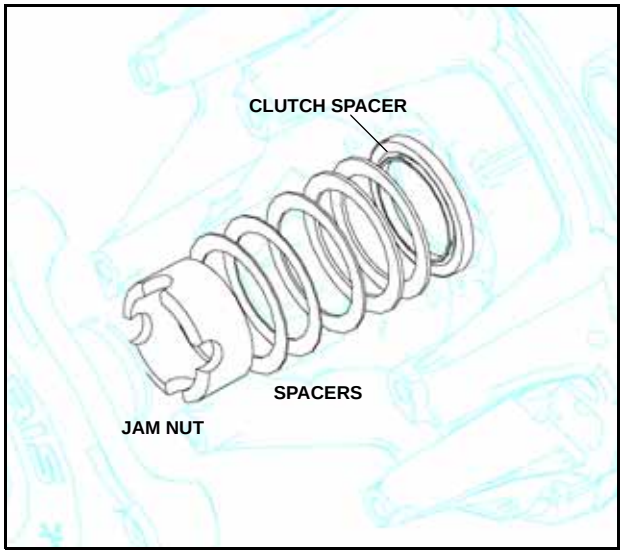
11. Measure the width of the moveable sheave towers. Specification is 1.50" (38.1mm).



12. Subtract the spider measurement form the tower measurement. The clearance between the spider buttons and the moveable sheave towers is .002" - .004" (.05 - .10mm).

Clutch Assembly

1. Assemble the rollers, bushings and roller pins if they were removed.
2. Install the head of the weight pin so that it is on the leading side of rotation. This will orientate the nut on the trailing side of rotation.
3. Torque weight pin to 30 in-lb. (3Nm).
4. Place the moveable sheave onto the stationary sheave.
5. Place the same number of spacers on top of the stepped spacer onto the shaft of the stationary sheave.



6. Thread the spider onto the stationary sheave shaft.
7. Index the spider. See “Spider Indexing” on page 8.17.
8. Using the spider tool (PN 2870341) torque to 200 ft.-lb. (276Nm).
9. Install the jam nut (6) onto the shaft and torque it to 235 ft.-lb. (324 Nm).
10. Place the drive spring on the shaft.
11. Place the cover onto the clutch and torque the cover fasteners to 90 in-lb. (10Nm).

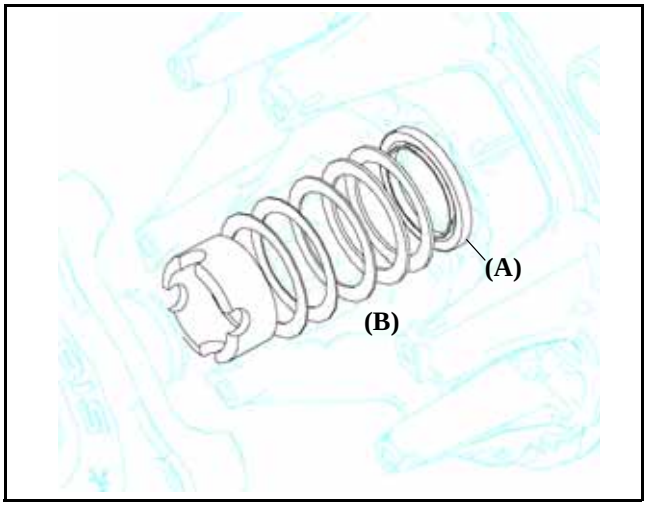
NOTE: Do not allow side loading or mis-alignment of the cover or the bushing may become damaged.

Spider Indexing

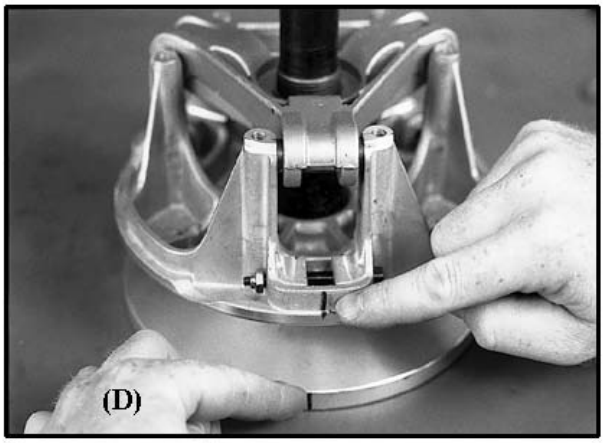
NOTE: Spider indexing effects belt to sheave clearance and clutch balance. Please read all procedures before proceeding.

1. Remove and disassemble clutch
2. Add or remove spider washers as required to achieve desired belt to sheave clearance. Make sure that the stepped washer (A) is on the bottom of the spacer stack (B). For example: If belt to sheave clearance is .020″ too large, removing one .020″ shim will position the movable sheave closer to the fixed sheave reducing belt to sheave clearance by .020″.
3. Place the correct number of spacer washers (B) beneath the spider. The following washers are available for fine tuning:

   - 5210752 - .020″ (.51mm)
   - 5242981 - .025″ (.63mm)
   - 5210753 - .032″ (.81mm)
   - 5210754 - .050″ (1.27mm)
   - Clutch Spacer - .130″ (3.3mm)



4. Install spider washer(s) and spider aligning the “X” with the moveable sheave’s “X”. Notice as the spider seat location is changed, the sheave marks made before disassembly no longer align (C). There are two ways to bring the sheave marks into alignment.

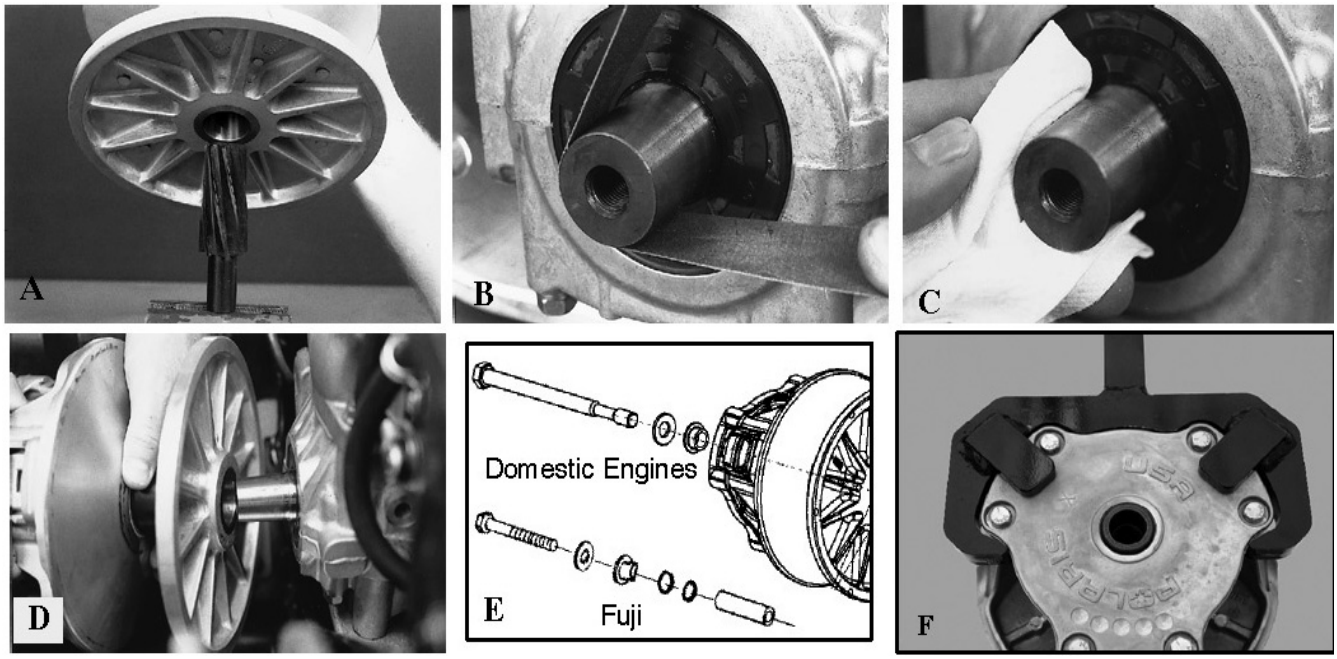


Vary the amount and thickness of spacer washers (washer thickness may vary slightly). Re-index marked spider leg to another tower. This can be done because spider has little effect on overall clutch balance.

Re-indexing the spider 1/3 turn clockwise, or 1 leg, will allow the realignment of the moveable and stationary sheaves as previously marked (D). For EXAMPLE: 0.020" or 0.032" (0.5 - 0.8mm) washer removed - re-index spider clockwise 1/3 turn.

NOTE: Alignment marks on the sheaves should be with in 1" (25.4mm) after final assembly and torquing.

Drive Clutch Installation



NOTE: Always clean the clutch taper before re-installing clutch on engine.

1. Place a clutch taper reamer (PN 2870576) in a vise (A) and lubricate the cutting edges with cutting oil. Clean the clutch taper by manually rotating the clutch clockwise on the reamer one or two revolutions. Only use the weight of the clutch and do not push down on the clutch while turning. This will clean up any galling or scoring of the bore taper.
2. Check crankshaft taper for galling or scoring. If necessary clean the taper evenly with 200 grit emery cloth (B).
3. The clutch taper and the crankshaft taper should be clean and dry. Do not use harsh cleaners which may cause clutch taper to corrode, or damage the crank seal.
4. Clean clutch taper with lacquer thinner or isopropyl alcohol (C).
5. Slide clutch onto crankshaft taper (D).
6. Install the retaining bolt with all spacers and washers or o-rings (E) that were on the bolt when it was removed.
7. Hold the clutch with the holding wrench (F) PN 931417-A. Re-check torque after first operation or test ride.
8. Torque retaining bolt to specification.
9. Run engine then re-torque the retaining bolt to specification.

Drive Clutch Bolt Torque

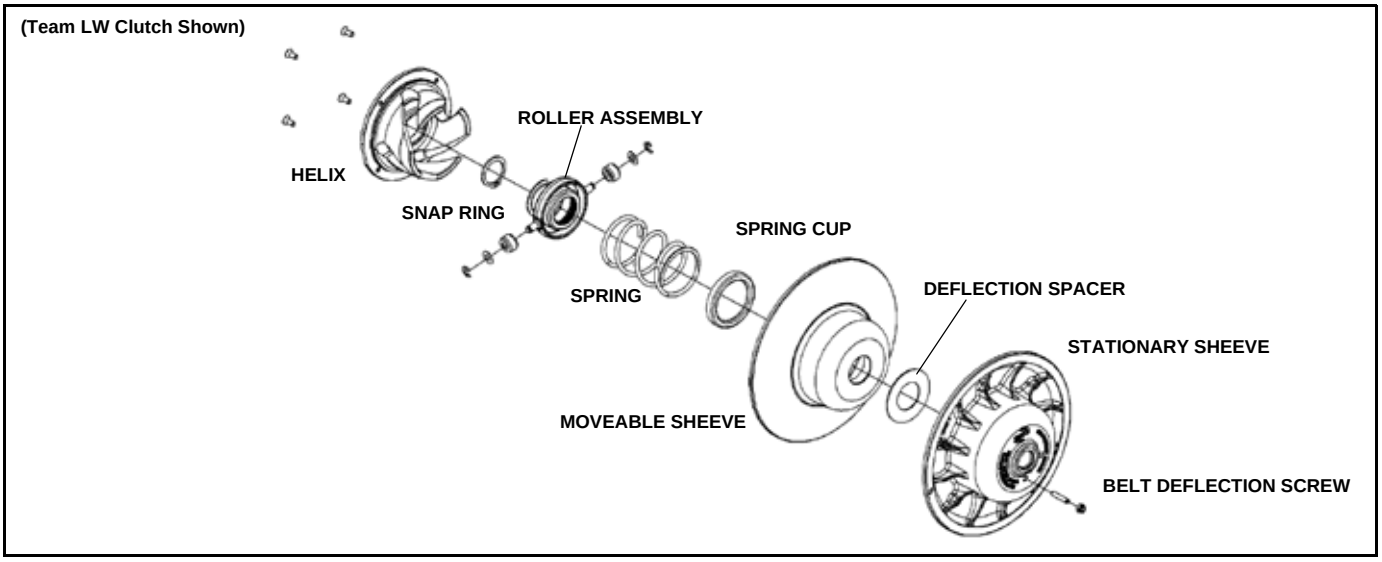
ENGINE	BOLT	TORQUE
FS / FST	14 mm	50 Ft.Lb. (68Nm)

⚠ CAUTION

Re-torque the drive clutch bolt after running the engine for several minutes.

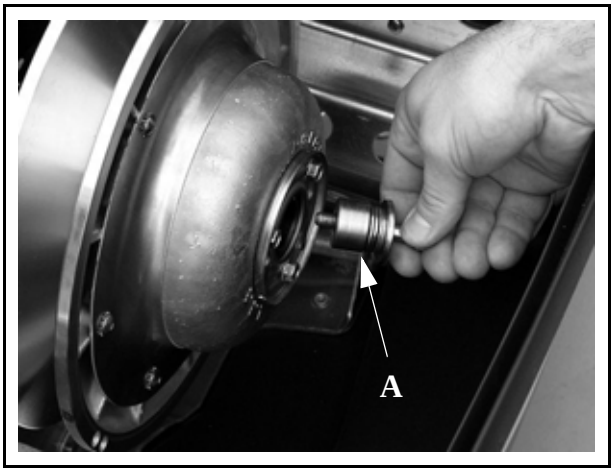
DRIVEN CLUTCH

Components



= T
Helix Fasteners = 60 - 80 In.Lbs. (7 - 9 Nm) Driven Clutch Retaining Fastener = 17 Ft.Lbs. (23 Nm)

Driven Clutch Removal

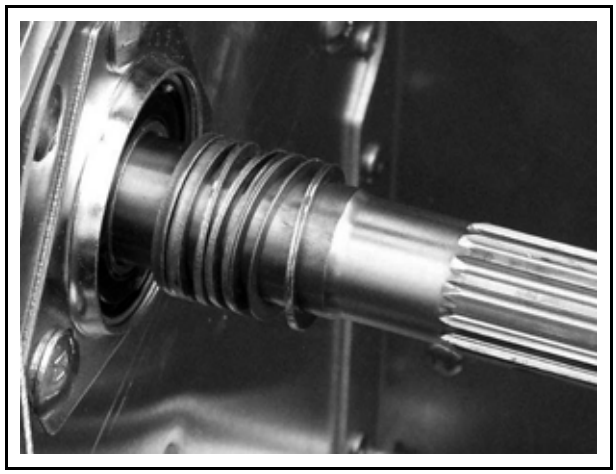


1. Remove the drive belt.
2. Apply and lock the parking brake.
3. Remove the driven clutch bolt and washers (A).

NOTE: Count the number and location of the spacer washers located on the fastener and behind the clutch.

4. Slide the driven clutch off the jackshaft.
5. Inspect the splines and replace jackshaft if damage is found.

Driven Clutch Installation



1. Install the driven clutch bolt with the same amount of washers at removal.
2. Torque the bolt to specification.
3. Check for correct belt deflection.

8

Driven Clutch Disassembly

1. Helix Removal:
   - Remove the fasteners securing the helix to the moveable sheave.
   - Using a flat-blade screwdriver, carefully pry the helix up and out of the sheave.
2. Install the clutch into the clutch compression tool, PN 8700220. Use the clutch compression extensions, PN PS-45909.
3. Compress the roller assembly to access the snap ring. Lock the clutch compression tool chain to hold the roller assembly down.
4. Carefully remove the snap ring.
5. Slowly release the compression tool.

> **⚠ WARNING**
>
> Wear eye protection when removing and installing the roller assembly.

6. Disassemble the clutch components. Replace damaged or worn components.

Driven Clutch Assembly

1. Clean the components with clutch cleaner. Reassemble the clutch components. Reference the illustration for order of assembly.
2. Visually align the wide notch on shaft with the wide opening on the roller assembly. Place the roller assembly on the spring.
3. While keeping the roller assembly centered on the shaft, compress the roller assembly and spring down into the moveable sheave enough to expose the snap ring groove.
4. Install the snap ring, then release the compression tool.
5. On dual-angled Team helixes, locate the desired angles etched on the helix cover. Install the helix so that the desired ramps fit around the two rollers. Push the helix down into the sheave, while keeping the fastener holes aligned.
6. Torque the helix fasteners to specification.

CHAPTER 9

Front Suspension / Steering

OVERVIEW / SPECIFICATIONS

Inspection

When inspecting steering and suspension components for wear or damage, always replace parts as necessary. Refer to the assembly exploded views in this chapter for identification of components and torque values of fasteners. Make notes of the direction a bolt goes through a part, what type of nut is used in an application, etc.

Some of the fasteners used in the IFS are special and cannot be purchased at a hardware store. Always use genuine Polaris parts and hardware when replacing front end components. Review steering adjustment guidelines before making adjustments.

The following components must be inspected at this time.

- Tie rods and tie rod ends
- Torsion bar and bushings / linkage (where applicable)
- Handlebars and steering post assembly
- Spindles and bushings
- Skis and skags
- Pitman arms / Idler arms
- A-arms and bushings
- Shock absorbers, shock mounts, springs
- All related fasteners - check torque. Refer to steering exploded views at the beginning of this section.
- Grease all fittings.

Always follow rod end engagement guidelines. Maximum setup width must be checked whenever front suspension components are adjusted or replaced.

Camber / Toe Specifications

The following table is the factory specifications for the 2006 Polaris Snowmobile front suspension set up.

Maximum width and camber measurements are to be taken with the front end elevated and shocks at full extension.

Toe alignment is measured at ride height. This means that the machine is on the ground and resting at normal ride height, not full rebound. Measure at a point 10” (2.54cm) forward of the ski mount bolt and 10” (2.54cm) behind the ski mount bolt, preferably on the center line of the carbide skags.

Width is measured from the center of the spindles.

Camber measurement is taken from the top of the alignment bar to the top of the ski mount hole in the spindle with the bushing removed.

Camber & Toe Specifications

SUSPENSION	MAXIMUM SET UP WIDTH in/ cm (± .25in/.6cm)	CAMBER in/ mm	TOE OUT (At ride height) in/mm
IQ 42.5	42.5/108	2.25±.31/ 57.2±7.9	0-.12/0-3.05

Springs

When the front suspension encounters a bump, the force of the bump compresses the spring. If the bump force is 450 pounds, a 100 #/in. spring will compress 4.5 inches. A 150 #/in. spring will compress 3 inches. If the suspension had 4 inches of spring travel, the 100 #/in. spring would bottom out, while the 150 #/ in. spring would have one inch of travel remaining.

- Free length - the length of a coil spring with no load applied to the spring
- Installed length - the length of the spring between the spring retainers. If the installed length of the spring is less than the free length, it will be pre-loaded.
- Spring rate - the amount of force required to compress a coil spring one inch. For example, if 150 pounds of force are required to compress a spring 1 inch, the spring rate would be 150 #/in.
- Straight rate spring - the spring requires the same amount of force to compress the last one inch of travel as the first one inch of travel. For example, if a 150 #/in. spring requires 150 pounds of force to compress it one inch, 300 pounds of force would compress it two inches, 450 pounds of force would compress it three inches, etc.
- Progressively wound spring - the rate of the spring increases as it is compressed. For example, a 100/200 #/ in. rate spring requires 100 pounds of force to compress the first one inch, but requires 200 additional pounds to compress the last one inch.

Adjustable Shocks

Snowmobiles equipped with adjustable Ryde FX shocks allow the driver to make adjustments to the compression valving by turning the screw on the shock.

Locate the adjustment screw near the base of the shock.

By turning the screw clockwise (a small screwdriver or dime work well), the compression valving is increased, stiffening the ride. To soften the ride, reduce the compression by turning the screw counter-clockwise. A great deal of ride performance is accomplished with a mere 1/2 to 1 turns. There are approximately 3 full turns of adjustment available.

If the suspension is "bottoming", tighten the compression screw clockwise in 1/2 turn increments until the bottoming stops. Backing off 1/4 turn counter-clockwise at this point should give you the best possible ride ensuring use of the full travel of the suspension. The opposite procedure should be used if the suspension is too stiff upon initial set-up.

If bottoming continues after the screw is turned in full clockwise, the compression spring should be adjusted with the threaded adjustment collar. Back the screw out to the original starting position after the compression spring has been adjusted.

Riding conditions are ever changing. Keep in mind the compression damping adjustable screw can be adjusted at any time to achieve the best possible ride in any condition.

NOTE: Install shock so the adjustment screw is facing outwards.

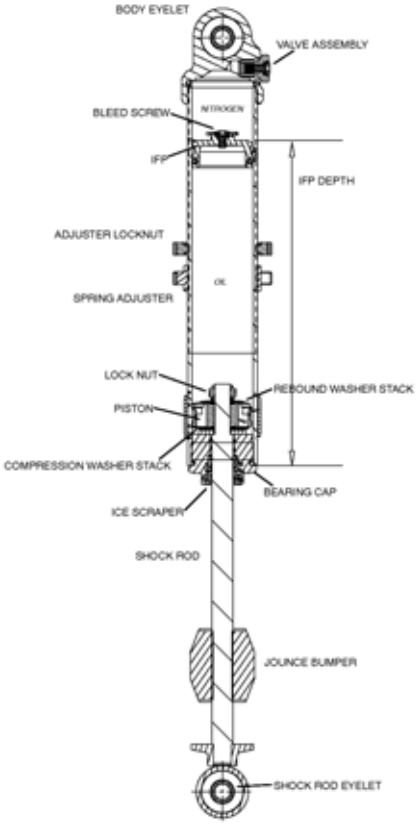
Rebuildable IFS Shock Specifications

Rebuildable IFS Shocks

SHOCK PN	BRAND	Extended Length (in)	Collapsed Length (in)	Stroke (in)	Shock Rod (in)	IFP Depth (in)	Nitrogen PSI
7043141	Fox	18.00	11.80	6.20	.50	7.11	200
7043245	Ryde FX	17.98	11.77	6.21	.49	6.92	200

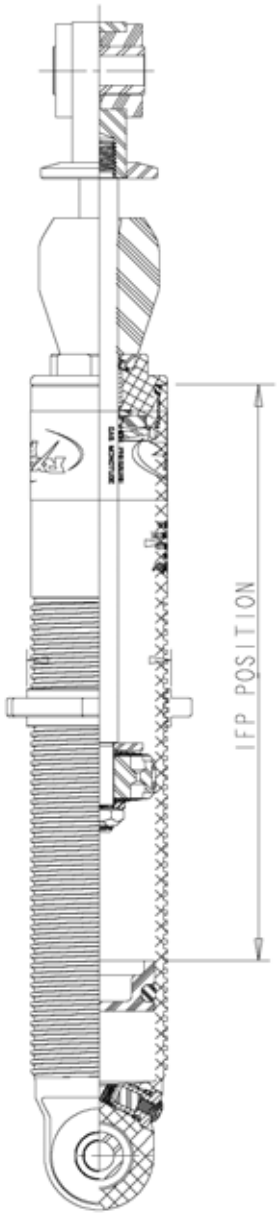
7043141 Piston Valve Specifications

COMPRESSION	1.125x.093
	.700x.012
	.700x.012
	.900x.008
	1.000x.008
	1.100x.008
	1.250x.008
	.800x.008
	1.100x.008
	1.300x.006
Piston Orifice = .078	
REBOUND	1.250x.008
	.700x.008
	1.100x.010
	1.000x.010
	.900x.012
	.800x.012
	.700x.012
	.620x.093



7043245 Piston Valve Specifications

COMPRESSION	.700 x .015
	.800 x .006
	.900 x .006
	1.000 x .006
	1.100 x .008
	1.250 x .006
	.800 x .008
	1.100 x .006
	1.300 x .008
Piston Orifice = .060	
REBOUND	1.250 x .008
	1.100 x .008
	1.000 x .008
	.900 x .008
	.800 x .008
	.700 x .008



Optional IFS Springs

IFS Shock Springs

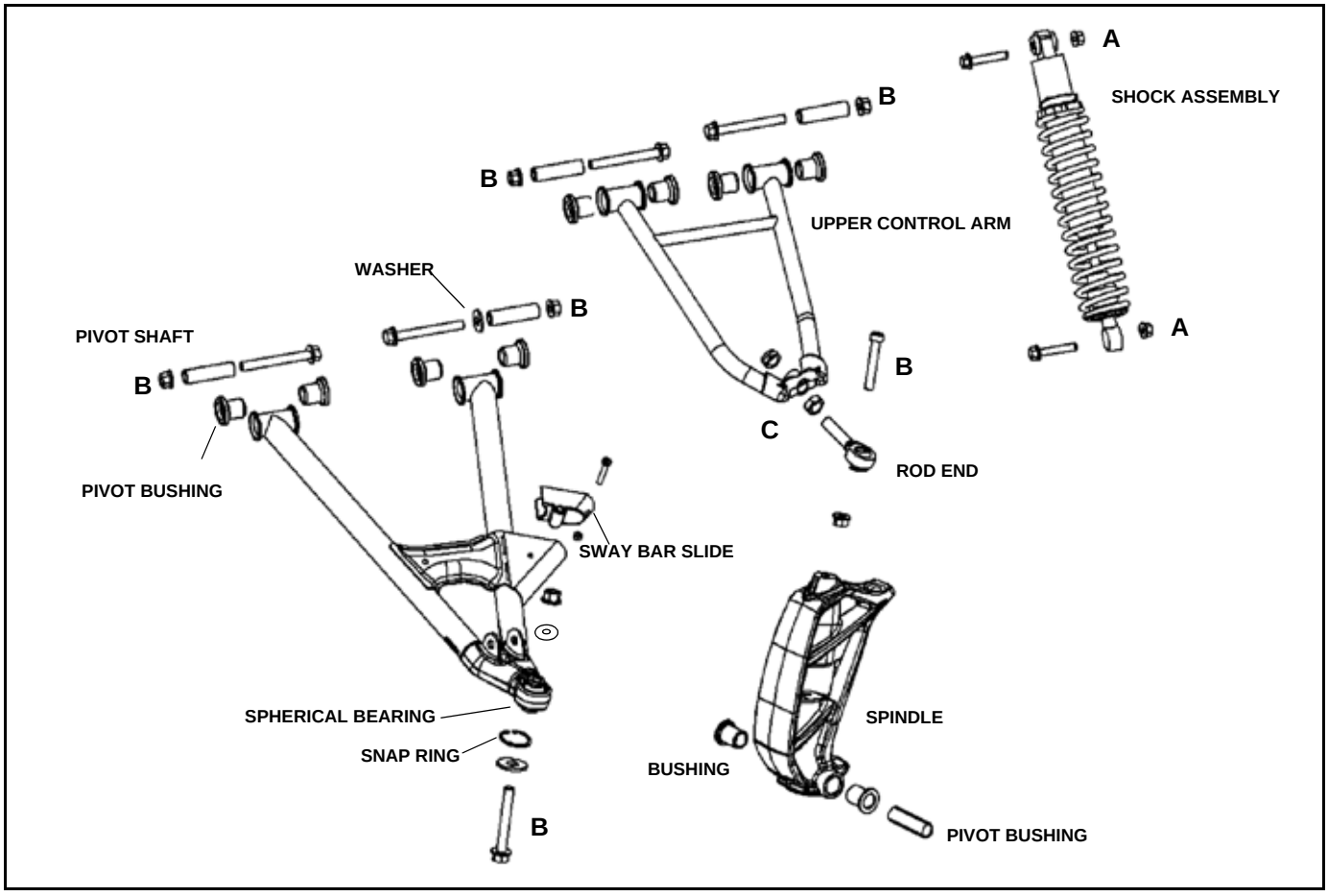
Part Number	Total # of Coils	Rate #/in)	Free Length	Wire Via.	I.D."	O.D."	Tabbed?
7041261	13	105	10.25	0.312	1.84	2.6	NO
7041396	13.35	50	11.88"	.283"	1.89"	2.82	Yes
7041398	12.72	75	11.88"	.312"	1.89"	2.88	Yes
7041405	13.40	65	11.88"	.306"	1.89"	2.82	Yes
7041489	14.70	74/120	11.30"	.312"	1.89"	2.75	Yes
7041491	13	185	13.50"	.438"	1.90"	3.60	Yes
7041520	10.60	90	10.50"	.283"	1.89"	2.57	No
7041528	17.57	74/160 var	11.30"	.306"	1.89"	2.53	Yes
7041529	19.39	50/140 var	11.30"	.283"	1.89"	2.50	Yes
7041530	14.42	70/105 var	10.50"	.283"	1.89"	2.50	Yes
7041549	9.17	140	10.75"	.331"	1.89"	2.75	Yes
7041550	8.29	120	10.80"	.306"	1.89"	2.75	Yes
7041551	9.55	100	10.75"	.306"	1.89"	2.75	Yes
7041552	9.09	80	10.75"	.283"	1.89"	2.75	Yes
7041553	11.46	60	11.33"	.283"	1.89"	2.75	Yes
7041554	9.09	80	10.75"	.283"	1.89"	2.75	Yes
7041571	10.40	70	10.50"	.263"	1.89"	2.53	No
7041573	9.28	160	10"	.331"	1.89"	2.91	Yes
7041574	10.32	140	10.25"	.331"	1.89"	2.91	Yes
7041575	10.36	120	11.42"	.331"	1.89"	2.87	Yes
7041576	9.55	100	10.80"	.306"	1.89"	2.86	Yes
7041591	12.79	80	12.25"	.306"	1.89"	2.75	Yes
7041598	9.71	105	9.33"	.312"	1.89"	2.894	Yes
7041613	14.01	75	11.88"	.295"	1.89"	2.62	Yes
7041668	6.94	70	4"	.219"	1.89"	2.34	No
7041669	6.27	80	4"	.218"	1.89"	2.33	No
7041670	6.28	90	4"	.225"	1.89"	2.35	No
7041671	11.71	160	9"	.331"	1.89"	2.56	No
7041672	10.63	180	9"	.331"	1.89"	2.56	No
7041673	12.72	200	9"	.362"	1.89"	2.62	No
7041674	12.72	220	9"	.362"	1.89"	2.62	No
7041677	10.43	140	9"	.306"	1.89"	2.52	No
7041678	8.65	100	7"	.262"	1.89"	2.43	No
7041683	12.12	80	11.88"	.312"	1.89"	2.87	Yes
7041698	5.84	100	4"	.225"	1.89"	2.35	No
7041699	5.75	120	4"	.235"	1.89"	2.37	No
7041701	10.57	120	9"	.295"	1.89"	2.49	No

IFS Shock Springs

Part Number	Total # of Coils	Rate #/in)	Free Length	Wire Via.	I.D."	O.D.”	Tabbed?
7041820	5.98	140	4”	.250”	1.89”	2.43	No
7041821	5.91	160	4”	.262”	1.89”	2.49	No
7041826	9.19	160	7”	.306”	1.89”	2.54	No
7041826	8.85	180	7”	.312”	1.89”	2.54	No
7041828	9.61	200	7”	.331”	1.89”	2.59	No
7041829	8.92	220	7”	.331”	1.89”	2.59	No
7041927	16.15	68/160	13”	.295”	1.89”	2.54	Yes
7041950	13.80	68/160	11.57”	.331”	1.89”	3.125	Yes
7042052	11.7	110	12	0.343	1.87	3	No
7042074	11.625	90/180 Var	10.65	0.343	1.89	3.2	Yes
7042187	13.76	68/160	12.55	0.343	1.89	3.18	Yes
7042195	14	90/180 Var	13	0.362	1.89	3.2	Yes
7042263		80/110 Var	10.78	0.331	1.89	3.25	Yes
7042314	10.64	75	10.01	0.281	1.89	2.71	Yes
7042315	10.89	55	9.85	0.262	1.89	2.66	Yes

ASSEMBLY ILLUSTRATIONS

Front Suspension



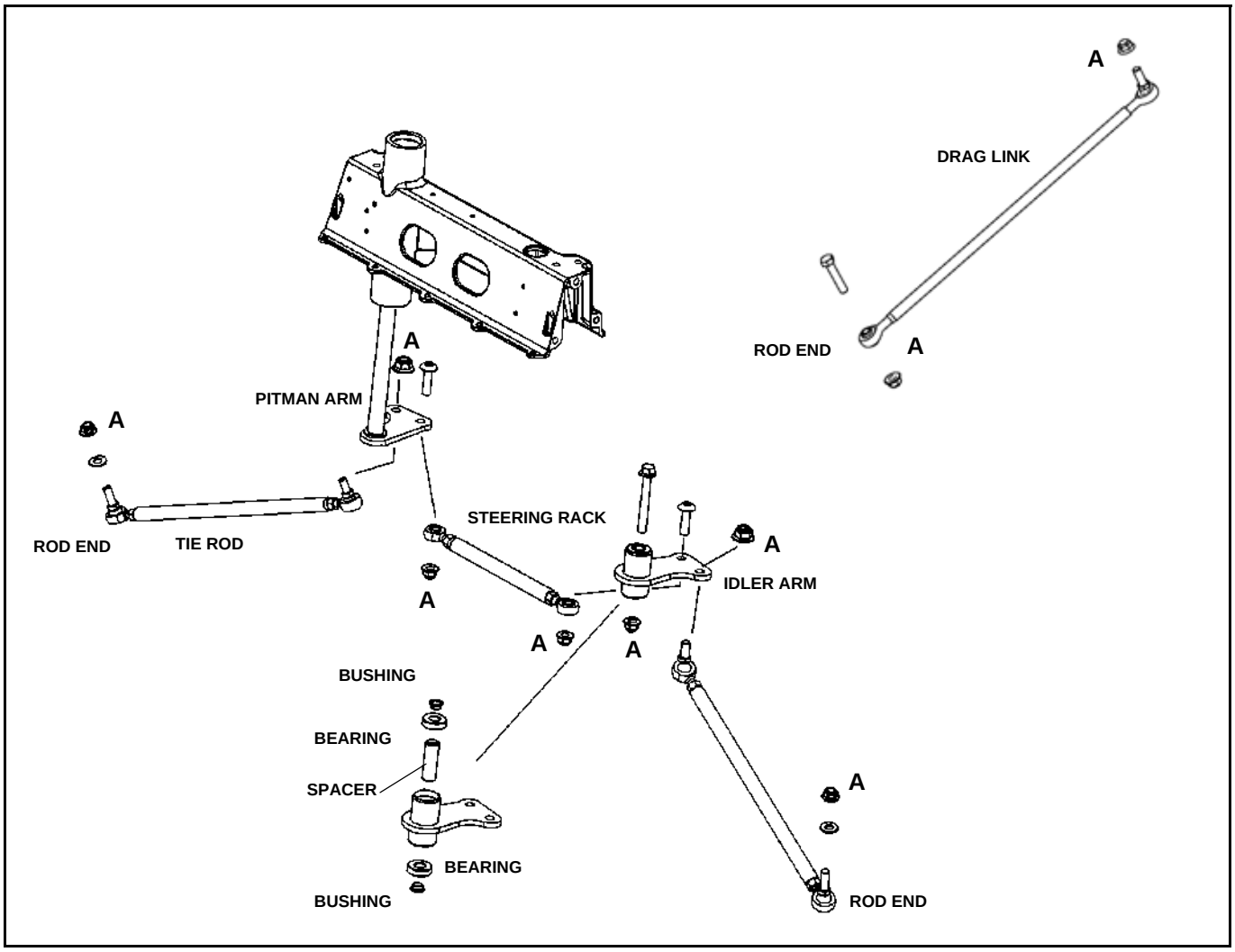
= T
A = 29 Ft.Lb. (39 Nm) B = 40 Ft.Lb. (54 Nm) C = 45 Ft.Lb. (61 Nm)

NOTE: Assembly Notes

- Note washer installed between fastener and pivot bushing on the rear, lower control arm mount to allow suffcient clearance between nut and sway bar.

9

Steering Linkage

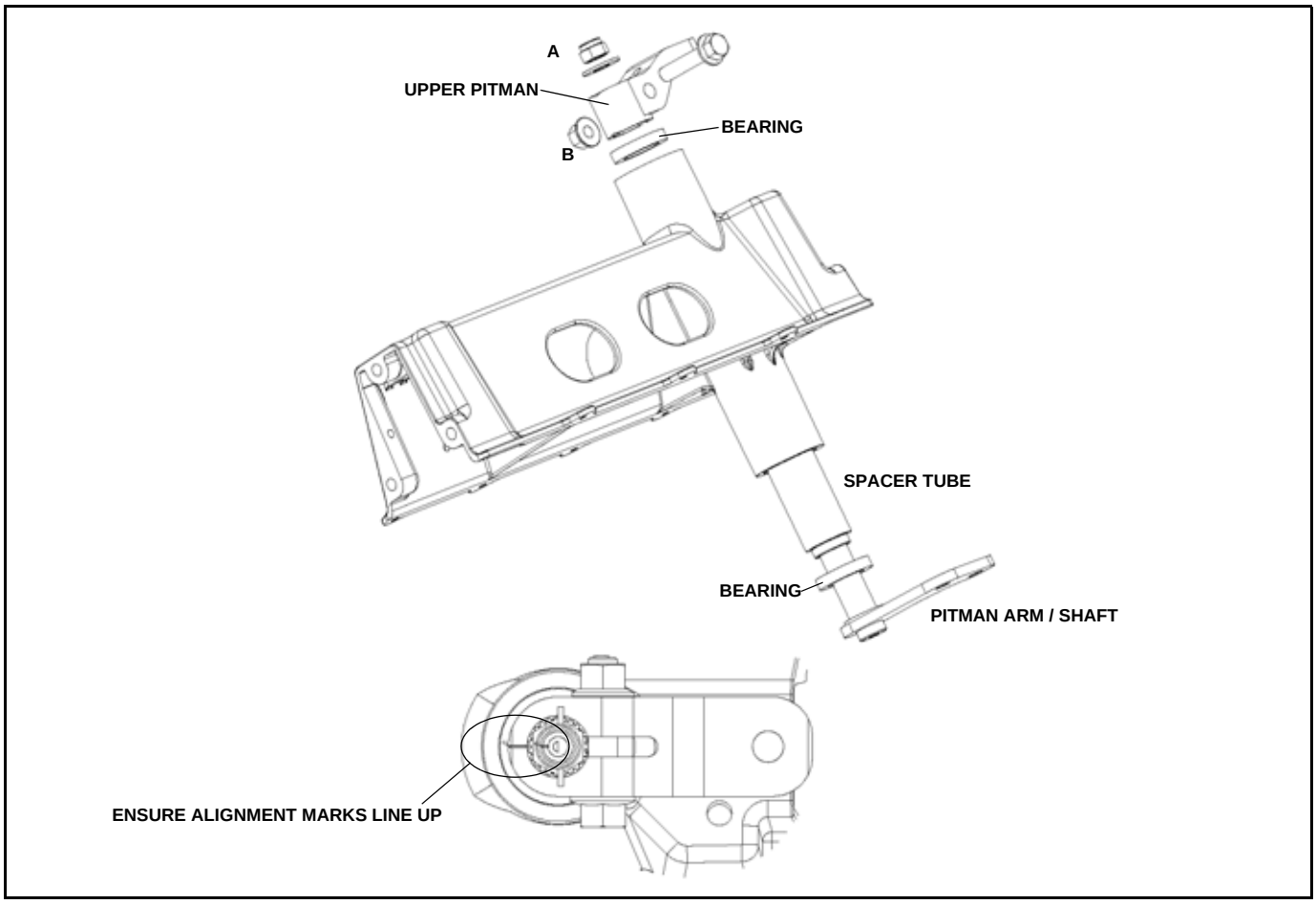


= T
A = 29 Ft.Lb. (39 Nm)

NOTE: Assembly Notes

- Tie Rod Length = 15.06″
- Drag Link Length = 17.31″
- Steering Rack Length = 9.3″
- Measure linkage length between center of one rod end to center of other rod end.

Steering Mount



= T
A = 40Ft.Lb. (54 Nm) B = 28 Ft.Lb. (38 Nm)

NOTE: Assembly Notes

- Install washer and torque the pitman arm / shaft nut before torquing the upper pitman clamping nut.
- Ensure the upper pitman mark and pitman arm / shaft marks are aligned.

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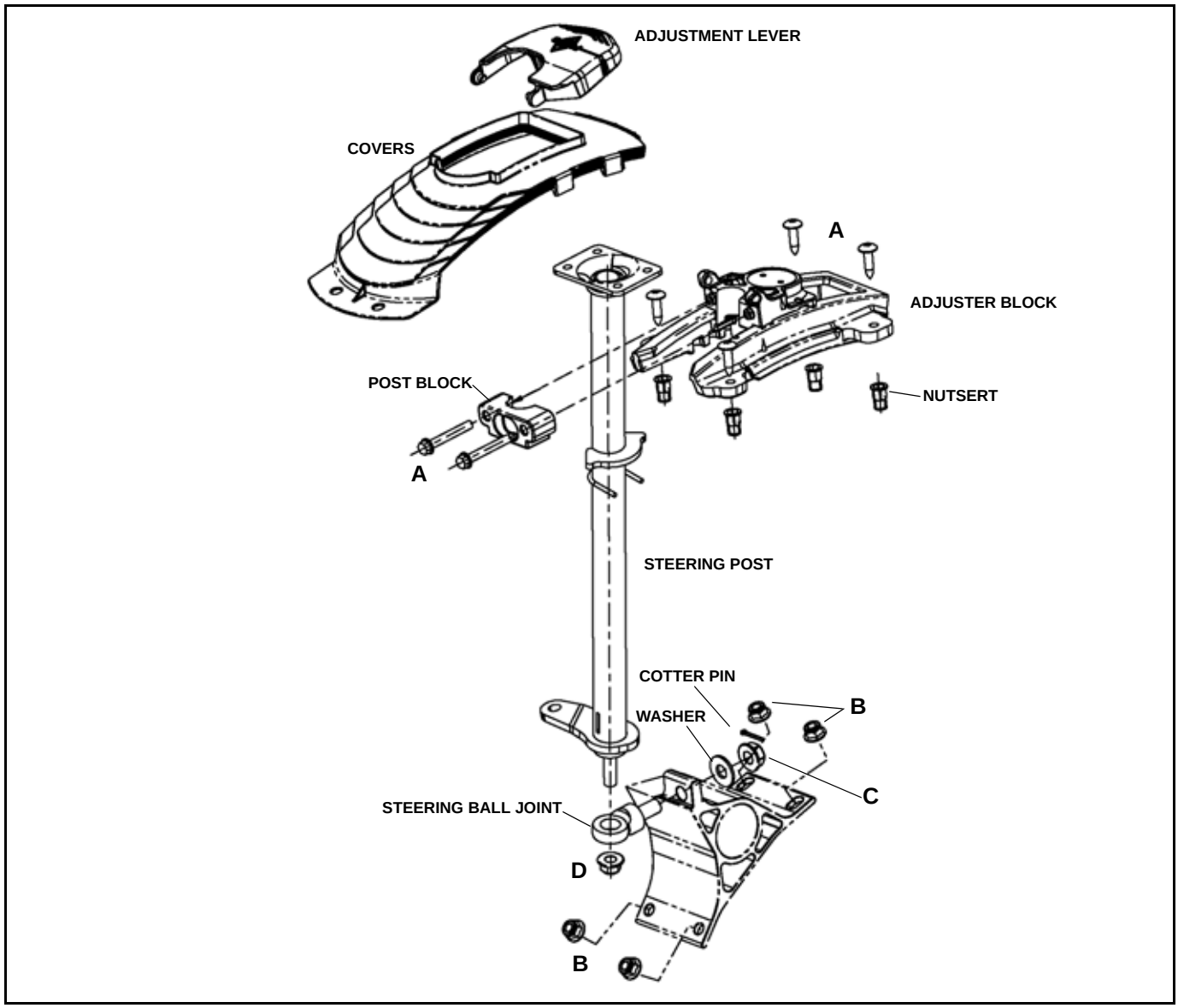
Handlebar Post - Rider Select



= T
A = 7 Lb. Ft. (9 Nm) B = 11 Lb. Ft. (15 Nm) C = 35 Lb. Ft. (47 Nm) D = 30 Lb. Ft. (41 Nm)

NOTE: Assembly Notes

- Always use a new cotter pin.
- Apply Polaris All Season Grease to the inner surface of the post block and where the steering post rests in the adjuster block.
- Perform steering alignment with handlebars in Rider Select position #4.
- Handlebar Hold-Down Clamp (not shown) Fastener Torque: 12 Ft.Lb. Tighten front fasteners first, then rear fasteners.

ADJUSTMENT PROCEDURES

SETUP AND ADJUSTMENTS

Spring preload is the amount of pressure at which the spring is held. The longer the installed length of the spring, the less the amount of preload; the shorter the installed length of the spring, the more the amount of preload. An increase in IFS shock spring preload will result in an increase in ski pressure.

To adjust front spring preload on threaded adjust models, grasp the spring and turn in a clockwise direction (as viewed from the top of the shock) to increase the preload. Turn in a counterclockwise direction to decrease preload.

Always set the preload equally between the right and left-side shocks.

For the best ride the spring preload should be as low as possible. Set the preload to use the full travel of the ski shock with occasional light bottoming.

> **⚠ CAUTION**
>
> If the plastic nut is unscrewed from the threaded body the nut will break. Always leave one thread showing above the plastic nut or the spring coils will stack, resulting in damage.

To determine if the suspension is using full travel, place the shock's jounce bumper against the shock body, then test ride the machine.

The bumper will move on the rod in relation to the amount of travel. For example, if the shock travel is full, the bumper will travel the entire length of the shock rod.

To prevent excessive bottoming-out, install the next highest rate spring, or reduce the preload on the existing spring and change the shock valving to obtain the desired effect.

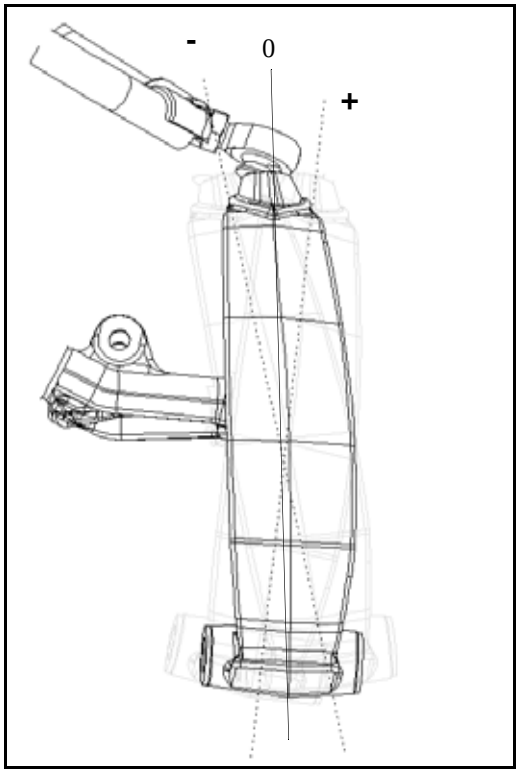
NOTE: Shock valving can only be adjusted or changed on models that have serviceable shocks.

Alignment Bar Specifications

- DIAMETER: .623"-.625" (15.824-15.875mm)
- LENGTH: 45" (114.3cm)
- MATERIAL: C-1018

Camber

- 0 = Neutral camber. The spindle is 90_ (perpendicular) to the ground.
- + = Positive camber. Spindle top is canted outward from the chassis.
- - = Negative camber. Spindle top is canted inward towards the chassis.



9

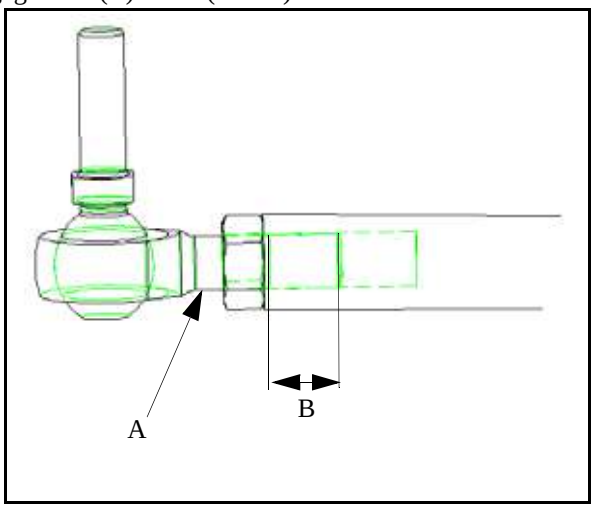
Rod Ends

Rod ends must be parallel to their respective mounting surface after tightening jam nut. If possible, support the edge of the rod end to keep it from rotating out of position until jam nut is tight. When rod ends are properly tightened, the rod should rotate freely approximately 1/8 turn.

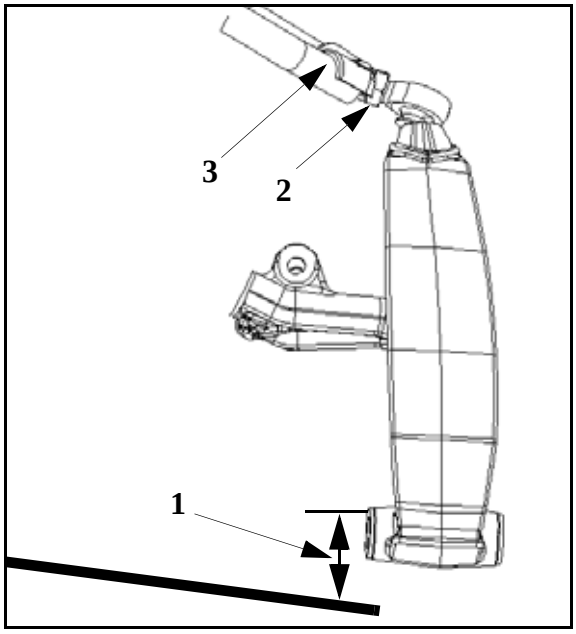
Rod End Engagement

Rod ends must engage the rod a minimum of 2x the thread diameter when adjustment is complete.

Example: .4375” (11mm) rod end (A) X 2 = minimum thread engagement (B) .875” (22mm).



Camber Adjustment



1. Raise the front of the machine so that the skis are off the floor 3” (7.62cm). The shocks should be at full extension
2. Remove the skis.
3. Determine which spindle requires the greatest amount of correction my installing the alignment bar through one spindle to the other spindle. Measure the distance from the top of the alignment bar to the top of the ski mount hole with the bushing(s) removed. Record measurement.
4. Remove the alignment bar and install it to measure the opposite side. Measure the distance from the top of the alignment bar to the top of the ski mount hole with the bushing(s) removed. Record measurement
5. To adjust the camber, unlock the lock nut and adjust the camber with the adjuster nut until alignment bar measurement is within the specified range for each spindle.
6. Once the specification is achieved, tighten all jam nut(s) and torque them Ft.Lb. (61 Nm).
7. Re-check the set up width and compare to specification.

Handlebar Centering

1. Raise the front of the machine off the floor so that the spindles are off the floor 3”(7.62cm).
2. Insert the alignment bar through both ski bolt holes in each spindles.
3. Adjust Toe until handlebar is centered.

Toe Adjustment

Toe is adjusted with the shocks and skis installed. Track alignment must be correct before starting this process.

Toe alignment is measured at ride height.

1. Lift front of the machine off the floor rock the front end up and down and then set it down gently. This will set the unit at ride height.
2. Measure and make a mark 10” (2.54cm) forward of the ski mount bolt and 10” (2.54cm) behind the ski mount bolt, preferably on the center line of the carbide skags.
3. Place a straight edge along the one side of the track. Make sure that the straight edge is touching along the length of the track.

4. Record the measurements from the edge of the straight edge to the forward ski mark and the rearward ski mark.
5. Adjust the tie rod so that both measurements are the same.
6. Place the straight edge on the opposite side of the track and measure the opposite ski marks.
7. Adjust the tie rod so that both measurements are the same.
8. Verify that the ski center distances are within specification from the forward marks and the rearward marks.

DISASSEMBLY AND ASSEMBLY

Spindle Removal

1. Securely support the front of the machine up off the floor.
2. Remove the ski(s).
3. Remove the upper control arm (UCA)-to-spindle fastener.
4. Remove the fastener securing the lower control arm (LCA) to the spindle. Note the orientation of the fastener and nut.
5. Remove the tie rod from the spindle, by removing the nut and bolt.

Spindle Assembly

1. Assembly is the reverse order of disassembly. Reference the front suspension assembly illustration for fastener torque values.

Spherical Bearing Replacement

1. Remove the fastener securing the lower control arm (LCA) to the spindle.
2. Remove the lower shock fastener.
3. Remove the fasteners securing the LCA to the bulkhead.
4. Remove the snap ring, then, using a press, press the spherical bearing out of the LCA.
5. Press in a new bearing, then install the snap ring.
6. Assemble the LCA into the spindle, and shock into LCA. Reference front suspension assembly illustration for fastener torque values.

Upper / Lower Control Arm Removal

1. Remove the fastener securing the control arm being removed from the spindle. Remove the lower shock fastener.
2. Remove the fasteners securing the control arm to the bulkhead.
3. Remove the control arm, pivot bushings, and pivot shafts.

Upper / Lower Control Arm Installation

1. Replace the upper or lower control arm bushings in the control arm(s).
2. Replace the upper or lower control arm(s) into the bulkhead.
3. Reference the front suspension illustration for the appropriate fastener torque.

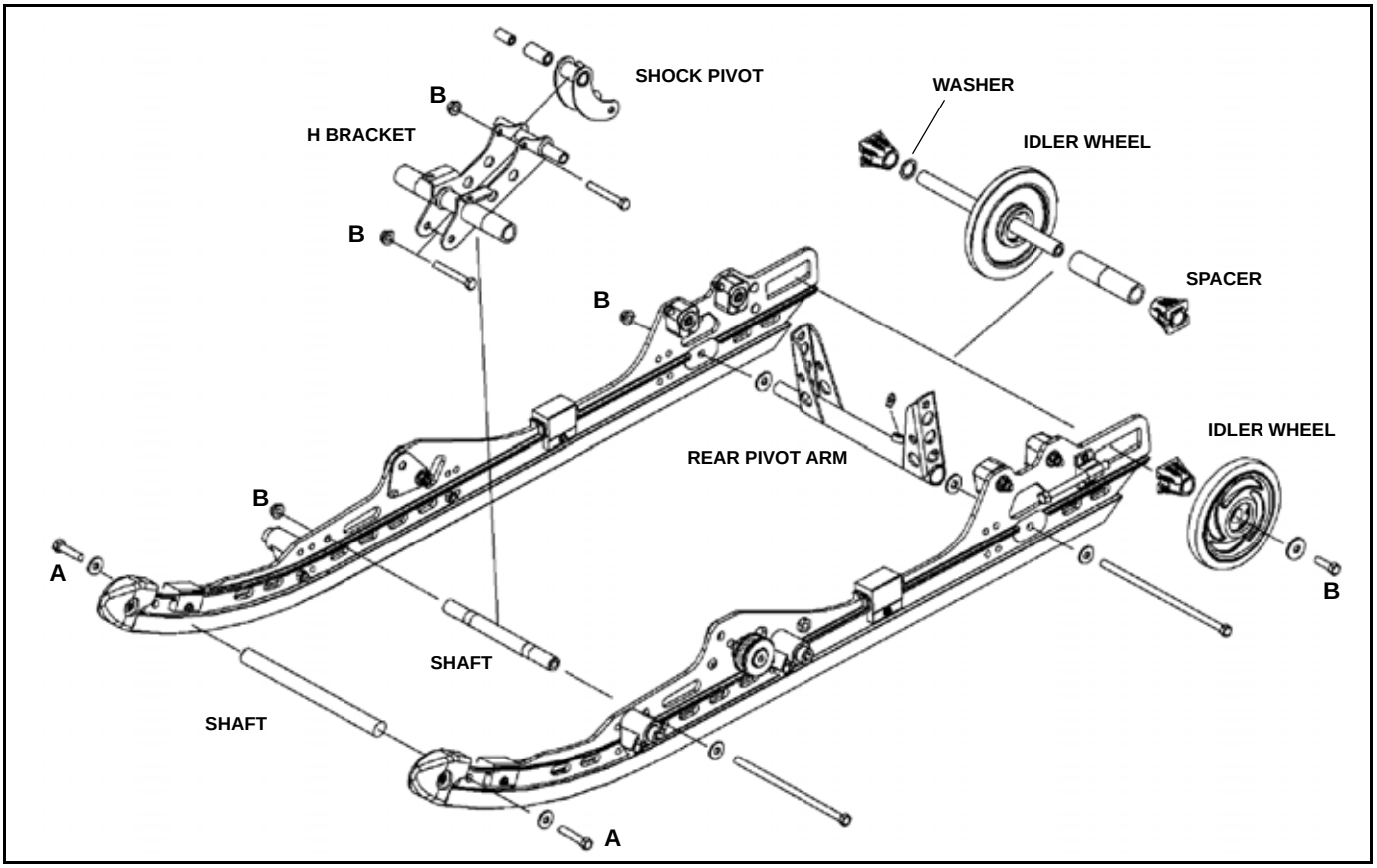
NOTE: There is a washer located on the rearward lower control arm mounting at the bolt head.

NOTES

CHAPTER 10
Rear Suspension

ASSEMBLY ILLUSTRATIONS

IQ 121 Pivots / Rear Idler

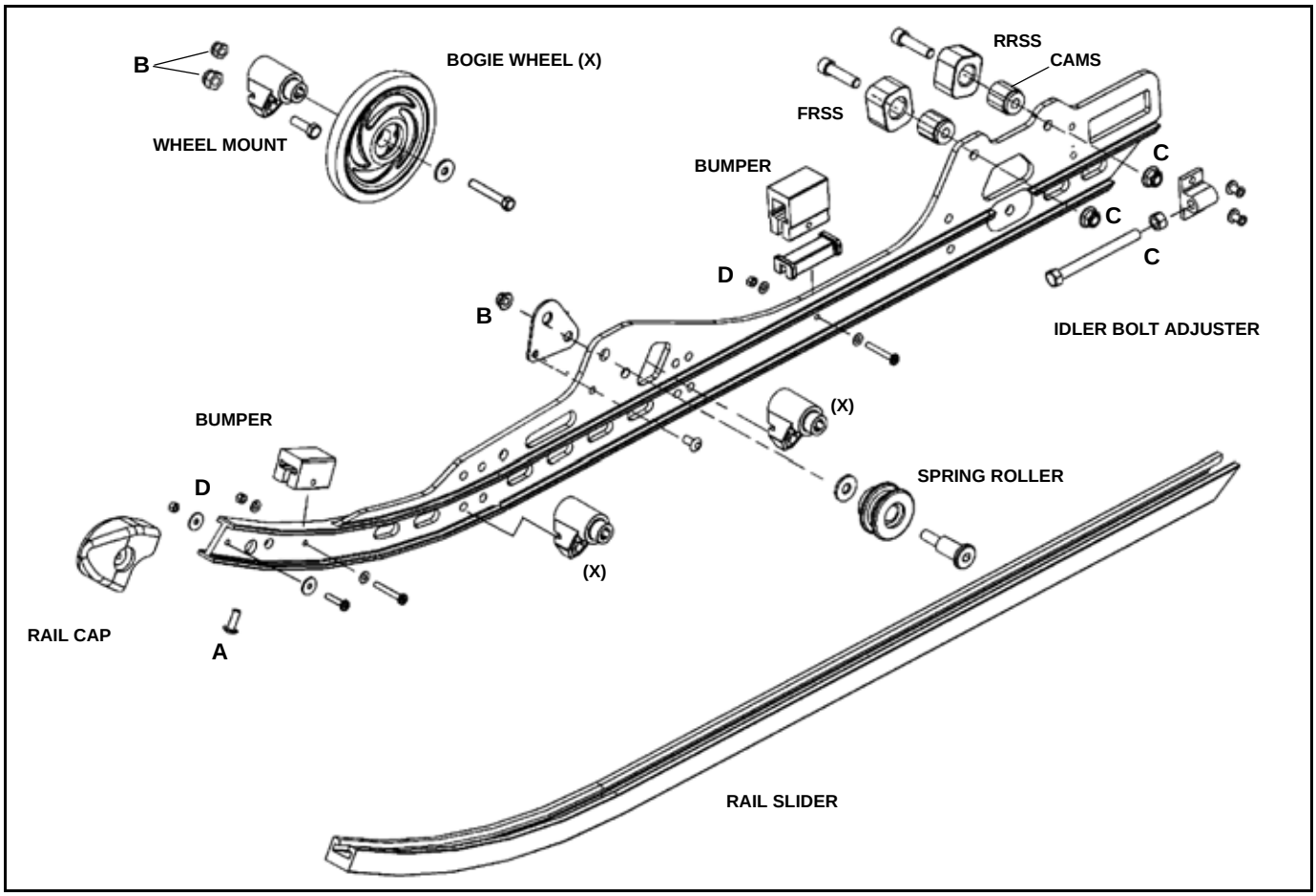


= T
A = 45 Ft.Lb. (61 Nm) B = 35 Ft.Lb. (47 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

IQ 121 Rail Assembly



= T
A = 3 - 6 Ft.Lb. (4 - 8 Nm) B = 19 Ft.Lb. (26 Nm) C = 35 Ft.Lb. (47 Nm) D = 35 In.Lb. (.2 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

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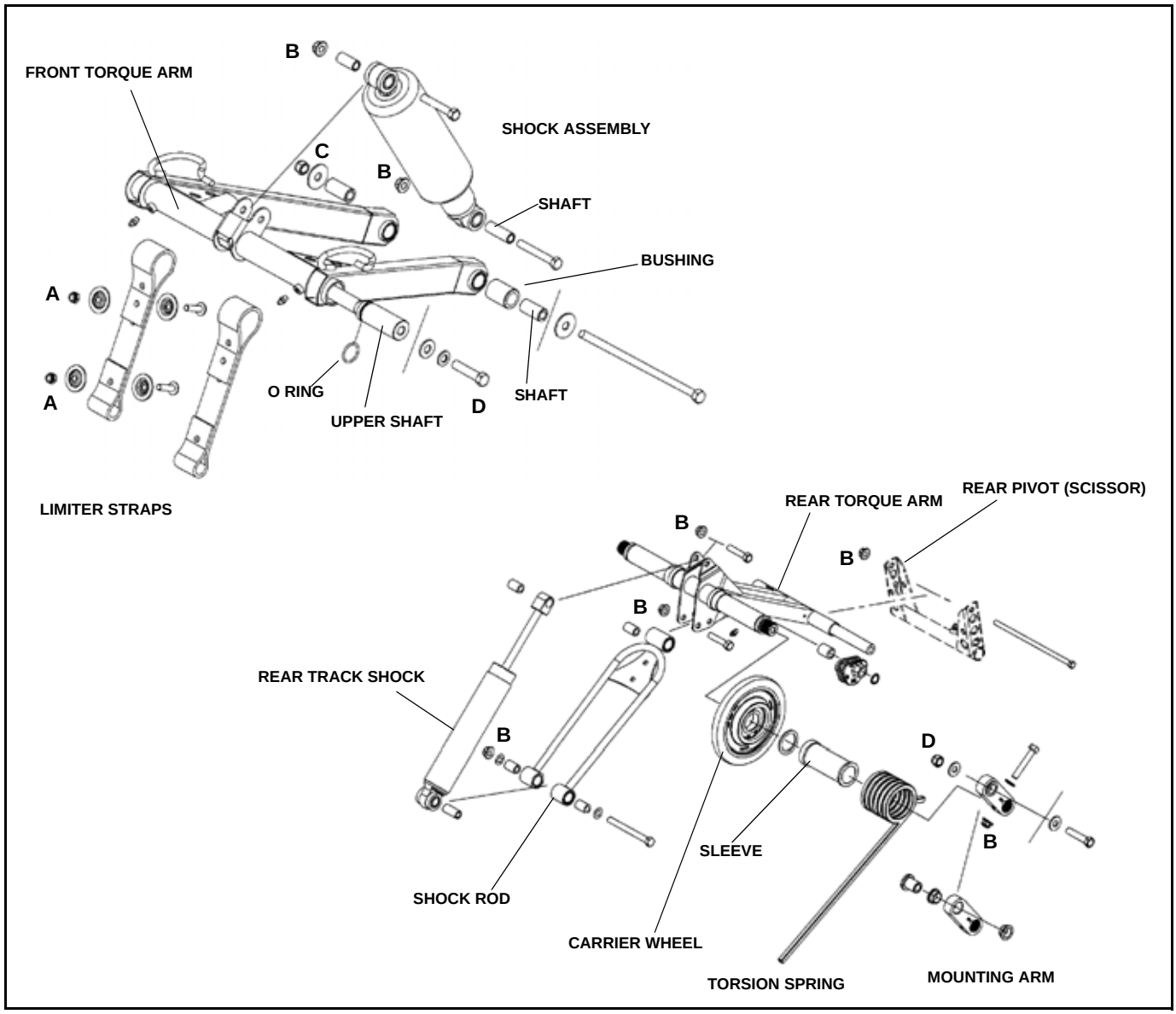
IQ 121 Front / Rear Torque Arms



= T
A = 12 Ft.Lb. (16 Nm) B = 35 Ft.Lb. (47 Nm) C = 45 Ft.Lb. (61 Nm) D = 60 Ft.Lb. (81 Nm)

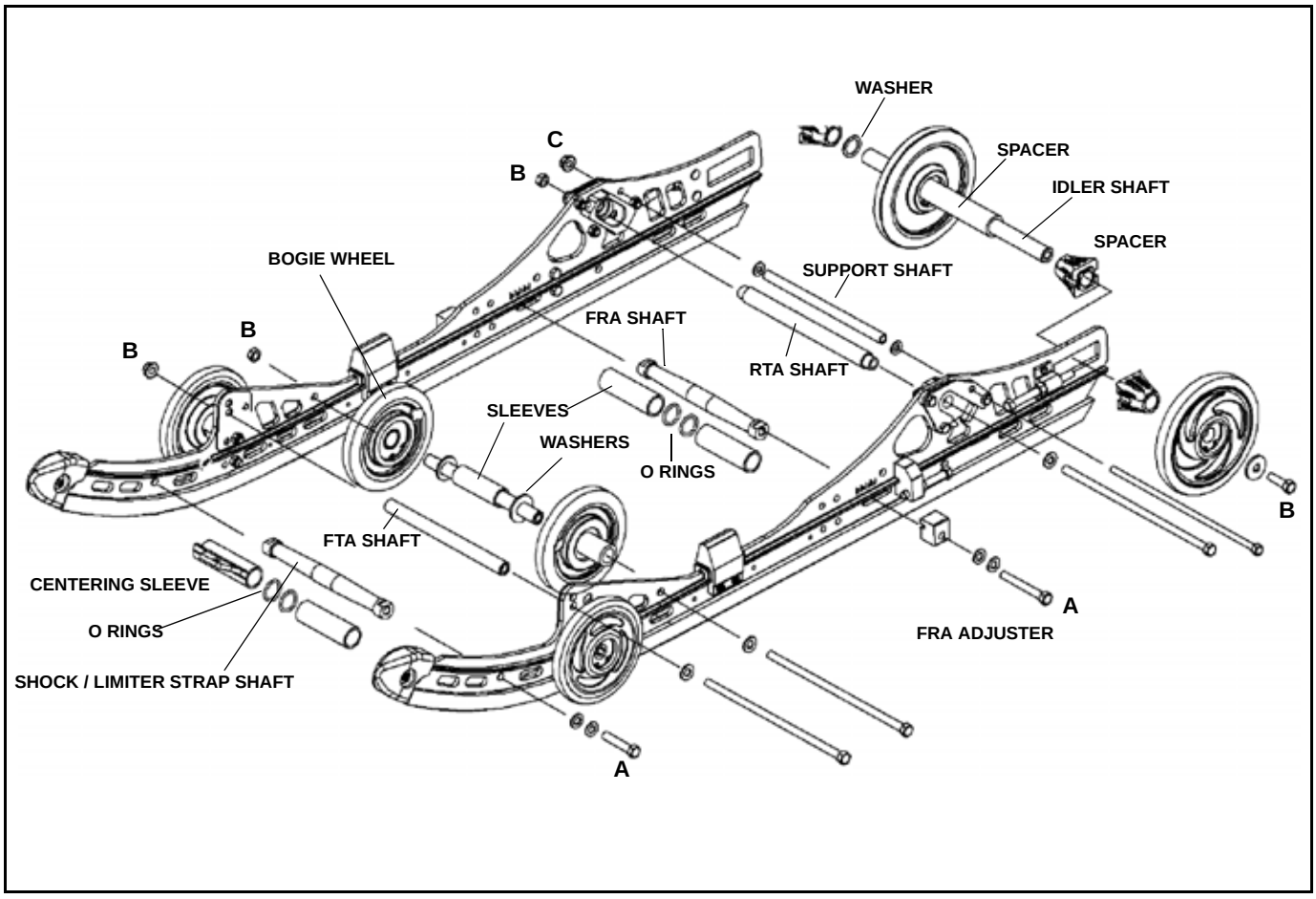
Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

⚠ CAUTION

The fasteners securing the rear suspension to the tunnel are pre-coated with a locking agent when new. Never re-use these fasteners when removed. Always use new pre-coated fasteners when mounting the suspension to the tunnel.

M-10 128 Pivots / Rear Idler

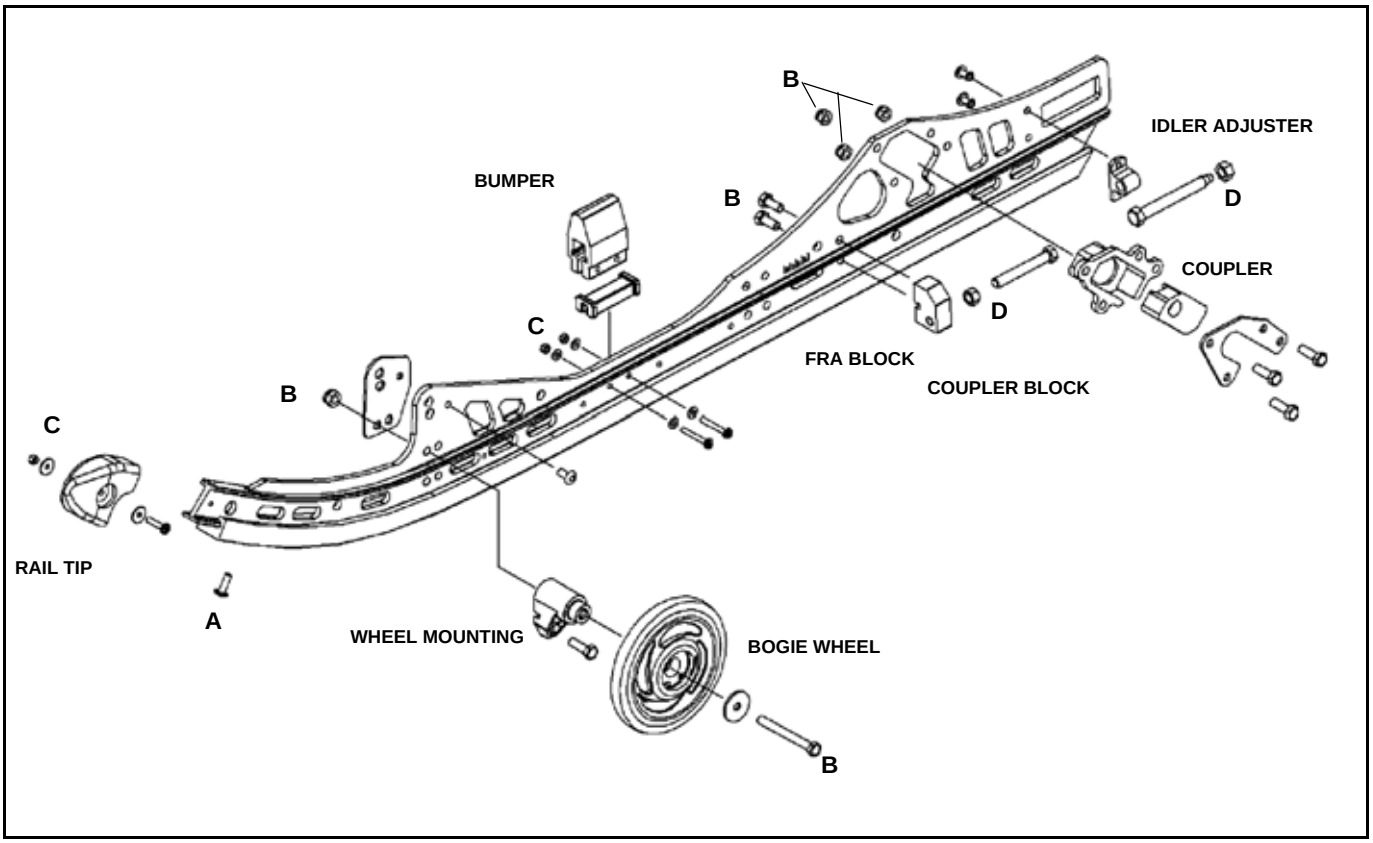


= T
A = 45 Ft.Lb. (61 Nm) B = 35 Ft.Lb. (47 Nm) C = 19 Ft.Lb. (26 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

M-10 128 Rail

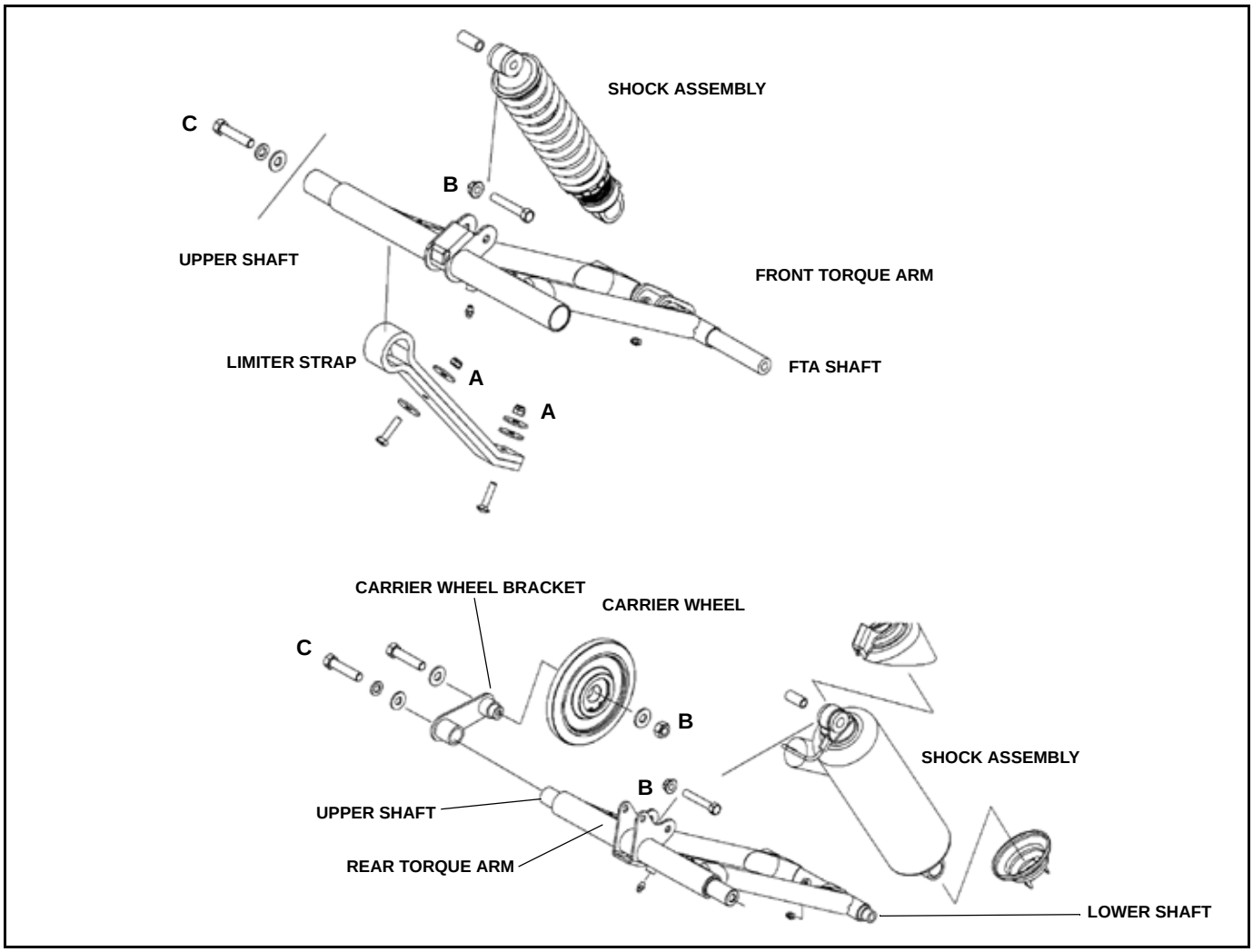


= T
A = 3 - 6 Ft.Lb. (4 - 8 Nm) B = 19 Ft.Lb. (26 Nm) C = 35 In.Lb. (.2 Nm) D = 35 Ft.Lb. (47 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

M-10 128 Front / Rear Torque Arms



= T
A = 12 Ft.Lb. (16 Nm) B = 35 Ft.Lb. (47 Nm) C = 70 Ft.Lb. (94 Nm)

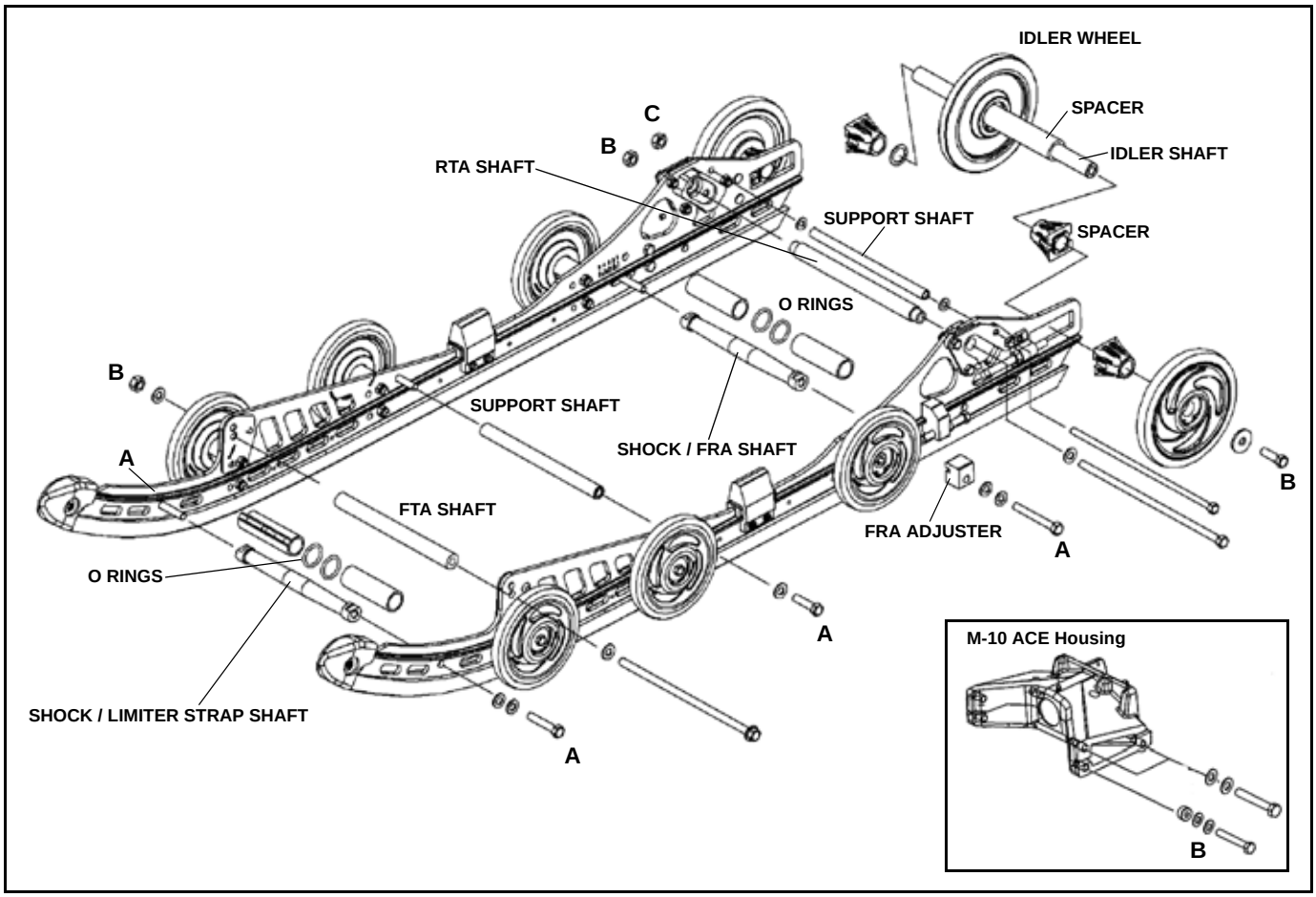
Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

⚠ CAUTION

The fasteners securing the rear suspension to the tunnel are pre-coated with a locking agent when new. Never re-use these fasteners when removed. Always use new pre-coated fasteners when mounting the suspension to the tunnel.

M-10 136 Pivots / Rear Idler

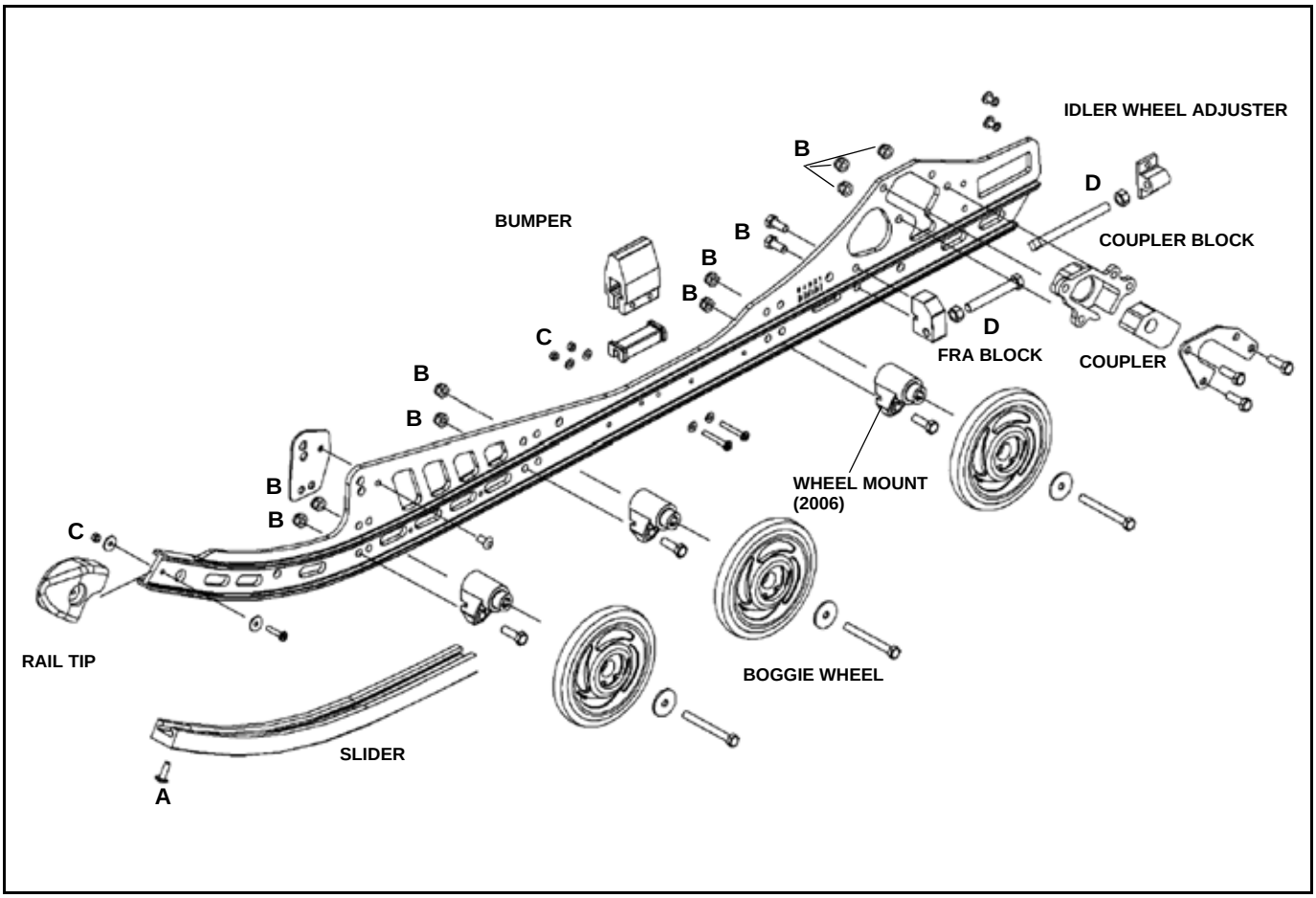


= T
A = 45 Ft.Lb. (61 Nm). B = 35 Ft.Lb. (47 Nm) C = 19 Ft.Lb. (26 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

M-10 136 Rail

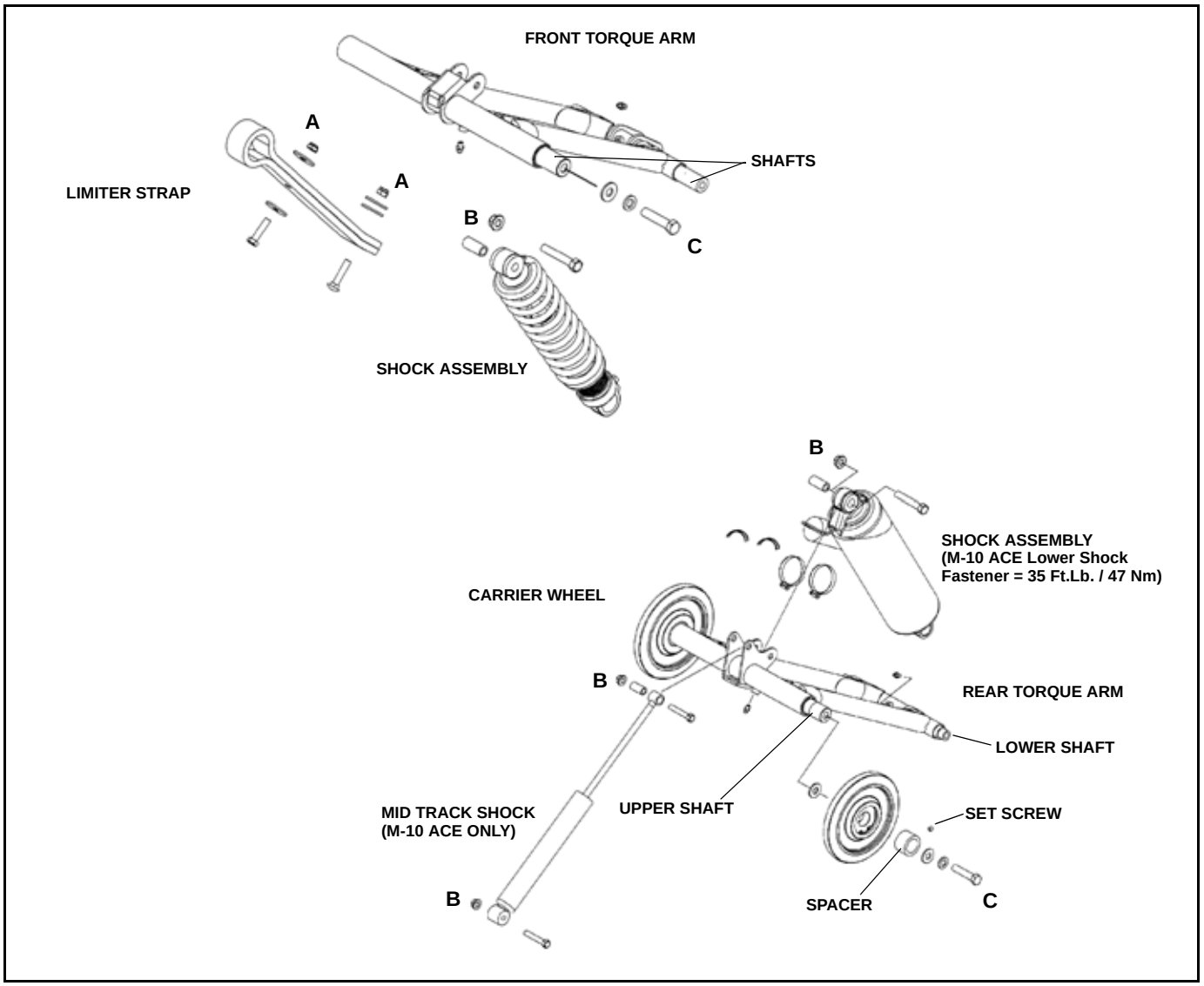


= T
A = 3 - 6 Ft.Lb. (4 - 8 Nm) B = 19 Ft.Lb. (26 Nm) C = 35 In.Lb. (.2 Nm) D = 35 Ft.Lb. (47 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

M-10 136 Front / Rear Torque Arms



= T
A = 12 Ft.Lb. (16 Nm) B = 35 Ft.Lb. (47 Nm) C = 70 Ft.Lb. (94 Nm)

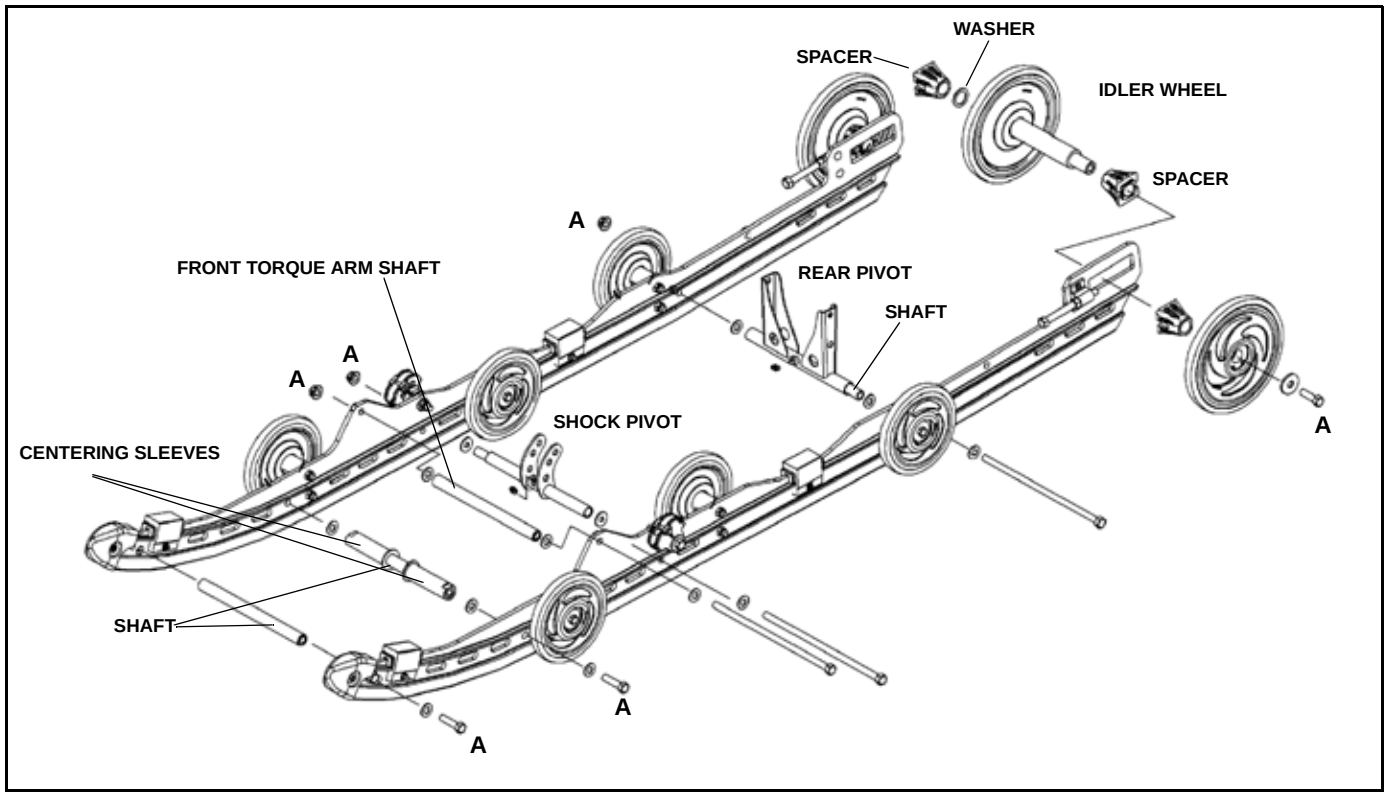
Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

⚠ CAUTION

The fasteners securing the rear suspension to the tunnel are pre-coated with a locking agent when new. Never re-use these fasteners when removed. Always use new pre-coated fasteners when mounting the suspension to the tunnel.

IQ Switchback Pivots / Rear Idler

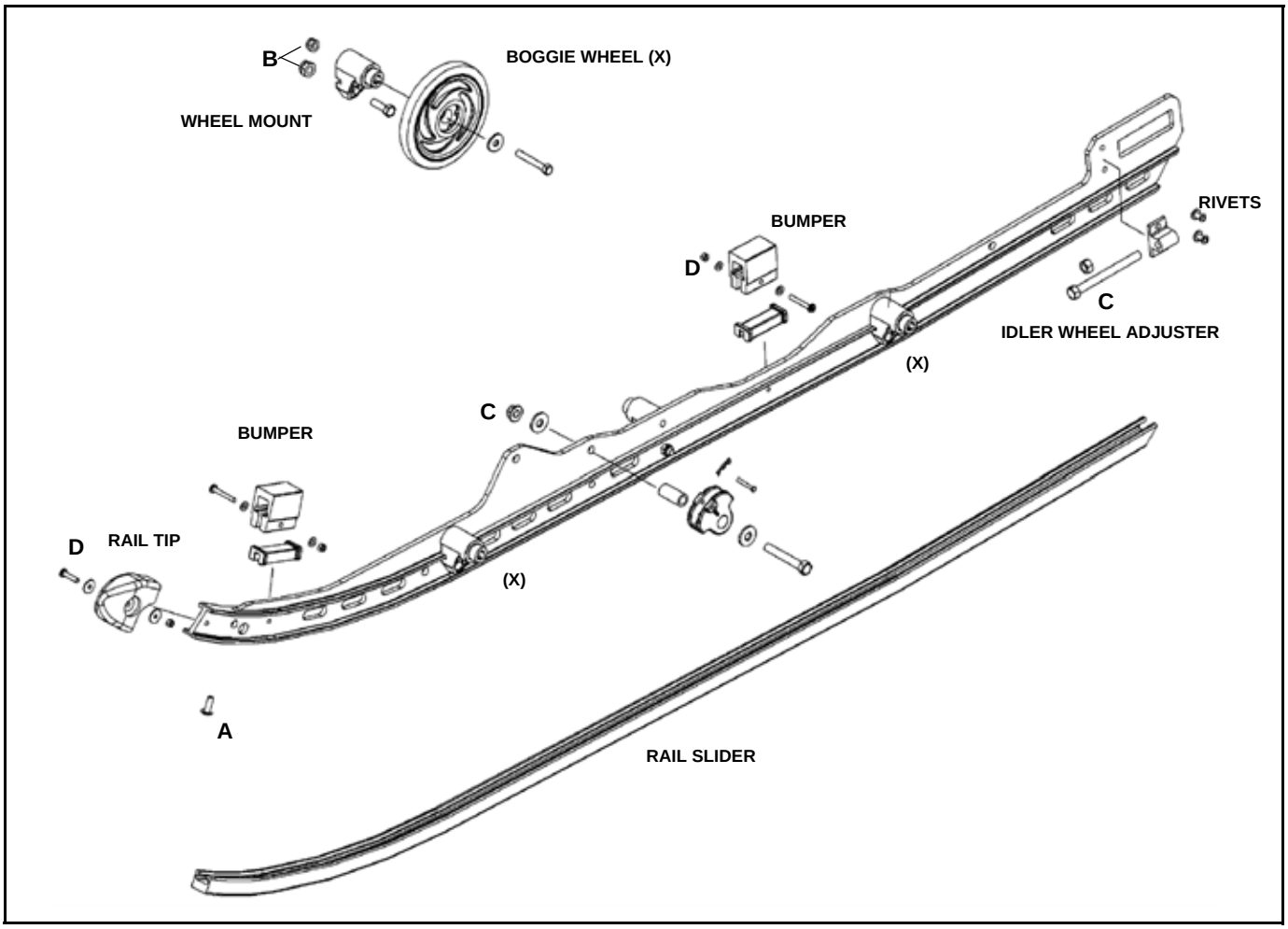


= T
A = 35 Ft.Lb. (47 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

IQ Switchback Rail Assembly

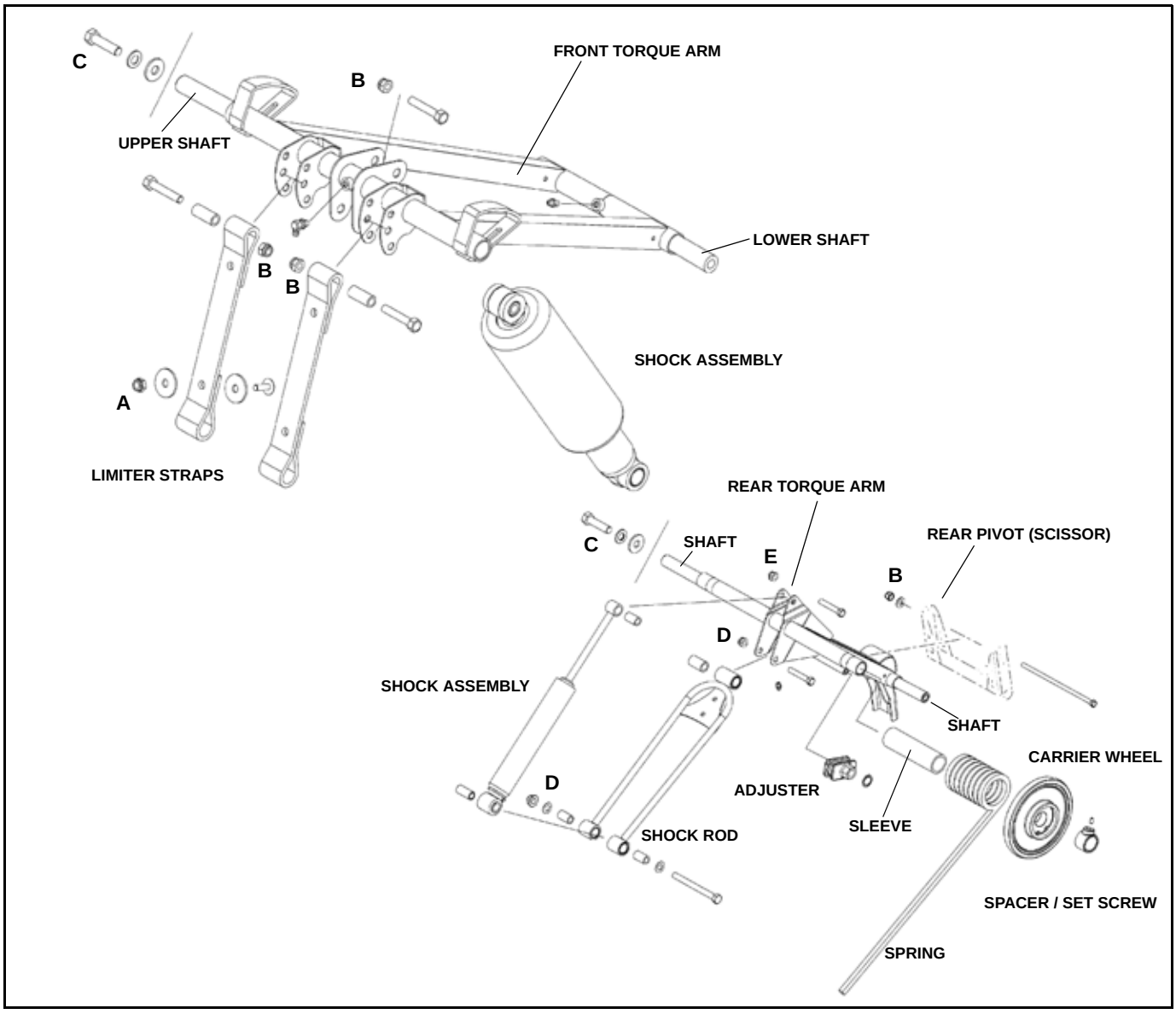


= T
A = 3 - 6 Ft.Lb. (4 - 8 Nm) B = 19 Ft.Lb. (26 Nm) C = 35 Ft.Lb. (47 Nm) D = 35 In.Lb. (.2 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

IQ Switchback Front / Rear Torque Arms



= T
A = 12 Ft.Lb. (16 Nm) B = 19 Ft.Lb. (26 Nm) C = 45 Ft.Lb. (61 Nm) D = 35 Ft.Lb. (47 Nm) E = 25 Ft.Lb. (34 Nm)

Assembly Notes

- Never re-use Nylock nuts. Always replace with new parts.
- All pivots must rotate freely after tightening fasteners.
- Apply Polaris Premium All Season Grease to all grease zerks as outlined in the periodic maintenance table.

⚠ CAUTION

The fasteners securing the rear suspension to the tunnel are pre-coated with a locking agent when new. Never re-use these fasteners when removed. Always use new pre-coated fasteners when mounting the suspension to the tunnel.

REAR SUSPENSION OPERATION

Operation

The primary function of the rear suspension is to provide a comfortable ride in all types of riding conditions. It separates the rider from the ground, while allowing for complete vehicle control. The rear suspension also must provide weight transfer and maintain track tension.

Rear suspensions have many adjustable features for fine tuning to achieve optimum comfort. The suspension can be adjusted to suit rider preference and deliver excellent performance for a given set of conditions. However, suspension adjustments involve compromises or trade offs. A rear suspension set up to perform well in moguls would not suit the preference of a groomed trail rider.

Weight Transfer

The shifting of weight from the skis to the track is called weight transfer. As engine torque is applied to the drive axle, the torque is transferred to the track, pulling it forward. This energy also tries to pull the suspension forward. The front torque arm reacts to this force by pushing down on the front of the track, in effect applying more weight to the front of the track and reducing the weight on the skis. It is important to note that energy used to lift the front of the machine is not available to push the vehicle forward.

Changing the angle of the front torque arm changes the suspension's reaction to the force. Adjusting the length of the limiter strap will change the front torque arm angle. Shortening the strap limits the extension of the front of the suspension; reducing the angle of the torque arm and increasing ski pressure during acceleration. Lengthening the strap allows the front of the suspension to extend further; increasing the angle of the torque arm and decreasing ski pressure during acceleration. Limiter strap adjustment has a great affect on weight transfer. Limiter straps only affect acceleration. It is important to check track tension whenever limiter strap length is changed.

Front track shock spring preload also affects weight transfer. A stiffer spring and/or more preload on the spring transfers more weight to the track. A softer spring and/or less preload keeps more weight on the skis. Keep your riding application in mind when choosing springs and setting spring preload. Soft springs/preload will increase ski pressure, but may bottom out. Stiff springs/preload will provide more track pressure (reduced ski pressure), but may result in a less comfortable ride

During acceleration, the rear of the suspension will compress and the IFS will extend, pivoting the machine about the front torque arm. Because of this pivoting effect, rear spring and spring preload also have some effect on weight transfer. Softer rear springs, or less preload, allow more weight transfer to the track and reduce ski pressure. Stiffer rear springs, or increased preload, allow less weight transfer to the track and increase ski pressure. The main function of the rear torque arm is to support the weight of the vehicle and rider, as well as to provide enough travel to absorb bumps and jumps.

Shock valving also has an effect on weight transfer. Refer to shock tuning information in this chapter. Scissor stops also affect weight transfer. See scissor stop information also in this chapter.

Coupling

On all Polaris snowmobile rear suspensions, there are two torque arms that control the movement of the rail beam. Prior to the advent of suspension coupling, these torque arms could move independently of each other. Rear suspension coupling links the movement of the front and rear torque arms to each other.

The front rear scissor stop (FRSS) couples the movement of the front torque arm with the rear torque arm and limits the amount of independence between the movement of the front torque arm and the rear torque arm.

When hitting a bump, the front torque arm starts to compress. The FRSS links that movement to the rear torque arm, causing it to compress and raise the rear suspension up as one, allowing the suspension to hit the bump only once and eliminating kickback. The factory setting are usually adequate for all riders in all conditions.

The rear-rear scissor stop (RRSS) couples the movement of the rear torque arm with the front torque arm and limits the amount of independent movement between the rear torque arm and the front torque arm.

Adjusting the RRSS to a lower setting allows more weight to transfer to the rear for more traction.

Adjusting the RRSS to a higher position will reduce weight transfer, improve chatter bump ride and improve cornering performance.

Torsion Spring Adjustment

Torsion spring adjustments are made by rotating the eccentric spring block. The block provides three spring tension positions.

Torsion springs are much like coil springs, although shaped differently. The rate of the torsion spring is controlled by the wire diameter of the spring, and the number of coils. Pre-load is controlled by the free opening angle.

REAR SUSPENSION ADJUSTMENTS AND SETTINGS

Adjustment Procedures

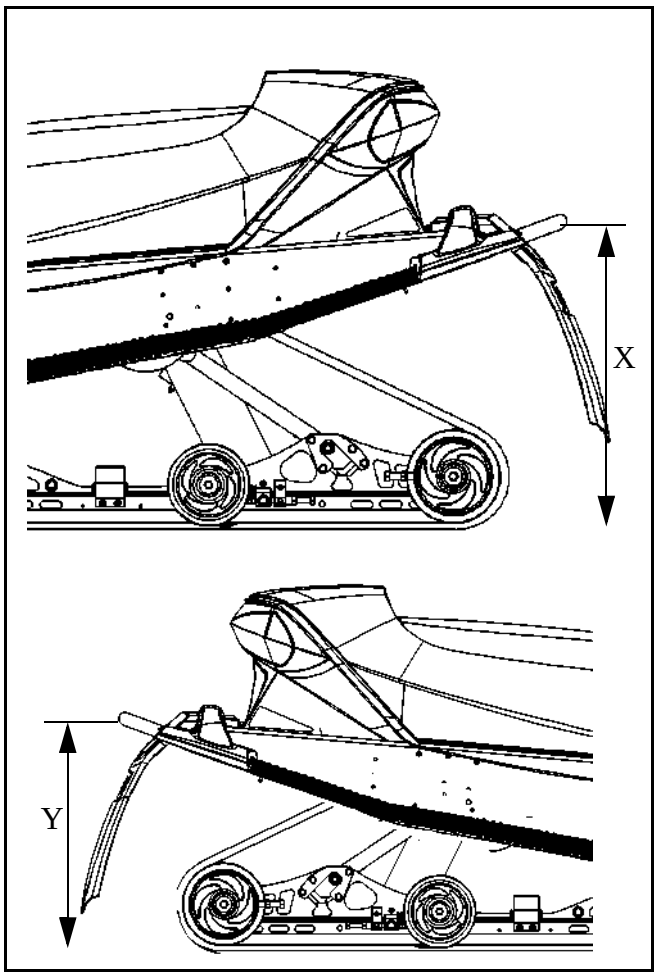
NOTE: Break-in the suspension for at least 150 miles (240 km) before making adjustments.

All settings will vary from rider to rider, and are dependant on rider weight, vehicle speed, riding style, and trail conditions. Always start with the factory settings. Make individual adjustments to suit rider preference. The machine should be methodically tested under the same conditions after each adjustment (trail and snow conditions, vehicle speed, riding position, etc.) until a satisfactory ride is achieved. Adjustments should be made to one area at a time, in order to properly evaluate the change.

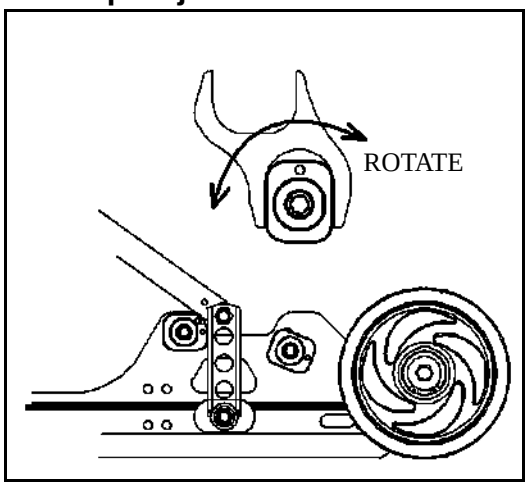
Rear Suspension Ride Height

1. To set up the rear suspension torsion spring preload, measure the distance between the ground and rear bumper with out the rider on the seat and the suspension at full extension. This can be achieved by lifting the rear of the machine so that the suspension is off the ground and carefully setting the machine down. Write this down as measurement “X”.
2. Have the rider in full gear drop down on the seat, work the suspension slightly by bouncing up and down and sit in the seated riding position. With the rider in the seated position measure from the ground to the bumper in the same spot as you did for measurement “X” and write it down as measurement “Y”.
3. To determine the correct ride height, subtract measurement X from measurement Y. (X - Y = ride height).
4. The ideal ride height is:
   - IQ 121 = 4-5”(10-13cm)
   - IQ RMK / Switchback = 5” (13cm)
   - IQ M-10 = 3-4” (8-10cm)
5. Adjust for the desired ride height by rotating the torsion spring cams located on the rear of the torsion spring.

If the rear suspension ride height cannot be adjusted to the correct dimension, optional torsion springs may be required. This is only an initial setup, and final spring preload may vary based on rider preference and riding conditions.



Scissor Stop Adjustment



The front rear scissor stop (FRSS) controls the bump attitude of the rear suspension. As the front torque arm (FTA) hits the bump, it forces the rear scissor to collapse a predetermined amount, depending on the FRSS block position.

This accomplishes two important things. First, it allows a lighter spring rate on the FTA because it can borrow spring rate from the

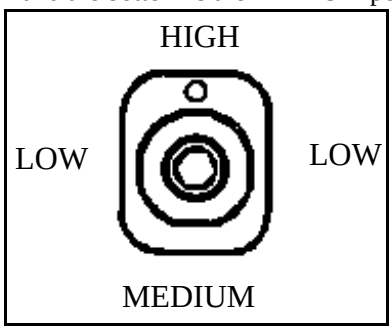
rear torsion springs. Second, it prepares the rear portion of the suspension for the bump, reducing secondary kick back.

The FRSS is made of a resilient material allowing smooth action and preventing any suspension component damage.

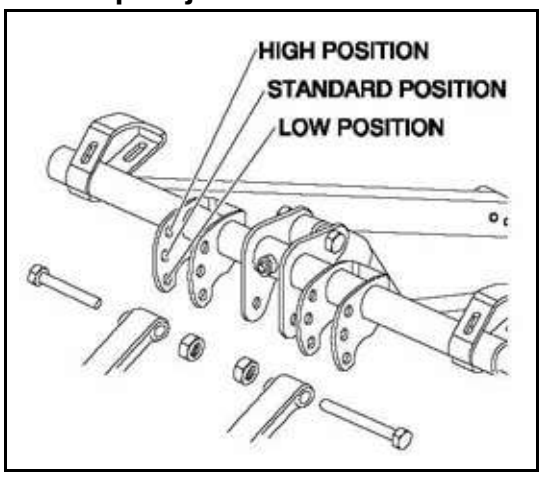
The RRSS controls weight transfer from the rear suspension to the skis. It also influences the stiffness of the ride by controlling the amount of coupling action between the front and rear torque arms. To decrease weight transfer, the RRSS should be set in the high position.

The RRSS can be removed for maximum weight transfer. However, unless the torsion springs and rear shock valving are changed, the ride will be compromised. Always maintain equal adjustment on both sides.

The dot is an indicator of the HIGH position. The sides are the LOW position and the bottom is the MEDIUM position.



Limiter Strap Adjustment



One method of changing ski-to-snow pressure is to change the length of the front limiter straps.

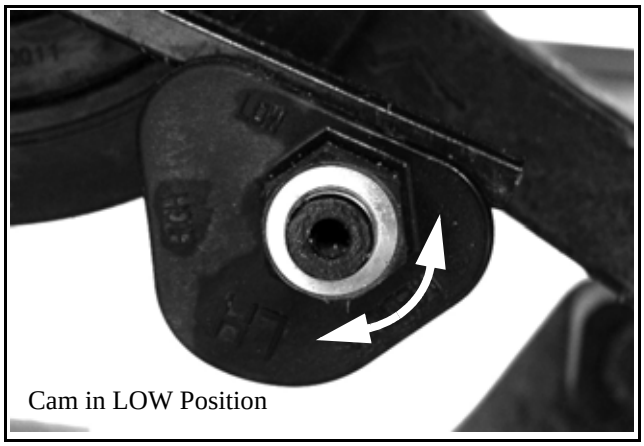
- Lengthening the straps decreases ski pressure under acceleration.
- Shortening the straps increases ski pressure under acceleration.

Set up Recommendations for Optimum Performance (RMK / Switchback Rear Suspensions)

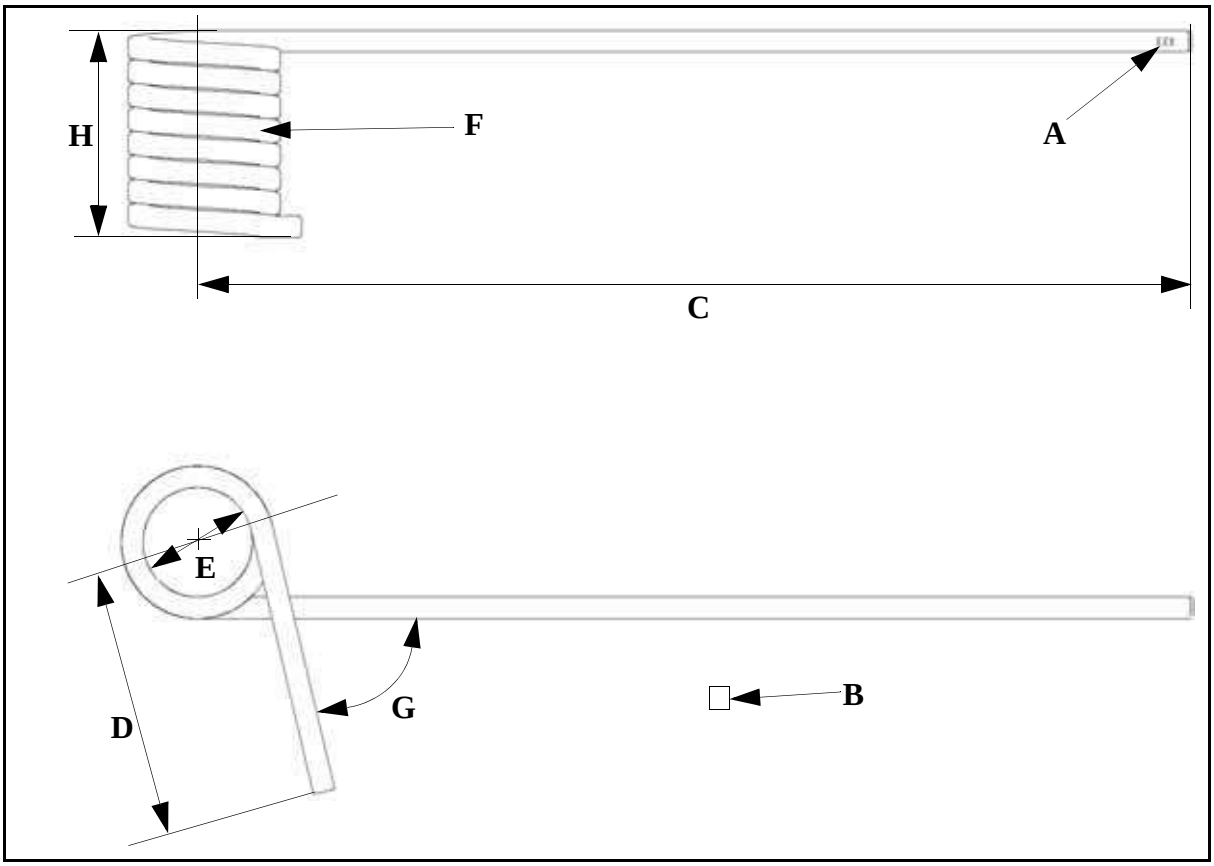
- DEEP POWDER SNOW: Limiter strap in LOW position for maximum lift and flotation
- POWDER-HARDPACK: Limiter strap in STANDARD position for overall handling and speed over snow.
- HARDPACK: Limiter strap in HIGH position for increased control and less transfer.

Torsion Spring Adjustment

To adjust the rear torsion spring, rotate the adjuster cam to the desired adjustment. The cam has three sides, LOW, MEDIUM and HIGH.


Cam in LOW Position

TORSION SPRINGS



The torsion spring tension is determined by the following factors.

1. Wire Diameter (B).
2. Number of coils (F).
3. Degree of the open angle (G).

Square Torsion Springs

SPRING PN (last 3 digits (A) add -067 for color	WIRE DIAMETER inches (B)	LEG 1 inches (C)	LEG 2 inches (D)	COIL ID inches (E)	# OF COILS inches (F)	DEGREES OPEN ANGLE (G)	SPRING WIDTH inches (H)
7042068 LH 7042069 RH	.359	16.5	4.5	1.95-2.01	8.64	47	3.75
7041911 LH 7041912 RH	.347	16.5	4.5	1.82-1.88	7.75	90	3.49
7041627 LH 7041628 RH	.347	16.5	4.5	1.82-1.88	7.71	77	3.45
7042064 LH 7042065 RH	.359	16.5	4.5	1.95-2.01	7.63	50	3.45
7042159 LH 7042160 RH	.347	15.625	3.75	1.89-1.91	6.71	77	3.45
7041902 LH 7041903 RH	.359	16.5	4.5	1.79-1.85	7.75	90	3.5
7041629 LH 7041630 RH	.359	16.5	4.5	1.79-1.85	7.71	77	3.46
7041856 LH 7041857 RH	.359	16.5	4.5	1.79-1.85	7.71	85	3.46

Square Torsion Springs

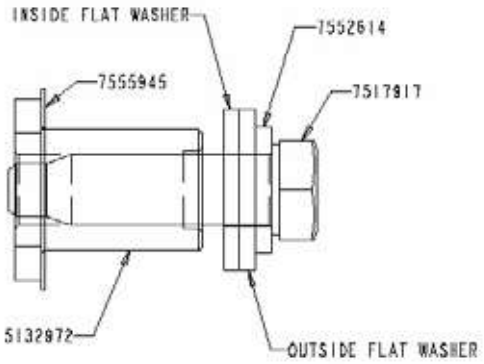
SPRING PN (last 3 digits (A) add -067 for color	WIRE DIAMETER inches (B)	LEG 1 inches (C)	LEG 2 inches (D)	COIL ID inches (E)	# OF COILS inches (F)	DEGREES OPEN ANGLE (G)	SPRING WIDTH inches (H)
7042079 LH 7042080 RH	.375	16.5	4.5	1.98	8.64	47	3.94
7042101 LH 7042102 RH	.347	15.625	3.75	1.69-1.71	6.71	77	3.45
7042139 LH 7042140 RH	.375	17.7	4	2.35	6.71	77	3.1
7042157 LH 7042158 RH	.359	15.625	3.75	1.82-1.84	6.71	77	3.46
7041631 LH 7041632 RH	.375	16.5	4.5	1.86-1.92	7.71	77	3.74
7041942 LH 7041943 RH	.375	16.5	4.5	2.225	6.71	77	3.52
7041895 LH 7041896 RH	.375	16.5	4.5	2.225	6.71	90	3.52
7042240 LH 7042241 RH	.405	17.7	4	2.35	6.71	77	3.25
7041655 LH 7041656 RH	.405	16.5	4.5	1.86-1.92	7.71	77	4
7041897 LH 7041898 RH	.405	16.5	4.5	2.225	6.75	90	3.55
7041940 LH 7041941 RH	.405	16.5	4.5	2.232	6.71	77	3.55
7043070 LH 7043071 RH	.347	14.75	4.5	1.80-1.84	6.72	80	3.20
7042157 LH 7042158 RH	.359	15.625	3.75	1.82-1.84	6.71	77	3.46
7042242 LH 7042243 RH	.359	17.70	3.25	2.35	6.71	77	3.1
7042253 LH 7042254 RH	.359	14.63	4.5	1.88-1.90	6.75	90	3.00
7042282 LH 7042283 RH	.421	17.70	4	2.45	6.71	71	3.4
7042321 LH 7042322 RH	.347	13.63	4.5	2.16-2.20	5.72	80	2.54
7043042 LH 7043043 RH	.347	14.75	4.5	1.80-1.82	6.72	80	3.2
7043079 LH 7043080 RH	.359	14.75	4.5	1.80-1.84	6.72	80	3.1
7043124 LH 7043125 RH	.405	17.70	4	2.35	6.71	77	3.44
7043128 LH 7043129 RH	.405	14.75	4.5	2.5	6.72	80	3.40
7043130 RH 7043131 LH	.359	14.75	4.5	2.5	5.72	80	3.75

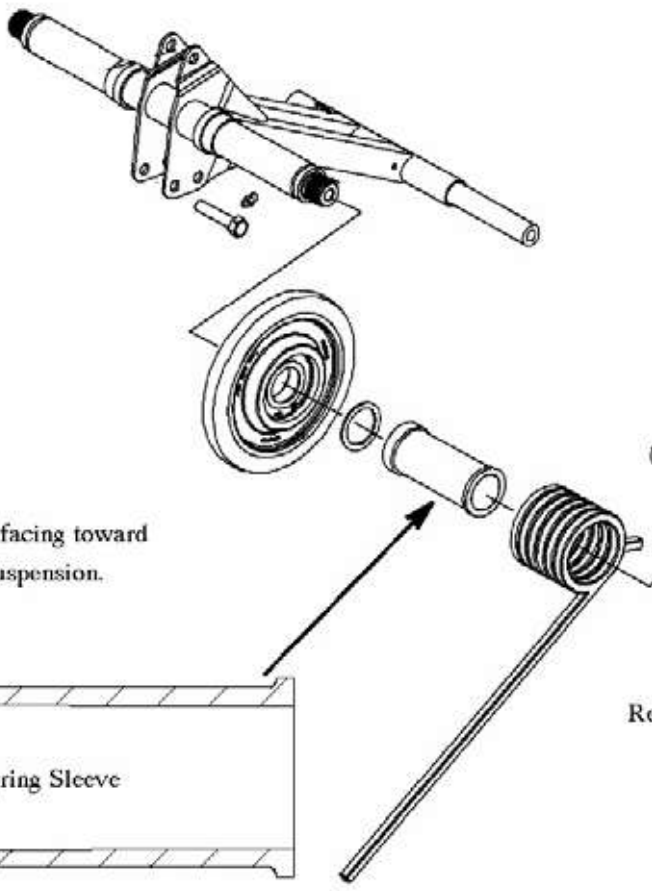
IQ 121 Heavy Torsion Spring Installation

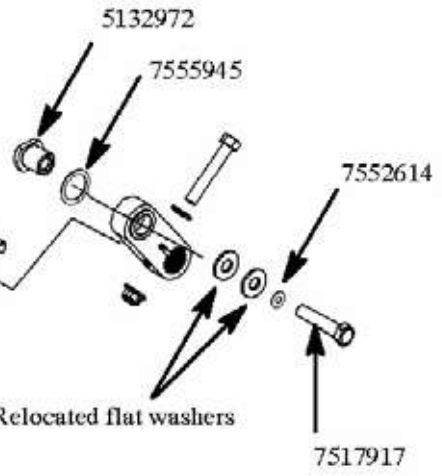
Please reference the following information when installing heavy torsion springs on IQ sleds. The issue that arises when installing the heavy spring on a Fusion sled is that the coil stack of the torsion spring is wide enough to interfere with the suspension arm clamp nut. To work around this issue you will need to order two (one for each side) of the following parts. Relocate the two washers that are next to the clamp nut to the outside of the link arm.

Parts Needed:

QUANT.	DESCRIPTION	PART NUMBER
2	SHAFT ARM	5132972
2	SCREW	7517917
2	THRUST WASHER	7555945
2	LOCK WASHER	7552614







Torsion spring sleeve
NOTE: Install so that the larger step is facing toward the center of the suspension

M-10 SUSPENSION

M-10 OVERVIEW

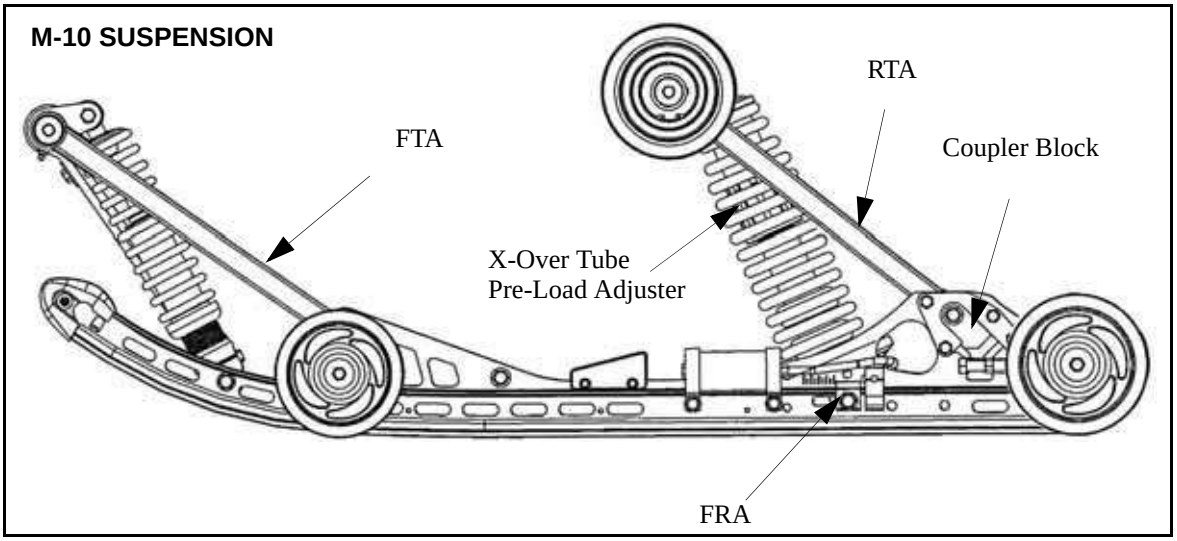
The FAST M-10 rear suspension has been designed and set up to deliver a soft ride under average riding conditions. Rider weight, riding styles, trail conditions, and vehicle speed each affect suspension action.

The suspension can be adjusted to suit rider preference and deliver excellent performance for a given set of conditions. It should be noted, however, that suspension adjustments involve a compromise or trade off. A machine set up to perform well in the moguls would not suit the preference of a groomed trail rider.

M-10 ADJUSTMENTS

- Full Range Adjuster (FRA)
- Center Retainer

IMPORTANT: The M-10 rear suspension has been designed to be very sensitive to rider weight. Changes in rider weight of 25 lbs. or more may require appropriate changes in FRA settings.



M-10 TERMINOLOGY

- **Couple Blocks:** Plastic blocks located at the rear of each rail. Blocks facilitate the couple function.
- **Full Range Adjuster (FRA):** FRA refers to the adjustable lower rear shock attachments. Changing the FRA location has two effects on tuning. First, moving the shock forward increases shock speed, resulting in firmer damping on compression and rebound. Second, it also increases the effect of the rear spring by displacing it further.
- **Sag Settings:** The difference in rear bumper height from the sleds fully extended position to its lower height with the rider seated on the sled.

M-10 ADJUSTMENTS

The primary adjustment on the M-10 suspension is the Full Range Adjustment (FRA). Adjusting the FRA will have the MOST effect on rear suspension performance.

Polaris recommends that you allow between 25 to 200 miles for the suspension to break in before performing any adjustments to the suspension.

This chart is a guideline to be used for initial suspension setups. Your setup may vary based on your desired riding style.

M-10 128

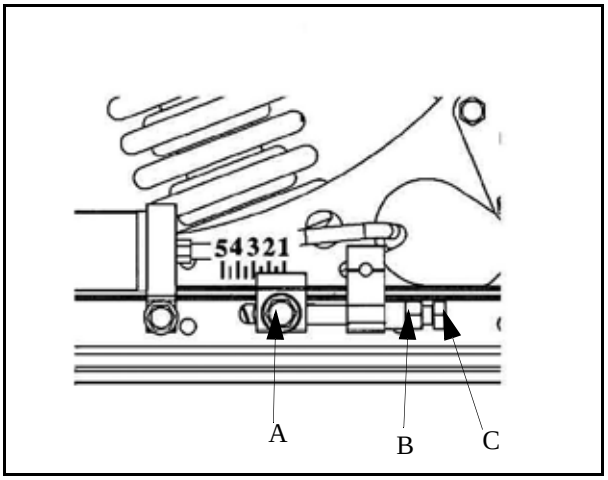
Rider weight with gear (lbs.)	Suggested FRA Range (Lower number is softer)
Under 100	1 to 1 1/2
100-150	1 1/2 to 2
150-200	2 to 2 1/2
200-250	2 1/2 to 3
250-300	3 to 3 1/2
300-350*	3 1/2 to 4
Over 350*	4 to 5

M-10 136

Rider weight with gear (lbs.)	Suggested FRA Range (Lower number is softer)
Under 100*	1 to 1 1/2
100-150*	1 1/2 to 2
150-200*	2 to 2 1/2
200-250	2 1/2 to 3
250-300	3 to 3 1/2
300-350	3 1/2 to 4
Over 350	4 to 5

*=Optional rear track middle spring retainer available. See Optional Retainer Table

M-10 FRA INITIAL SET UP REFERENCE



Adjusting the FRA will have the MOST effect on the rear suspension performance. To adjust the FRA:.

1. Refer to the initial set-up reference chart (see Table and Table) to determine the desired FRA position.
2. To adjust, loosen the hex bolts (A) attaching the rear lower shock cross shaft to the rail beam.
3. Using a 9/16" wrench, loosen the jam nuts (B) on the preload bolts.
4. Adjust the preload bolts (C) to the desired FRA position.
5. Tighten the jam nuts.

NOTE: Make sure the preload bolt contacts the slide block before tightening the jam nut.

6. Tighten the hex bolts and torque to 35 ft. lbs. (47 Nm)

NOTE: When the M-10 suspension is new, it will take 25 to 200 miles (40-300 km) to properly break in the springs and shocks, at which time the suspension will be softer and may require FRA re-adjustment.

M-10 REAR SPRING PRELOAD

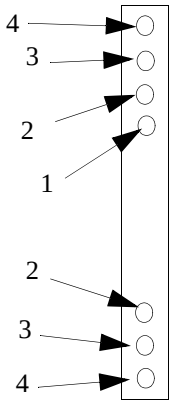
If FRA position alone does not allow the setup of the proper amount of sag, the center retainer of the rear track shock can be replaced with optional retainers to adjust the preload and change the sag.

Optional Retainers

Retainer insert Part Number	Retainer part Number	Preload	Sag
5436109	5135077 (std. on M10/128)	Least	Most
	5134923	Middle	Middle
	5135080 (std. on M10/136)	Most	Least

NOTE: Whenever ordering any of the retainers listed in the chart, always order the retainer insert as well. The insert is not removable once installed, so a new insert is needed when installing a new retainer.

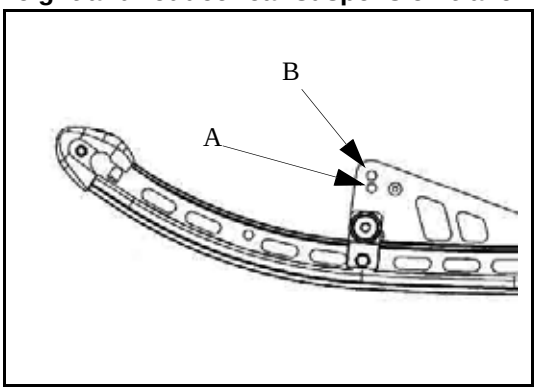
M-10 SKI PRESSURE



Ski pressure is set at the factory to deliver the optimum balance between ride and handling. If a rider prefers more ski pressure for improved steering performance, adjustments can be made to the front limiter strap and front arm mount.

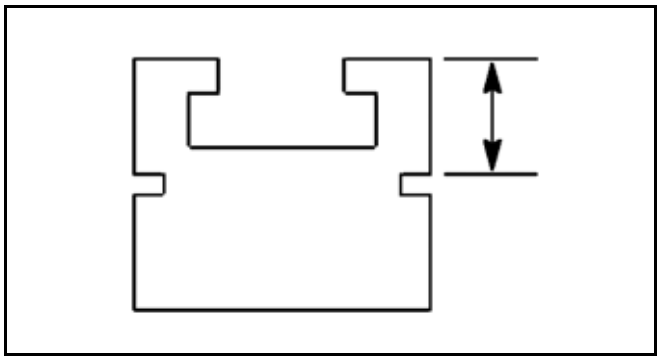
1. Determine if the rider prefers comfort or control. Lean toward the #4 setting for comfort and toward the #3 setting for aggressive riding.
2. For full hole adjustments, remove the 5/16" nut and flat washers from the lower attachments of the limiter straps and relocate the straps to the desired position (i.e. move from position 4 to 3). Replace the nut and washer. Tighten securely.
3. For half-hole increments (such as 3/4), the limiter straps have slots at the upper pinch bolt. These slots allow the bolts to be loosened (rather than removed) for half-step adjustments. Re-tighten the pinch bolts.
4. There are also two front arm mounting holes in the slide rail that can adjust ski pressure. The lower hole (A) increases ski pressure while the upper hole (B) decreases ski pressure.

NOTE: By design, the BIASED COUPLE design of the M-10 suspension displaces the rear arm as the front arm is compressed. This means that when you raise the front limiter strap, at some point you will collapse the rear suspension arm, which will affect SAG height and reduce rear suspension travel.



RAIL SLIDER

Wear Limit



Replace sliders when wear exceeds notch. If sliders look "wavy" in appearance, check and adjust track tension or consider adding more bogie wheels.

Removal

1. Remove the rear suspension.

NOTE: Some models may allow the rail sliders to be removed by sliding it through track windows with the suspension mounted in the machine.

2. Remove front rail slider retaining bolt, located at the rail tip.
3. Use a block of wood or a drift punch and hammer to drive the slider rearward off the slide rail.
4. With the rail slider at room temperature, install a new rail slider by reversing steps 1 - 3.

NOTE: Lightly coat rail slider track clip area with a lubricant such as LPS2 or WD-40 to ease installation.

Break-In

After installing new rail sliders they must be "broke in" for longer life and better wear patterns. When performing the breaking in procedure ride the sled on a surface that has adequate snow conditions with deeper snow nearby. Run the sled on the adequate snow surface and dip into the deeper snow every so often.

REAR SUSPENSION REMOVAL / INSTALLATION

Removal

1. Support the rear of the machine so that the track is off the floor.
2. Loosen the rear idler bolts, then push the rear idler shaft toward the front of the machine.
3. Carefully release the torsion spring pressure (if equipped).
4. Remove the support from the tunnel letting the suspension carry the weight of the machine.
5. Remove the fasteners securing the skid to the tunnel.
6. Place a protective mat on the floor and tip the unit over on the left side, supporting the sled on the end of the handlebar.
7. Collapse the torque arms, and remove the suspension from the tunnel.

Installation

⚠ CAUTION

Always use new fasteners when securing the torque arms to the tunnel.

1. With the unit on its left side, place the suspension in the tunnel.
2. Align the front and rear torque arms with the tunnel mounting holes. Loosely install two new fasteners.

NOTE: On IQ 121 and Switchback skids, verify the rear track shock pivot and brackets are rotated forward before attempting to collapse the rear torque arm.

3. Set the machine upright.
4. Install the remaining two new torque arm mounting fasteners.
5. Torque the rear suspension mounting bolts to specification.
6. Align the track guides/clips with the suspension rails.
7. Adjust the rear idler to achieve the correct amount of track sag.

SHOCK INFORMATION

Specifications

Rebuildable Front Track Shocks

SHOCK PN	BRAND	Extended Length (in)	Collapsed Length (in)	Stroke (in)	Shock Rod (in)	IFP Depth (in)	PSI
7043123	Fox	12.53	5.78	3.34	.49	1.250 b	300
7043142	Fox	12.51	8.92	3.59	.49	.840 b	200
7043244	Ryde FX	12.12	8.6	3.51	.49	4.68t	200

Rebuildable Rear Track Shocks

SHOCK PN	BRAND	Extended Length (in)	Collapsed Length (in)	Stroke (in)	Shock Rod (in)	IFP Depth (in)	PSI
7043177	Fox	15.60	10.56	5.04	.49	1.22 b	200
7043216	Fox	14.12	9.29	4.83	.498	2.40 rr	300
7043190	Fox	14.12	N/A	N/A	.498	2.40 rr	300
7043143	Fox	16.60	N/A	5.69	.498	1.75 rr	200
7043246	Fox	16.60	10.91	5.69	.49	2.23rr	200

b=IFP depth measured form the bottom of the shock body

t=IFP depth measured form the top of the shock body.

rr=top of remote reservoir

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Front Track Shock Valving

FTS 7043123

COMPRESSION	1.125x.093
	1.100x.006
	1.300x.015
	1.000x.004
	1.300x.015
	1.300x.015
	1.300x.015
Piston orifice .093	
REBOUND	1.250x.010
	1.100x.008
	.900x.008
	.800x.008
	.620x.093

FTS 7043142

COMPRESSION	1.125x.093
	.700x.012
	.700x.012
	.900x.008
	1.100x.008
	1.250x.008
	.900x.008
	1.250x.008
	1.300x.008
Piston orifice .078	
REBOUND	1.250x.008
	.800x.008
	1.100x.010
	1.000x.010
	1.000x.010
	.900x.012
	.900x.012
	.800x.015
	.700x.015
	.620x.093

FTS 7043244

COMPRESSION	1.300 x .008
	1.250 x .008
	.800 x .008
	1.250 x .012
	1.100 x .012
	1.000 x .010
	.700 x .015
	.700 x .015
	.700 x .015
Piston orifice .070	
REBOUND	1.250x.008
	.700x.006
	1.100x.015
	1.100x.015
	.900x.008

Rear Track Shock Valving

RTS 7043216

COMPRESSION	1.300 x .008
	1.300 x .006
	.800 x .010
	1.300 x .010
	1.300 x .008
	1.300 x .008
	.900 x .008
	1.125 x .093 Top Out
Piston orifice .055	
REBOUND	1.250 x .012
	1.100 x .010
	1.125 x .093 Top Out
	.620 x .093 Back Up

RTS 7043190

COMPRESSION	1.125x.093
	.900x.008
	1.300x.008
	1.300x.008
	1.300x.010
	.800x.010
	1.300x.006
	1.300x.008
Piston orifice .055	
REBOUND	1.250x.012
	1.100x.010
	1.125x.093
	.620x.093

RTS 7043177

COMPRESSION	1.125x.093
	.900x.010
	1.000x.010
	1.100x.012
	1.100x.010
	1.100x.008
	1.000x.006
	1.300x.008
	1.300x.008
Piston orifice .093	
REBOUND	1.250x.010
	1.250x.010
	1.100x.012
	1.000x.012
	.900x.012
	.800x.012
	.620x.093

RTS 7043246

COMPRESSION	1.300 x .008
	1.250 x .008
	.800 x .008
	1.250 x .012
	1.100 x .012
	1.000 x .010
	.700 x .015
	.700 x .015
	.700 x .015
	1.125 x .093 Top Out
Piston orifice .070	
REBOUND	1.250 x .008
	.700 x .006
	1.100 x .015
	1.100 x .015
	.900 x .008
	.950 x .050 Back Up
	.950 x .050 Back Up

SHIM PART NUMBERS

Shims are used in a stack on the top and on the bottom of the shock piston. The stacks can be adjusted to control the amount of fluid that is forced by as the piston travels through its motion. Below is a chart that has the part numbers of these shims, proceeding the part number is the size of the washer (out side diameter x thickness). A thick washer (.700 x .010) will try to keep the fluid from passing through the piston as it travels.

Refer to the appropriate parts manual for a complete listing of shock parts.

Ryde FX Shims

PART NUMBER	SIZE	THICKNESS
1700080	0.700	0.004
1700086	0.800	
1700092	0.900	
1700081	0.700	0.006
1700087	0.800	
1700093	0.900	
1700121	1.000	
1700129	1.100	
1700134	1.250	
1700139	1.300	
1700094	0.900	0.008
1700122	1.000	
1700130	1.100	
1700135	1.250	
1700140	1.300	
1700082	0.700	0.009
1700088	0.800	
1700083	0.700	0.010
1700089	0.800	
1700095	0.900	
1700126	1.000	
1700131	1.100	
1700136	1.250	
1700141	1.300	
1700084	0.700	0.012
1700090	0.800	
1700096	0.900	
1700127	1.000	
1700132	1.100	
1700137	1.250	
1700142	1.300	
1700085	0.700	0.015
1700091	0.800	
1700120	0.900	
1700128	1.000	
1700133	1.100	
1700138	1.250	
1700143	1.300	

Fox Shims

NOTE: The chart below groups the valves by thickness

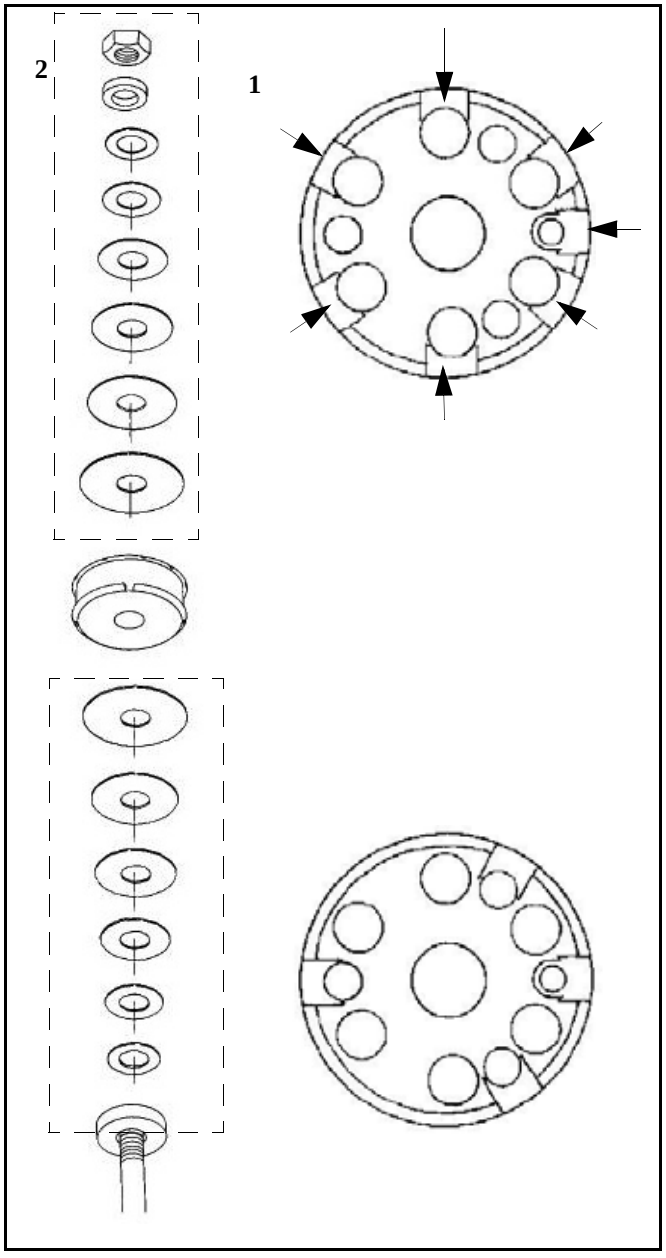
PART NUMBER	SIZE	THICKNESS
1500055	0.700	
1500054	0.800	
1500053	0.900	
1500048	1.000	0.006
1500049	1.100	
1500050	1.250	
1500052	1.300	
1500029	0.700	
1500028	0.800	
1500033	0.900	
1500032	1.000	0.008
1500031	1.100	
1500051	1.250	
1500030	1.300	
1500044	0.700	
1500047	0.800	
1500046	0.900	
1500045	1.000	0.010
1500027	1.100	
1500026	1.250	
1500062	1.300	
1500056	0.700	
1500057	0.800	
1500058	0.900	
1500059	1.000	0.012
1500060	1.100	
1500078	1.250	
1500079	1.300	

PART NUMBER	SIZE	THICKNESS
1500081	0.700	
1500082	0.800	
1500083	0.900	
1500084	1.000	0.015
1500085	1.100	
1500086	1.250	
1500087	1.300	

Shim Arrangement

Shown below is an example of how valving stacks are arranged. Parts in the box below are an example of standard valving.

NOTE: Note the direction of the valve piston before disassembly. The side with the greater number of relief slots (1) should face the nut end (2) of the shaft.



SPECIAL TOOLS

Shock Rebuilding Tools

Special Tools

PART NUMBER	DESCRIPTION
2200421	Gas Shock Recharging Kit
2201639	Shock Shaft Seal Protector 1/2” Diameter
2201640	Shock Shaft Seal Protector 5/8” Diameter
2870623	Shock Absorber Spring Compression Tool
2870803	Shock Spring Pre-Load Adjustment Too
PS-45259	Gas Fill Tool
9917736	VIDEO-Rebuilding Mono Tube Shocks
9917737	VIDEO-Rebuilding Remote Reservoir Shocks

Ryde FX Shock Special Tools

PART NUMBER	DESCRIPTION
PS-45259	Gas Fill Tool and Gauge (Incl. 5 needles)
PS-45259-1	Gas Fill Needles replacement pack
PS-45259-2	Gas Fill Gauge (replacement)
PS-45260	Lower Retainer Wrench
PS-45261	IFP Positioning / Extraction tool
PS-45262	Cylinder Head Wrench
PS-45263	Wear Band Tool
PS-45629	Arvin Shock Body Holder
PS-45280	Shock Collar Tool
PS-45821	Shock Reservoir Holder

FOX Shock Special Tools

PART NUMBER	DESCRIPTION
2871021	Shock Body Holding Tool
2871352	Shock Rod Holding Tool 1/2" rod
2872429	Shock Rod Holding Tool 5/8" rod
2871232	Fox Shock Spanner
2871351	Fox Shock IFP Depth Tool
PS-44925	Fox Inner Tube Puller PS 2

SHOCK MAINTENANCE

SHOCK MAINTENANCE

It is recommended to change the shock oil annually and should be included when performing end of season storage preparation. Changing the shock oil will prevent internal corrosion and moisture absorption.

When performing maintenance, use Gas Shock Recharging Kit, PN 2200421. The kit consists of the necessary valves, pressure gauge, and fittings to deflate and pressurize the shocks. The Body Holder Tool, Internal Floating Piston (IFP), and Shock Rod Holding Tool are not included in the Recharging Kit and must be ordered separately. Refer to the SPX Specialty Tool catalog for part numbers.Videos on shock rebuilding are also available. Monotube shocks 9917736, Remote Reservoir 9917737.

⚠ CAUTION

EXTREME CAUTION SHOULD BE OBSERVED WHILE HANDLING AND WORKING WITH HIGH PRESSURE SERVICE EQUIPMENT. WEAR A FACE SHIELD, SAFETY GLASSES, AND EAR PROTECTION DURING SERVICE OF THESE SHOCKS. CARE SHOULD BE OBSERVED WHILE HANDLING THE INFLATER NEEDLE AND PRESSURE GAUGES. MAINTAIN YOUR EQUIPMENT AND KEEP IT IN GOOD WORKING CONDITION. IF INJURY SHOULD OCCUR, CONSULT A PHYSICIAN IMMEDIATELY. EXTREME CLEANLINESS IS OF UTMOST IMPORTANCE DURING ALL DISASSEMBLY AND REASSEMBLY OPERATIONS TO PREVENT ANY DIRT OR FOREIGN PARTICLES FROM GETTING INTO THE SHOCKS. KEEP THE PARTS IN ORDER AS THEY ARE DISASSEMBLED. NOTE THE DIRECTION AND POSITION OF ALL INTERNAL PARTS FOR REASSEMBLY.

RYDE FX MONO-TUBE SHOCK DISASSEMBLY

Procedures for the proper disassembly and assembly of RydeFX gas charged IFP and emulsion mono-tube shock absorbers.

⚠ CAUTION

BEFORE SERVICING A GAS SHOCK IT IS IMPORTANT THAT ALL THE GAS PRESSURE BE DISCHARGED FROM THE UNIT. REFER TO THE INSTRUCTIONS LISTED BELOW FOR THE PROPER PROCEDURE OF DISCHARGING THE GAS PRESSURE FROM A SHOCK. PROTECTIVE EYE WEAR SHOULD BE WORN TO AVOID RISK OF INJURY WHILE SERVICING RYDEFX GAS CHARGED MONO-TUBE SHOCKS.

1. Remove the shock(s) from the vehicle.
2. Before unscrewing pre-load springs, measure the compressed length of the installed spring and mark position for reinstallation.
3. If the shock incorporates a spring, remove the spring and all collateral retainers.

⚠ CAUTION

WHEN REMOVING THE SPRING FROM A SHOCK THAT UTILIZES A FIXED LOWER RETAINER; THE USE OF A PROPER SPRING COMPRESSOR SHOULD BE USED TO AVOID RISK OF BODILY INJURY.

4. Wash the shock body in parts cleaner; then dry with compressed air to remove sand and dirt.

⚠ WARNING

WHEN USING COMPRESSED AIR TO DRY COMPONENTS, PROTECTIVE EYE WEAR SHOULD BE WORN TO AVOID RISK OF INJURY.

5. Remove bearing, sleeve and/or bushings from lower shock mount eyelet. Secure the lower mount of the shock in a vise. The use of soft jaws is recommend to prevent damage or marks to the shock.

⚠ CAUTION

IT IS IMPORTANT THAT THE GAS SHOCK BE RETAINED IN THE VISE BY THE LOWER MOUNT. ANY OTHER METHOD OF SECURING THE CHOCK BODY DURING THESE PROCEDURES MAY DEFORM THE SHOCK BODY CYLINDER.

6. Remove the small button head screw from the pressure valve assembly.
7. Depressurize the shock with the charging needle.

⚠ WARNING

NITROGEN GAS IS UNDER EXTREME PRESSURE. USE CAUTION WHEN RELEASING NITROGEN GAS FROM SHOCK. PROTECTIVE EYE WEAR SHOULD BE WORN TO AVOID RISK OF INJURY.

8. Internal Floating Piston Shocks: Using a slotted screwdriver, loosen the pressure valve assembly counterclockwise two full revolutions allowing any residual gas pressure to fully escape past the pressure valve assembly O-ring.
9. Emulsion Shocks: With the shock inverted and the piston rod fully extended, secure the lower mount of the shock in a vise. Allow a couple of minutes for the gas pressure to separate from the oil and rise to the top. Using a rag as a shield to prevent spraying of gas and oil, depressurize the shock with the shock charging needle. Then, loosen the

pressure valve assembly two full revolutions allowing the any residual gas pressure to escape.

10. Allow all the gas pressure to escape before proceeding with the removal of the pressure valve assembly. Pressurized gas and shock oil could eject the valve assembly from the cylinder resulting in bodily injury.
11. Using a slotted screwdriver, remove the pressure valve assembly from the lower end mount. Account for an O-ring.
12. Using an adjustable face spanner (PN PS45262), fully loosen and remove cylinder head assembly.
13. Pour the oil out of the shock body. Discard old oil into an approved storage container and dispose appropriately. Never reuse damper oil during shock rebuild.
14. Using the I.F.P extraction tool thread the tool into the I.F.P and pull upwards, removing the I.F.P from the shock body. Account for wear band and an O-ring. Note: Not applicable for emulsion shock
15. Clean the inside of the shock body using clean parts-cleaning solvent and blow dry using compressed air.
16. Place the shock piston rod upper mount in bench vise, begin piston and valve removal. Arrange parts removed in the sequence of disassembly. The piston should have the flat slots facing the nut end (as highlighted in black).
17. Items to inspect: Piston rod for straightness, nicks or burrs. Cylinder Head Assembly / DU Bearing clean, inspect, or replace. Inside of shock body for scratches, burrs or excessive wear. Teflon piston and I.F.P wear band for cuts, chipped or nicked edges, or excessive wear. O-rings for nicks, cuts, or cracks. Cap and rod seals for nicks, cuts or cracks. Valve discs for kinks or waves. Compression bumpers (ski shocks only) for chipping, cracking or missing. Should any of these items be in question replacement is recommended.

RYDE FX MONO-TUBE SHOCK ASSEMBLY

1. Place the piston rod upper mount into the vise. Reassemble damper rod assembly in the reverse order of disassembly. Special attention should be paid the order of the Rebound and Compression disc (shim) stacks, ensuring that they are in the same order prior to disassembly. Tighten the lock nut to 15-20 ft-lb. of torque. DO NOT OVER-TORQUE. If excessive torque is applied, damage to the piston and valves will occur.
2. Secure the shock body by its lower mount in vise. The use of soft jaws is recommend to prevent damage or marks to the shock. It is important that the gas shock be retained in the vice by the lower mount. Any other method of securing the shock body during these procedures may deform the shock body cylinder.

NOTE: The next points on IFP are not applicable for emulsion shocks. Proceed to assembly of the pressure valve.

3. Thread the positioning head onto the I.F.P locator tool and adjust the top of the value indicator to the appropriate measurement. Depending on which shock absorber is being worked on, adjust the piston location tool to the specified depth indicated in the shock specification chart.
4. Apply a thin film of oil onto the floating wear band and O-ring and install the floating piston into the top of the shock body, positioning it below the counter-bore.
5. Using the tool as a handle, push the floating piston down into the shock body, being careful not to damage I.F.P wear band and O-ring, until the value indicator knob comes in contact with the shock body. The piston should now be located correctly.
6. Screw the pressure valve assembly into the valve port by hand with a slotted head screwdriver; and tighten to 100-110 in.lb of torque.
7. Fill the shock body with shock oil. Internal Floating Piston Shocks: Fill the shock body with shock oil to the bottom of the thread within the cylinder. Emulsion Shocks: Fill shock body with 110cc's of oil. This will allow for the required air space to properly gas charge the shock with nitrogen gas.

NOTE: After filling the shock body with oil, allow a couple of minutes for all air bubbles to rise to the top.

8. With the cylinder head assembly pushed down against the piston, carefully, insert the piston rod and assembly into the cylinder; Slightly oscillating the piston rod to allow piston to enter shock body bore. A light coating of oil on the piston wear band will ease installation.
9. Slowly push the piston rod and assembly into shock body until the cylinder head assembly bottoms on the cylinder counterbore. Slight up and down movement may be required to allow all air to pass through piston assembly.
10. During installation, some shock oil will overflow. Wrap a shop cloth around shock body to catch possible oil overflow. Fast installation of the piston rod and assembly may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.
11. Using an open face spanner wrench tighten cylinder head securely into the shock cylinder.
12. Pressurize the shock, through the pressure valve, with nitrogen gas to the specified pressure.
13. If using RydeFX inflation tool Refer to Procedures for use of replaceable inflation needle instruction manual found in the RydeFX inflation tool case.
14. After being compressed, the piston rod should fully extend from the shock body once the shock has been pressurized.
15. Install the small button head screw in the pressure valve assembly and tighten securely.
16. Reinstall sleeve and bushings in lower shock mount.

FOX PS-5 DISASSEMBLY

1. Remove the shock from the vehicle.
2. Remove the steel sleeve from the eyelet using the mallet and an appropriate sized socket.
3. Pry the polyurethane bushings out using the flat blade screwdriver, being careful not to scratch the body cap.
4. Clean the entire shock assembly with soapy water. Try to remove as much dirt and grime as possible by scrubbing with a soft bristle brush. Never pressure wash your shock, as this can force water and debris inside which will damage the seals. Dry the shock assembly with compressed air, if available, or use clean towels.
5. Use a 3/32" Hex Key to remove the button head screw from the FOX air valve in the shock body.
6. Securely clamp Fox Nitrogen Safety Needle in vice.

> **⚠ CAUTION**
>
> Point air valve away from face and body when charging or discharging any shock.

7. Insert the Fox Safety Needle squarely into center of gas valve.
8. Using a blunt object, depress the air valve core to release pressure.
9. When the shock is FULLY DISCHARGED, pull reservoir away from the Fox Safety Needle in a straight, smooth motion.
10. Clamp the body end eyelet of the shock securely in vice with shaft side up.
11. Using the 1 3/8" wrench, loosen and unscrew the bearing assembly from the shock body. If the body cap unscrews instead of the bearing, that is OK. You will need to remove both for this rebuild procedure.
12. Clamp the shock in the vice using the body clamp blocks. If the bearing is still in the body, use the 1 3/8” end wrench to loosen and un-thread the bearing. If the body cap is what needs removal, use the large crescent wrench to loosen and unthread the body cap.
13. Remove the shaft assembly from the body tube, and place on a clean, lint free paper towel. Remove the shock from the vice and pour shock oil from body tube into a proper disposal container. Do not re-use old shock oil.
14. Using the handle of the mallet, push the IFP out of the shock body on to a folded shop towel.
15. Remove the bleed screw from the IFP using the 1/8" T-Handle
16. Clean the IFP with solvent. Dry with compressed air in a well ventilated area. If compressed air is not available, dry parts using clean, lint free paper towels and let sit in a well ventilated area to allow the solvents to evaporate.
17. Set body assembly aside on a clean, lint free towel.
18. Clamp the shaft eyelet securely in vice with the piston end up.
19. Using a 9/16" wrench, remove the piston lock nut from the end of the shaft.
20. Hold the tip of the Phillips Head Screwdriver against the end of shaft. Hold the piston assembly under the top-out plate and lift upwards. Slide the piston assembly onto the shaft of the screwdriver. Pull the Screwdriver away from shock shaft while supporting the piston assembly. Set this on a clean, lint free towel. There are many pieces to the piston assembly, and the assembly order of these pieces is critical to the proper performance of your shock. This step ensures that the proper order is kept.
21. Slide bearing assembly off of shaft. Use extreme caution not to scratch inside of the bearing assembly when passing it over the threads at end of shaft and set it on a clean, lint free towel.
22. Remove the bleed screw from the IFP and set them both on a clean, lint free towel.

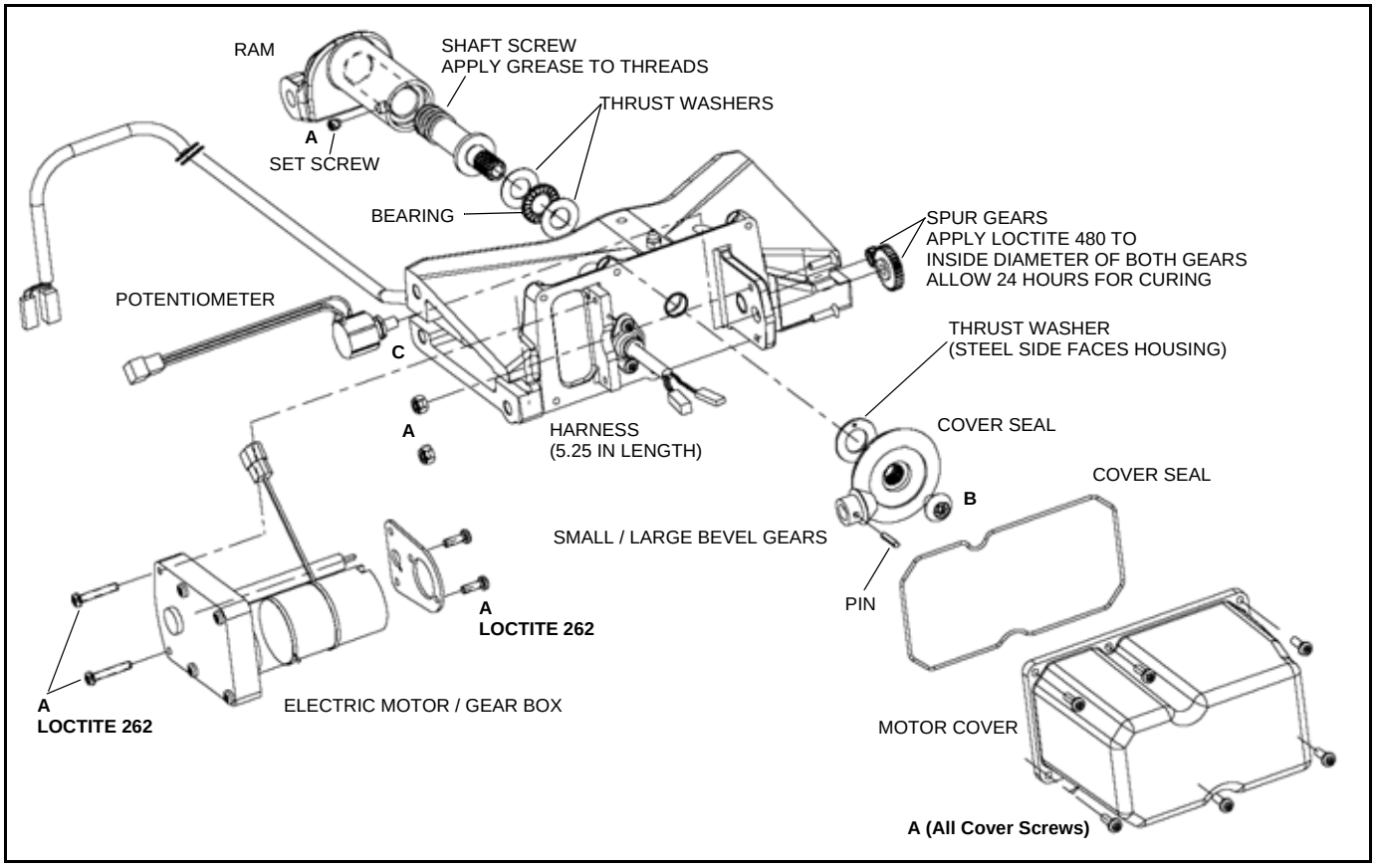
FOX PS-5 ASSEMBLY

1. Using a small pair of snap ring pliers, remove the snap ring from the bearing housing. Using your fingers, remove the FIST scraper from the housing. Use a scribe or a dental pick to remove the o-ring from the inside of the FIST scraper by "spearing" the seal with the point of the scribe and pulling it out. Use extreme caution when using a scribe to remove seals. Always "spear" the seal with the point of the scribe. Do not wedge the point of the scribe in behind the seal. This can scratch the surface of the seal groove which will compromise the performance and reliability of the shock absorber.
2. Use the scribe to remove the u-cup wiper and o-ring seals from the bearing housing. Be careful not to scratch the seal grooves or the DU bushing that is pressed into the bearing.
3. Thoroughly clean the FIST scraper, bearing housing, and piston assembly with solvent. Dry with compressed air in a well ventilated area. If compressed air is not available, dry parts using clean, lint free paper towels and let sit in a well ventilated area, to allow the remaining solvent to evaporate.
4. Use a scribe or dental pick to remove the o-ring seal from the IFP.
5. Install the new, well lubricated, o-ring into the FIST scraper. Check to make sure the seal is properly seated, and is not twisted. If a tool is required to aid in proper seating of o-ring, use the non-writing end of a pen, or a similar soft, blunt object, to push it in.

6. Install the new, well lubricated, o-rings into the bearing housing. Correct placement of the shaft seal o-ring is in the groove next to the DU bushing. Check to make sure the seals are properly seated, and are not twisted. If a tool is required to aid in proper seating of o-ring, use the non-writing end of a pen, or a similar soft, blunt object, to push it in.
7. Install the new U-cup seal into bearing. U-cup should be installed so the cupped end is facing the DU bushing inside of bearing. Check to make sure seal is properly seated. If a tool is required to aid in proper seating of U-cup seal, use the non-writing end of a pen, or a similar soft, blunt object, to push it in.
8. Install FIST bearing into housing. Check for proper orientation of the FIST bearing. The stepped side of the FIST bearing should be visible.
9. Using a small pair of snap-ring pliers, install the snap-ring into the bearing housing. Check for proper orientation of the snap ring. The flat side of the snap-ring should be visible. Check to make sure the snap-ring is properly seated.
10. Install the new, well greased o-ring onto the IFP.
11. Install the new, well greased o-ring on the IFP bleed screw.

M-10 ACE SYSTEM

Assembly Illustration



= T
A = 15 In.Lb. (1.7Nm) B = 4 Ft.Lb. (5.5Nm) C = 25 In.Lb. (2.8Nm)

NOTE: Never re-use a potentiometer gear if it has slipped on the shaft during use as the ID will be too large for the Loctite to hold securely.

Assembly Notes

- Install potentiometer with pin aligned with recess in mounting plate. Tighten lock nut to 25 In. Lbs.
- Turn ram and screw shaft assembly so the ram is fully-retracted into the housing before setting potentiometer and installing gears.
- Turn potentiometer shaft so the resistance between the BLACK and WHITE wires is 107 Ohms.
- Apply Loctite 480 to the ID of the potentiometer gear, then carefully install without moving the potentiometer.
- Once installed, verify the resistance has not changed from 107 Ohms.

TROUBLESHOOTING

Rear Suspension

PROBLEM	SOLUTION
Rear Suspension Bottoms Too Easily	IQ 121 / Switchback: Adjust torsion spring preload to achieve proper static sag. Change torsion spring to a stiffer optional spring. Re-valve the rear track shock. M-10: Increase FRA position. Install appropriate optional center retainer on rear track shock. Increase front track shock coil spring preload by adding washers. Re-valve the rear track shock. Check the track tension.
Rear Suspension Too Stiff	IQ 121 / Switchback: Adjust torsion spring preload to achieve proper static sag. Change torsion spring to a softer optional spring. Re-valve the rear track shock. Lubricate pivot points. Move limiter straps to lower holes. Check track tension. M-10: Decrease FRA position. Install appropriate option center retainer on rear track shock. Decrease front track shock coil spring preload by removing washers. Re-valve the rear track shock. Check track tension.
Deep Snow Operation	IQ Switchback: Change worn rail slides. Move limiter straps to lower holes (lengthen). Always adjust torsion spring preload to achieve proper static sag setting. Install stiffer front track spring to remove ski pressure.

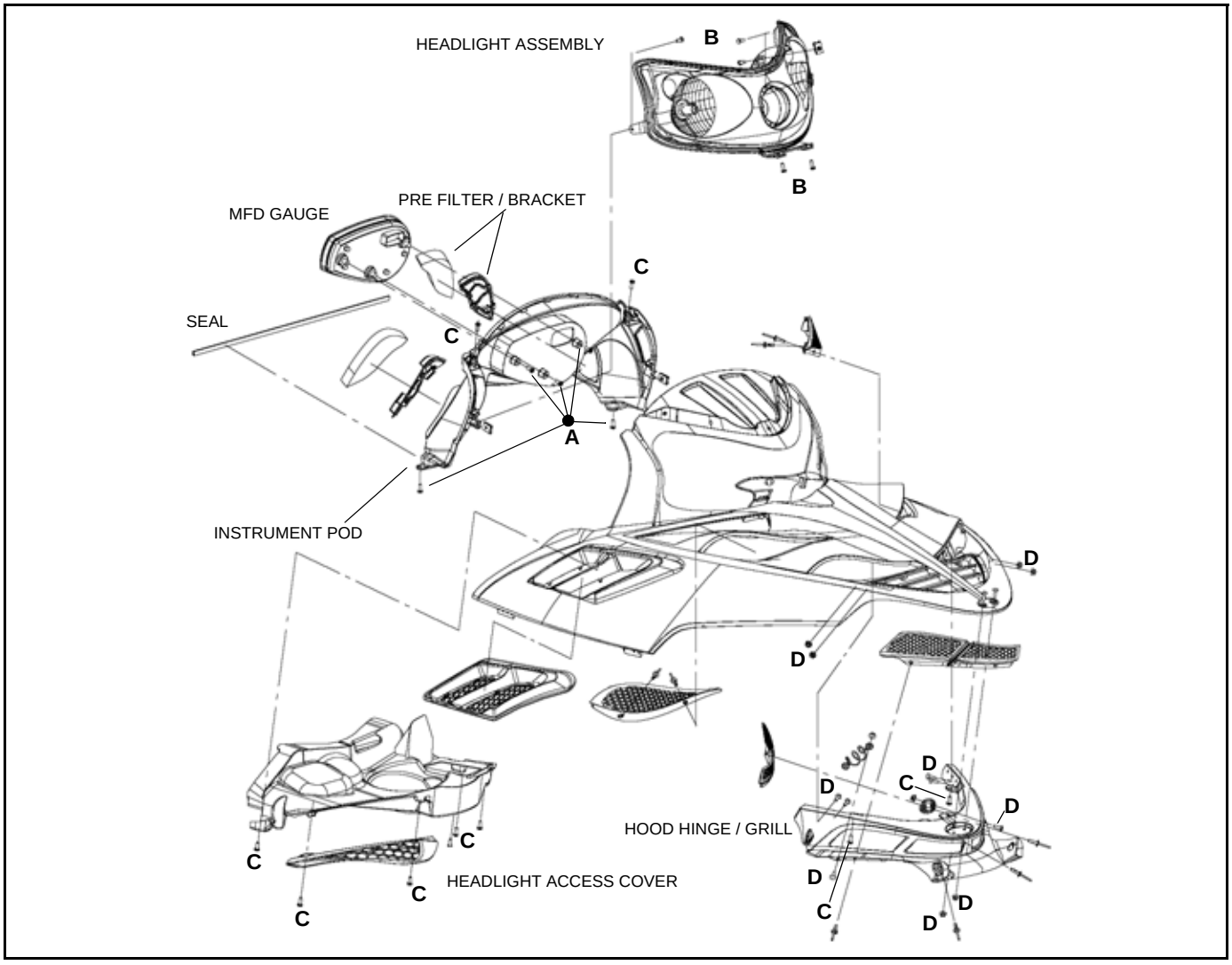
NOTES

CHAPTER 11
Chassis

11

HOOD / MFD / HEADLIGHT

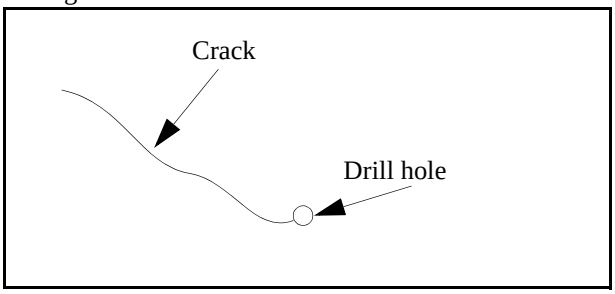
Assembly Illustration



= T
A: 12 - 15 In.Lb. (1.3 - 1.7Nm) B: 15 - 20 In.Lb. (1.7 - 2.25Nm) C: 5 In.Lb. (.6Nm) D: 22 In.Lb. (2.5Nm) Apply torque to nut, not screw.

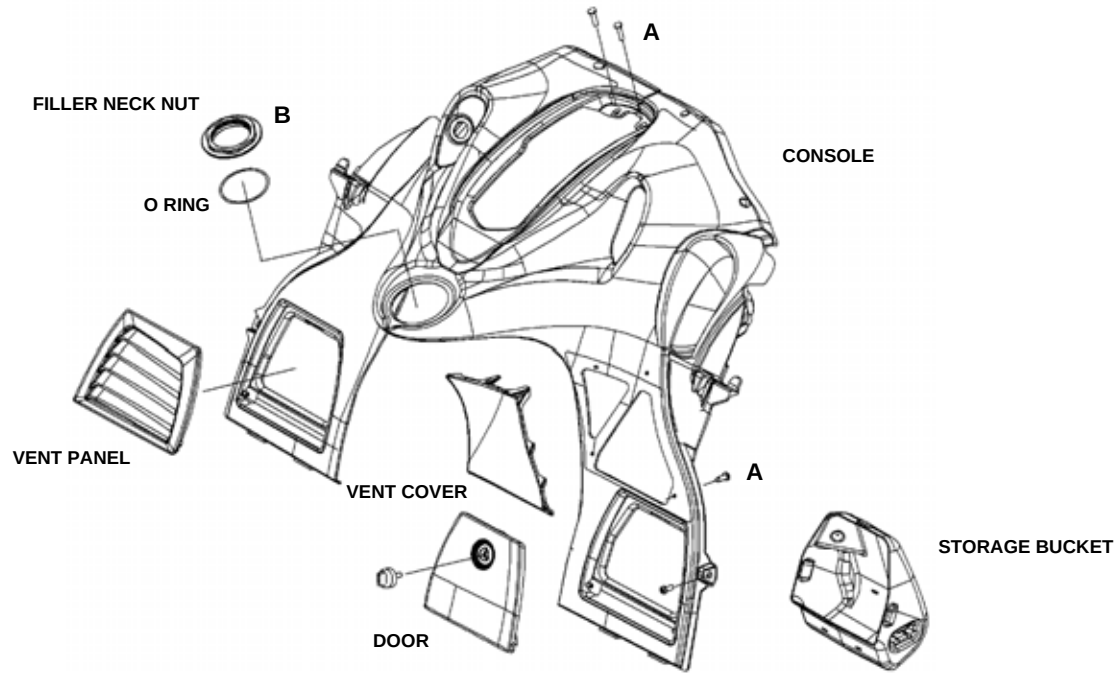
Hood / Plastic Repair

Hoods are made of Thermoplastic Olefin (TPO) and cannot be repaired. If a hood is broken it must be replaced. For small cracks, drill a small hole on both ends of the crack to limit spreading.



CONSOLE

Assembly Illustration

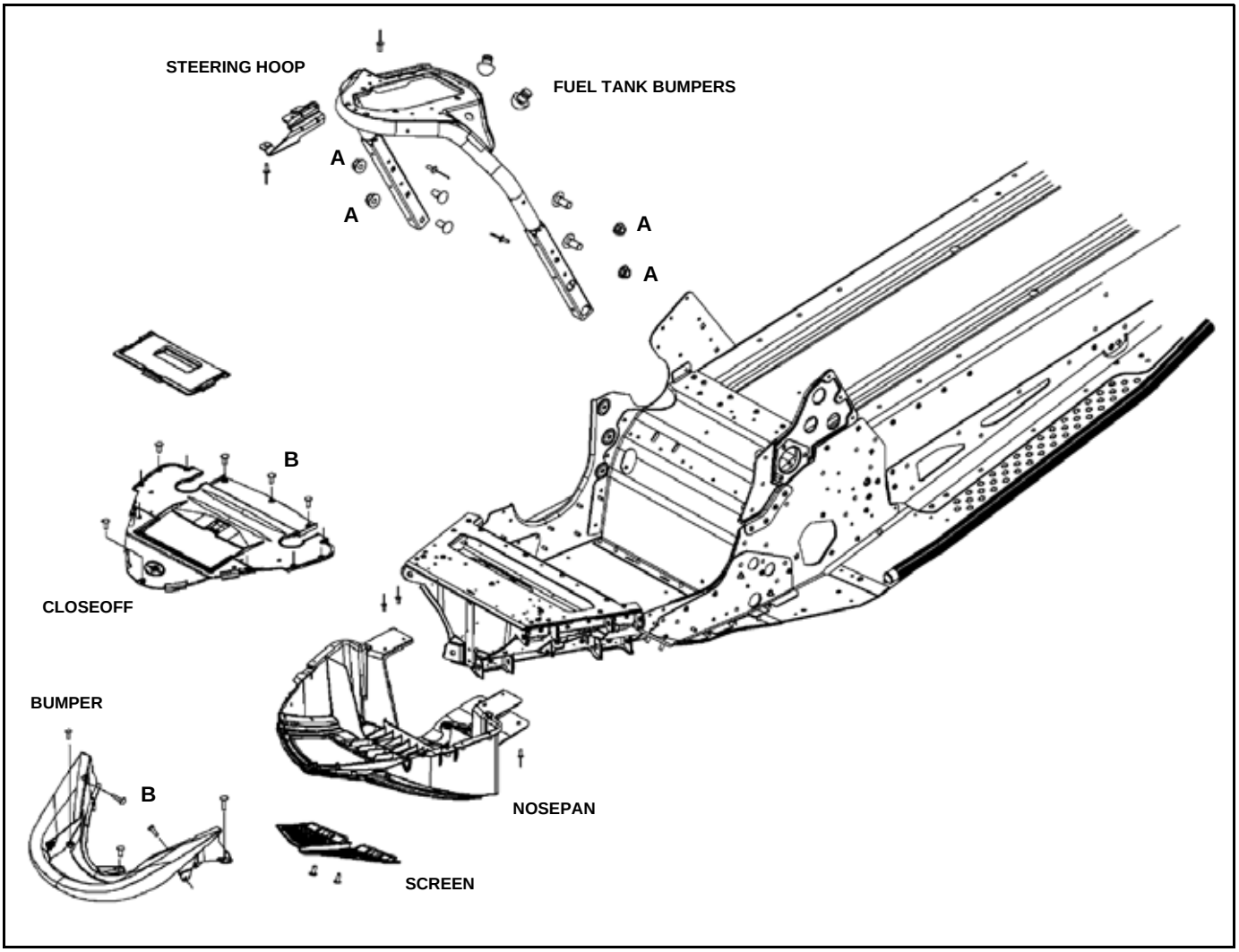


= T
A: 40 In.Lbs. (4.5 Nm) B: 5.5 Ft.Lbs. (7.5 Nm)

Rev. 1 07/2006

BUMPER / STEERING LOOP

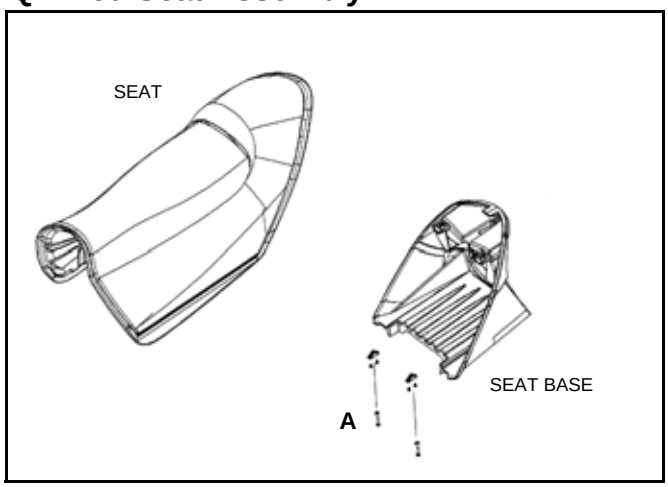
Assembly Illustration



= T
A: 18 Ft.Lb. (24 Nm) B: 30 In.Lbs. (3 Nm)

SEAT ASSEMBLIES

IQ Fixed Seat Assembly



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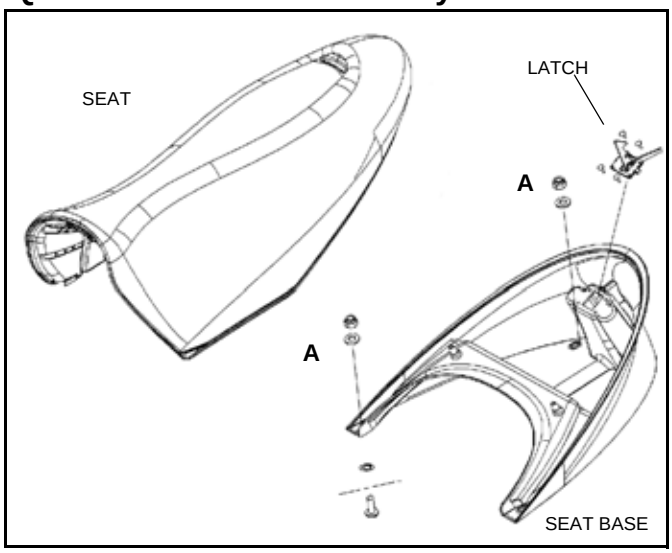
A: 5.5 Ft.Lbs. (7.5 Nm)

IQ Removable Seat Assembly



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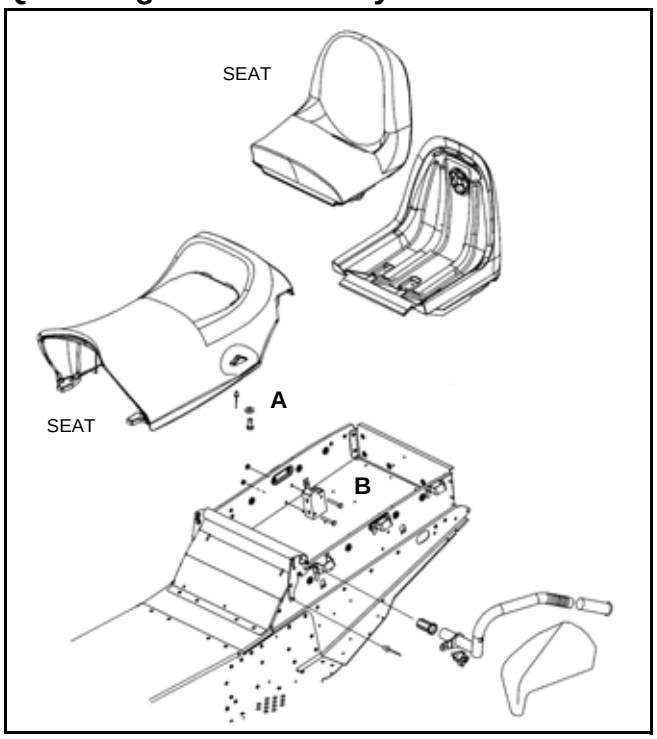
A: 5.5 Ft.Lbs. (7.5 Nm) Plastic crushes at 10 Ft.Lbs. (13 Nm).

IQ Touring Seat Assembly



= T
A: 10 Ft.Lbs. (13 Nm) B: 6 - 8 Ft.Lbs. (8 - 11 Nm)

11

Seat Cover Replacement

1. Remove seat.
2. Remove the old covering by removing the staples that hold it on the base.
3. Drape the new cover over the seat foam.
4. Turn the assembly over and begin upholstering by lining up the seat cover vinyl side flaps with the indented square location indicators located on the plastic seat base.

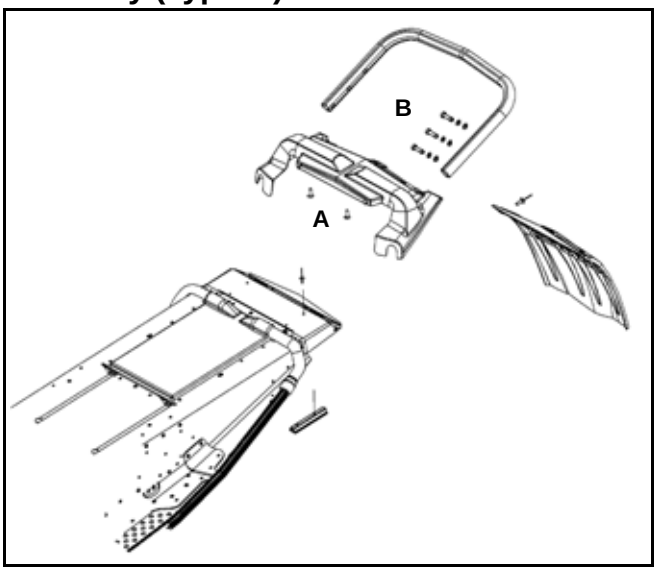
⚠ WARNING

Apply staples in the stapling channel only. If you apply staples outside the channel, you will damage the fuel tank reservoir in the seat base. If this happens you will have to replace the entire seat assembly.

5. Using a staple gun, tack each side of the vinyl cover in place using two staples (1). If cover has a “POLARIS” emblem carefully align emblem with the bottom edge of the seat. This will help ensure that the cover is positioned properly.
6. Align the two sewn seams located at the rear of the seat cover with the two back corners of the seat base.
7. Pull the vinyl tight and tack the seat cover to the plastic seat base in each corner. Use two or three staples per corner.
8. Now that the cover is positioned, and tacked to the plastic seat base in for places, turn the assembly over an inspect it. If the seat cover seems to fit correctly and everything looks straight, continue.
9. Staple the remainder of the unattached seat cover to the plastic seat base. Always staple between two existing staples and follow this procedure until the seat cover is completely stapled to the seat base see the staple sequence above.
10. Turn the seat cushion assembly over and inspect for wrinkles or imperfections. If imperfections are visible, remove the staples in the affected area and staple correctly.
11. Trim excess vinyl from the bottom around the back of the seat area only after a satisfactory fit is obtained.

BUMPER

Assembly (Typical)



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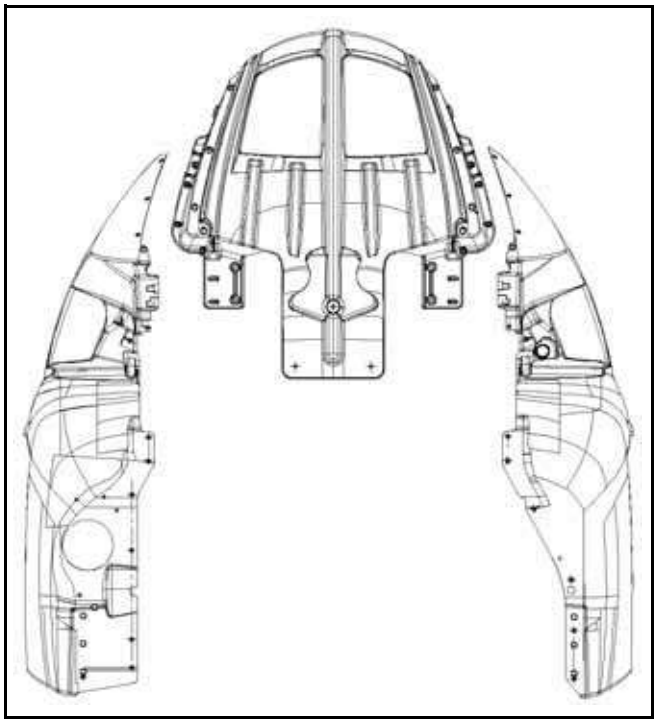
A: 30 In.Lbs. (3 Nm)
B: 10 Ft.Lbs. (13 Nm)

NOSEPAN

REPLACEMENT

IMPORTANT: When installing a replacement nosepan, the open circles represent rivets installed from inside the nosepan through the bottom. The filled in circles represent rivets installed from the under side of nosepan through to the top.

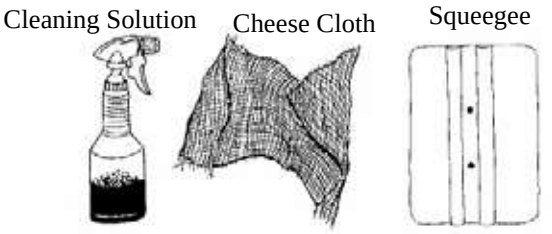
NOTE: Rivet holes may require drilling into the bulkhead. When transfer drilling holes do not force the nosepan into a position which is not uniform to the other side. Rivet holes across from each other.



DECALS

Decal Removal

Before beginning, read these instructions and check to be sure all parts and tools are accounted for.



Use the following items:

- Squeegee
- Cheese Cloth or a non abrasive cloth
- Paper Shop Towels
- Hair Drier or Heat Gun
- Wallpaper seam roller or similar roller
- 3M t citrus based clear (3M t PN 62-4615-430-5) available at most auto parts stores
- Cleaning solution (99% water 1% mild dish washing detergent)
- ScotchR 233 Performance masking tape

Perform the decal removal procedures carefully! If care is not taken, the possibility exists that paint could peel from the hood. Follow each step thoroughly and completely to avoid hood damage! **Polaris is not responsible for any hood or paint damage resulting from this decal replacement procedure**.

⚠ CAUTION

USE SAFETY GLASSES AND RUBBER GLOVES WHEN PERFORMING THIS PROCEDURE.

1. Using masking tape, tape off all decals that are not going

to be replaced. If you do not tape off the other decals, the cleaning solution used later in the process may cause the adhesive to break down in the non-affected decals.

2. Using a hair dryer (preferable) or low setting on a heat gun, carefully heat the decal to loosen the adhesive. Heat until the decal is warm to touch. **DO NOT OVER HEAT! Overheating may cause damage to the paint and to the integrity of the hood.** Polaris is not responsible for any hood damage resulting from this decal replacement procedure.
3. Once the decal is warm to touch and the adhesive is loose, peel the decal off slowly and evenly. **Use of a hair dryer or heat gun is required!** If heat is not applied, the decal will be very hard to remove and paint from the hood may peel off with the decal.
4. After the decal is removed, apply 3M t citrus based cleaner to the decal area to remove the adhesive. Be sure to follow the instructions and the precautions on the container, and use rubber gloves and safety glasses. Spray the cleaner on the adhesive and let set for 15-20 seconds. Using a squeegee, wipe the adhesive from the hood and deposit it in a paper shop towel. You may have to repeat this process several times to remove all of the adhesive from the hood. Use care not to get the cleaner on any other decals.

5. When the bulk of the adhesive is removed from the hood by using the squeegee, remove any left over residue with a clean, non-abrasive shop towel or cheese cloth that is wet with the 3M t cleaner.
6. Once all of the adhesive is removed from the decal area, follow with a cleaning solution of 99% water to 1% mild dishwasher detergent. Use a non-abrasive cloth with the solution to remove dirt, grease, cleaning solvent, and finger prints. Always clean the surface where the decal will be applied.

⚠ CAUTION

It is extremely important to remove all traces of dirt and debris from the hood where the decal is to be applied. Left over debris will be magnified through the chrome decals.

Decal Installation

All decals should be applied indoors, free from dust, dirt, cold air, and humidity. Room temperature must be between 40_ and 100_F (4 - 38_C). These decals are to be applied dry.

1. Make sure the surface area of the hood where the decal is to be placed is free of any dirt, debris, or adhesive.

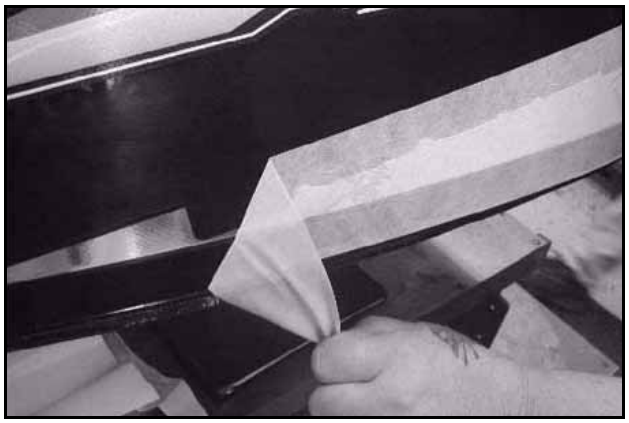
2. Place the decal in the area to be installed and make sure that everything lines up properly.
3. Carefully peel away the adhesive side of the decal.

4. Apply the decal and slowly work the decal down using a clean squeegee to lay the decal straight and to avoid creating air bubbles. Do NOT remove the decal mask until the decal is fully applied.

⚠ CAUTION

ONCE THE ADHESIVE STICKS, IT CAN BE VERY DIFFICULT TO PULL THE DECAL BACK OFF OF THE HOOD. USE EXTREME CARE! IF YOU ENCOUNTER AIR BUBBLES DO NOT ATTEMPT TO USE A STRAIGHT PIN TO POKE THE BUBBLE AND LET THE AIR OUT. A HOLE POKED IN A CHROME DECAL WILL BE VERY NOTICEABLE.

5. When finished installing the decal, carefully remove the decal mask at a 180_ angle.



6. Peel the backing off and install the urocals in the appropriate places. These also have strong adhesives and once applied they cannot be removed easily. Use a wall paper roller to adhere all surfaces of the urocal. Urocal decals are rigid and need to be rolled to ensure good adhesion, particularly on the edges.

NOTES

CHAPTER 12

Chassis Electrical System

RELAYS / SWITCHES / MFI GAUGE

System Overview

The following components are included within this chapter:

- Fuses and Relays (Fuse Block Components)
- Fuel / Intercooler Fan Relays
- Forward / Reverse Chaincase / PERC 4 Switches
- Ignition / Tether / Throttle / Emergency Safety Slap - Stop Switches
- PERC 4 Reverse System Controller
- MFD (Multi-Function Display)
- Battery
- Alternator (Generator)
- Starter Motor - Starter Solenoid
- Fusible Links
- M-10 ACE System

⚠ WARNING

BATTERY ELECTROLYTE IS POISONOUS. IT CONTAINS ACID!

SERIOUS BURNS CAN RESULT FROM CONTACT WITH THE SKIN, EYES, OR CLOTHING.
ANTIDOTE:
EXTERNAL: FLUSH WITH WATER.

INTERNAL: DRINK LARGE QUANTITIES OF WATER OR MILK. FOLLOW WITH MILK OF MAGNESIA, BEATEN EGG, OR VEGETABLE OIL. CALL PHYSICIAN IMMEDIATELY.

EYES: FLUSH WITH WATER FOR 15 MINUTES AND GET PROMPT MEDICAL ATTENTION.

BATTERIES PRODUCE EXPLOSIVE GASES. KEEP SPARKS, FLAME, CIGARETTES, ETC. AWAY. VENTILATE WHEN CHARGING OR USING IN CLOSED SPACE. ALWAYS SHIELD EYES WHEN WORKING NEAR BATTERIES.

KEEP OUT OF REACH OF CHILDREN.

Battery / Charging System Specifications

Sealed Battery

COMPONENT	SPECIFICATION
Battery Type	Yuasa YTX20L-BS (Sealed) 2006 Yuasa YTX20L-BS (Fresh Pack) 2007
Voltage	12 Vdc
Nominal Capacity @ 10 Hour Rate	18 AH
Charging Current	1.8A
CCA @ 0°F	270 AMPS
Charging System	Bosch External Alternator w/Internal Regulator - Rectifier
Alternator Output Voltage (No Load)	14.5 Vdc
Maximum Alternator Output Current	55A
Maximum Electrical Power	780 watts
Regulated Voltage	14.5 Vdc
Relay Coil Resistance (Between pins 1 and 2 on relay.)	123Ω ±10% @ 77°F (25°C)
Starter Motor Solenoid Resistance	2.5Ω ±10% @ 77°F (25°C
CAC Fan Motor Resistance	TBD
Perc 4 Motor Resistance	TBD
Starter Motor Draw -No Load -Loaded -Stalled	 45A / 10.9Vdc 120A / 9Vdc 390A / 2.25Vdc
Starter Motor Brush Length (SVC. Limit)	5/16in. (8mm)

MAINTENANCE - FREE BATTERY

Battery Preparation

2006 models were supplied with a sealed, maintenance-free battery. Maintenance-free batteries do not require electrolyte as they are filled and charged at the factory.

1. When preparing a new, maintenance-free battery for service, test the battery voltage with a multi-meter.
2. If the indicated voltage is 12.8Vdc or less, charge the battery with a battery charger.
3. Apply dielectric grease to the battery terminals and install into snowmobile.

FRESH PACK BATTERY

NOTE: Do not service the battery unless it will be put into regular service within 30 days.

Battery Preparation

2007 models are equipped with a fresh pack battery. These batteries require filling with electrolyte and a full charge prior to service.

1. Fill battery with electrolyte to the upper level marks on the case.
2. Set battery aside and allow it to cool and stabilize for at least 30 minutes.
3. Add electrolyte to bring the level back to the upper level mark on the case.

NOTE: This is the last time that electrolyte should be added.

4. Charge battery at 1/10 of its amp/hour rating. Example:1/10 of 9 amp battery =.9 amps, 1/10 of 14 amp battery = 1.4 amps, 1/10 of 18 amp battery = 1.8 amps (recommended charging rates).
5. Check specific gravity of each cell with a hydrometer to ensure each has a reading of 1.270 or higher.
6. Install vent cover.

NOTE: Once the vent cover is installed, the battery is sealed. Do not remove the cover.

BATTERY TESTING

Testing Procedures

Batteries should be kept at or as near full charge as possible. If the battery is stored or used in a partially charged condition, hard crystal sulfation will form on the plates, reducing their efficiency and possibly ruining the battery.

OPEN CIRCUIT VOLTAGE TESTING (OCV)

Battery voltage should be checked with a multi-meter. Readings of 12.8Vdc or less require further battery testing and charging.

LOAD TEST

A battery may pass the OCV test, but still not have the storage capacity necessary to properly function. A battery capacity or load test should be conducted whenever poor battery performance is encountered.

To perform the test, connect a multi-meter to the battery in the same manner as in the OCV test. The reading should be 12.8 volts or greater. Engage the electric starter while viewing the battery voltage. Continue the test for 15 seconds. The observed voltage should not drop below 9.5 Vdc. If the beginning voltage is 12.8 or higher and the cranking voltage drops below 9.5 volts during the test, replace the battery.

OFF SEASON STORAGE

To prevent battery damage during extended periods of non-use, the following maintenance items must be performed.

1. Remove battery from machine and wash the case and battery tray with a mild solution of baking soda and water. Rinse with of fresh water after cleaning.

> ⚠ CAUTION
>
> DO NOT ALLOW ANY OF THE BAKING SODA SOLUTION TO ENTER THE BATTERY OR THE ACID WILL BE NEUTRALIZED.

2. Using a wire brush or knife, remove any corrosion from the cables and terminals.
3. Charge at a rate no greater than 1/10 of the battery's amp/hr. capacity.
4. The battery may be stored either in the machine with the cables disconnected, or on a piece of wood in a cool place.

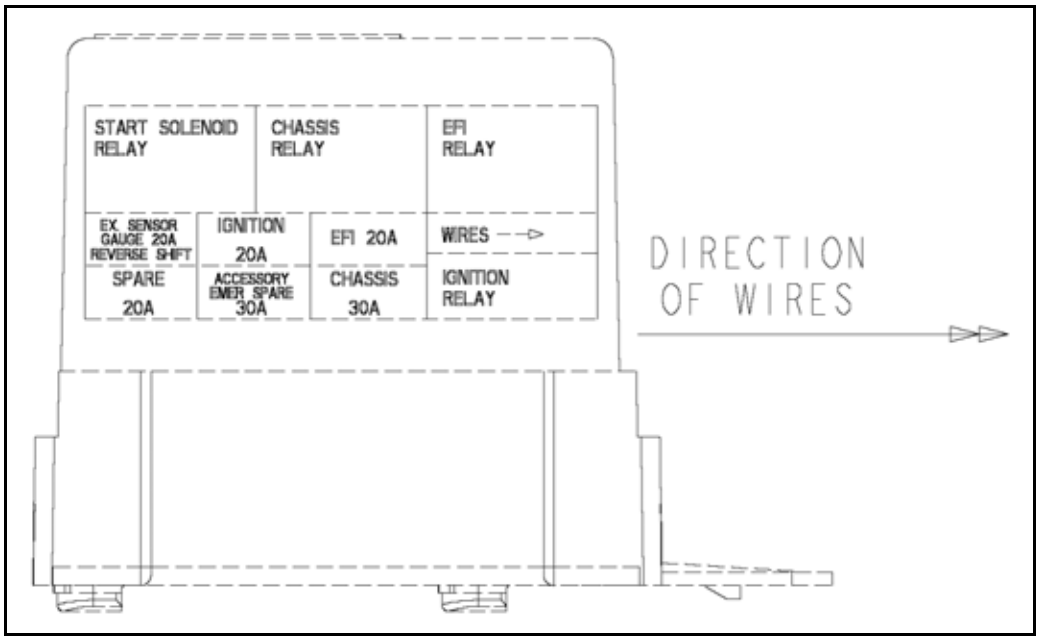
NOTE: Stored batteries lose their charge at the rate of 1% per day. They should be fully recharged every 30 to 60 days during a non-use period. If stored during winter months, the electrolyte will freeze at higher temperatures as the battery discharges.

MAIN RELAY PANEL

The main relay panel is located near the battery in the engine compartment.

Relay Overview

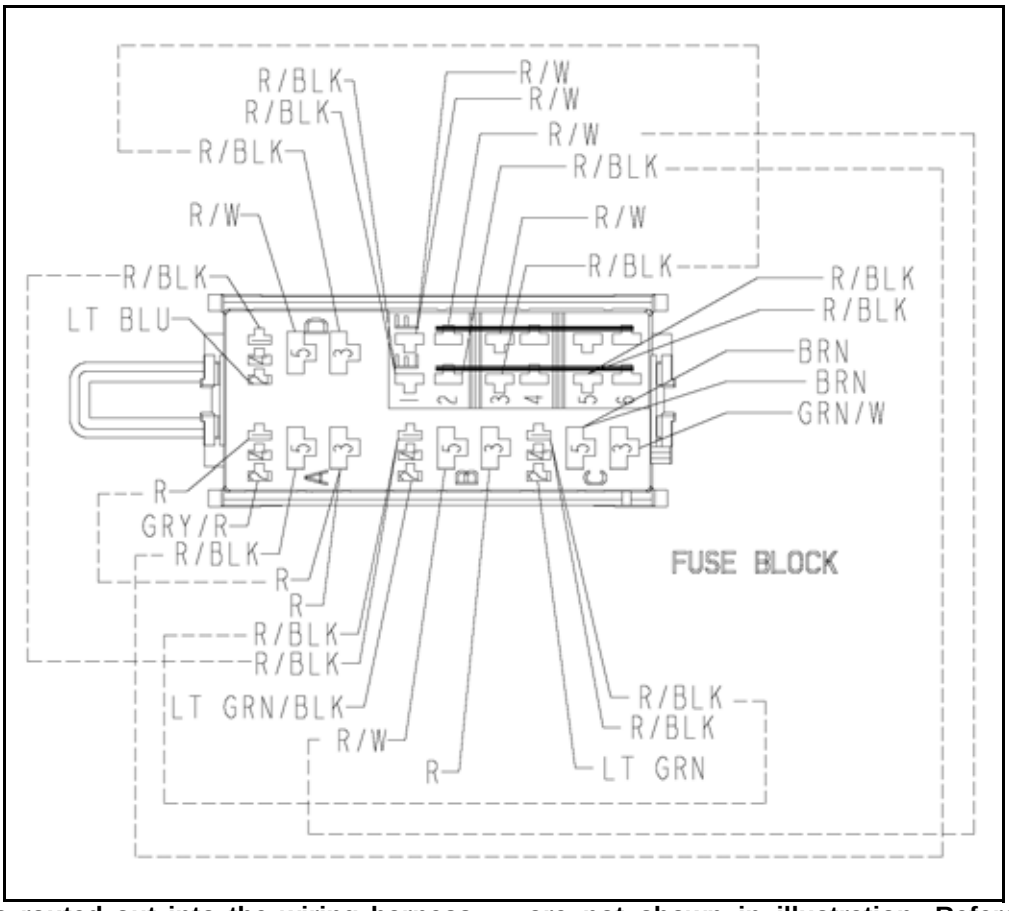
The main relay panel houses several relays and fuses designated to route power and protect the snowmobile electrical system.



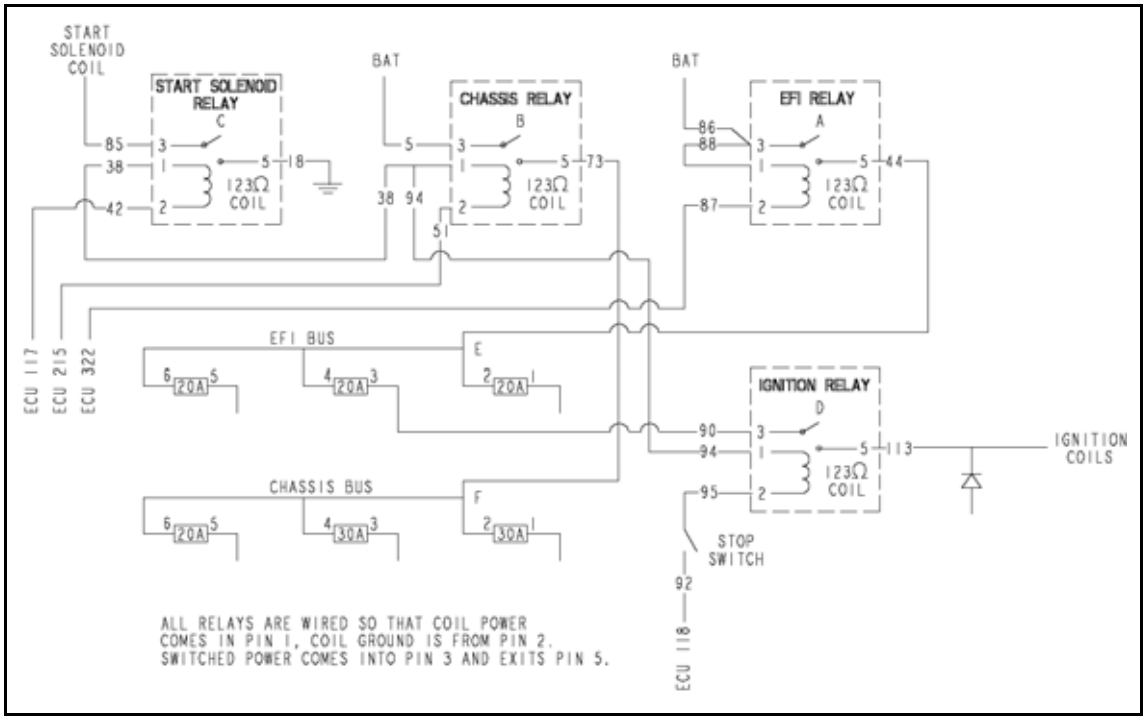
Relay Functions

Relay	Supplies Power To:
EFI Relay	EFI 20A Fuse Ignition 20A Fuse Lambda (O2) Sensor / Reverse / MFD 20A Fuse
Chassis Relay	Chassis 30A Fuse Accessory / Spare 30A Fuse M-10 ACE 20A Fuse
Ignition Relay	PTO / MAG Ignition Coils
Starter Solenoid Relay	Provides a ground path for the starter motor solenoid coil.
Fuel Pump Relay (Located on wiring harness.)	Fuel Pump
Fan Relay (Located on wiring harness.)	Charge Air Cooler (Intercooler) Fan Motor (N/A on FS)

Relay Panel Wire Routing



NOTE: Circuits routed out into the wiring harness, then back to the relay panel or on to other systems, are not shown in illustration. Reference complete wiring diagram for more information.



Fuse Overview

Several fuses are installed in the main relay panel to protect the snowmobile electrical system from damage.

> **CAUTION**
>
> Never replace a fuse with a higher amperage rating. Serious electrical system damage may occur if a fuse with a higher amperage rating is installed.

Fuse Functions

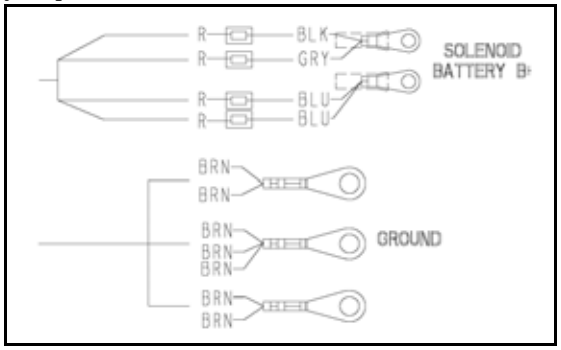
Fuse	Protected Circuit
EFI 20A	Cam Phase Sensor ECU Power Circuit(s) FWD / REV Limit Switches Starter Motor Solenoid Coil Chassis Relay Coil Ignition Relay Coil Fuel Pump Relay Coil Fan Relay Coil Fuel Pump Relay Power Fuel Injectors Wastegate Pulse Valve Solenoid
Ignition 20A	Ignition Relay Power
O2 / Reverse / MFD 20A	Lambda (O2) Sensor MFD Gauge Reverse Shift Control (H Bridge - ECU) Diagnostic Plug Snow Beam Lights (Optional)
Chassis 30A	Headlights Taillights Hand / Thumb warmers Alternator Charging Field On / Off Control
Spare (2006) / M-10 ACE 20A (2007)	M-10 ACE Controller
Accessory / Spare 30A	Accessory Plugs

NOTE: A spare (2006) / M-10 ACE (2007) 20A fuse is supplied within the fuse panel. The spare location is powered by the chassis relay.

Fusible Links

A set of four fusible links are installed in-line on the four main power cables attached to the starter motor solenoid positive battery post. A fusible link can fail or “blow” like an ordinary fuse when its circuit is shorted.

Always replace a blown fusible link with the OEM link.



Fusible Link Service Parts

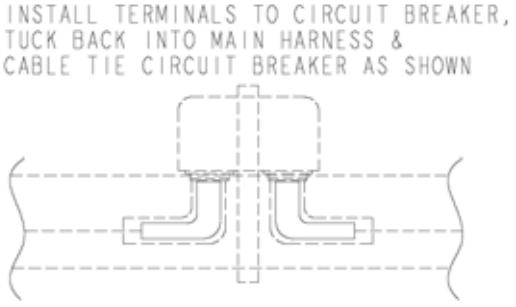
Link	Part Number
.5mm (Gray)	2202147
.8mm (Blue)	2202607
1.0mm (Black)	2202670

Fuse Link Service

Circuit Breaker

A 10A circuit breaker is installed on the power circuit for the charge air cooler fan. The circuit breaker protects the circuit in the event that the fan becomes jammed from snow or foreign material.

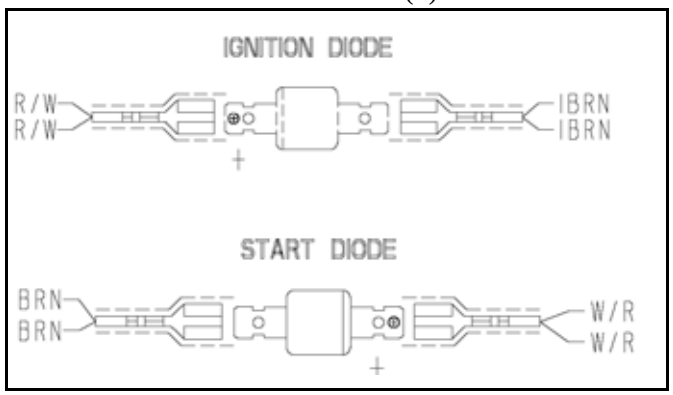
The circuit breaker will re-set itself automatically after it is given time to cool down. When tripped, inspect the fan assembly for damage. Clear away any snow or foreign material that may be obstructing the fan.



Diodes

Two diodes are used within the electrical system. The diodes are designed to prevent stray voltage from back-tracking through the start and ignition circuits when the switches and relays are opened and closed.

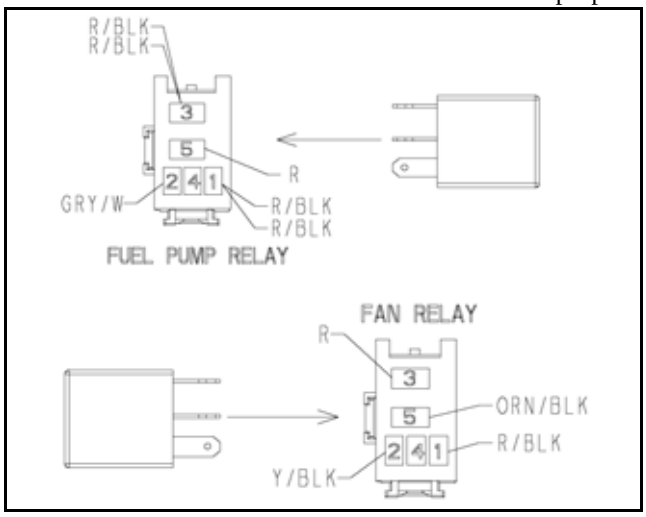
Always note the orientation of the wires connected to the diode. Always connect ground wires to the NEGATIVE terminal on the diode. The POSITIVE terminal has a (+) mark.



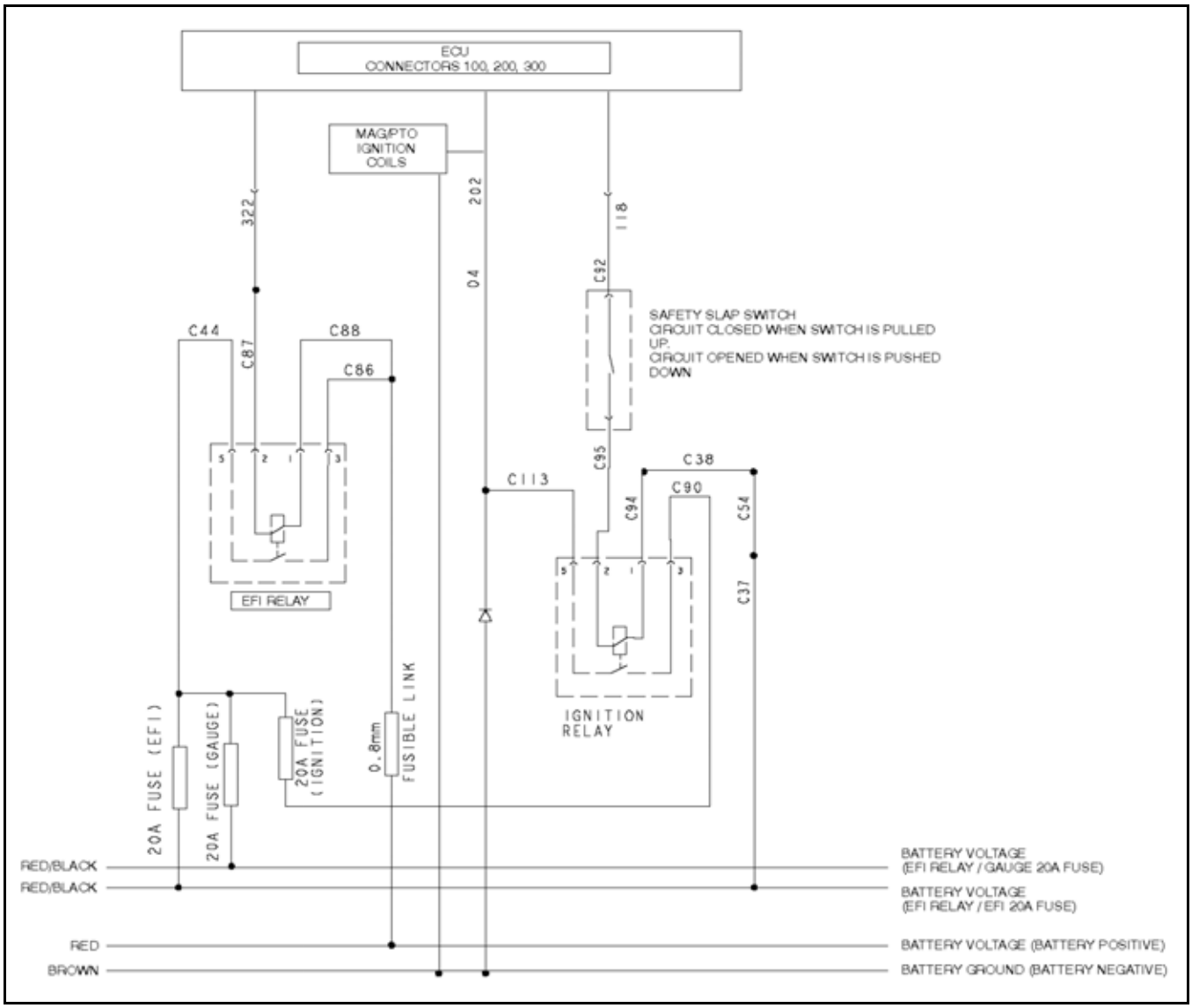
External Relays (Relays Located Outside of the Main Relay Panel)

The fuel pump and charge air cooler (intercooler) relays are not located within the main relay panel. These two relays are located on the main wiring harness and secured with tape.

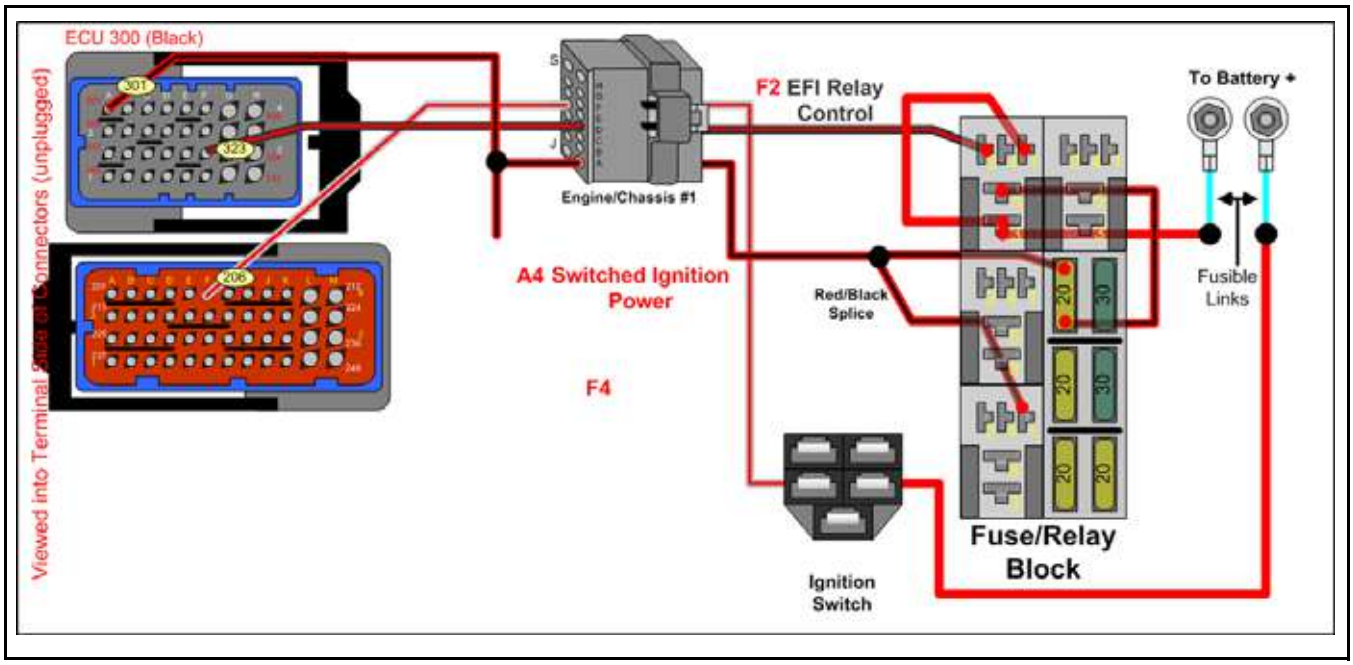
Reference the illustration for wire color identification purposes.



EFI / Ignition Relay Circuit



EFI Relay Circuit

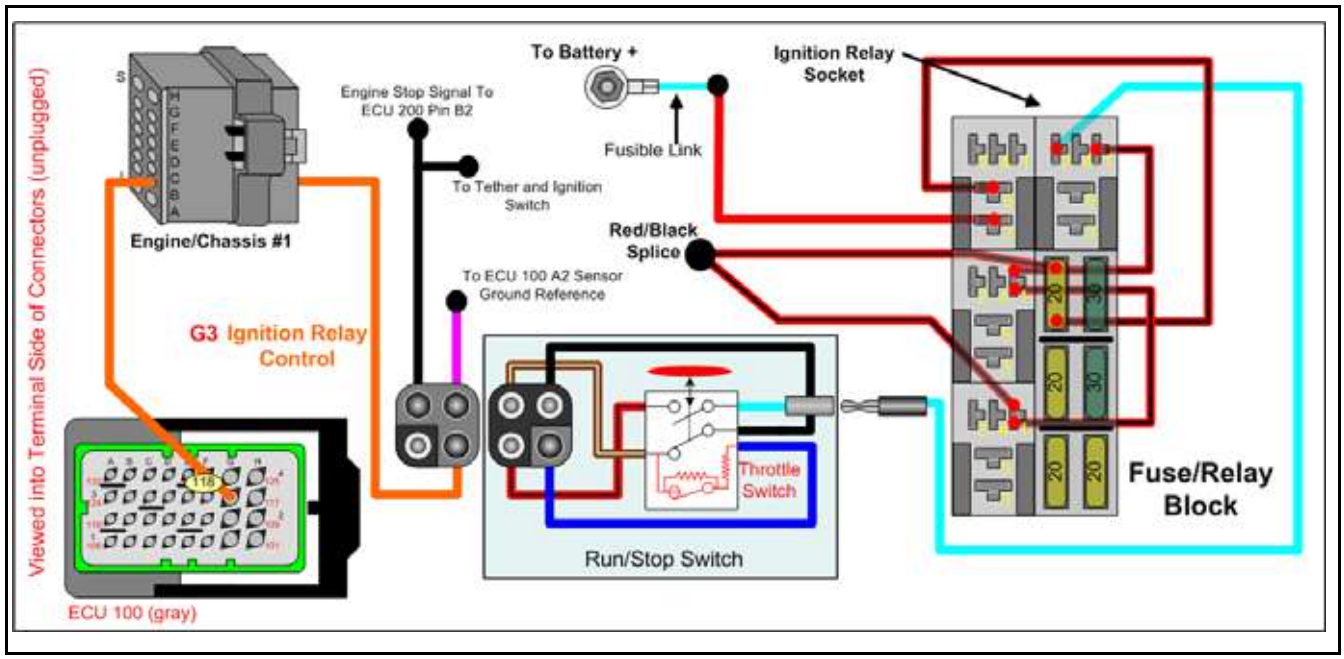


The EFI relay is the primary or "main" relay. If the EFI relay fails, the ECU will never power-up and the engine will not start.

When closed by the ECU, the EFI relay supplies battery voltage to the "EFI Bus" circuits. These circuits include:

- 20A Ignition Relay Power
- 20A EFI System Power
- 20A Lambda / MFD Power

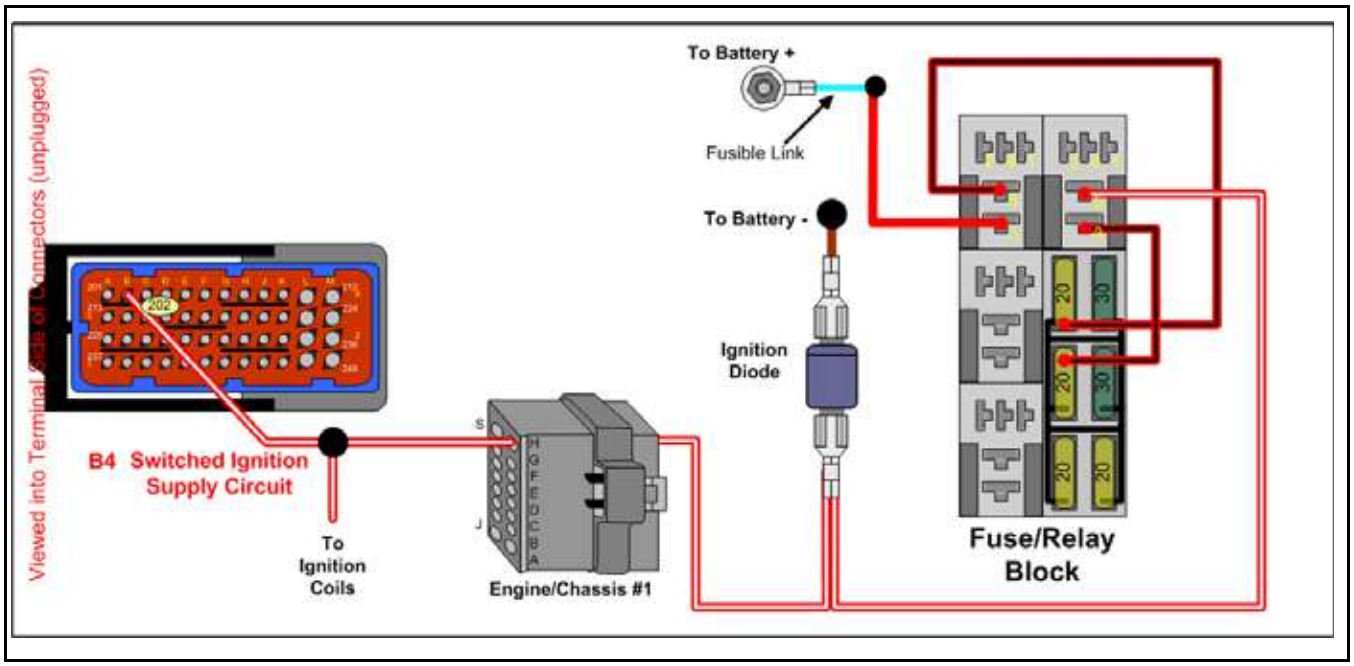
Ignition Relay Control Circuit



The Ignition Relay's two functions are to supply battery voltage to the ECU's ignition system and each ignition coil.

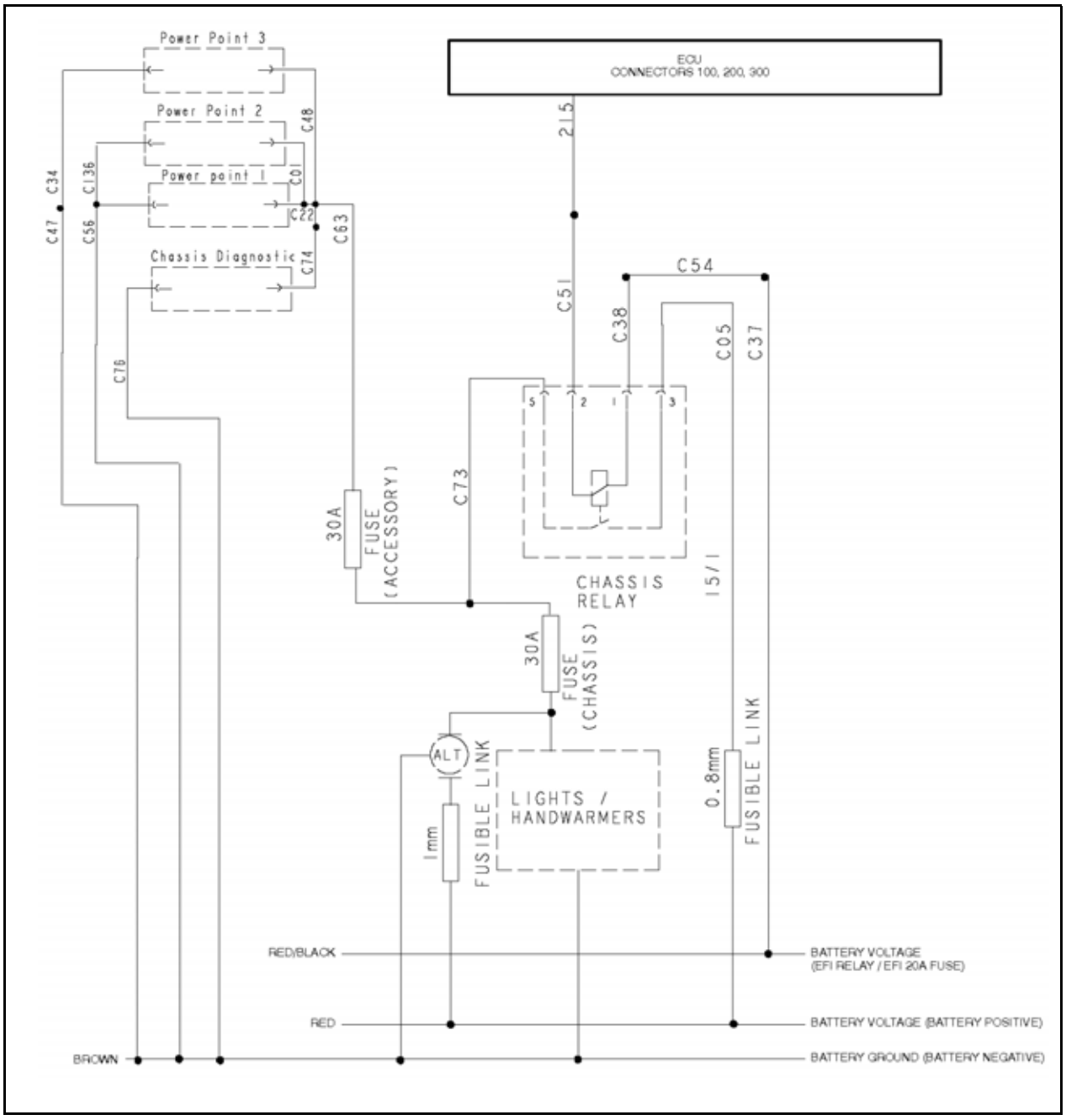
The ECU controls the relay by grounding the relay via the ignition relay control circuit. Ignition relay activation can only occur when the safety slap switch is in the "pulled" or "UP" position.

Ignition Relay Power Circuit



When the ignition relay is closed by the ECU, fuse-protected battery voltage is supplied to the ECU and each ignition coil via the RED/WHT circuit. An ignition diode is installed on the RED/WHT circuit to prevent voltage back-feeding during ignition power-up and shut-down.

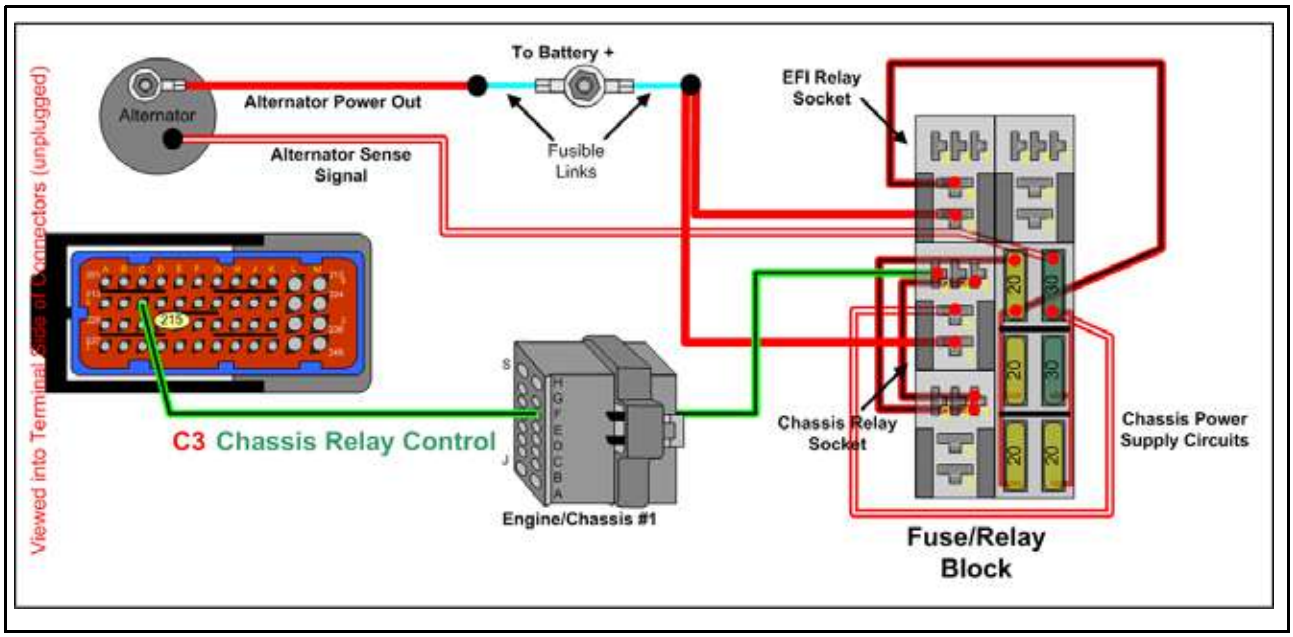
2006 Chassis Relay Circuit



The chassis relay circuit supplies battery voltage to the following systems:

- Head Lights, Tail Lights
- Hand and Thumb Warmers
- Accessory Take-Off Pigtails
- Alternator Charge Field Coil Activation (Alternator charges battery when RED/WHT circuit is energized.)
- M-10 ACE System

Chassis Relay

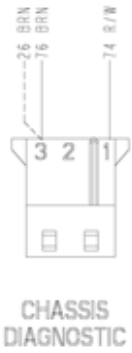


The ECU controls the chassis relay via the relay control circuit (ECU Pin 215). To verify the chassis relay circuit is energized (closed):

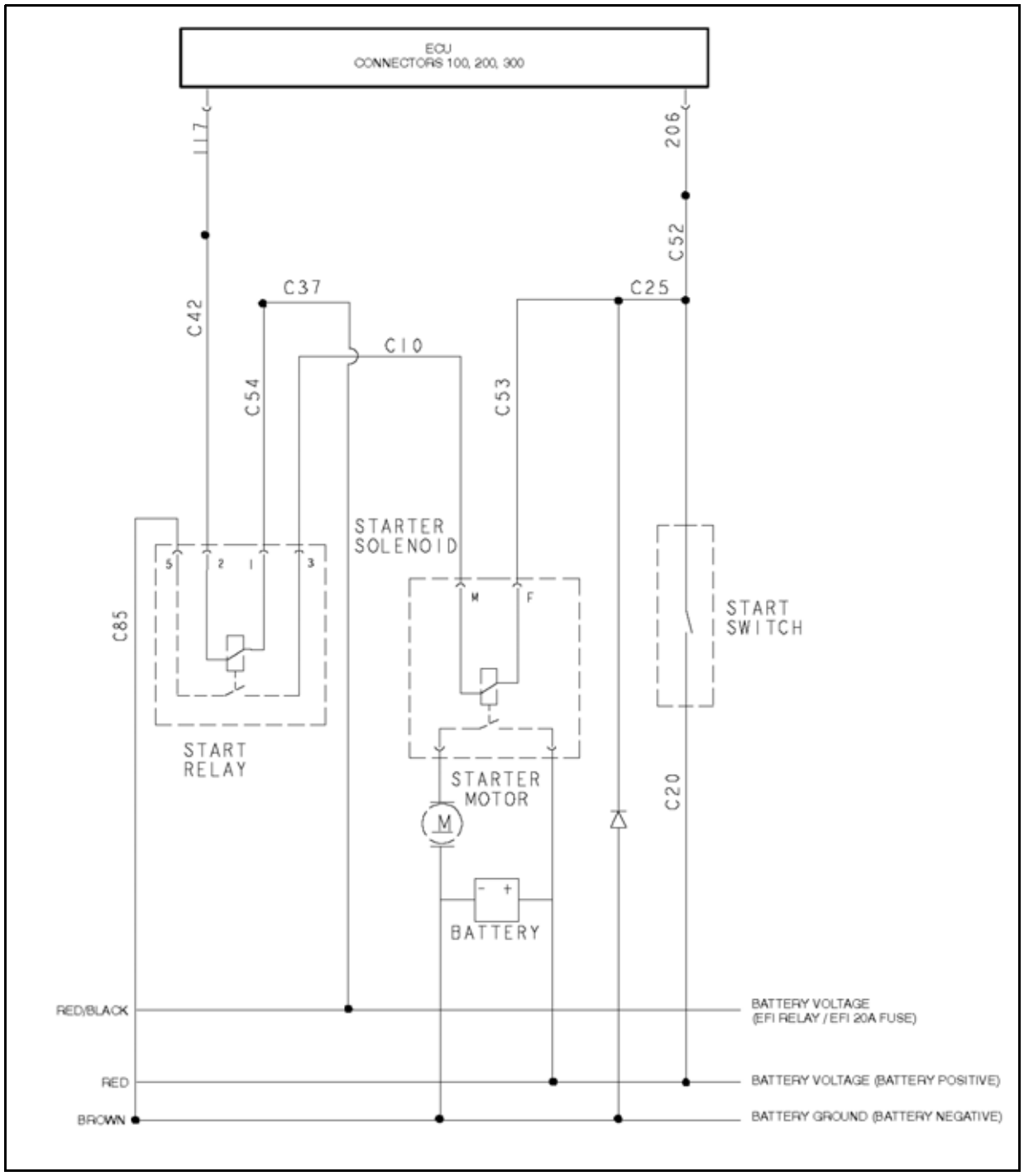
- Verify that the headlights turn on after the engine has started and the engine idle RPM has stabilized.
- Perform a Vdc test at the positive and negative battery terminals. At least 14 - 14.5 Vdc should be present at the battery terminals when the chassis relay circuit is closed.
- If 14 - 14.5 Vdc is not found at the battery when the engine is running and the headlights are illuminated, verify the RED/WHT alternator charging switch circuit is connected to the alternator. The RED/WHT circuit should show 14 - 14.5 Vdc (battery voltage) whenever the chassis relay is energized. This lead turns the alternator's charging field on (chassis relay closed) or off (chassis relay open).
- If 14 - 14.5 Vdc is found on the RED/WHT circuit at the alternator, verify the alternator drive belt has the correct amount of tension.
- Verify the fusible links are not blown.
- Replace the alternator assembly if the alternator fails to activate when the RED/WHT circuit is energized with battery voltage.

The circuits powered by the chassis relay can be energized and tested when the engine is off by supplying 12 Vdc external battery voltage to the chassis diagnostic plug. The plug is located underneath the handlebar cover.

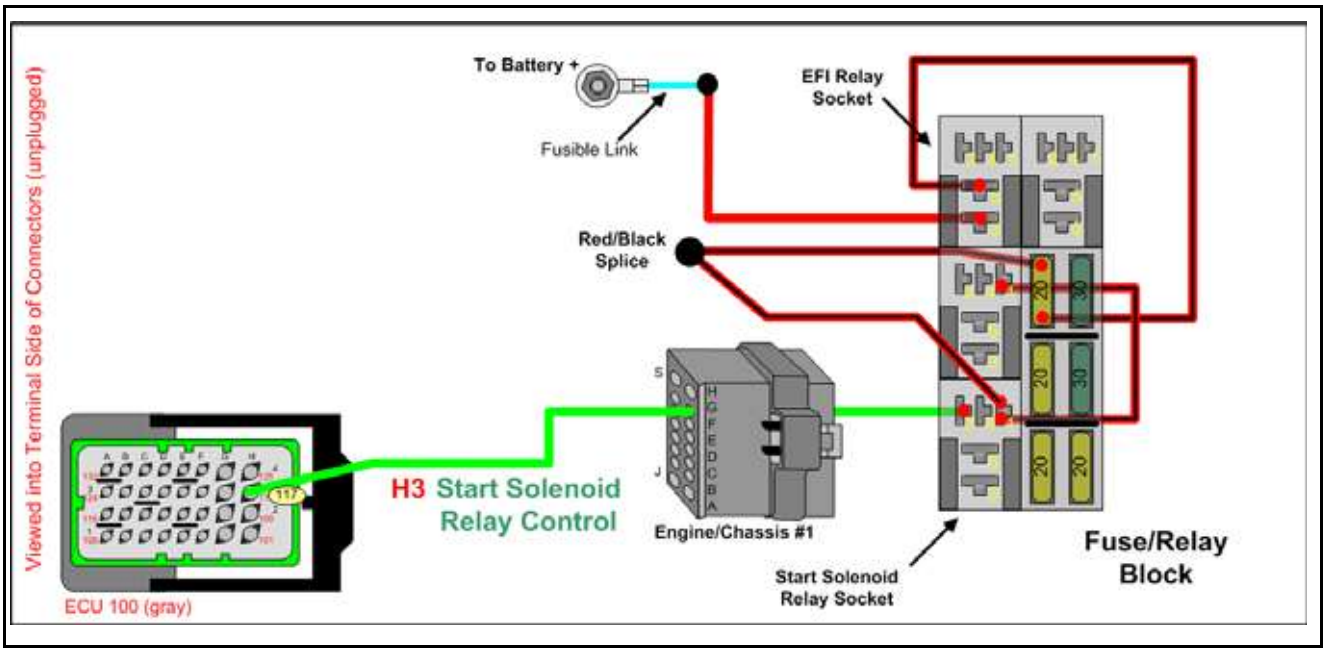
When connecting an external 12 Vdc battery to the chassis diagnostic plug, connect the RED(Positive) wire to the RED/WHT plug terminal and the BLACK(Negative) wire to the BROWN plug terminal.



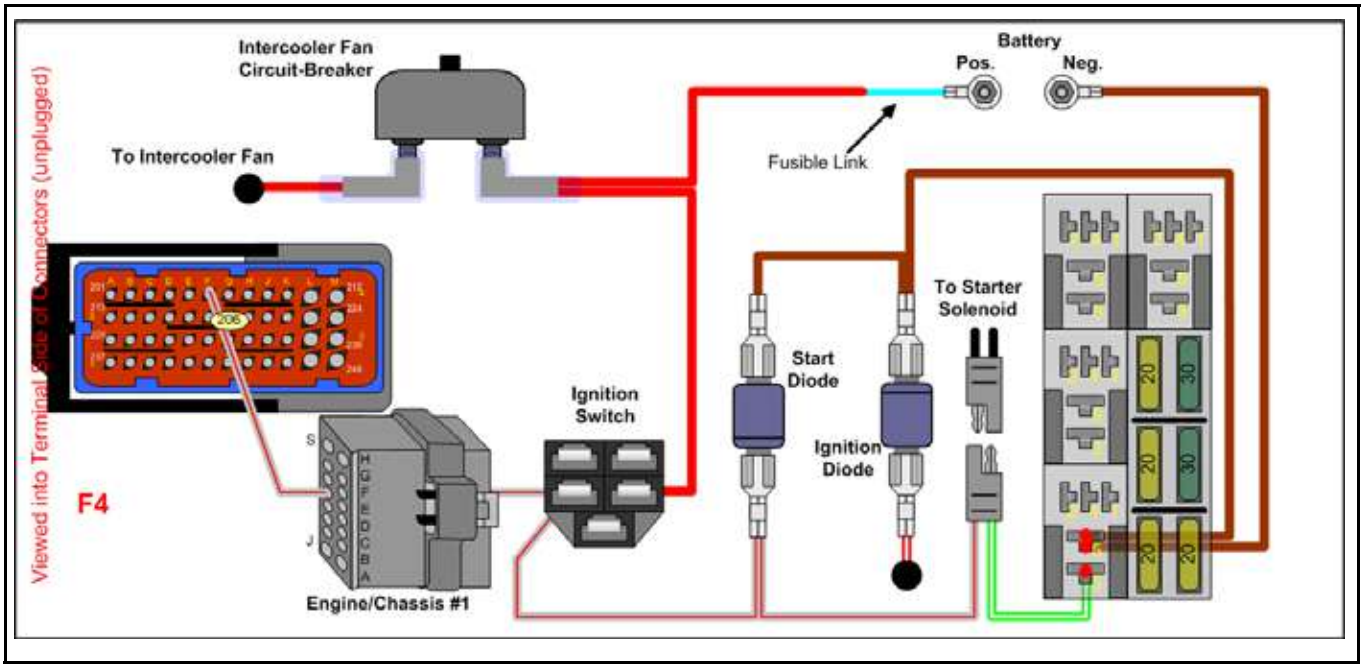
Start Solenoid Relay Circuit



Start Solenoid Relay Control Circuit



Start Solenoid Grounding Relay Circuit

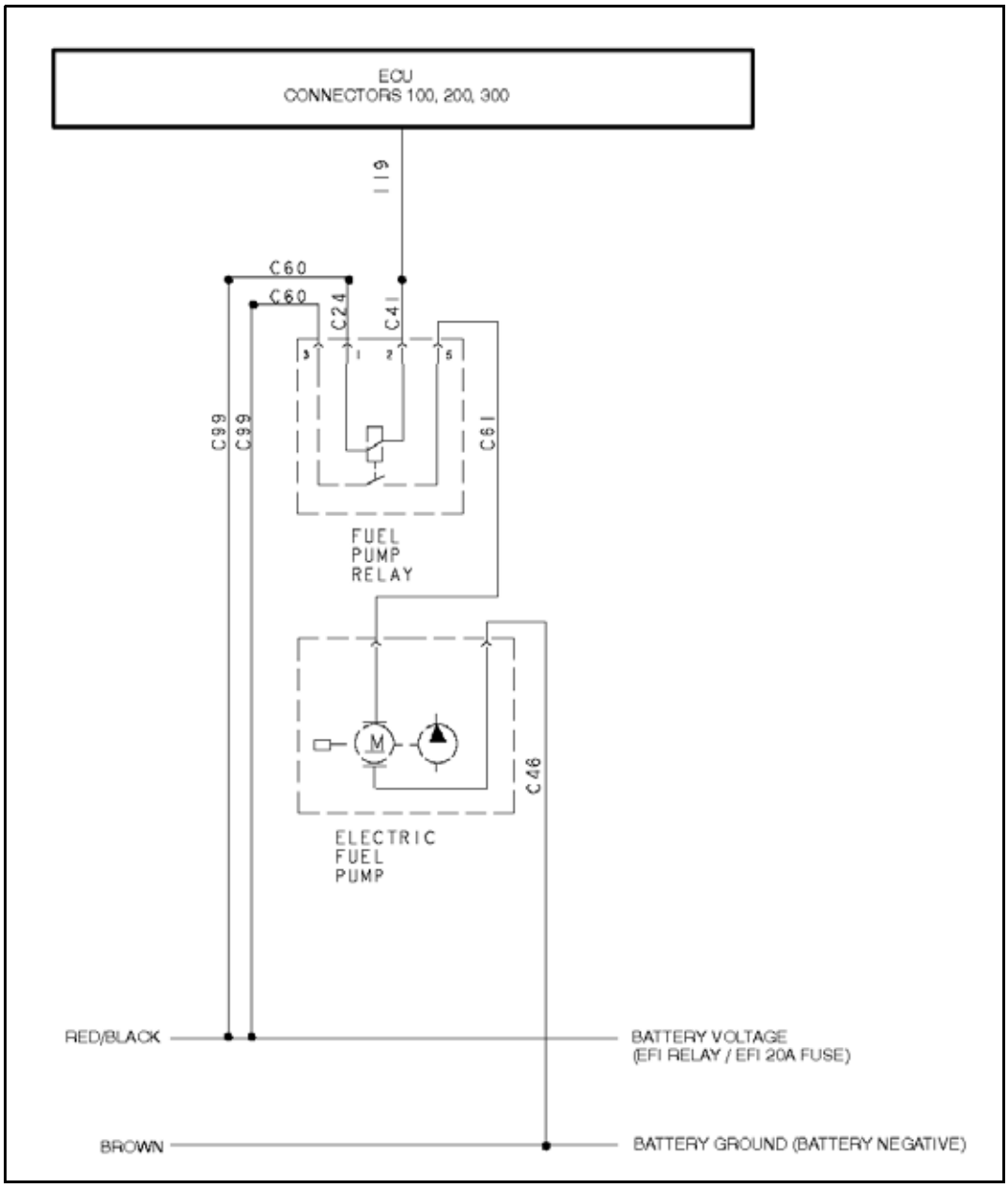


The start solenoid is responsible for completing the starter motor solenoid's ground circuit. The start solenoid relay DOES NOT directly supply power to the starter motor.

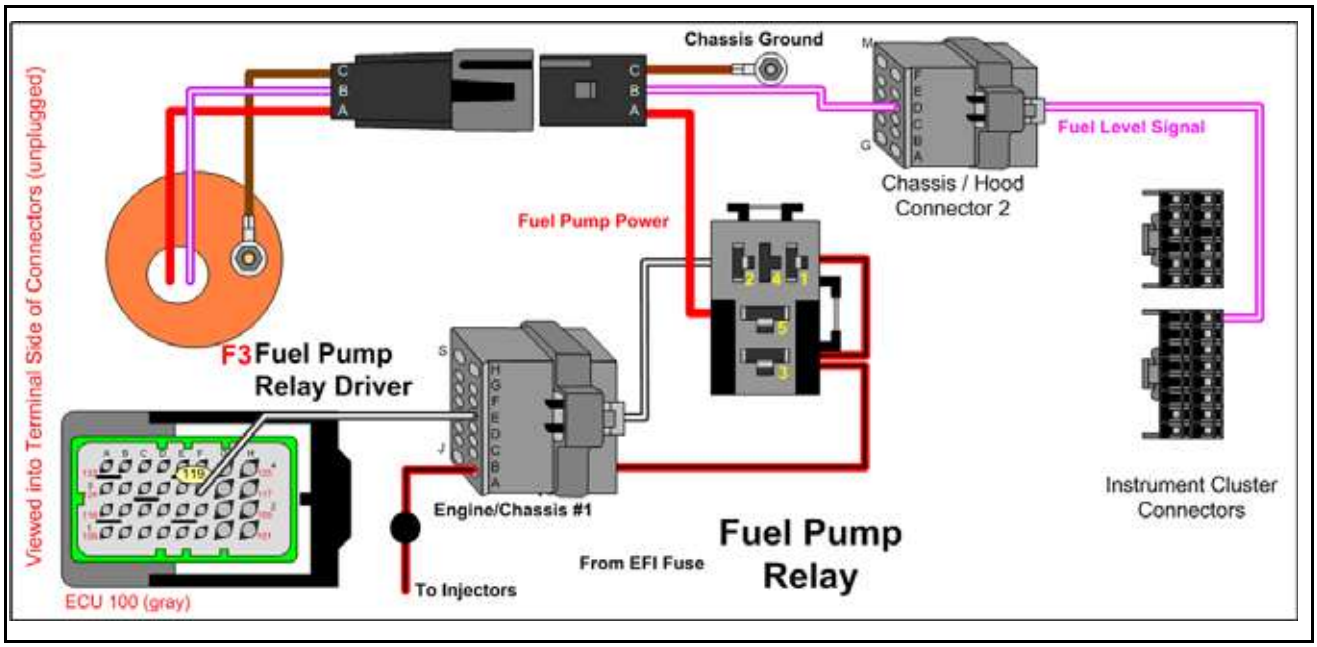
Battery voltage is supplied to the power-side of the starter motor solenoid when the key is turned to the "START" position. The ECU will activate the start solenoid only when the safety slap switch is in the "UP" position.

The key-switched start solenoid power supply is protected with a diode to prevent voltage back-feeding during starter motor activation and de-activation.

Fuel Pump Relay Circuit

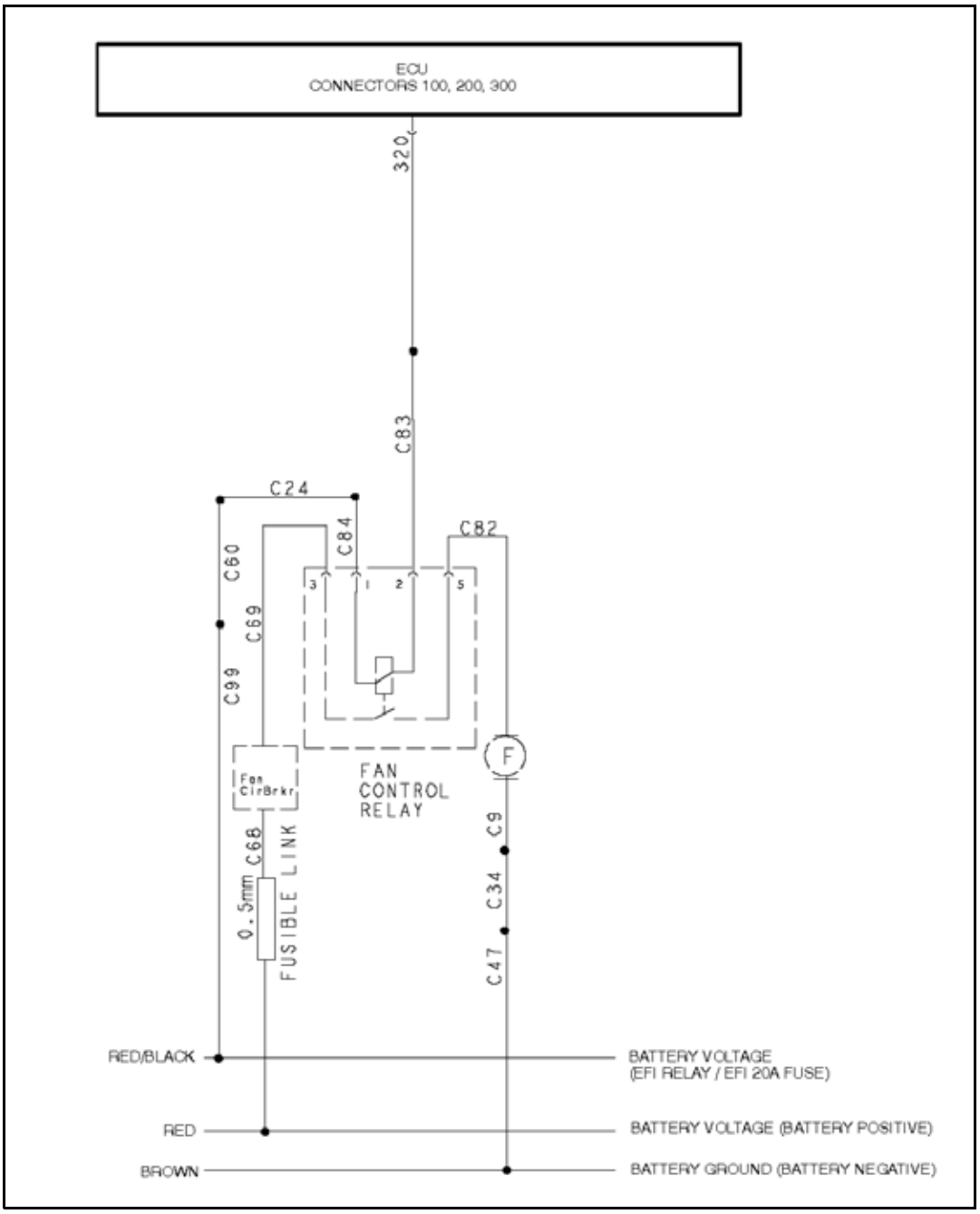


Fuel Pump Relay Circuit

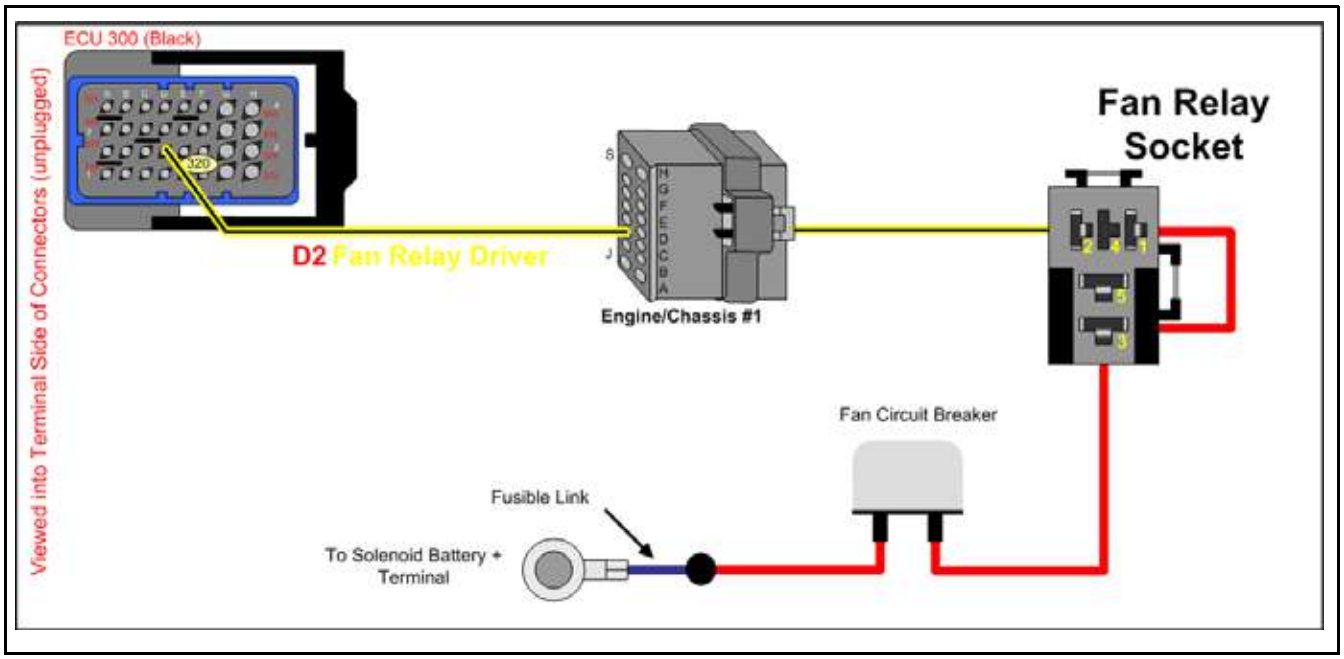


The ECU controls the fuel pump relay via the fuel pump relay driver control (ECU Pin 119). When the relay is activated (closed), EFI-fused protected battery voltage is supplied to the fuel pump motor inside the fuel tank.

Charge Air Cooler (Intercooler) Fan Relay Circuit

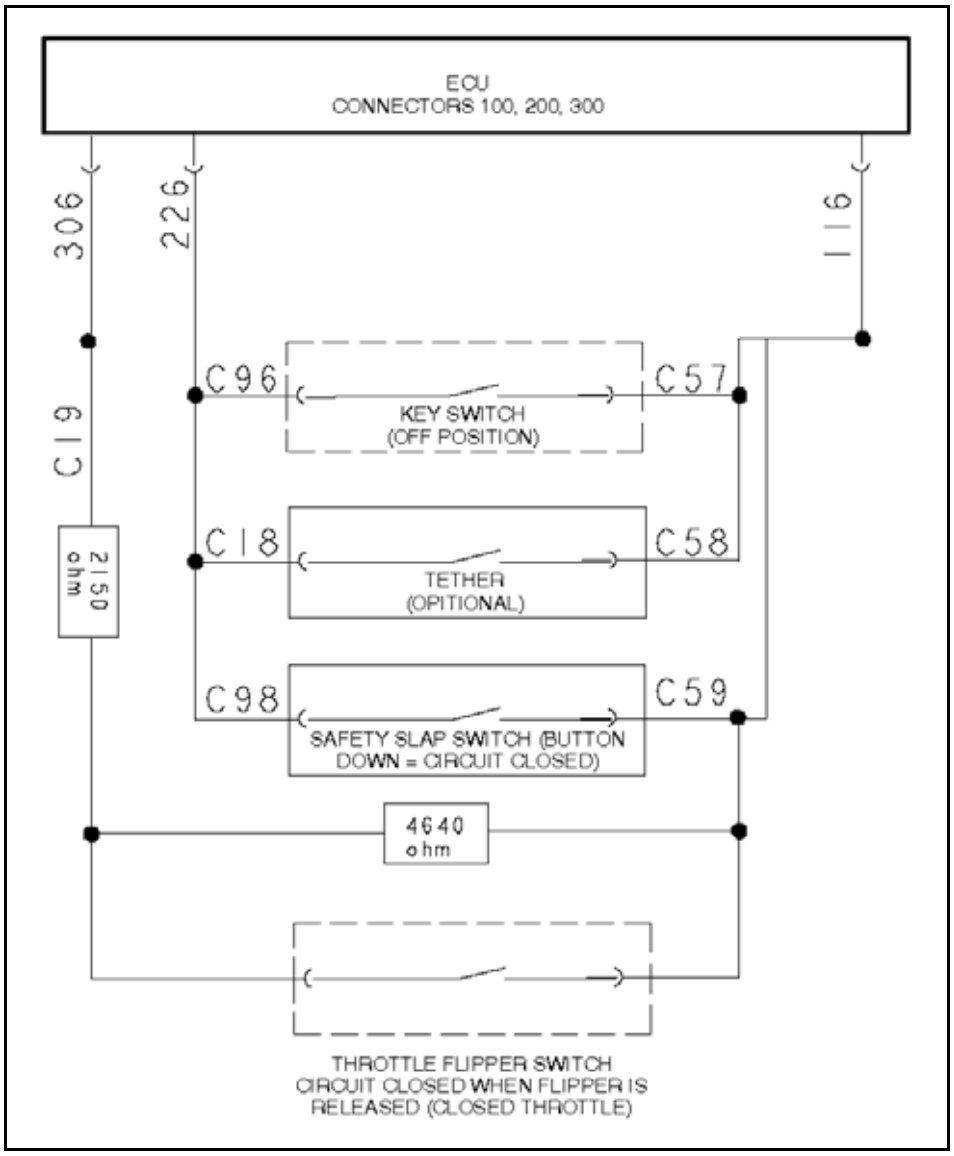


Charge Air Cooler Relay Circuit

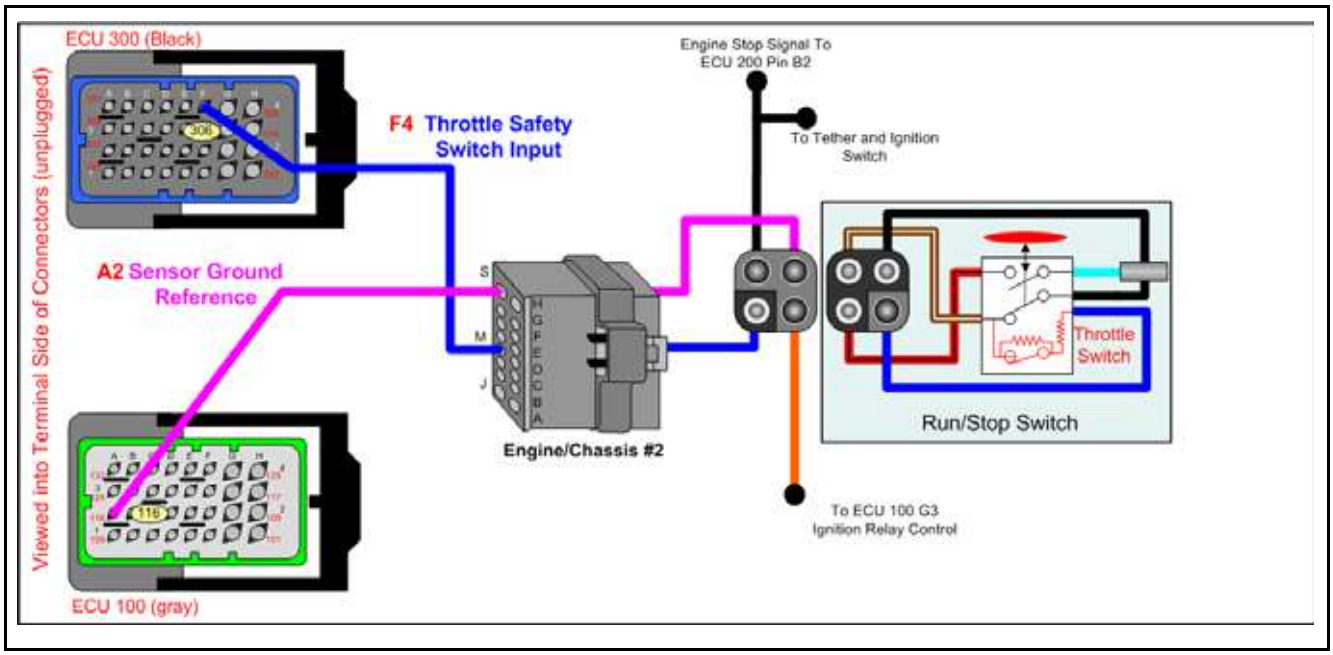


The ECU controls the CAC fan with the CAC fan relay. A circuit breaker is installed on the fan's power circuit to prevent fan / electrical system damage in the event the fan becomes jammed or obstructed. The circuit breaker will reset itself when given time to cool down.

Engine Stop / Throttle Safety Stop Circuits



Throttle Safety System



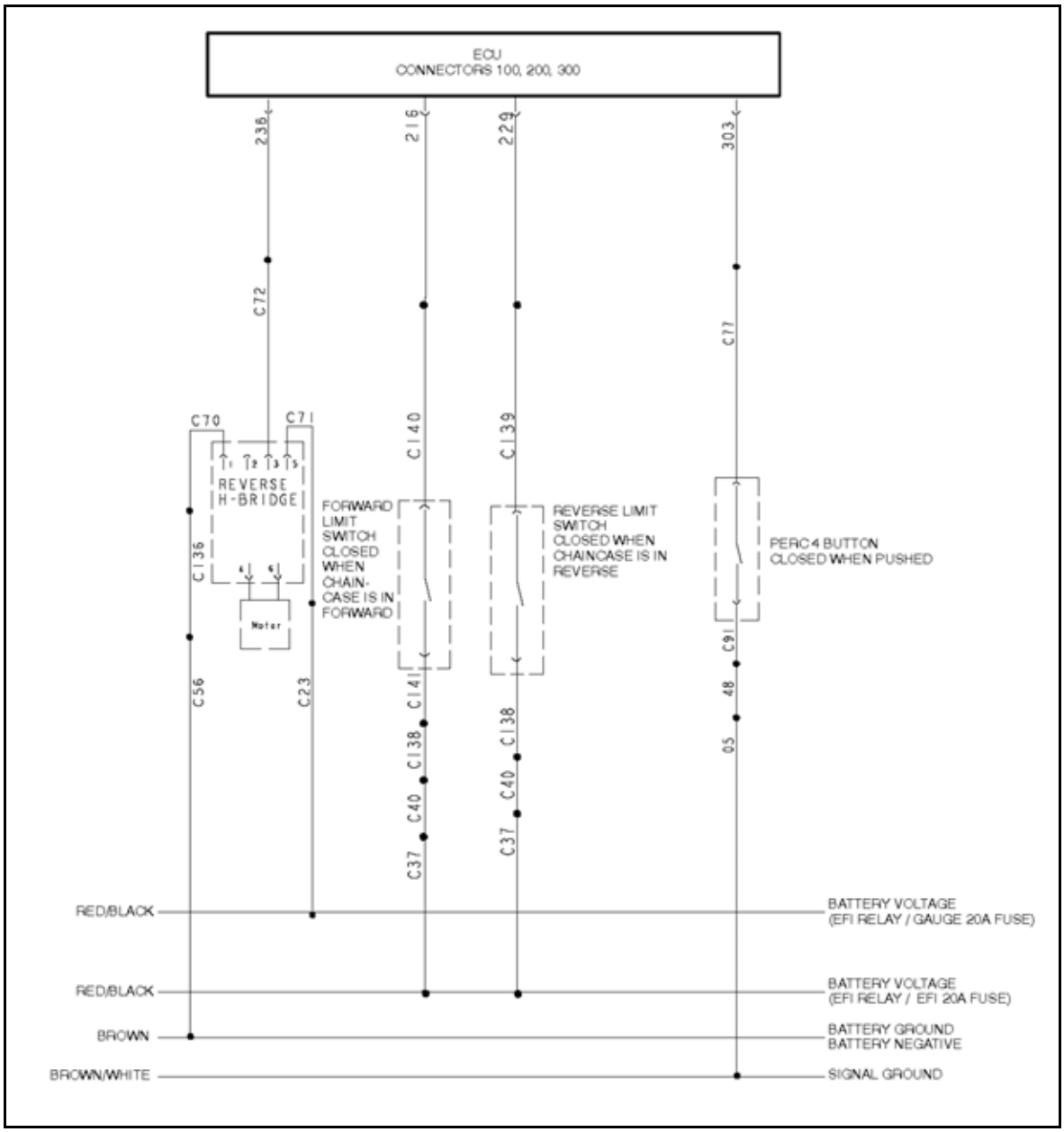
The ECU monitors the position of the throttle lever and determines if the lever is open or closed by the sensor signal returned by the throttle safety circuit. The ECU then compares the returned signal to the signal returned by the Throttle Position Sensor (TPS). If the ECU determines that the throttle flipper is closed “released”, but that the TPS is not at idle position, the ECU will determine that there is a potential problem with the throttle cable and enter engine-RPM limit / vehicle speed mode

When the throttle lever is closed, the resistance between the switch’s BRN/W and BLUE wires should be approximately 2150Ω.

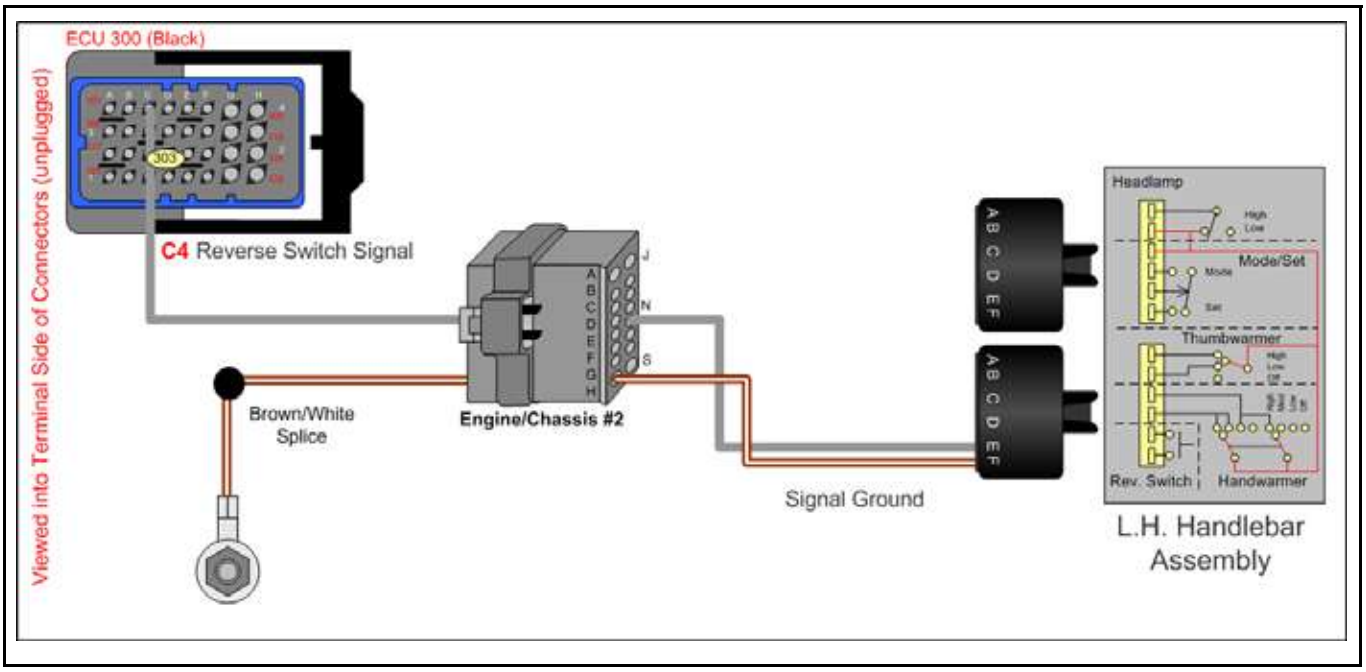
Once the throttle flipped is pushed, the resistance between the BRN/W and BLUE wires should be approximately 6810Ω.

Pushing the safety slap switch “down” while the engine is running will open the ignition relay coil, thus turning off the ignition system.

Perc 4 Reverse System Circuits

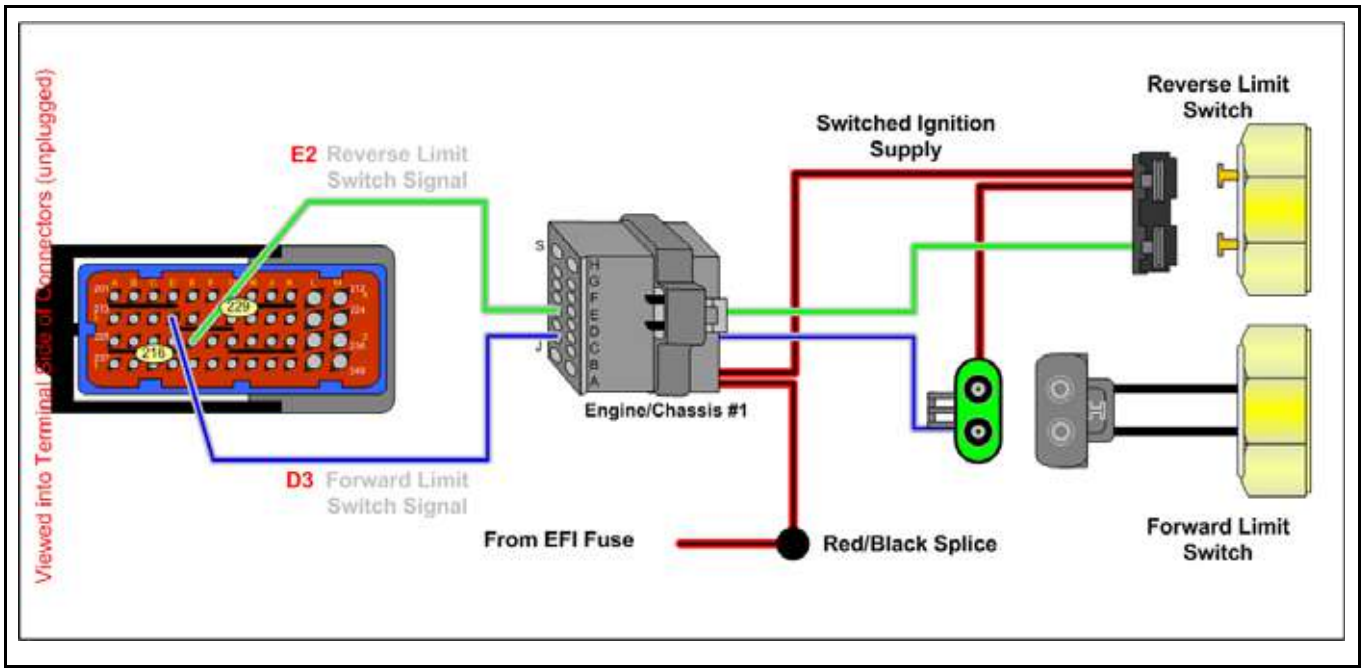


Perc 4 Button Circuit



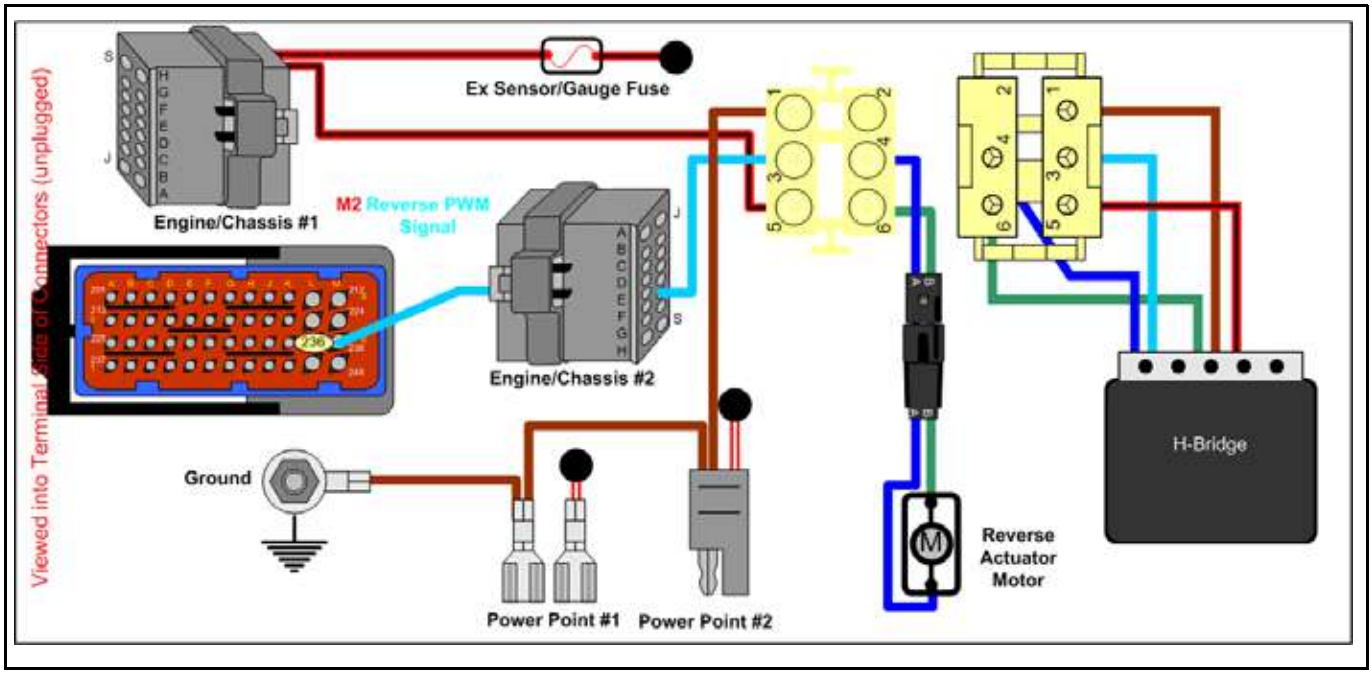
Pushing the Perc 4 button completes the reverse switch signal circuit. This action enables to the ECU to begin the reverse-request functions.

Forward / Reverse Limit Switch Circuits



The forward / reverse switches allow the ECU to determine the position of the shift fork inside the chaincase. In forward, the forward limit switch is depressed. When depressed, battery voltage is routed to the ECU via the forward limit switch signal circuit. In reverse, the reverse limit switch is depressed. When depressed, battery voltage is routed to the ECU via the reverse limit switch signal circuit.

Perc 4 Forward Reverse Controller Circuit

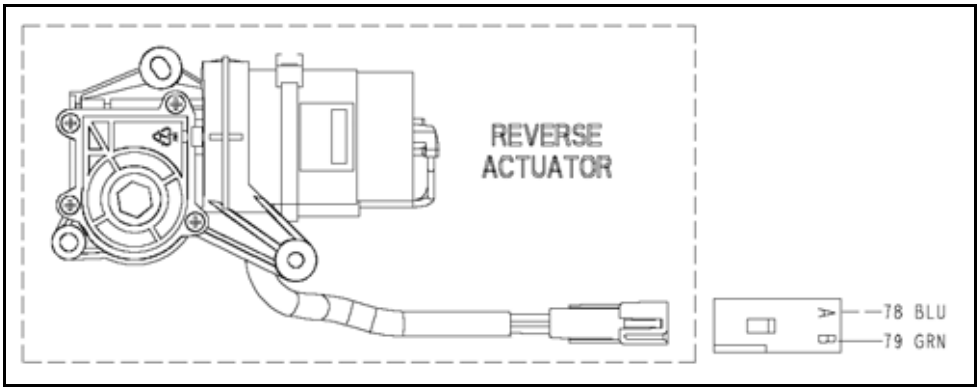


The Perc 4 reverse controller is a polarity-switching driver module that can operate the reverse motor either clockwise or counter clockwise by changing the polarity of the power and ground circuits.

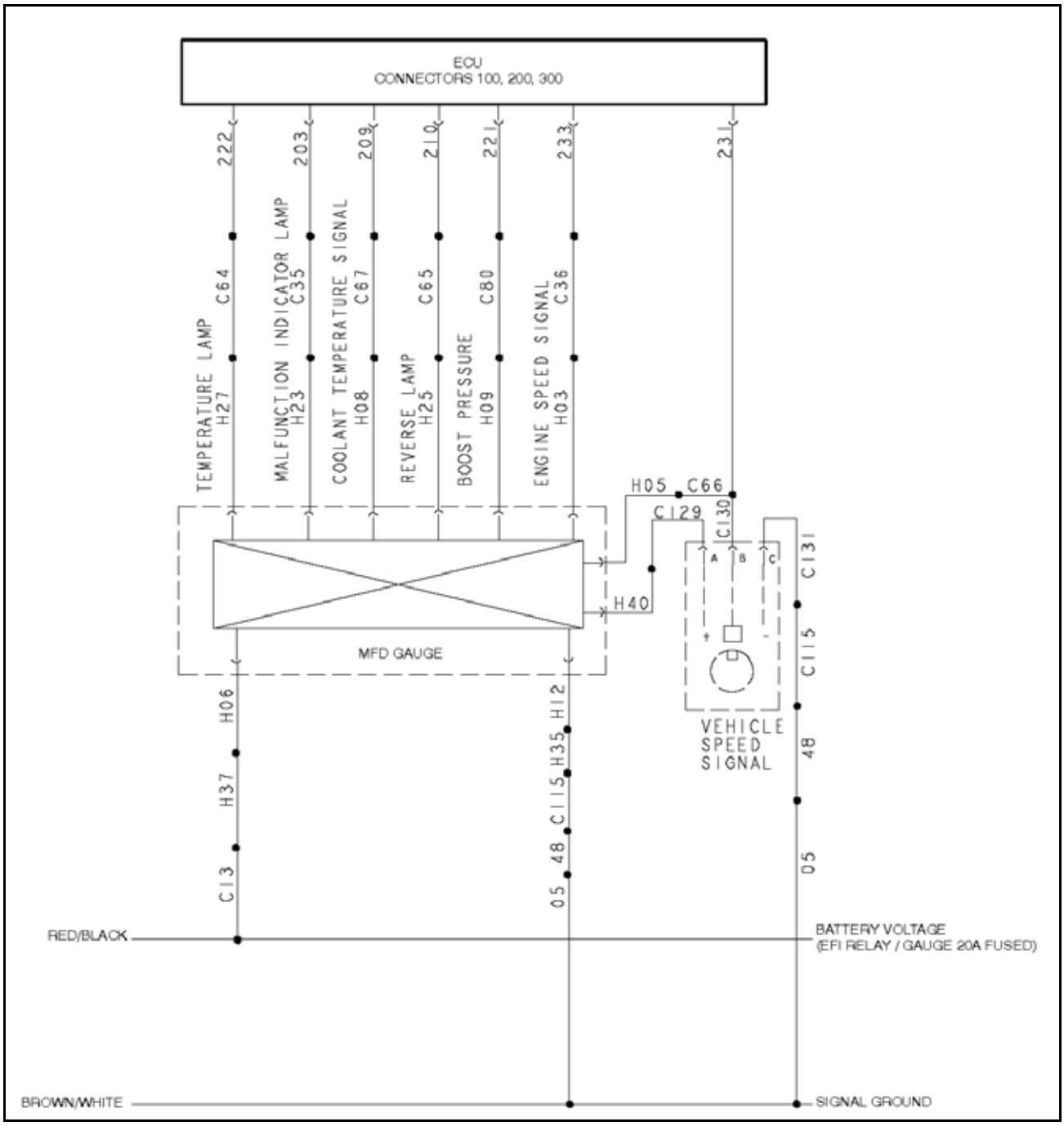
The ECU commands the reverse controller via the reverse PWM signal circuit.

The Perc 4 reverse system works in the following manner:

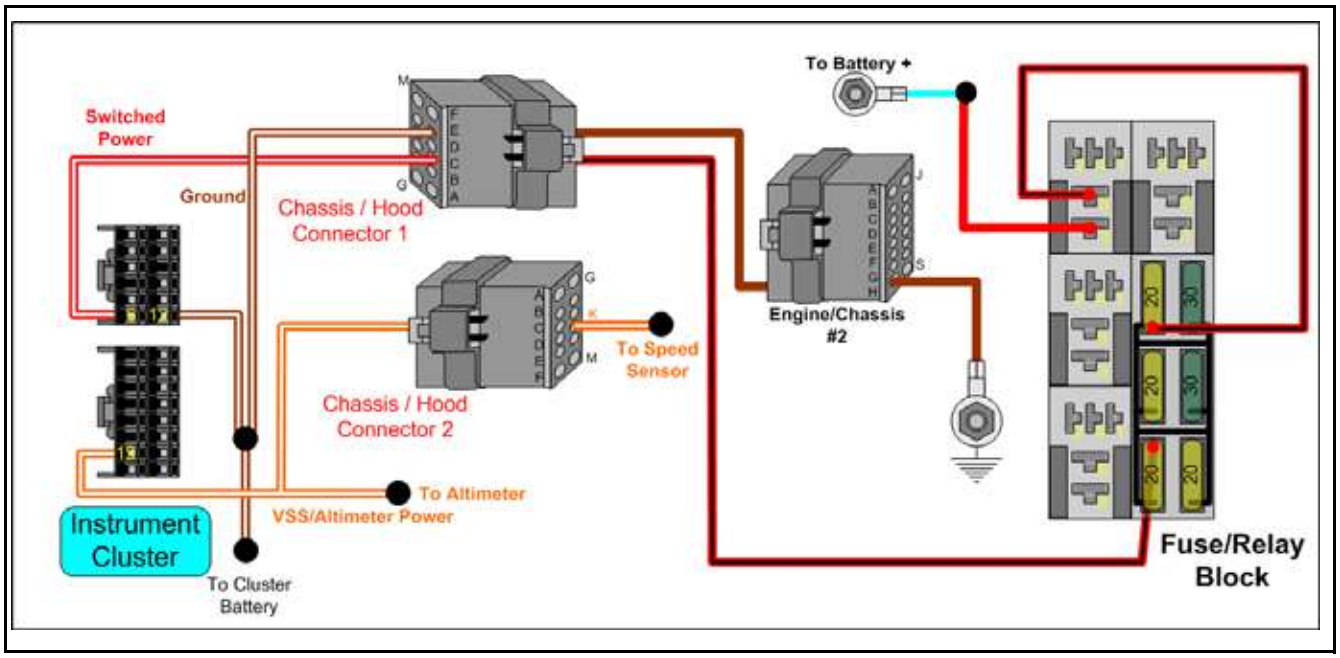
1. Operator requests reverse gear while the engine is running.
2. ECU determines if the shift fork is in the forward or reverse position by analyzing the FWD and REV limit switch signal returns. If the ECU cannot determine the position of the shift fork, the operator's request for reverse gear will be canceled and a diagnostic trouble code generated.
3. The ECU will "request" reverse gear from the reverse controller module. The controller will then activate the reverse actuator motor which connects to a worm gear inside the chaincase. The ECU will signal the controller to stop the worm gear when the REV limit switch is depressed by the moving shift fork. If the reverse controller determines that a problem exists with the actuator motor or shift fork worm gear, the controller will shut down, alert the ECU, and a diagnostic trouble code will be generated.
4. The process when shifting from REV gear to FWD gear is the same as described when moving from FWD to REV gear. The ECU, and reverse controller will always return the shift fork to the FWD position whenever the machine is started. The ECU will also command the motor to drive the shift fork FWD a second time to ensure the transmission is in FWD gear.



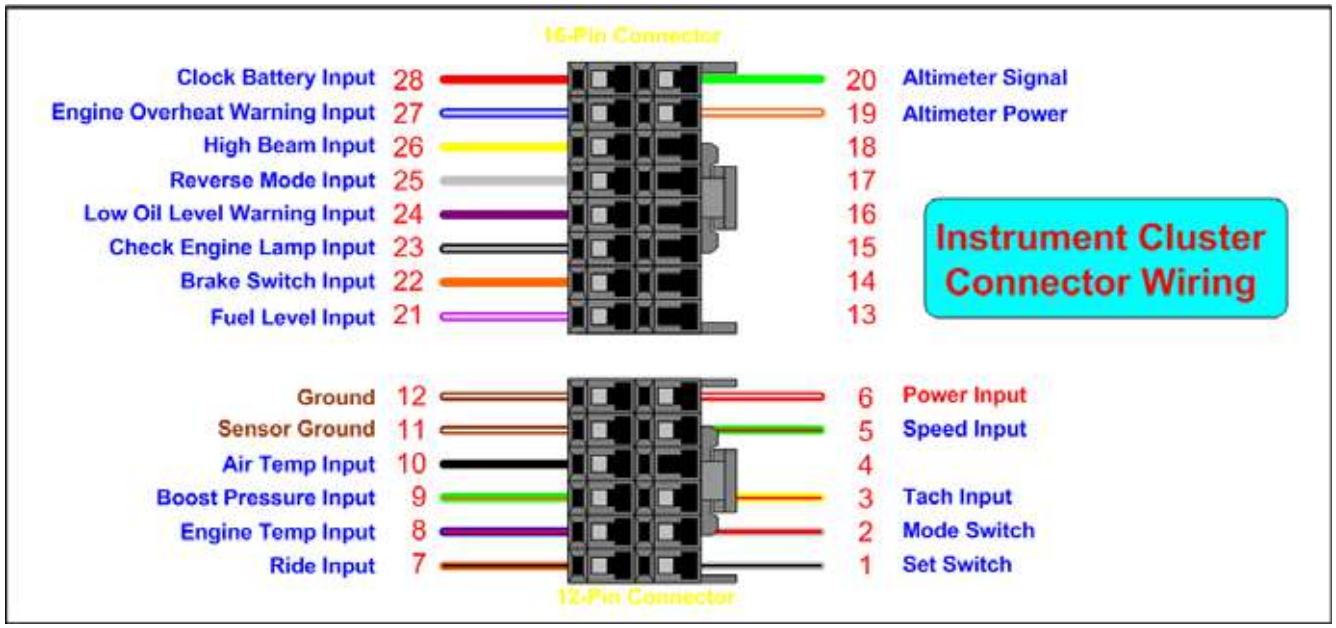
Multi-Function Display (MFD) Circuits



Multi-Function Display Power Circuit

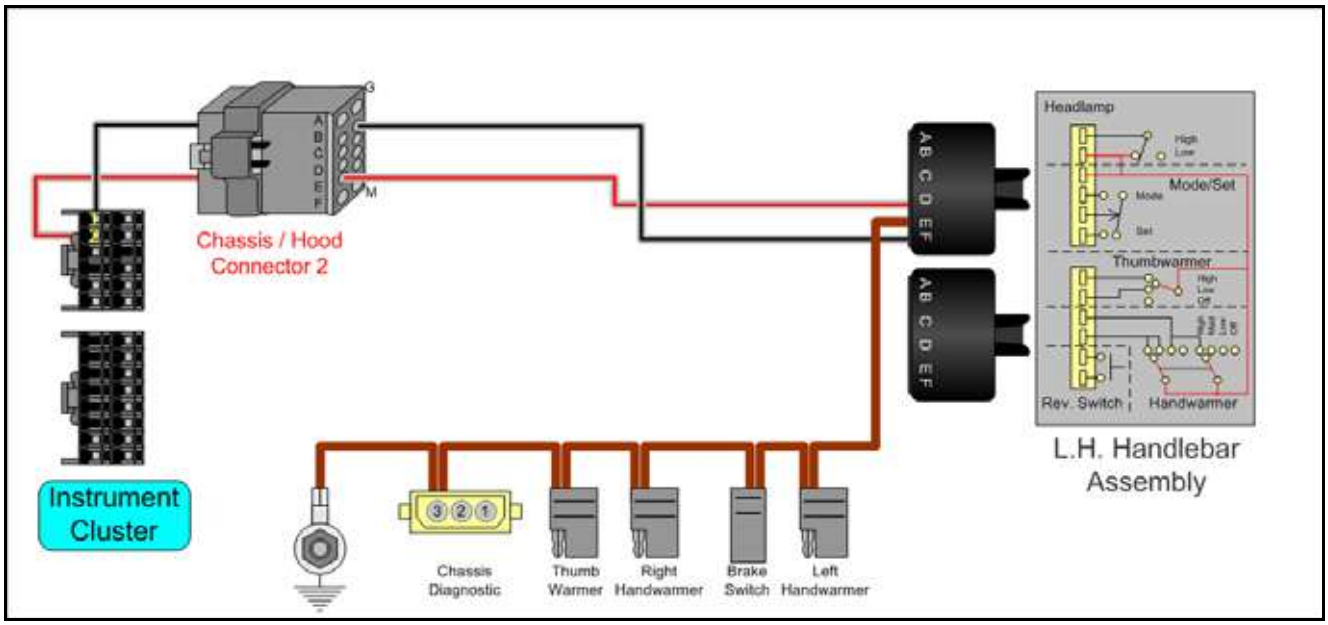


Multi-Function Display Inputs / Outputs

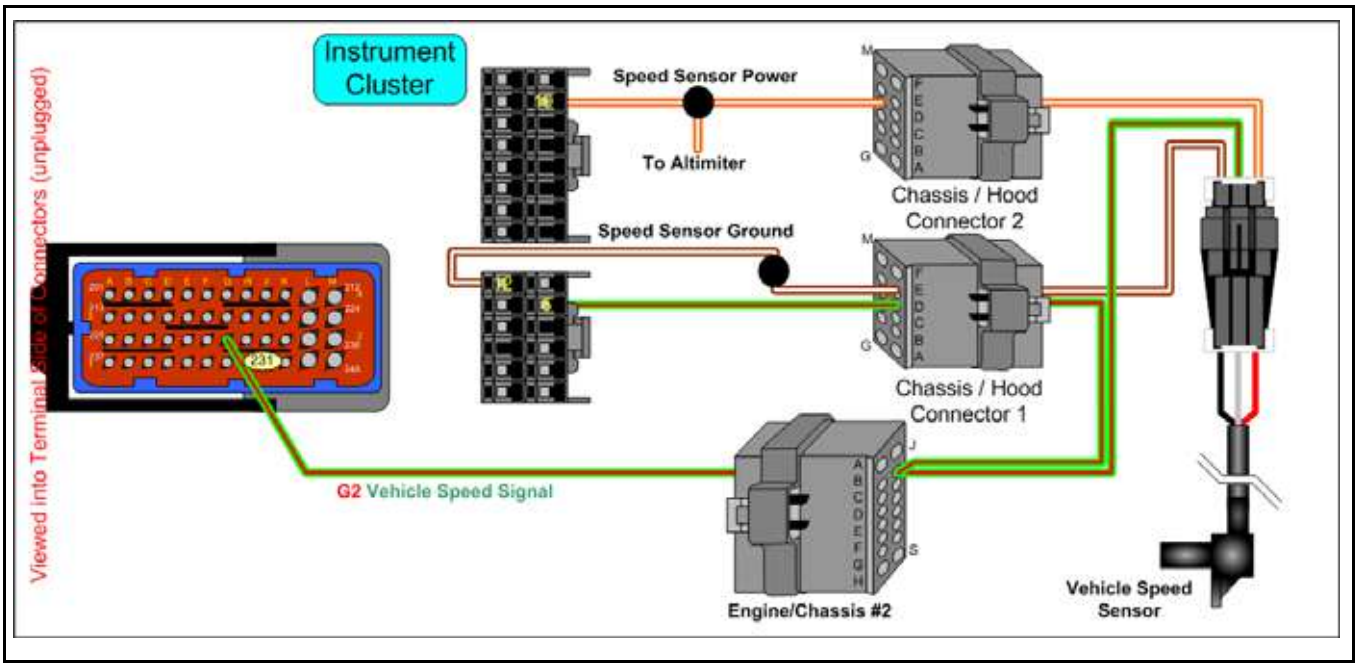


Mode / Set Switch Circuit (Non-ACE)

NOTE: Reference the schematics in the Wiring Diagram chapter for M-10 ACE circuits.



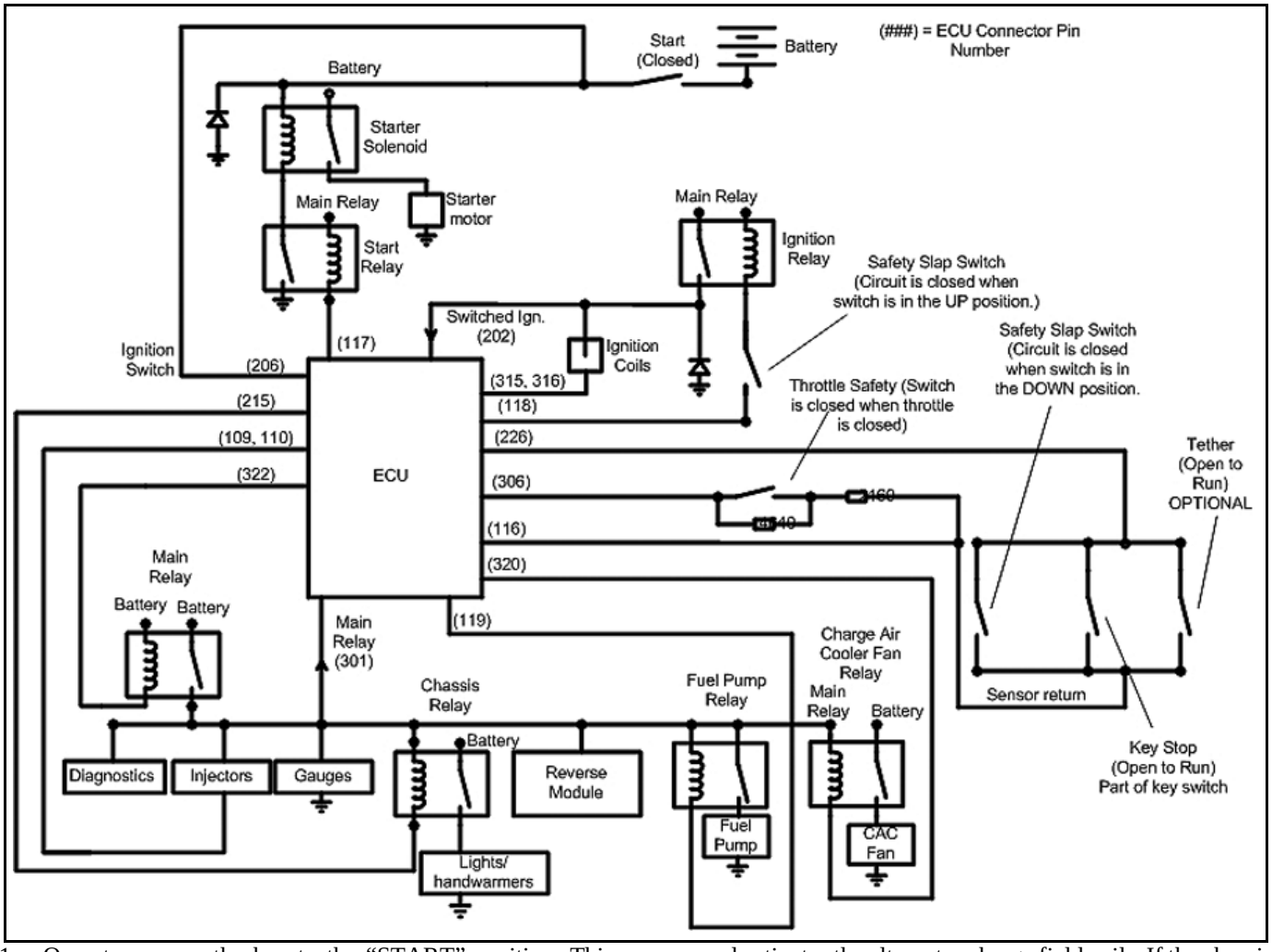
Vehicle Speed Sensor Circuit



Power-Up / Power-Down Sequence Overview

The following is an outline of the sequence of events that occur when the operator attempts to start and stop the engine on all FS

and FST snowmobiles. These sequences are critical to the starting and stopping process and should be used in any troubleshooting methods.



1. Operator moves the key to the "START" position. This action supplies battery voltage to the ECU (PIN 206). In order for the starter motor to engage, the safety slap switch must be in the "UP" position. If the safety slap switch is in the "DOWN" position, the ECU will not engage the starter motor.
2. With the key turned to "START" and the safety slap switch in the "UP" position, the ECU will activate the EFI relay via PIN 322. Power to the EFI relay is supplied directly from the battery.
3. The ECU will then activate the ignition relay, fuel pump relay, and the ground side of the start relay.
4. The start relay provides the ground path for the starter motor solenoid. The engine should turnover and start at this point.
5. The chassis relay is activated once the ECU determines the engine can maintain sufficient engine RPM to compensate for the increased electrical loads.
6. The chassis relay supplies power to the lights, power points, and activates the alternator charge field coils. If the chassis relay does not activate, the alternator will not supply voltage to charge the battery or power the electrical system.
7. The CAC fan relay (FST Only) is turned on and off as determined by the ECU.
8. To turn off the engine, the operator must either turn the key to the "OFF" position, push the safety slap switch down, or remove the optional tether.

9. When the operator commands the ECU to stop the engine, the ECU opens the ignition coil, then cuts power to the ignition coils, fuel injectors, and fuel pump.
10. The ECU then shuts off the chassis relay, removing power from the lights, power points and turning the alternator off.
11. The ECU then performs an internal shut-down sequence which can last up to two minutes. If the ECU recognizes the Digital Wrench diagnostic software during the shut-down sequence, the ECU will remain powered-up for approximately ten minutes.

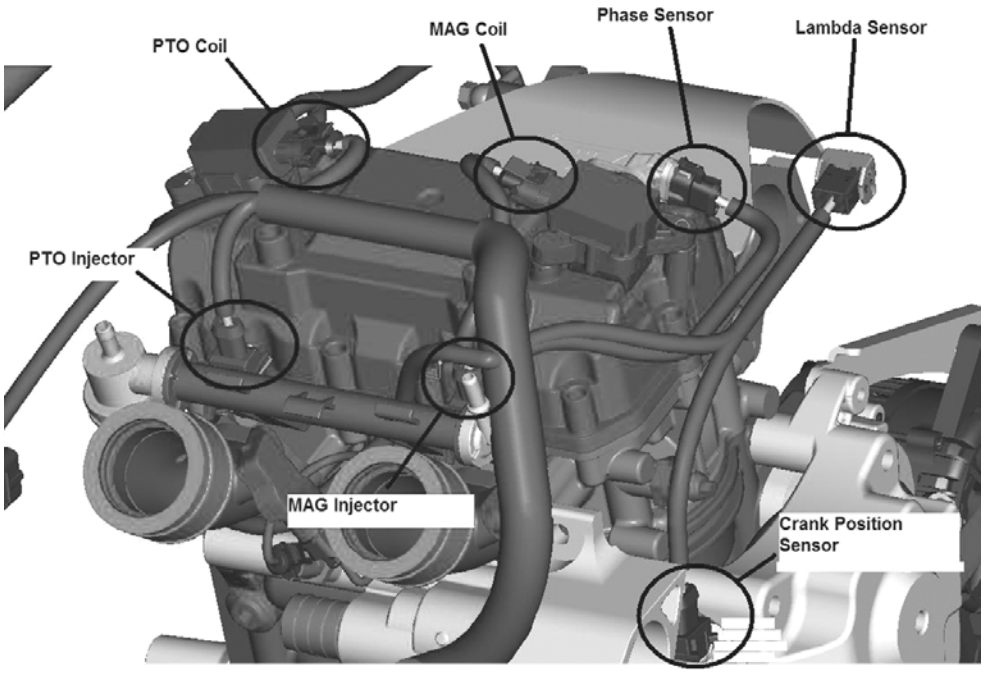
Power-Up / Power-Down Troubleshooting

1. Verify the battery is in good condition and charged. During engine turnover, the battery voltage should not drop below 11 Vdc.
2. Verify the fusible links, fuses, circuit breakers, and relays are in good condition and working properly. Replace a blown fuse, relay, or fusible link with the specified part. Do not substitute a fuse with a higher-amp-rated fuse.
3. Verify all ground wires are connected to the engine/chassis and to the battery. Test the continuity between ground wires and the engine/chassis. Resistance should equal approximately 0 (zero) ohms.
4. Verify the ignition key switch works properly.
5. Verify the safety slap switch works properly.
6. Verify the throttle lever (flipper) works properly.
7. Check all sensor, and electrical component connections. Connections must be clean, tight and free from damage.
8. Verify the fuel tank is at least 1/8 to 1/4 full.
9. The ECU can be “reset” by:

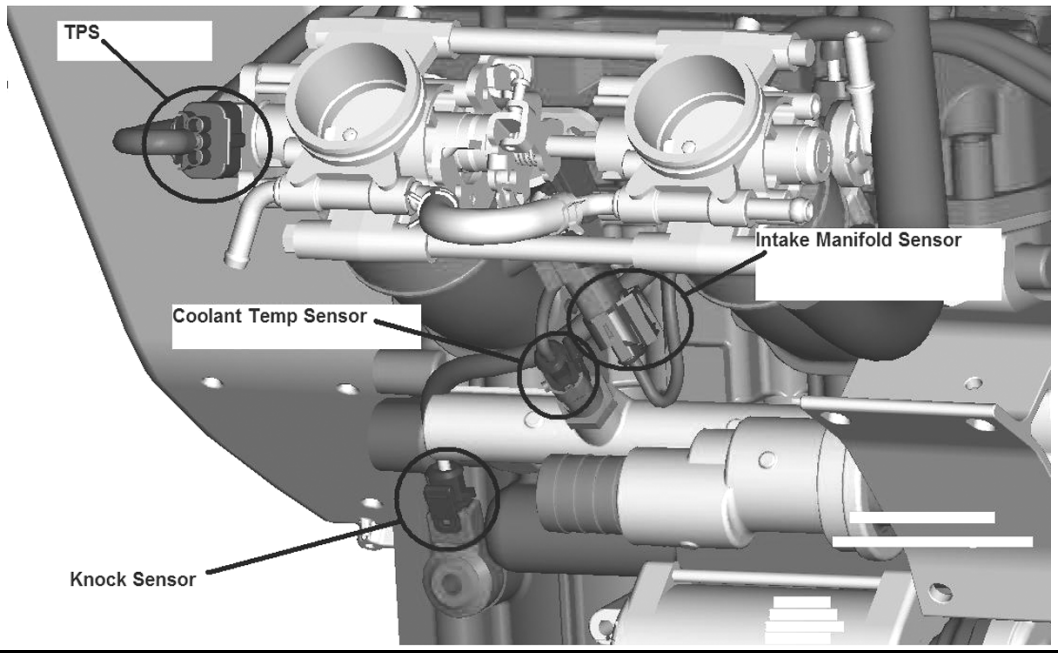
    - Push the safety slap switch down.
    - Insert the ignition key, then turn to the “START” position. Release key.
    - Remove the EFI relay from the relay panel.
    - Turn the Ignition key to the “OFF” position. Install the EFI relay.

2007 SELECTED HARNESS ROUTINGS

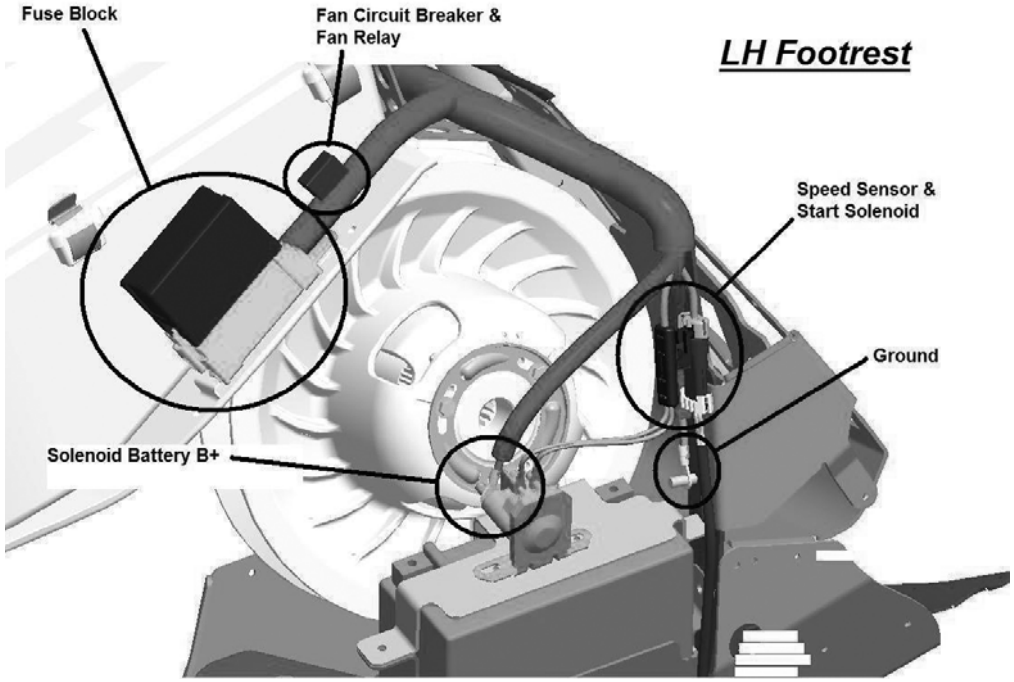
Cylinder Head Routings



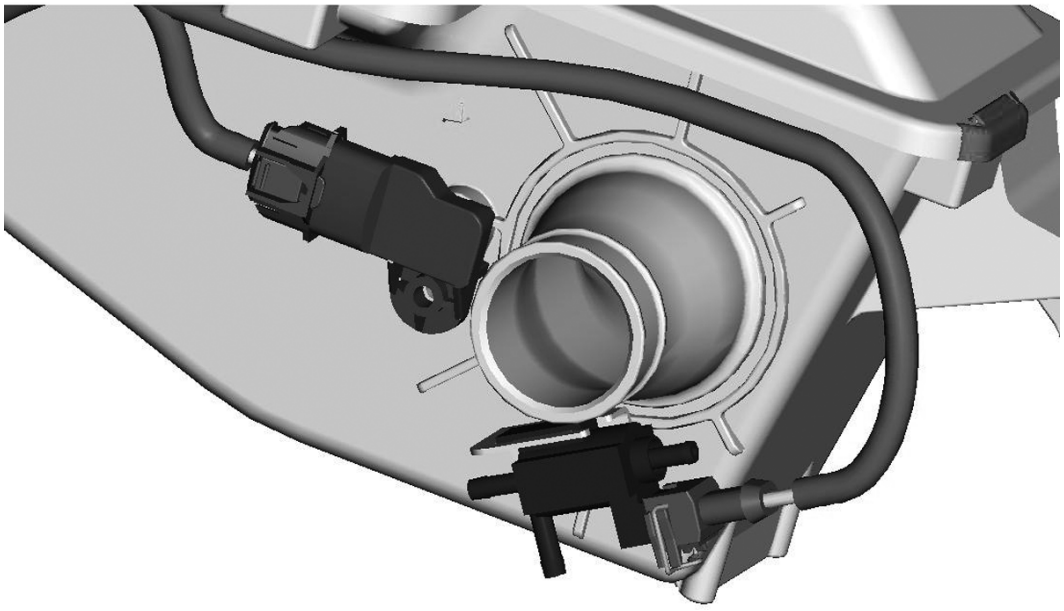
Crankcase / Throttle Body Routings



LH Foot Rest Routings



Ambient Pressure / Wastegate Solenoid Routings



M-10 ACE

Overview

The M-10 ACE system allows the rider to adjust the M-10 rear suspension FRA position electronically by pushing the Mode / Firm or Set / Soft Switch on the left handlebar control.

The ACE system consists of the following components:

- Mode / Firm - Set / Soft Switch - Used in conjunction with the ACE / Gauge console rocker switch. In the ACE mode, pushing the switch up is for a firmer setting, while pushing the switch down is for a softer setting. In the Gauge mode, the switch controls the MFD display settings.
- (A)CE / (G)auge Console Rocker Switch - The switch allows the rider to control either the MFD gauge settings or the ACE controller. In the ACE position, the ACE Controller will move the FRA and signal the FRA's position to the MFD gauge. In the Gauge position, the ACE controller will pass the Mode/Set signals to the MFD gauge.
- Ace Controller - Located behind the left foot rest, this controller reads the position of the ACE / Gauge Rocker Switch, position of the Mode/Firm - Set/Soft Switch, and the actuator motor potentiometer position. If will also output actuator motor forward and reverse drive power, ride position signal to the MFD gauge, and protect the ACE system from short circuits and power surges.
- The controller reads the position of the potentiometer and supplies a signal to the gauge. Full soft is 0 volts, full firm is around 5.5 volts. The entire system will function without a gauge, but if the gauge is operational, most likely the potentiometer is also good
- Actuator Motor - Drives the ram that moves the FRA.
- Potentiometer - Used to signal the position of the FRA ram. When the ram is fully retracted, the resistance is 120 ohms. When fully extended, the resistance is 650 ohms.

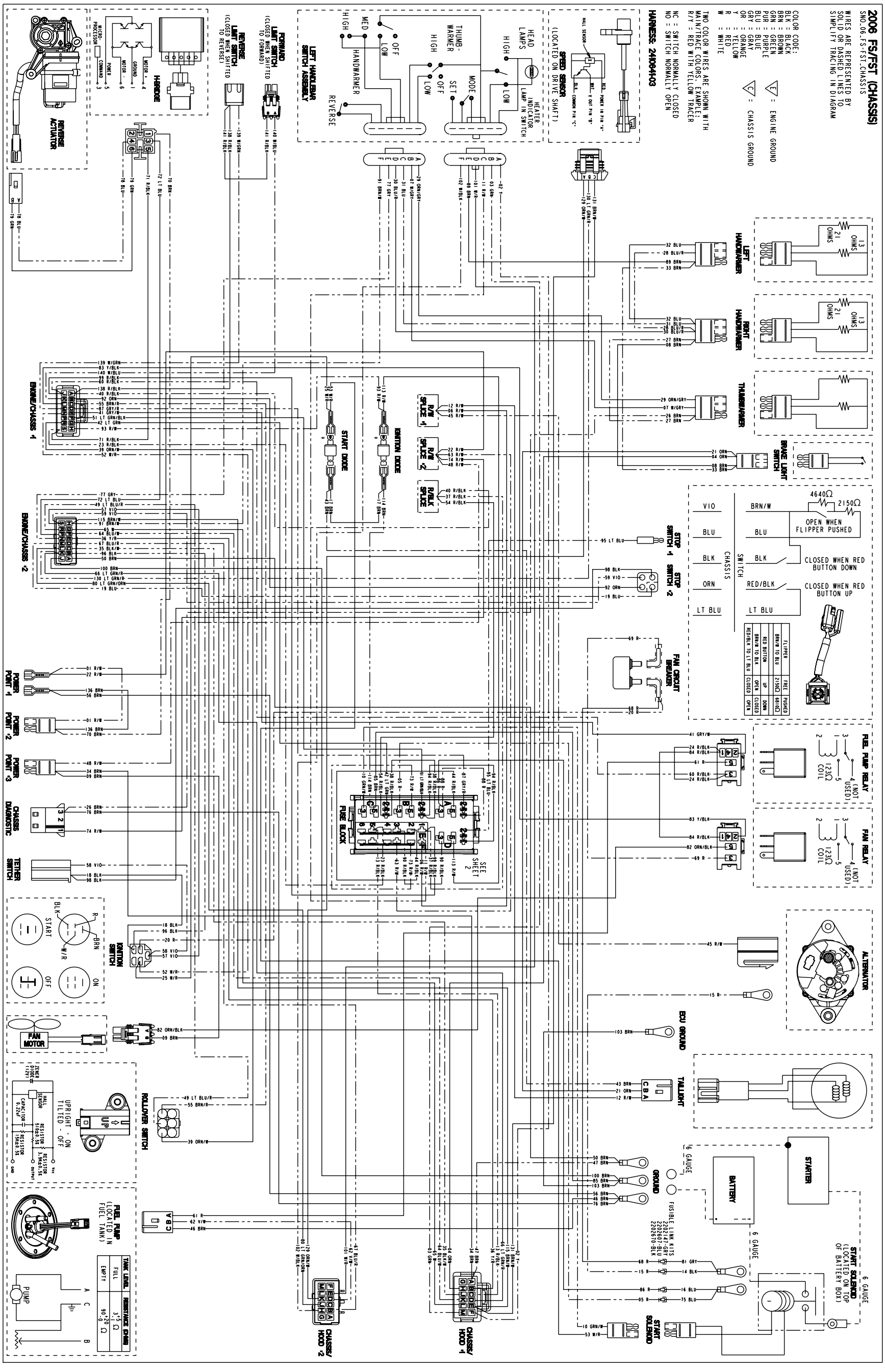
Checking Components

When checking the function of all the ACE components, use the supplied service tool part number PA-46355. The power supply must be able to supply at least 13.1 volts and 5 amps (as most battery chargers WILL NOT WORK).

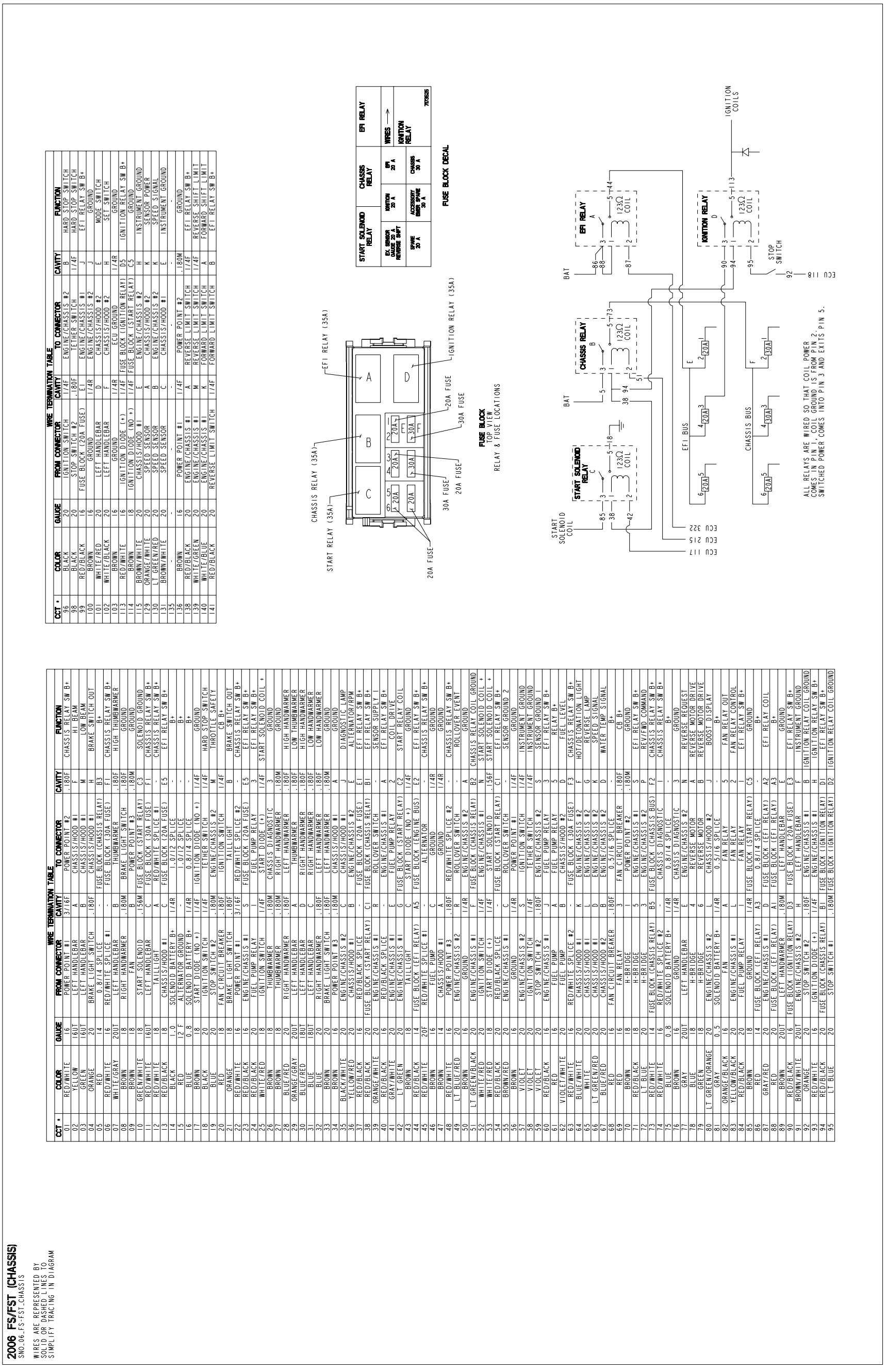
Connect the tool to the CHASSIS DIAGNOSTIC POWER SUPPLY PLUG.

ITEM	CHECK
ACE MOTOR	Disconnect the BLUE and GREEN wires from the controller and apply 12 volts across these wires. The motor should move either in or out. Change the polarity and the direction should change. If the motor does not move, check wire continuity to the motor. If continuity is good, replace motor.
POTENTIOMETER	Check basic resistances: 1000 ohms between BLACK and ORANGE. Fully Retracted (Firm Setting): 120 ohms between BLACK and WHITE. Fully Extended (Soft Setting): 650 ohms between BLACK and WHITE. If these resistances are not to spec and/or they do not change as the motor moves, replace the potentiometer.
LEFT HAND SWITCH	Continuity between BROWN and the WHITE/GREEN when the switch is depressed in the firm direction. The same is true for the GREEN/WHITE when depressed in the soft direction. Replace the switch if otherwise.
CONTROLLER	All the following must be true or the controller must be replaced. a. With the system powered up using the jumper, measure the voltage across the BLUE and GREEN wires (motor wires). A voltage of -13 to 13 volts should be present when the switch is depressed. b. A voltage of 0--6 volts should be measured between the ORANGE and BROWN gauge wires when the system is powered. This voltage should change accordingly when the system is adjusted (near 6 volts at firm, near 0 volts at soft). c. 5 volts +/- 1 should be measured between the ORANGE and BLACK module leads when the system is powered.

2006 FS / FST Chassis 1 of 2



2006 FS / FST Chassis 2 of 2



WIRE TERMINATION TABLE

CCT *	COLOR	GAUGE	FROM CONNECTOR	CAVITY	FUNCTION
96	BLACK	20	IGNITION SWITCH	1/4F	EFI RELAY SW B+
98	BLACK	20	STOP SWITCH #2	.180F	HARD STOP SWITCH
99	RED/BLACK	16	FUSE BLOCK (20A FUSE)	EI	EFI RELAY SW B+
100	BROWN	16	GROUND	1/4R	EFI RELAY SW B+
101	WHITE/RED	20	LEFT HANDLEBAR	D	GROUND
102	WHITE/BLACK	20	LEFT HANDLEBAR	F	GROUND
103	BROWN	16	GROUND	1/4R	
113	RED/WHITE	16	IGNITION DIODE (+)	1/4F	FUSE BLOCK (IGNITION RELAY)
114	BROWN	18	IGNITION DIODE (NO +)	1/4F	FUSE BLOCK (START RELAY)
115	BROWN/WHITE	20	CHASSIS/HOOD #1	E	EFI RELAY SW B+
129	ORANGE/WHITE	20	SPEED SENSOR	A	GROUND
130	LT GREEN/RED	20	SPEED SENSOR	B	EFI RELAY SW B+
131	BROWN/WHITE	20	SPEED SENSOR	C	GROUND
135	-	-	-	-	
136	BROWN	16	POWER POINT #1	1/4F	
138	RED/BLACK	20	ENGINE/CHASSIS #1	A	REVERSE LIMIT SWITCH
139	WHITE/GREEN	20	ENGINE/CHASSIS #1	M	REVERSE LIMIT SWITCH
140	WHITE/BLUE	20	ENGINE/CHASSIS #1	K	FORWARD LIMIT SWITCH
141	RED/BLACK	20	REVERSE LIMIT SWITCH	1/4F	EFI RELAY SW B+

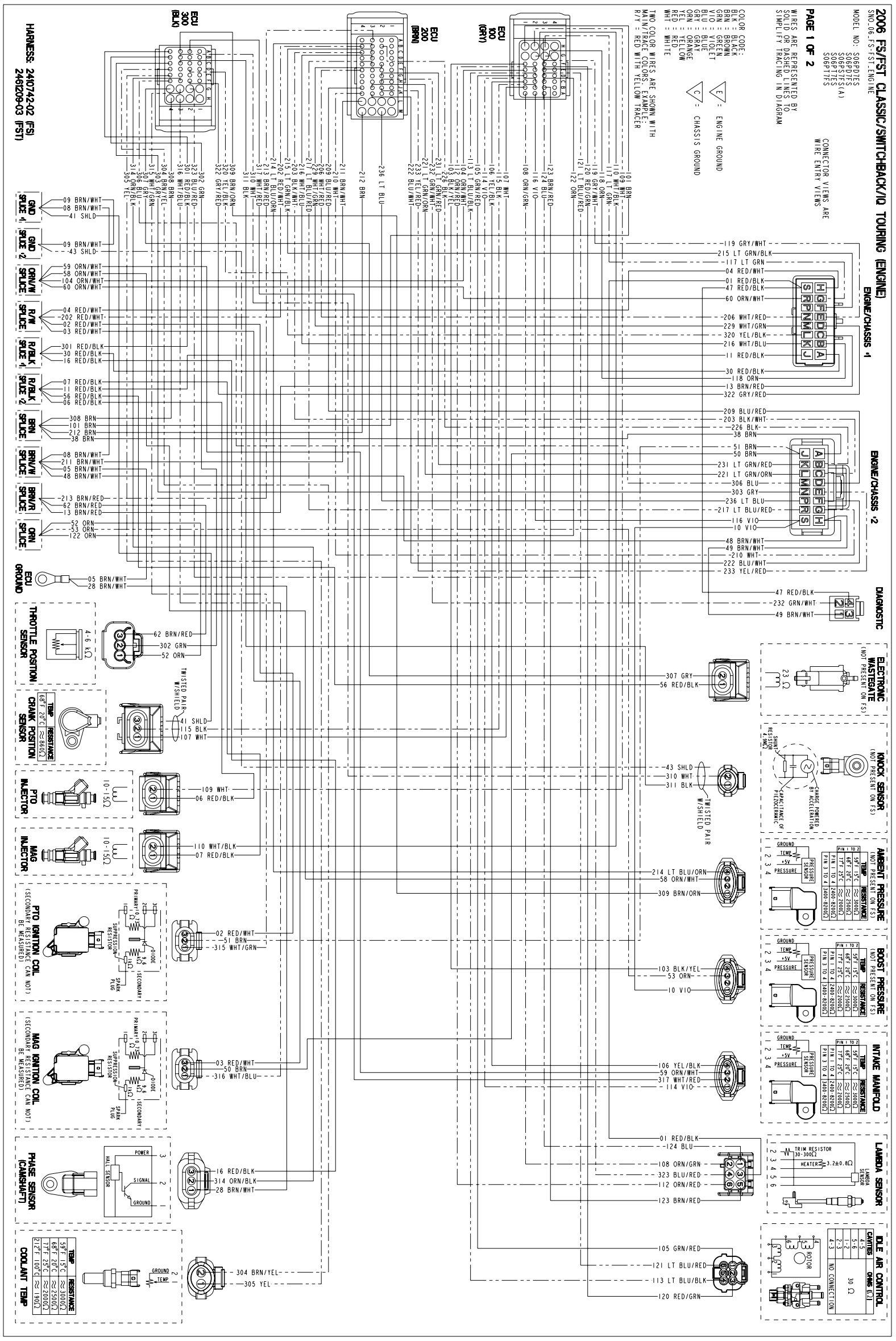
WIRE TERMINATION TABLE

CCT *	COLOR	GAUGE	FROM CONNECTOR	CAVITY	FUNCTION
01	RED/WHITE	16	POWER POINT #1	3/16F	POWER POINT #1
02	YELLOW	16UT	CHASSIS/HOOD #1	F	HI BEAM
03	GREEN	16UT	CHASSIS/HOOD #1	M	LOW BEAM
04	ORANGE	20	CHASSIS/HOOD #1	H	BRAKE SWITCH OUT
05	RED	14	POWER POINT #1	B3	B+
06	RED/WHITE	16	FUSE BLOCK (30A FUSE)	F1	CHASSIS RELAY SW B+
07	WHITE/GRAY	20UT	HIGH THUMBWARMER	.180F	HIGH THUMBWARMER
08	BROWN	18	GROUND	.180F	GROUND
09	BROWN	18	GROUND	.180M	GROUND
10	GREEN/WHITE	18	SOLENOID GROUND	C3	SOLENOID GROUND
11	RED/WHITE	16UT	CHASSIS RELAY	F1	CHASSIS RELAY SW B+
12	RED/WHITE	18	CHASSIS RELAY	-	CHASSIS RELAY SW B+
13	RED/BLACK	18	FUSE BLOCK (20A FUSE)	E5	EFI RELAY SW B+
14	BLACK	1.0	SPEED SENSOR	-	B+
15	RED	12 F	ACCESSORY	-	B+
16	BLUE	0.8	SOLENOID	-	B+
17	BROWN	18	STARTER MOTOR	-	GROUND
18	BLACK	20	FUSE BLOCK (30A FUSE)	E4	FUSE BLOCK (30A FUSE)
19	BLUE	20	FUSE BLOCK (30A FUSE)	E4	FUSE BLOCK (30A FUSE)
20	RED	18	FAN CIRCUIT BREAKER	3	B+
21	ORANGE	18	BRAKE SWITCH	B	BRAKE SWITCH OUT
22	RED/WHITE	16	CHASSIS/HOOD #1	-	CHASSIS RELAY SW B+
23	RED/BLACK	16	EFI RELAY	E5	EFI RELAY SW B+
24	RED/BLACK	20	EFI RELAY	3	EFI RELAY SW B+
25	WHITE/RED	18	EFI RELAY	1/4F	START SOLENOID COIL +
26	BROWN	18	GROUND	3	GROUND
27	BROWN	18	GROUND	.180M	GROUND
28	BLUE/RED	20	RIGHT HANDWARMER	.180F	HIGH HANDWARMER
29	ORANGE/GRAY	20UT	LOW THUMBWARMER	.180F	LOW THUMBWARMER
30	BLUE/RED	18UT	RIGHT HANDWARMER	.180F	HIGH HANDWARMER
31	BLUE	18UT	RIGHT HANDWARMER	.180F	LOW HANDWARMER
32	BLUE	20	LEFT HANDWARMER	.180F	LOW HANDWARMER
33	BROWN	20	LEFT HANDWARMER	.180M	GROUND
34	BROWN	16	CHASSIS/HOOD #1	A	GROUND
35	BLACK/WHITE	20	CHASSIS/HOOD #1	J	DIAGNOSTIC LAMP
36	YELLOW/RED	20	ENGINE/CHASSIS #2	E	ALTERNATOR/RPM
37	RED/BLACK	16	FUSE BLOCK (20A FUSE)	E1	EFI RELAY SW B+
38	RED/BLACK	20	FUSE BLOCK (CHASSIS RELAY)	B1	EFI RELAY SW B+
39	ORANGE/WHITE	20	ROLLOVER SWITCH	-	SENSOR SUPPLY 1
40	RED/BLACK	16	ENGINE/CHASSIS #1	A	EFI RELAY SW B+
41	GRAY/WHITE	20	FUEL PUMP RELAY	2	COIL DRIVE
42	LT GREEN	20	FUSE BLOCK (START RELAY)	C2	START RELAY COIL
43	BROWN	18	START DIODE (NO +)	1/4F	GROUND
44	RED/BLACK	14	FUSE BLOCK (ENGINE BUS)	E2	EFI RELAY SW B+
45	RED/WHITE	20F	ALTERNATOR	-	CHASSIS RELAY SW B+
46	BROWN	16	GROUND	1/4R	GROUND
47	BROWN	14	GROUND	1/4R	GROUND
48	RED/WHITE	16	POWER POINT #1	-	CHASSIS RELAY SW B+
49	LT BLUE/RED	20	ROLLOVER SWITCH	-	ROLLOVER EVENT
50	BROWN	16	GROUND	A	GROUND
51	LT GREEN/BLACK	20	ENGINE/CHASSIS #2	B2	CHASSIS RELAY COIL GROUND
52	WHITE/RED	20	ENGINE/CHASSIS #1	N	START SOLENOID COIL +
53	WHITE/RED	18	START SOLENOID	.156F	START SOLENOID COIL +
54	RED/BLACK	20	FUSE BLOCK (START RELAY)	C1	EFI RELAY SW B+
55	BROWN/RED	20	ROLLOVER SWITCH	-	SENSOR GROUND 2
56	BROWN	16	POWER POINT #1	1/4F	GROUND
57	VIOLET	20	IGNITION SWITCH	1/4F	INSTRUMENT GROUND
58	VIOLET	20	TETHER SWITCH	1/4F	INSTRUMENT GROUND
59	VIOLET	20	ENGINE/CHASSIS #2	S	SENSOR GROUND 1
60	RED/BLACK	16	FUEL PUMP RELAY	3	EFI RELAY SW B+
61	RED	16	FUEL PUMP RELAY	5	RELAY B+
62	VIOLET/WHITE	20	CHASSIS/HOOD #2	D	FUEL LEVEL
63	RED/WHITE	16	FUSE BLOCK (30A FUSE)	F3	CHASSIS RELAY SW B+
64	BLUE/WHITE	20	ENGINE/CHASSIS #2	F	HOT/DETONATION LIGHT
65	WHITE	20	ENGINE/CHASSIS #2	G	REVERSE LAMP
66	LT GREEN/RED	20	ENGINE/CHASSIS #2	K	SPEED SIGNAL
67	BLUE/RED	20	ENGINE/CHASSIS #2	D	WATER TEMP SIGNAL
68	RED	16	FAN CIRCUIT BREAKER	.180F	B+
69	RED	16	POWER POINT #2	.180M	GROUND
70	BROWN	18	GROUND	-	CB B+
71	RED/BLACK	18	ENGINE/CHASSIS #1	S	EFI RELAY SW B+
72	LT BLUE	20	ENGINE/CHASSIS #2	P	REV/FWD COMMAND
73	RED/WHITE	14	FUSE BLOCK (CHASSIS BUS)	F2	CHASSIS RELAY SW B+
74	RED/WHITE	16	CHASSIS DIAGNOSTIC	I	CHASSIS RELAY SW B+
75	BLUE	0.8	0.8/14 SPLICE	-	B+
76	BROWN	16	CHASSIS DIAGNOSTIC	3	GROUND
77	GRAY	20UT	ENGINE/CHASSIS #2	N	REVERSE REQUEST
78	BLUE	18	REVERSE MOTOR	A	REVERSE MOTOR DRIVE
79	GREEN	18	REVERSE MOTOR	B	REVERSE MOTOR DRIVE
80	LT GREEN/ORANGE	20	CHASSIS/HOOD #2	J	BOOST DISPLAY
81	GRAY	0.5	0.5/16 SPLICE	-	B+
82	ORANGE/BLACK	16	FAN RELAY	5	FAN RELAY OUT
83	YELLOW/BLACK	20	FAN RELAY	2	FAN RELAY CONTROL
84	RED/BLACK	20	FAN RELAY	I	EFI RELAY SW B+
85	BROWN	18	FUSE BLOCK (START RELAY)	C5	GROUND
86	RED	14	0.8/14 SPLICE	-	B+
87	GRAY/RED	20	EFI RELAY	A2	EFI RELAY COIL
88	RED	20	FUSE BLOCK (EFI RELAY)	A3	B+
89	BROWN	20UT	LEFT HANDLEBAR	E	GROUND
90	RED/BLACK	16	FUSE BLOCK (20A FUSE)	E3	EFI RELAY SW B+
91	BROWN/WHITE	20UT	LEFT HANDLEBAR	F	INSTRUMENT GROUND
92	ORANGE	20	-	-	
93	RED/WHITE	16	IGNITION SWITCH	B	IGNITION RELAY COIL GROUND
94	RED/BLACK	20	FUSE BLOCK (IGNITION RELAY)	D1	EFI RELAY SW B+
95	LT BLUE	20	FUSE BLOCK (IGNITION RELAY)	D2	IGNITION RELAY COIL GROUND

2006 FS/FST (CHASSIS)
SNO_06_FS-FST_CHASSIS

WIRES ARE REPRESENTED BY SOLID OR DASHED LINES TO SIMPLIFY TRACING IN DIAGRAM

2006 FS / FST Engine 1 of 2



2006 FS / FST Engine 2 of 2

2006 FS/FST CLASSIC/SWITCHBACK/IQ TOURING (ENGINE)
SNO_06_FS-FST_ENGINE

MODEL NO: S06PD7FS
S06PD7IFS
S06PS7IFS(A)
S06PT7IES
S06PT7IFS

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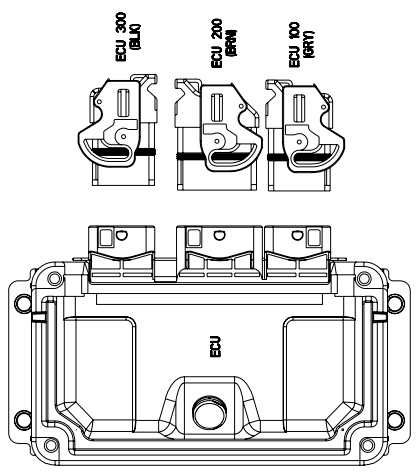
NOTE:
⚠1 CIRCUITS ARE NOT PRESENT ON FS MODEL.

WIRE TERMINATION TABLE

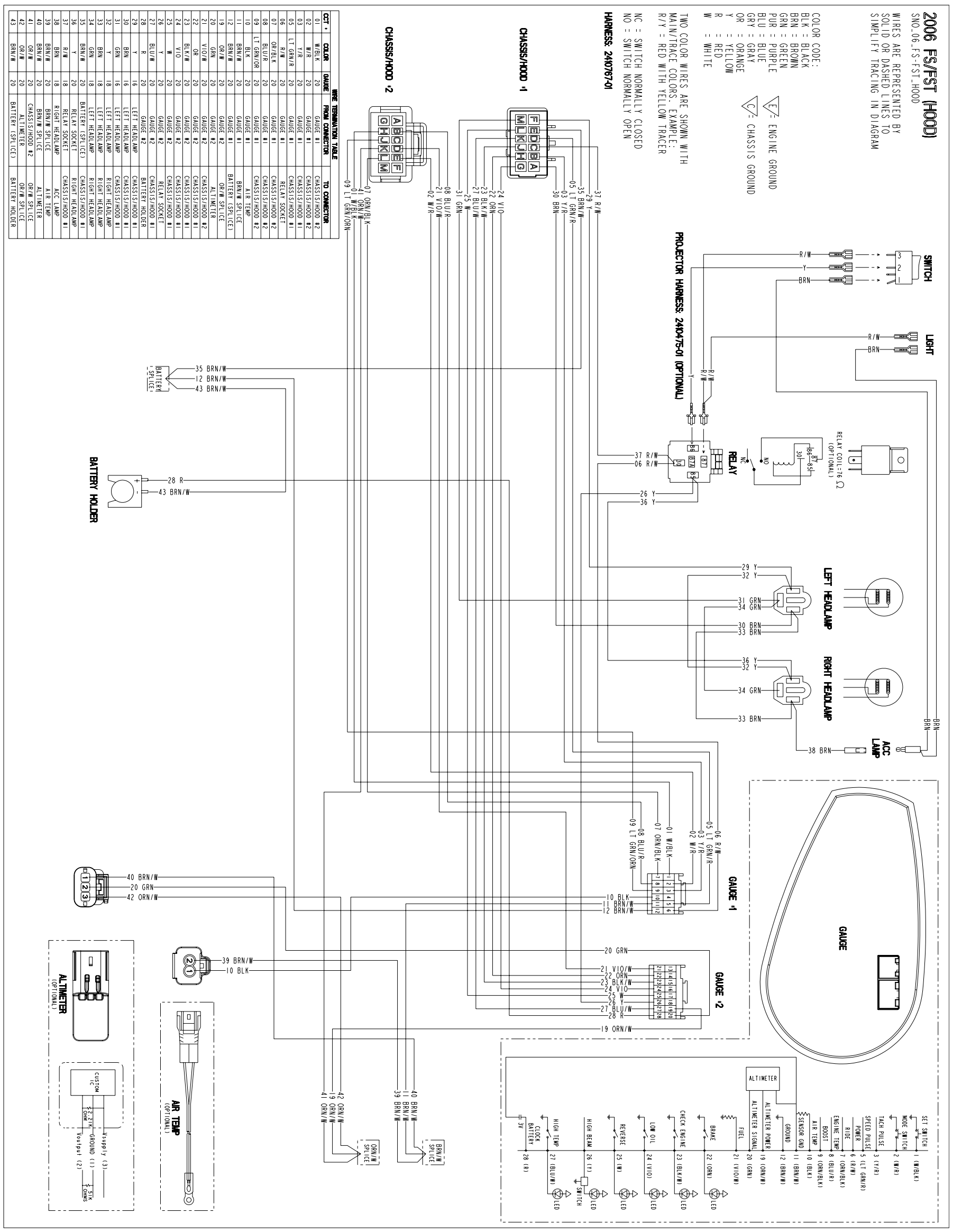
CCT *	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY	FUNCTION
202	RED/WHITE	18	ECU 200	B4	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
203	BLACK/WHITE	20	ECU 200	C4	ENGINE/CHASSIS #2	C	DIAGNOSTIC LAMP/MIL
206	WHITE/RED	20	ECU 200	F4	ENGINE/CHASSIS #1	N	START SOLENOID COIL +
209	BLUE/RED	20	ECU 200	J4	ENGINE/CHASSIS #2	D	TEMP OUT (CJ910)
210	WHITE	20	ECU 200	K4	ENGINE/CHASSIS #2	G	REVERSE LAMP
211	BROWN/WHITE	18	ECU 200	L4	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND 2
212	BROWN	16	ECU 200	M4	BROWN SPLICE	-	OUTPUT GROUND 1
213	BROWN/RED	20	ECU 200	A3	BROWN/RED SPLICE	-	SENSOR GROUND 2
214	LT BLUE/ORANGE	20	ECU 200	B3	AMBIANT PRESSURE	4	AMBIANT PRESSURE SIGNAL
215	LT GREEN/BLACK	20	ECU 200	C3	ENGINE/CHASSIS #1	F	CHASSIS RELAY COIL
216	WHITE/BLUE	20	ECU 200	D3	ENGINE/CHASSIS #1	K	FORWARD LIMIT SWITCH
217	LT BLUE/RED	20	ECU 200	E3	ENGINE/CHASSIS #2	R	ROLLOVER SWITCH
221	LT GREEN/ORANGE	20	ECU 200	J3	ENGINE/CHASSIS #2	L	BOOST OUTPUT (CJ910)
222	BLUE/WHITE	20	ECU 200	K3	ENGINE/CHASSIS #2	F	HOT LAMP
226	BLACK	20	ECU 200	B2	ENGINE/CHASSIS #2	B	ENGINE STOP SWITCH
229	WHITE/GREEN	20	ECU 200	E2	ENGINE/CHASSIS #1	M	REVERSE LIMIT SWITCH
231	LT GREEN/RED	20	ECU 200	G2	ENGINE/CHASSIS #1	K	VEHICLE SPEED
232	GREEN/WHITE	20	ECU 200	H2	DIAGNOSTIC	2	DIAGNOSTIC LINE K
233	YELLOW/RED	20	ECU 200	J2	ENGINE/CHASSIS #2	E	ENGINE SPEED SIGNAL
236	LT BLUE	18	ECU 200	M2	ENGINE/CHASSIS #2	P	REVERSE PWM
301	RED/BLACK	18	ECU 300	A4	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
302	GREEN	20F	ECU 300	B4	TPS	2	TPS SIGNAL
303	GRAY	20	ECU 300	C4	ENGINE/CHASSIS #2	N	REVERSE COMMAND
304	BROWN/YELLOW	20F	ECU 300	D4	COOLANT TEMP	2	ENGINE COOLANT TEMP GROUND
305	YELLOW	20F	ECU 300	E4	COOLANT TEMP	1	ENGINE COOLANT TEMP
306	BLUE	20	ECU 300	F4	ENGINE/CHASSIS #2	M	SAFETY SWITCH
307	GRAY	18	ECU 300	G4	ELECTRONIC WASTEGATE	2	WASTEGATE (CJ920)
308	BROWN	16	ECU 300	H4	BROWN SPLICE	-	IGNITION GROUND
309	BROWN/ORANGE	20	ECU 300	A3	AMBIANT PRESSURE	1	SENSOR GROUND 3
310	WHITE	TP20F	ECU 300	B3	KNOCK SENSOR	2	KNOCK SENSOR GROUND
311	BLACK	TP20F	ECU 300	B3	KNOCK SENSOR	1	KNOCK SENSOR
314	ORANGE/BLACK	20F	ECU 300	F3	PHASE SENSOR	2	PHASE SENSOR
315	WHITE/GREEN	16	ECU 300	G3	PTO IGNITION COIL	1	PTO IGNITION
316	WHITE/BLUE	16	ECU 300	H3	MAG IGNITION COIL	1	MAG IGNITION
317	WHITE/RED	20F	ECU 300	A2	INTAKE MANIFOLD	2	INTAKE AIR TEMP
320	YELLOW/BLACK	20	ECU 300	D2	ENGINE/CHASSIS #1	L	FAN RELAY COIL
322	GRAY/RED	20	ECU 300	F2	ENGINE/CHASSIS #1	D	MAIN RELAY COIL
323	BLUE/RED	16	ECU 300	G2	LAMBDA SENSOR	4	LSU HEATER



WIRE TERMINATION TABLE

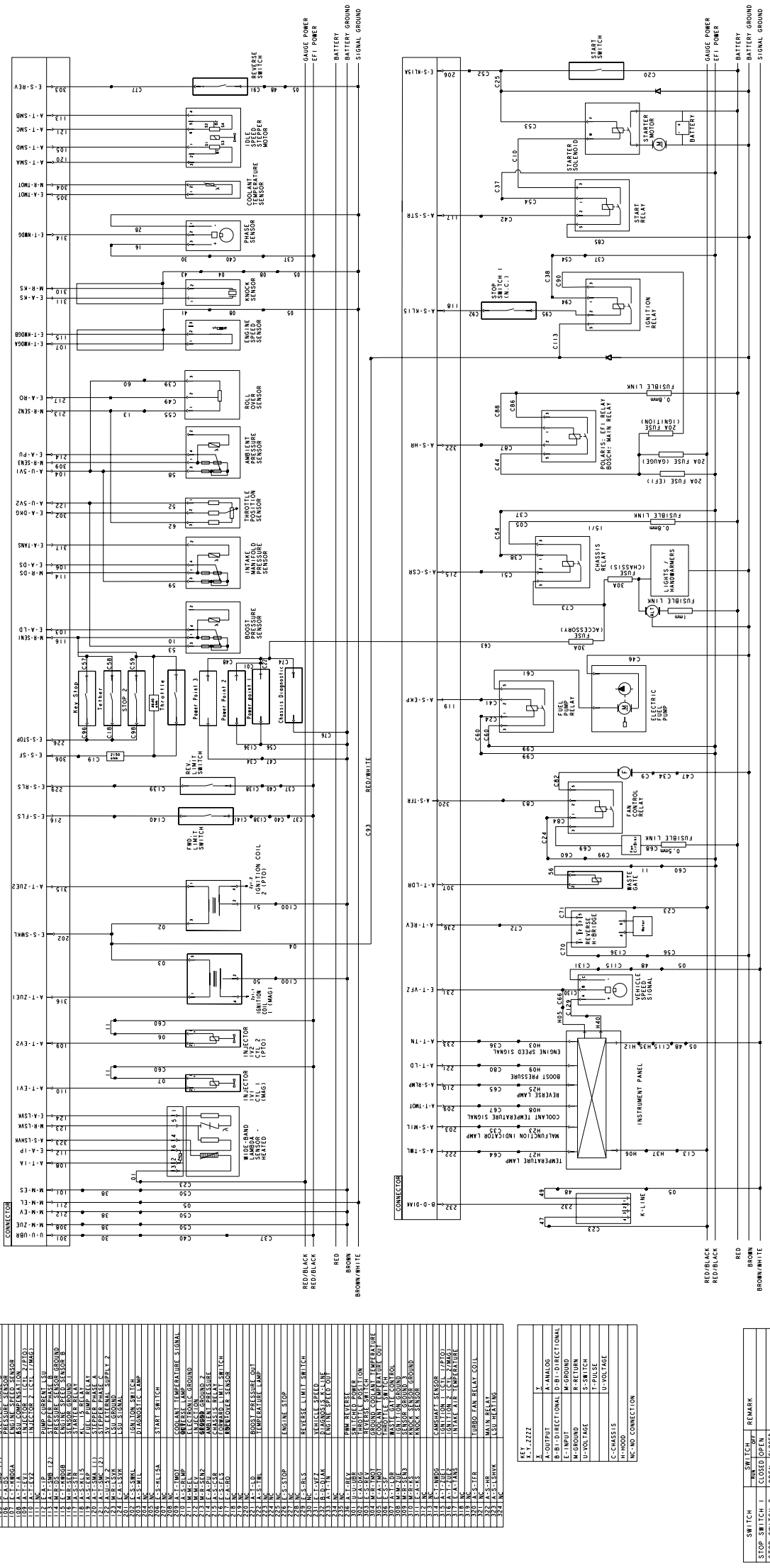
CCT *	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY	FUNCTION
01	RED/BLACK	18	ENGINE/CHASSIS #1	S	LAMBDA SENSOR	3	MAIN RELAY SW B+
02	RED/WHITE	16	PTO IGNITION COIL	3	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
03	RED/WHITE	16	MAG IGNITION COIL	3	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
04	RED/WHITE	16	ENGINE/CHASSIS #1	H	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
05	BROWN/WHITE	18	ECU GROUND	-	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
06	RED/BLACK	16	RED/BLACK SPLICE #2	-	PTO INJECTOR	1	MAIN RELAY SW B+
07	RED/BLACK	16	RED/BLACK SPLICE #2	-	MAG INJECTOR	1	MAIN RELAY SW B+
08	BROWN/WHITE	20	GROUND SPLICE #1	-	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
09	BROWN/WHITE	20	GROUND SPLICE #1	-	GROUND SPLICE #2	-	ELECTRONIC GROUND
10	VIOLET	20	ENGINE/CHASSIS #2	S	BOOST PRESSURE	1	SENSOR GROUND 1
11	RED/BLACK	16	ENGINE/CHASSIS #1	J	RED/BLACK SPLICE #2	-	MAIN RELAY SW B+
13	BROWN/RED	20	ENGINE/CHASSIS #1	C	BROWN/RED SPLICE	-	SENSOR GROUND 2
16	RED/BLACK	20F	PHASE SENSOR	3	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
28	BROWN/WHITE	20F	PHASE SENSOR	1	ECU GROUND	-	ELECTRONIC GROUND
30	RED/BLACK	18	ENGINE/CHASSIS #1	A	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
38	BROWN	14	ENGINE/CHASSIS #2	A	BROWN SPLICE	-	OUTPUT GROUND 1
41	SHIELD	TP20	GROUND SPLICE #1	-	TRIM FLUSH	-	SHIELD
43	SHIELD	TP20	GROUND SPLICE #2	-	TRIM FLUSH	-	SHIELD
47	RED/BLACK	18	ENGINE/CHASSIS #1	S	DIAGNOSTIC	4	MAIN RELAY SW B+
48	BROWN/WHITE	18	ENGINE CHASSIS #2	H	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
49	BROWN/WHITE	20	ENGINE/CHASSIS #2	H	DIAGNOSTIC	1	ELECTRONIC GROUND
50	BROWN	18	ENGINE/CHASSIS #2	J	MAG IGNITION COIL	2	OUTPUT GROUND 1
51	BROWN	18	ENGINE/CHASSIS #2	J	PTO IGNITION COIL	2	OUTPUT GROUND 1
52	ORANGE	20F	TPS	-		1	SENSOR SUPPLY 2
53	ORANGE	20	BOOST PRESSURE	3	ORANGE SPLICE	-	SENSOR SUPPLY 2
56	RED/BLACK	16	RED/BLACK SPLICE #2	-	ELECTRONIC WASTEGATE	1	MAIN RELAY SW B+
58	ORANGE/WHITE	20	AMBIANT PRESSURE	3	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
59	ORANGE/WHITE	20F	INTAKE MANIFOLD	3	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
60	ORANGE/WHITE	20	ENGINE/CHASSIS #1	R	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
62	BROWN/RED	20F	BROWN/RED SPLICE	-	TPS	3	SENSOR GROUND 2
101	BROWN	16	ECU 100	H1	BROWN SPLICE	-	OUTPUT GROUND 2
103	BLACK/YELLOW	20	ECU 100	F1	BOOST PRESSURE	4	BOOST PRESSURE (ADC)
104	ORANGE/WHITE	20	ECU 100	E1	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
105	GREEN/RED	18	ECU 100	D1	IAC	1	STEPPER MOTOR
106	YELLOW/BLACK	20F	ECU 100	C1	INTAKE MANIFOLD	4	INTAKE MANIFOLD PRESSURE
107	WHITE	TP20	ECU 100	B1	CRANK POSITION SENSOR	1	ENGINE SPEED SENSOR A
108	ORANGE/GREEN	20	ECU 100	A1	LAMBDA SENSOR	2	LSU COMPENSATION
109	WHITE	18	ECU 100	H2	PTO INJECTOR	2	PTO INJECTOR
110	WHITE/BLACK	18	ECU 100	G2	MAG INJECTOR	2	MAG INJECTOR
112	ORANGE/RED	18	ECU 100	E2	LAMBDA SENSOR	6	LSU PUMP CURRENT
113	LT BLUE/BLACK	18	ECU 100	D2	IAC	4	STEPPER COIL
114	VIOLET	20F	ECU 100	C2	INTAKE MANIFOLD	1	SENSOR GROUND
115	BLACK	TP20	ECU 100	B2	CRANK POSITION SENSOR	2	ENGINE SPEED SENSOR B
116	VIOLET	20	ECU 100	A2	ENGINE/CHASSIS #2	S	SENSOR GROUND 1
117	LT GREEN	18	ECU 100	H3	ENGINE/CHASSIS #1	G	START RELAY COIL
118	ORANGE	18	ECU 100	G3	ENGINE/CHASSIS #1	B	IGNITION RELAY COIL
119	GRAY/WHITE	18	ECU 100	F3	ENGINE/CHASSIS #1	E	FUEL PUMP RELAY COIL
120	RED/GREEN	18	ECU 100	E3	IAC	3	STEPPER COIL
121	LT BLUE/RED	18	ECU 100	D3	IAC	6	STEPPER COIL
122	ORANGE	20	ECU 100	C3	ORANGE SPLICE	-	SENSOR SUPPLY 2
123	BROWN/RED	18	ECU 100	B3	LAMBDA SENSOR	5	LSU GROUND
124	BLUE	18	ECU 100	A3	LAMBDA SENSOR	1	LSU SIGNAL

2006 FS / FST Hood

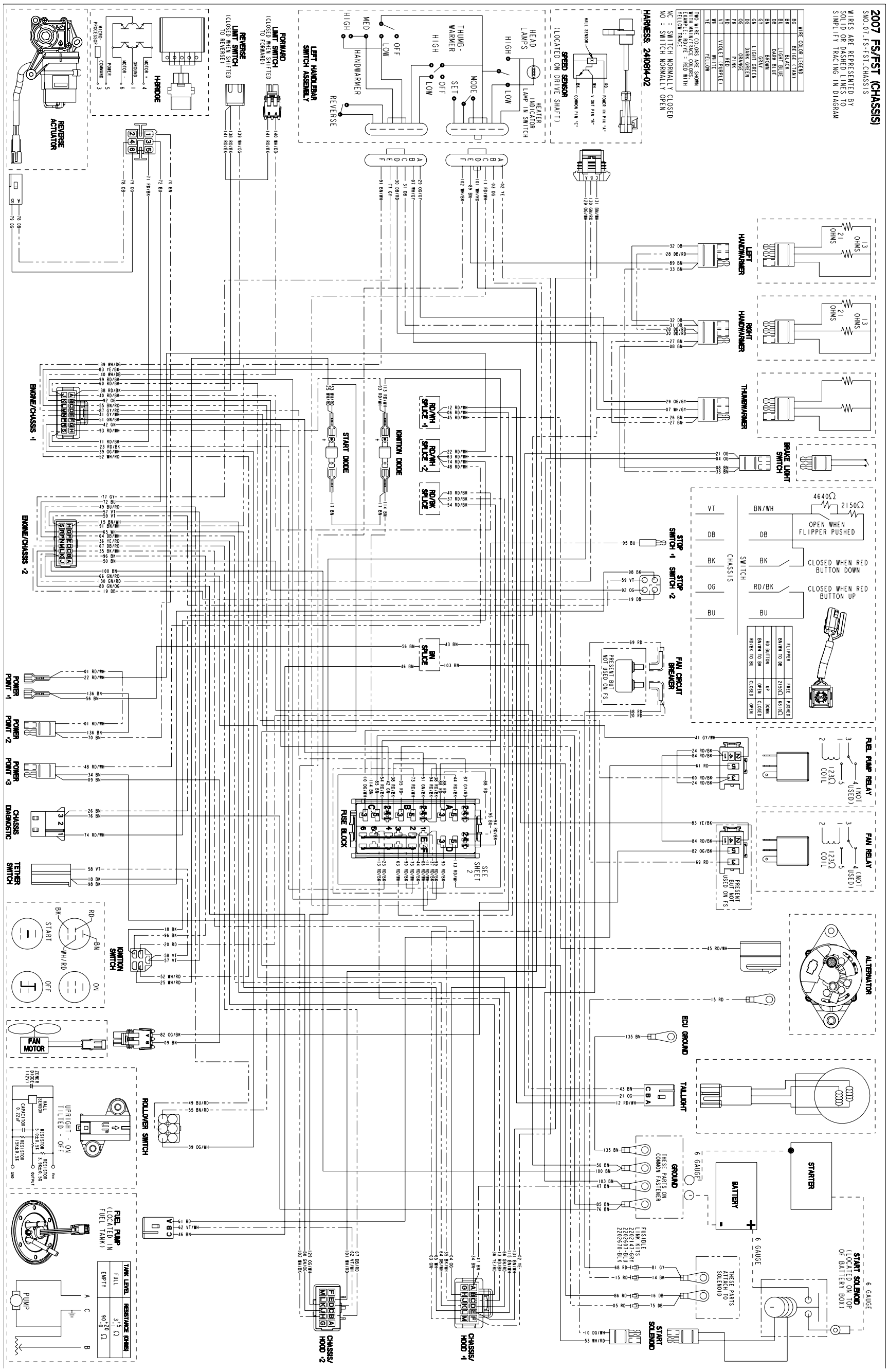


CCT #	COLOR	WIRE TERMINATION TABLE GAUGE	FROM CONNECTOR	TO CONNECTOR
01	W/BLK	20	GAUGE #1	CHASSIS/HOOD #2
02	W/R	20	GAUGE #1	CHASSIS/HOOD #2
03	Y/R	20	GAUGE #1	CHASSIS/HOOD #1
05	LT GRN/R	20	GAUGE #1	CHASSIS/HOOD #1
06	R/W	20	GAUGE #1	RELAY SOCKET
07	ORN/BLK	20	GAUGE #1	CHASSIS/HOOD #2
08	BLU/R	20	GAUGE #1	CHASSIS/HOOD #2
09	LT GRN/ORN	20	GAUGE #1	CHASSIS/HOOD #2
10	BLK	20	GAUGE #1	AIR TEMP
11	BRN/W	20	GAUGE #1	BRN/W SPLICE
12	BRN/W	20	GAUGE #1	BATTERY (SPLICE)
19	ORN/W	20	GAUGE #2	ORN/W SPLICE
20	GRN	20	GAUGE #2	ALTIMETER
21	VIO/W	20	GAUGE #2	CHASSIS/HOOD #2
22	ORN	20	GAUGE #2	CHASSIS/HOOD #1
23	BLK/W	20	GAUGE #2	CHASSIS/HOOD #1
24	VIO	20	GAUGE #2	CHASSIS/HOOD #1
25	W	20	GAUGE #2	CHASSIS/HOOD #1
26	Y	20	GAUGE #2	RELAY SOCKET
27	BLU/W	20	GAUGE #2	CHASSIS/HOOD #1
28	R	20	GAUGE #2	BATTERY HOLDER
29	Y	16	LEFT HEADLAMP	CHASSIS/HOOD #1
30	BRN	16	LEFT HEADLAMP	CHASSIS/HOOD #1
31	GRN	16	LEFT HEADLAMP	CHASSIS/HOOD #1
32	Y	18	LEFT HEADLAMP	RIGHT HEADLAMP
33	BRN	18	LEFT HEADLAMP	RIGHT HEADLAMP
34	GRN	18	LEFT HEADLAMP	RIGHT HEADLAMP
35	BRN/W	20	BATTERY (SPLICE)	CHASSIS/HOOD #1
36	Y	20	RELAY SOCKET	RIGHT HEADLAMP
37	R/W	18	RELAY SOCKET	CHASSIS/HOOD #1
38	BRN	18	RIGHT HEADLAMP	ACC LAMP
39	BRN/W	20	BRN/W SPLICE	AIR TEMP
40	BRN/W	20	BRN/W SPLICE	ALTIMETER
41	ORN/W	20	CHASSIS/HOOD #2	ORN/W SPLICE
42	ORN/W	20	ALTIMETER	ORN/W SPLICE
43	BRN/W	20	BATTERY (SPLICE)	BATTERY HOLDER

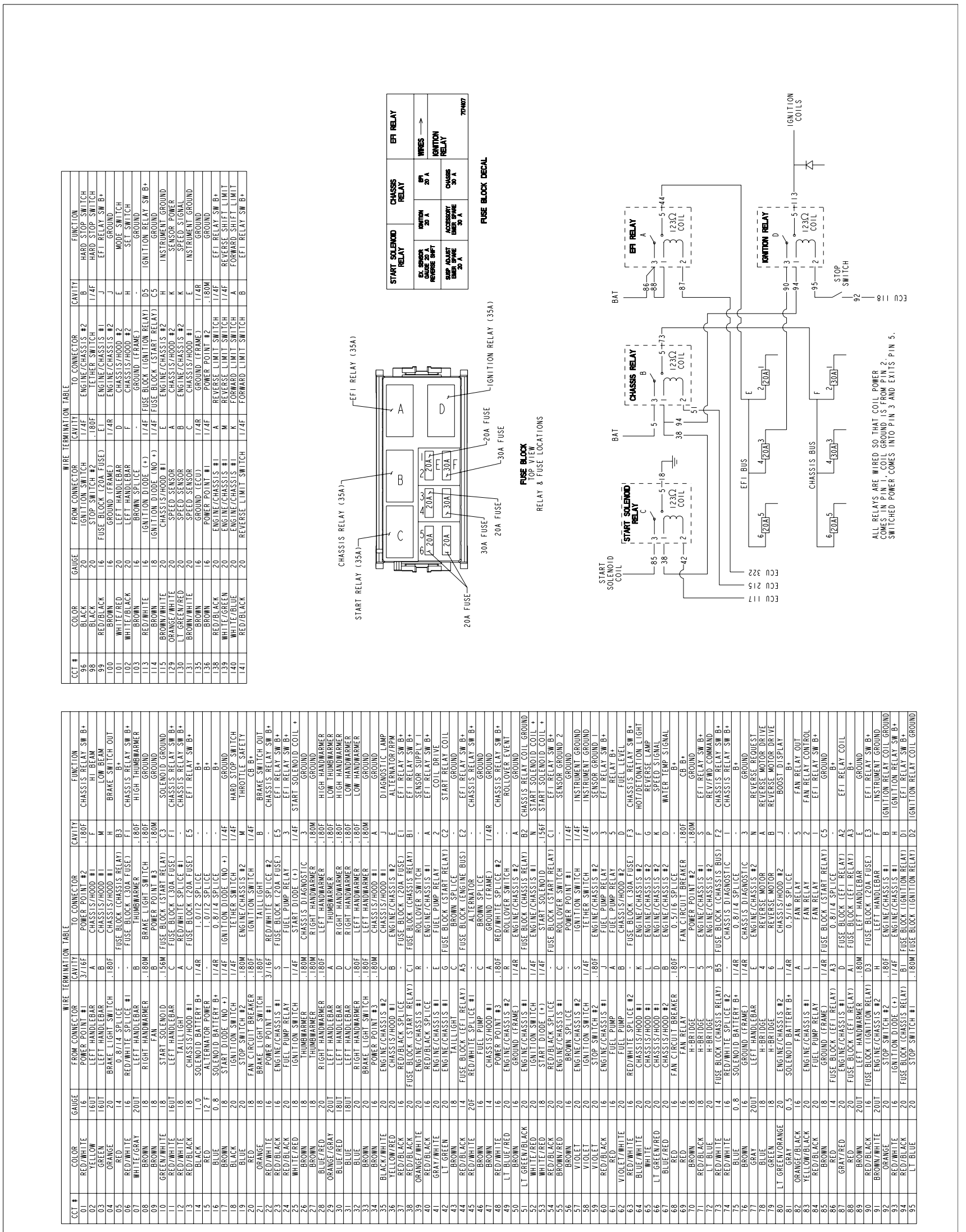
2006 FS / FST System Diagram



2007 FS / FST Chassis 1 of 2



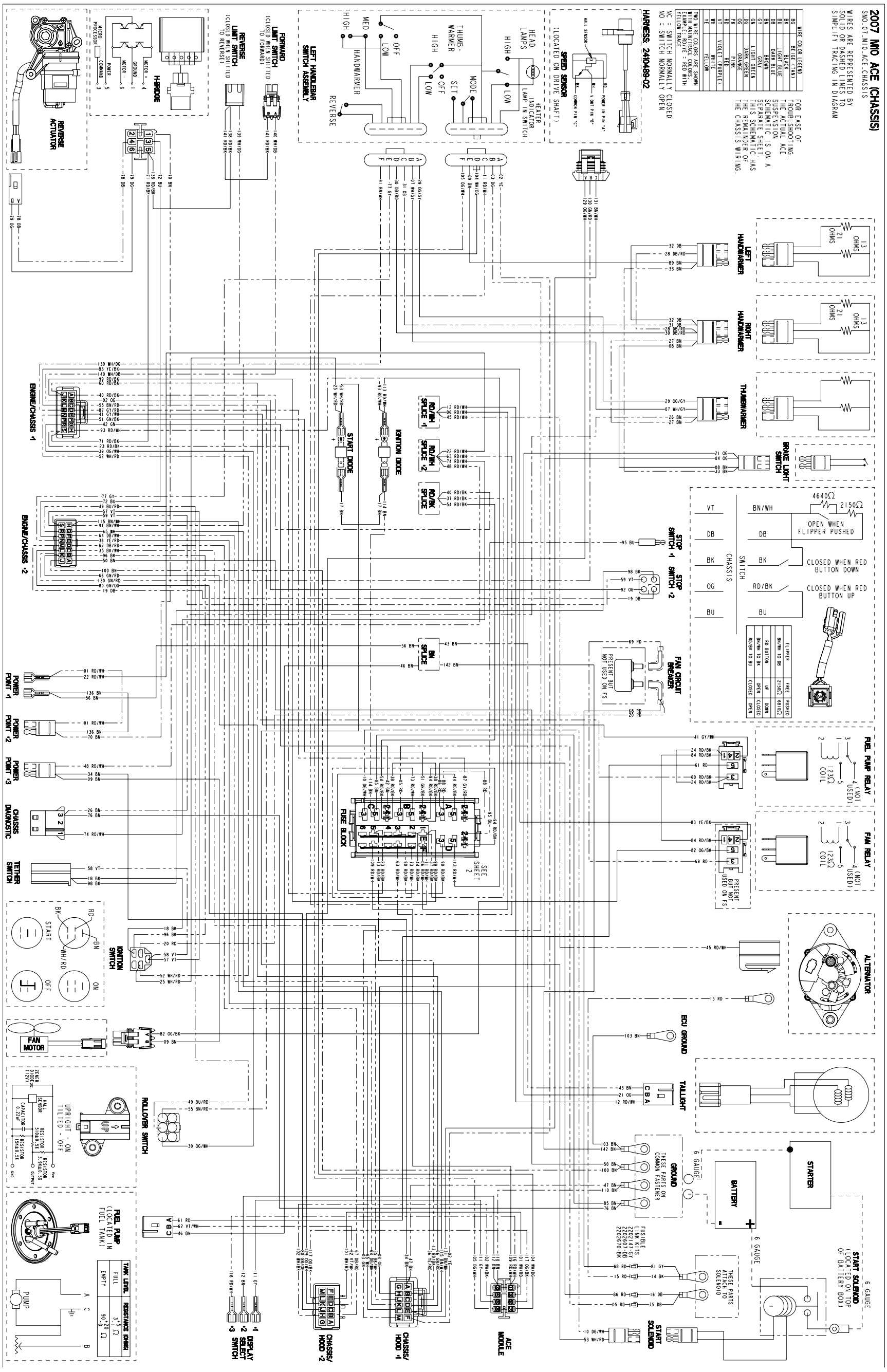
2007 FS / FST Chassis 2 of 2



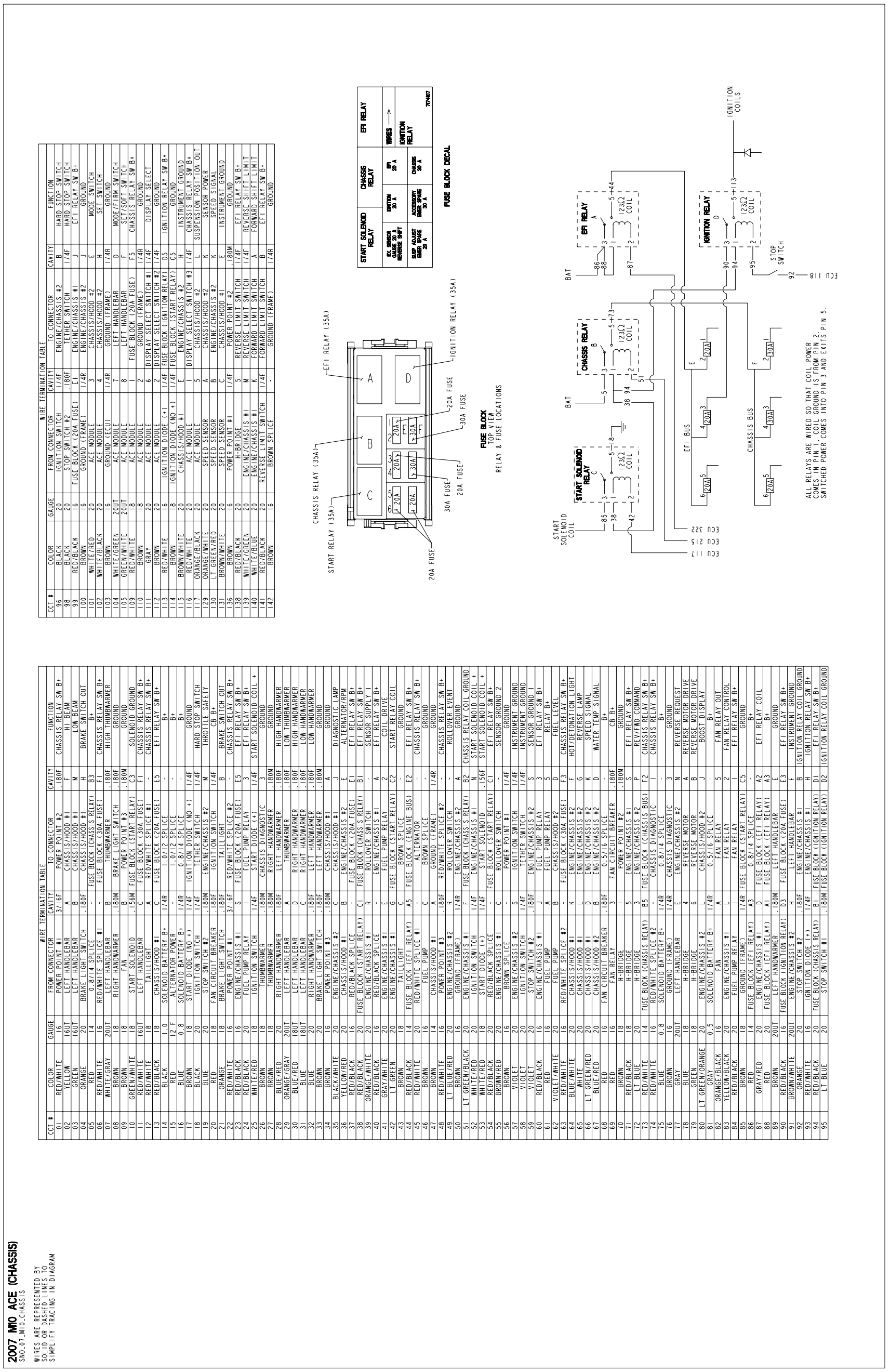
2007 FS/FST (CHASSIS)
SNO_07_FS-FST_CHASSIS

WIRES ARE REPRESENTED BY
SOLID OR DASHED LINES TO
SIMPLIFY TRACING IN DIAGRAM

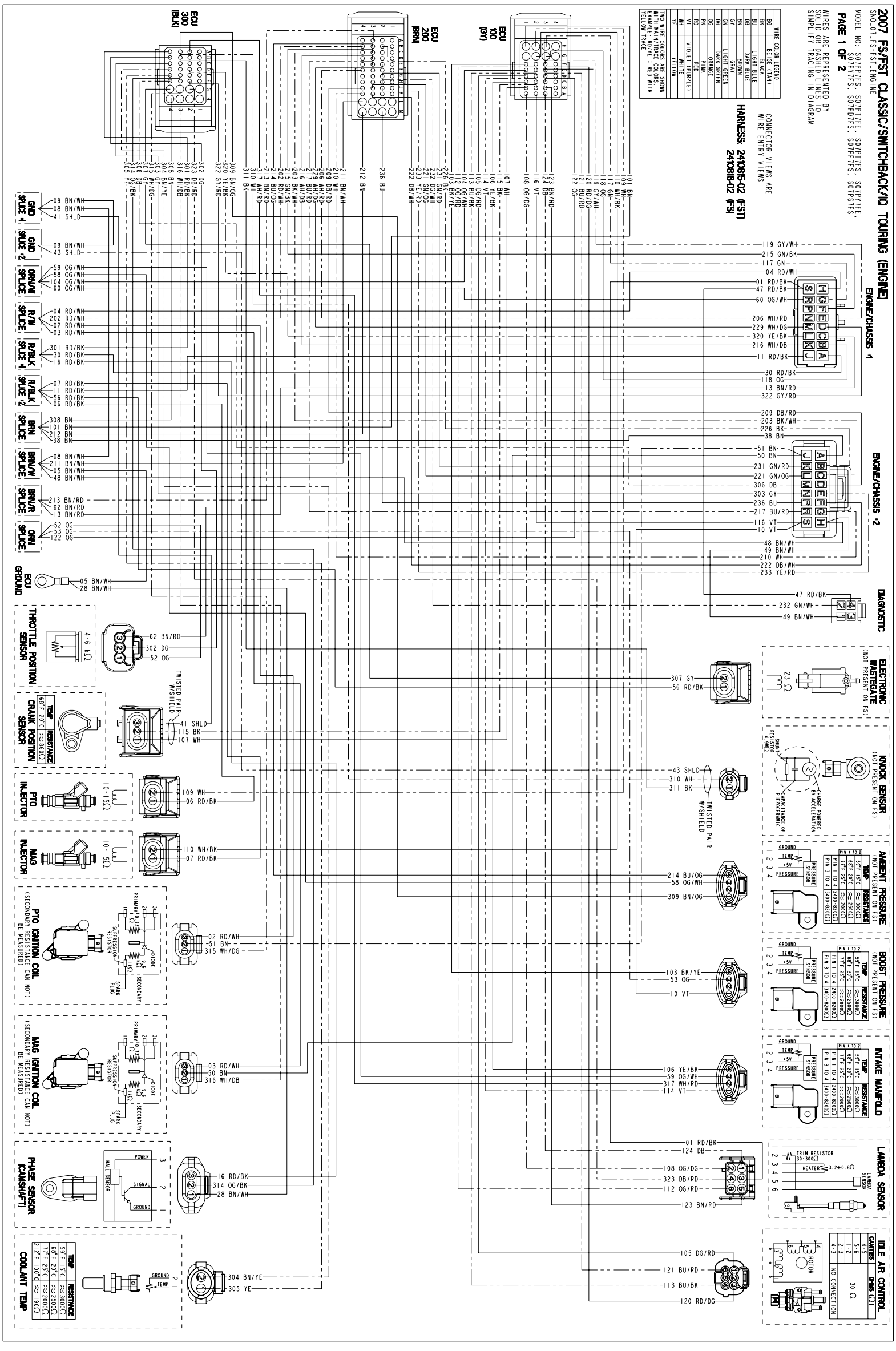
2007 FS / FST M10 ACE Chassis 1 of 2



2007 FS / FST M10 ACE Chassis 2 of 2



2007 FS / FST Engine 1 of 2



2007 FS/FST CLASSIC/SWITCHBACK/IQ TOURING (ENGINE)

SNO_07_FS-FST_ENGINE

MODEL NO: S07PP7FS, S07PT7FE, S07PT7FS, S07PY7FE, S07PY7FS, S07PD7FS, S07PF7FS, S07PS7FS

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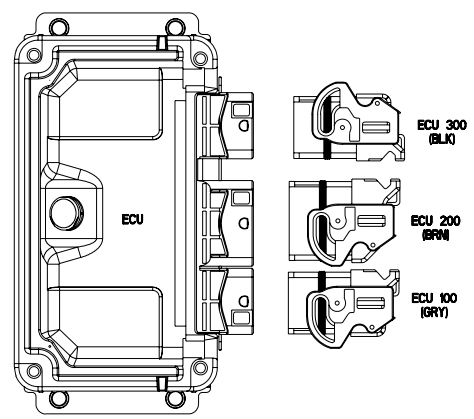
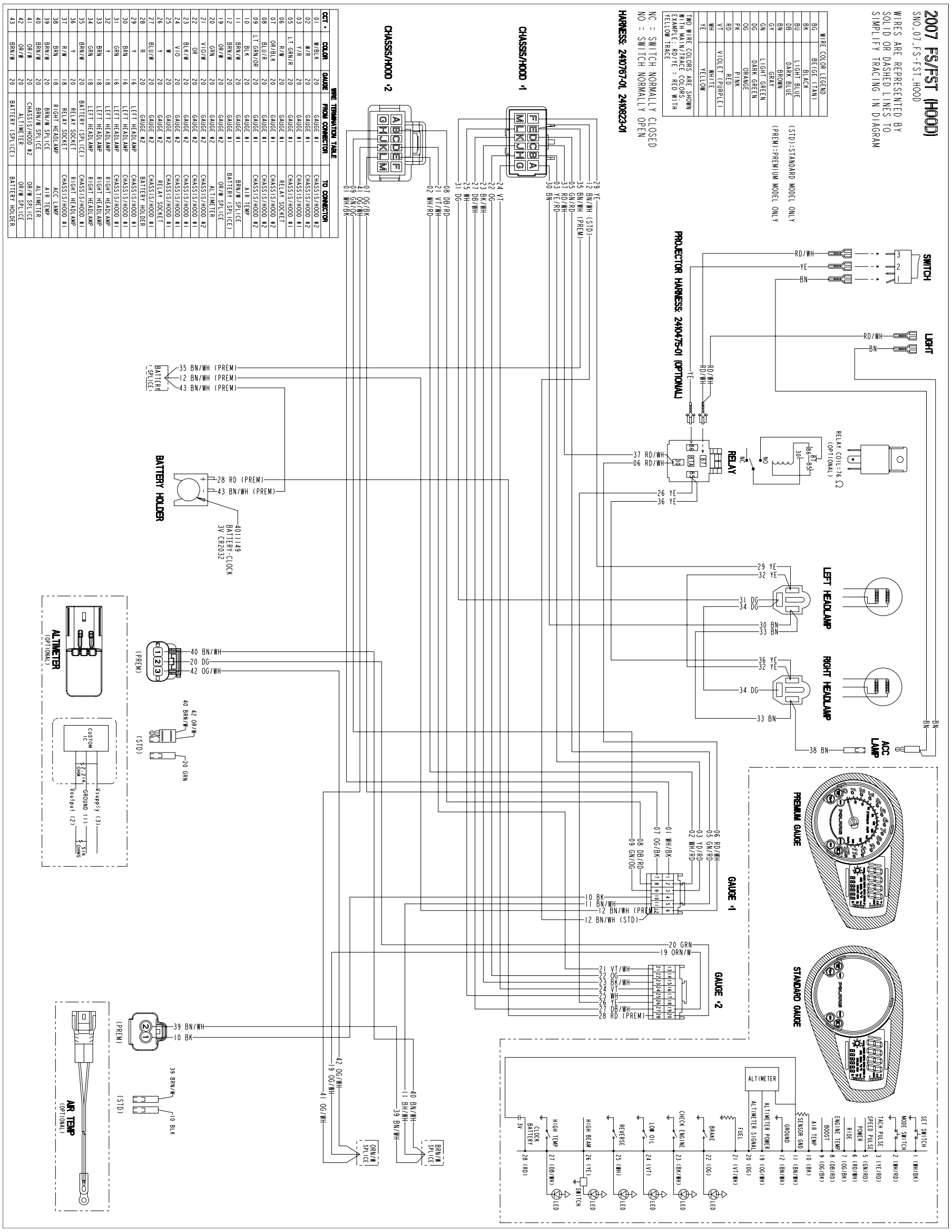
NOTE:
1 CIRCUITS ARE NOT PRESENT ON FS MODEL.

WIRE TERMINATION TABLE							
CCT #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY	FUNCTION
01	RED/BLACK	18	ENGINE/CHASSIS #1	S	LAMBDA SENSOR	3	MAIN RELAY SW B+
02	RED/WHITE	16	PTO IGNITION COIL	3	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
03	RED/WHITE	16	MAG IGNITION COIL	3	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
04	RED/WHITE	16	ENGINE/CHASSIS #1	H	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
05	BROWN/WHITE	18	ECU GROUND	-	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
06	RED/BLACK	16	RED/BLACK SPLICE #2	-	PTO INJECTOR	1	MAIN RELAY SW B+
07	RED/BLACK	16	RED/BLACK SPLICE #2	-	MAG INJECTOR	1	MAIN RELAY SW B+
08	BROWN/WHITE	20	GROUND SPLICE #1	-	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
1 09	BROWN/WHITE	20	GROUND SPLICE #1	-	GROUND SPLICE #2	-	ELECTRONIC GROUND
1 10	VIOLET	20	ENGINE/CHASSIS #2	S	BOOST PRESSURE	1	SENSOR GROUND 1
11	RED/BLACK	16	ENGINE/CHASSIS #1	J	RED/BLACK SPLICE #2	-	MAIN RELAY SW B+
13	BROWN/RED	20	ENGINE/CHASSIS #1	C	BROWN/RED SPLICE	-	SENSOR GROUND 2
16	RED/BLACK	20F	PHASE SENSOR	3	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
28	BROWN/WHITE	20F	PHASE SENSOR	1	ECU GROUND	-	ELECTRONIC GROUND
30	RED/BLACK	18	ENGINE/CHASSIS #1	A	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
38	BROWN	14	ENGINE/CHASSIS #2	A	BROWN SPLICE	-	OUTPUT GROUND 1
41	SHIELD	TP20	GROUND SPLICE #1	-	TRIM FLUSH	-	SHIELD
1 43	SHIELD	TP20	GROUND SPLICE #2	-	TRIM FLUSH	-	SHIELD
47	RED/BLACK	18	ENGINE/CHASSIS #1	S	DIAGNOSTIC	4	MAIN RELAY SW B+
48	BROWN/WHITE	18	ENGINE CHASSIS #2	H	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND
49	BROWN/WHITE	20	ENGINE/CHASSIS #2	H	DIAGNOSTIC	1	ELECTRONIC GROUND
50	BROWN	18	ENGINE/CHASSIS #2	J	MAG IGNITION COIL	2	OUTPUT GROUND 1
51	BROWN	18	ENGINE/CHASSIS #2	J	PTO IGNITION COIL	2	OUTPUT GROUND 1
1 52	ORANGE	20F	TPS	1	ORANGE SPLICE	-	SENSOR SUPPLY 2
1 53	ORANGE	20	BOOST PRESSURE	3	ORANGE SPLICE	-	SENSOR SUPPLY 2
1 56	RED/BLACK	16	RED/BLACK SPLICE #2	-	ELECTRONIC WASTEGATE	1	MAIN RELAY SW B+
1 58	ORANGE/WHITE	20	AMBIANT PRESSURE	3	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
59	ORANGE/WHITE	20F	INTAKE MANIFOLD	3	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
60	ORANGE/WHITE	20	ENGINE/CHASSIS #1	R	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
62	BROWN/RED	20F	BROWN/RED SPLICE	-	TPS	3	SENSOR GROUND 2
101	BROWN	16	ECU 100	H1	BROWN SPLICE	-	OUTPUT GROUND 2
1 103	BLACK/YELLOW	20	ECU 100	F1	BOOST PRESSURE	4	BOOST PRESSURE (ADC)
104	ORANGE/WHITE	20	ECU 100	E1	ORANGE/WHITE SPLICE	-	SENSOR SUPPLY 1
105	GREEN/RED	18	ECU 100	D1	IAC	1	STEPPER MOTOR
106	YELLOW/BLACK	20F	ECU 100	C1	INTAKE MANIFOLD	4	INTAKE MANIFOLD PRESSURE
107	WHITE	TP20	ECU 100	B1	CRANK POSITION SENSOR	1	ENGINE SPEED SENSOR A
108	ORANGE/GREEN	20	ECU 100	A1	LAMBDA SENSOR	2	LSU COMPENSATION
109	WHITE	18	ECU 100	H2	PTO INJECTOR	2	PTO INJECTOR
110	WHITE/BLACK	18	ECU 100	G2	MAG INJECTOR	2	MAG INJECTOR
112	ORANGE/RED	18	ECU 100	E2	LAMBDA SENSOR	6	LSU PUMP CURRENT
113	LT BLUE/BLACK	18	ECU 100	D2	IAC	4	STEPPER COIL
114	VIOLET	20F	ECU 100	C2	INTAKE MANIFOLD	1	SENSOR GROUND
115	BLACK	TP20	ECU 100	B2	CRANK POSITION SENSOR	2	ENGINE SPEED SENSOR B
116	VIOLET	20	ECU 100	A2	ENGINE/CHASSIS #2	S	SENSOR GROUND 1
117	LT GREEN	18	ECU 100	H3	ENGINE/CHASSIS #1	G	START RELAY COIL
118	ORANGE	18	ECU 100	G3	ENGINE/CHASSIS #1	B	IGNITION RELAY COIL
119	GRAY/WHITE	18	ECU 100	F3	ENGINE/CHASSIS #1	E	FUEL PUMP RELAY COIL
120	RED/GREEN	18	ECU 100	E3	IAC	3	STEPPER COIL
121	LT BLUE/RED	18	ECU 100	D3	IAC	6	STEPPER COIL
122	ORANGE	20	ECU 100	C3	ORANGE SPLICE	-	SENSOR SUPPLY 2
123	BROWN/RED	18	ECU 100	B3	LAMBDA SENSOR	5	LSU GROUND
124	BLUE	18	ECU 100	A3	LAMBDA SENSOR	1	LSU SIGNAL

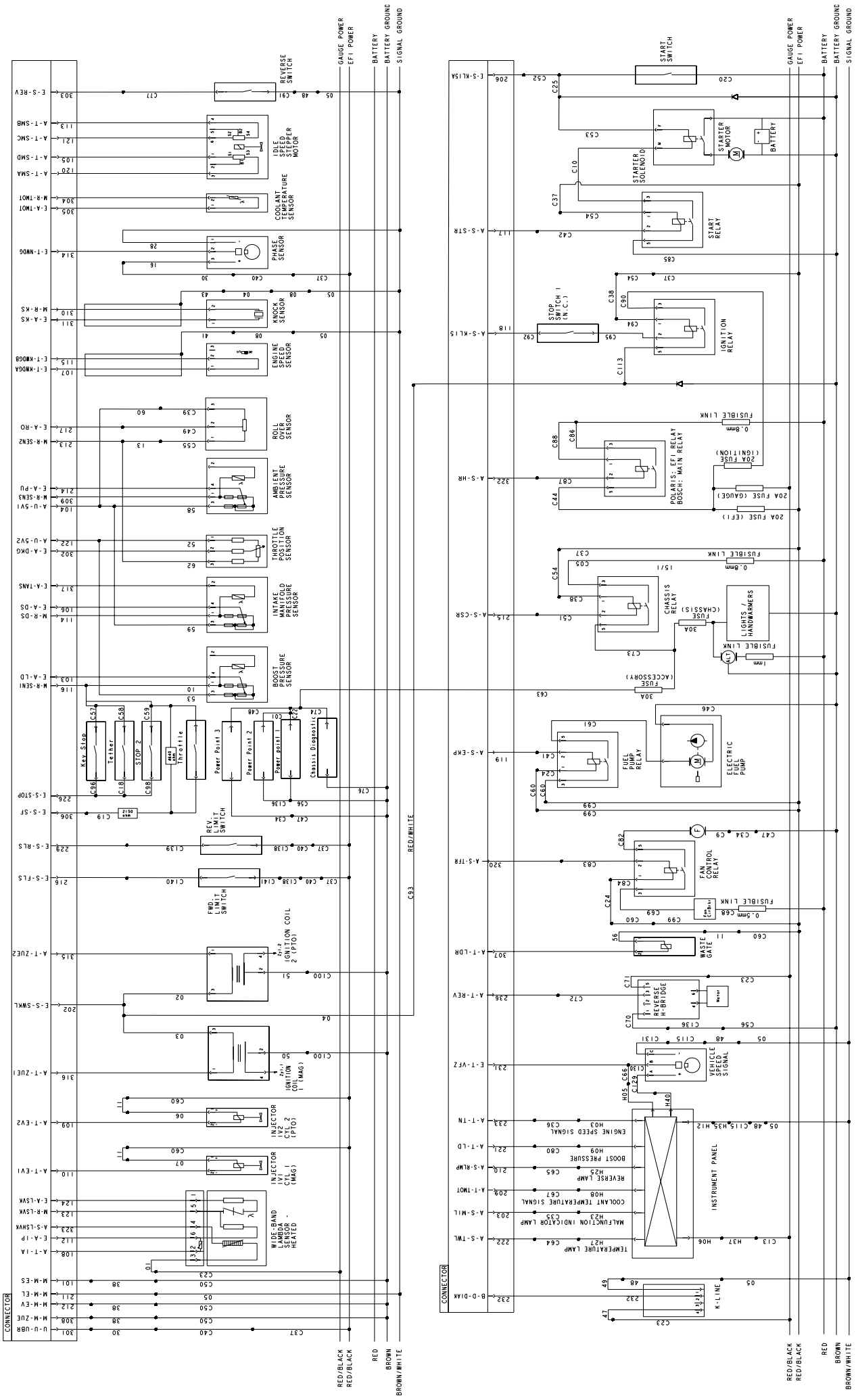
WIRE TERMINATION TABLE							
CCT #	COLOR	GAUGE	FROM CONNECTOR	CAVITY	TO CONNECTOR	CAVITY	FUNCTION
202	RED/WHITE	18	ECU 200	B4	RED/WHITE SPLICE	-	IGNITION RELAY SW B+
203	BLACK/WHITE	20	ECU 200	C4	ENGINE/CHASSIS #2	C	DIAGNOSTIC LAMP/MIL
206	WHITE/RED	20	ECU 200	F4	ENGINE/CHASSIS #1	N	START SOLENOID COIL +
209	BLUE/RED	20	ECU 200	J4	ENGINE/CHASSIS #2	D	TEMP OUT (CJ910)
210	WHITE	20	ECU 200	K4	ENGINE/CHASSIS #2	G	REVERSE LAMP
211	BROWN/WHITE	18	ECU 200	L4	BROWN/WHITE SPLICE	-	ELECTRONIC GROUND 2
212	BROWN	16	ECU 200	M4	BROWN SPLICE	-	OUTPUT GROUND 1
213	BROWN/RED	20	ECU 200	A3	BROWN/RED SPLICE	-	SENSOR GROUND 2
1 214	LT BLUE/ORANGE	20	ECU 200	B3	AMBIANT PRESSURE	4	AMBIANT PRESSURE SIGNAL
215	LT GREEN/BLACK	20	ECU 200	C3	ENGINE/CHASSIS #1	F	CHASSIS RELAY COIL
216	WHITE/BLUE	20	ECU 200	D3	ENGINE/CHASSIS #1	K	FORWARD LIMIT SWITCH
217	LT BLUE/RED	20	ECU 200	E3	ENGINE/CHASSIS #2	R	ROLLOVER SWITCH
221	LT GREEN/ORANGE	20	ECU 200	J3	ENGINE/CHASSIS #2	L	BOOST OUTPUT (CJ910)
222	BLUE/WHITE	20	ECU 200	K3	ENGINE/CHASSIS #2	F	HOT LAMP
226	BLACK	20	ECU 200	B2	ENGINE/CHASSIS #2	B	ENGINE STOP SWITCH
229	WHITE/GREEN	20	ECU 200	E2	ENGINE/CHASSIS #1	M	REVERSE LIMIT SWITCH
231	LT GREEN/RED	20	ECU 200	G2	ENGINE/CHASSIS #2	K	VEHICLE SPEED
232	GREEN/WHITE	20	ECU 200	H2	DIAGNOSTIC	2	DIAGNOSTIC LINE K
233	YELLOW/RED	20	ECU 200	J2	ENGINE/CHASSIS #2	E	ENGINE SPEED SIGNAL
236	LT BLUE	18	ECU 200	M2	ENGINE/CHASSIS #2	P	REVERSE PWM
301	RED/BLACK	18	ECU 300	A4	RED/BLACK SPLICE #1	-	MAIN RELAY SW B+
302	GREEN	20F	ECU 300	B4	TPS	2	TPS SIGNAL
303	GRAY	20	ECU 300	C4	ENGINE/CHASSIS #2	N	REVERSE COMMAND
304	BROWN/YELLOW	20F	ECU 300	D4	COOLANT TEMP	2	ENGINE COOLANT TEMP GROUND
305	YELLOW	20F	ECU 300	E4	COOLANT TEMP	1	ENGINE COOLANT TEMP
306	BLUE	20	ECU 300	F4	ENGINE/CHASSIS #2	M	SAFETY SWITCH
1 307	GRAY	18	ECU 300	G4	ELECTRONIC WASTEGATE	2	WASTEGATE (CJ920)
308	BROWN	16	ECU 300	H4	BROWN SPLICE	-	IGNITION GROUND
1 309	BROWN/ORANGE	20	ECU 300	A3	AMBIANT PRESSURE	1	SENSOR GROUND 3
1 310	WHITE	TP20F	ECU 300	B3	KNOCK SENSOR	2	KNOCK SENSOR GROUND
1 311	BLACK	TP20F	ECU 300	C3	KNOCK SENSOR	1	KNOCK SENSOR
314	ORANGE/BLACK	20F	ECU 300	F3	PHASE SENSOR	2	PHASE SENSOR
315	WHITE/GREEN	16	ECU 300	G3	PTO IGNITION COIL	1	PTO IGNITION
316	WHITE/BLUE	16	ECU 300	H3	MAG IGNITION COIL	1	MAG IGNITION
317	WHITE/RED	20F	ECU 300	A2	INTAKE MANIFOLD	2	INTAKE AIR TEMP
320	YELLOW/BLACK	20	ECU 300	D2	ENGINE/CHASSIS #1	L	FAN RELAY COIL
322	GRAY/RED	20	ECU 300	F2	ENGINE/CHASSIS #1	D	MAIN RELAY COIL
323	BLUE/RED	16	ECU 300	G2	LAMBDA SENSOR	4	LSU HEATER



2007 FS / FST Hood



2007 FS / FST System Diagram

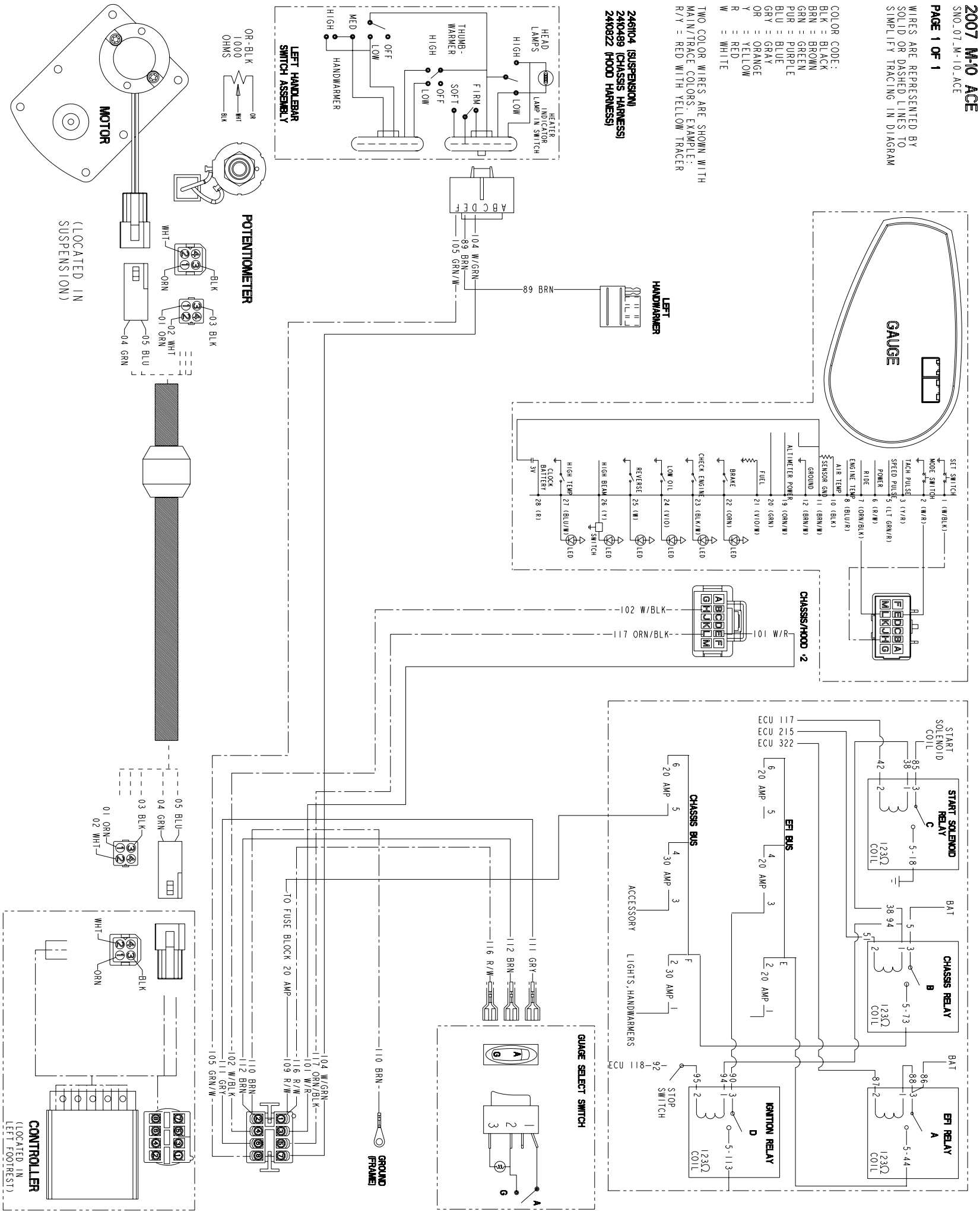


PIN-NO	SIGNAL	FUNCTION
101	M-W-ES	POWER GROUND
102	NC	
103	E-A-LD	BOOST PRESSURE
104	A-U-SV1	SWITCH SIGNAL SUPPLY 1
105	A-T-SMD (1)	STEPPER PHASE D
106	E-A-DS	PRESSURE SENSOR
107	E-T-NWDGA	ENGINE SPEED SENSOR
108	A-T-IA	ENGINE COOLANT (CYL 2/PTO)
109	A-T-EV2	INJECTOR 2 (CYL 1/MAG)
110	A-T-EV1	
111	NC	
112	E-A-IP	PUMP CURRENT LSU
113	A-T-SMB (2)	STEPPER PHASE B
114	M-R-DS	PRESSURE SENSOR GROUND
115	E-T-NWDGB	ENGINE SPEED SENSOR B
116	M-R-SEN1	SENSOR GROUND 1
117	A-S-STR1	STARTER RELAY
118	A-S-RLI5	K-L5 RELAY
119	A-S-EKP	FIELD PUMP RELAY
120	A-T-SMA (1)	STEPPER PHASE A
121	A-T-SMC (2)	STEPPER PHASE C
122	A-U-SV 2	5V EXTERNAL SUPPLY 2
123	M-R-LSYK	LSU GROUND
124	E-A-LSYK	LSU SIGNAL
201	NC	
202	E-S-SWKL	IGNITION SWITCH
203	A-S-MIL	DIAGNOSTIC LAMP
204	NC	
205	NC	
206	E-S-RLI5A	START SWITCH
207	NC	
208	NC	
209	A-T-TMOT	COOLANT TEMPERATURE SIGNAL
210	A-S-RLMP	REVERSE LAMP
211	M-W-EL	ELECTRONIC GROUND
212	M-W-EV	HOUSING
213	M-R-SEN2	GROUND 2
214	E-A-PU	AMBIENT PRESSURE
215	A-S-CSR	CHASSIS RELAY
216	A-S-RLS	REVERSE LIMIT SWITCH
217	E-A-RO	ROLLOVER SENSOR
218	NC	
219	NC	
220	NC	
221	A-T-LD	BOOST PRESSURE OUT
222	A-S-TWL	TEMPERATURE LAMP
223	NC	
224	NC	
225	NC	
226	E-S-STOP	ENGINE STOP
227	NC	
228	NC	
229	E-S-RLS	REVERSE LIMIT SWITCH
230	NC	
231	E-T-VFZ	VEHICLE SPEED
232	E-T-TWAK	DIAGNOSTIC LINE
233	A-T-TN	ENGINE SPEED OUT
234	NC	
235	NC	
236	A-T-REV	PWM REVERSE
237	U-U-UBR	SWITCHED POWER
302	E-A-DKG	THROTTLE POSITION
303	E-S-REV	REVERSE SWITCH
304	A-T-TMOT	COOLANT TEMPERATURE
305	E-A-TMOT	COOLANT TEMPERATURE OUT
306	E-S-SF	THROTTLE SWITCH
307	A-T-LDR	WASTE GATE CONTROL
308	M-W-EV	IGNITION GROUND
309	M-R-SEN3	SENSOR GROUND 3
310	M-R-KS	KNOCK SENSOR GROUND
311	E-A-KS	KNOCK SENSOR
312	NC	
313	NC	
314	E-T-NWDG	CAMSHAFT SENSOR
315	A-T-ZUE2	IGNITION 2 (CYL 2/PTO)
316	A-T-ZUE1	IGNITION 1 (CYL 1/MAG)
317	E-A-TANS	INTAKE AIR TEMPERATURE
318	NC	
319	NC	
320	A-S-TFR	TURBO FAN RELAY COIL
321	NC	
322	A-S-HR	MAIN RELAY
323	A-S-LSHYK	LSU HEATING
324	NC	

KEY	
X-Y-ZZZZ	Y
X	
A-OUTPUT	A-ANALOG
B-BI-DIRECTIONAL	D-BI-DIRECTIONAL
E-INPUT	M-GROUND
M-GROUND	R-RETURN
U-VOLTAGE	S-SWITCH
	T-PULSE
	U-VOLTAGE
C-CHASSIS	
H-HOOD	
NC-NO CONNECTION	

SWITCH	SWITCH		REMARK
	RUN	OFF	
STOP SWITCH 1	CLOSED	OPEN	
STOP SWITCH 2	OPEN	CLOSED	
KEY STOP	OPEN	CLOSED	
TETHER	OPEN	CLOSED	
THROTTLE	OPEN	CLOSED	CLOSED WHEN FLIPPER RELEASED
START	OPEN	CLOSED	CLOSED TO CRANK

2007 FS / FST M10 ACE Suspension



CONTROLLER SPECS/LOGIC:

CONTROL

THE CONTROL WILL READ THE CONTROL SWITCH POSITION (UP OR DOWN) AND THE ACTUATORPOTENTIOMETER POSITION. IT WILL OUTPUT MOTOR FORWARD OR REVERSE DRIVE POWER, OUTPUT A VOLTAGE TO THE DISPLAY, AND PROTECT BOTH ITSELF AND THE MOTOR FROM OVER-CURRENT.

SOFTWARE

FOLLOWING IS A TYPICAL SCENARIO:

IF THE OPERATOR WANTS TO CHANGE THE SUSPENSION SET POINT, THEY WILLMOMENTARILY PUSH THE SWITCH (ONE OR MORE TIMES, UP OR DOWN). THE CONTROL WILL SEE AND REMEMBER THE NEW SET POINT. IF THE CONTROL SEES THE SWITCH HELD FOR 3 SECONDS, IT WILL GO TO THE FAR END OF TRAVEL IN THAT DIRECTION; IF WHILE THE ACTUATOR IS IN MOTION THE OPERATOR MOMENTARILY PUSHES THE SWITCH IN THE OPPOSITE DIRECTION IT WILL STOP AT THE NEXT SET POINT. THERE ARE 9 POSSIBLE SET POINTS.

WHEN THE CONTROLLER SET POINT IS CHANGED IT WILL ATTEMPT TO DRIVE THE ACTUATOR IN THE CORRECT DIRECTION. WHEN THE POTENTIOMETER INDICATES THE ACTUATOR IS IN POSITION IT WILL STOP. IF THE ACTUATOR DOES NOT MOVE OR STOPS MOVING FOR 2.5SEC THE CONTROLLER WILL TURN OFF POWER TO THE MOTOR FOR 2.5SEC, IT WILL THEN ATTEMPT TO DRIVE THE MOTOR AGAIN. THIS PATTERN WILL REPEAT 2 TIMES, IF THE ACTUATOR IS STILL NOT IN POSITION THE CONTROLLER WILL ABANDON THE CHANGED SET POINT AND REMAIN AT REST UNTIL THE OPERATOR SETS A NEW POINT.

WHEN THE CONTROLLER IS ENABLED, IF THE SET POINT AND THE ACTUATOR POSITION MATCH THEN THE MOTOR REMAINS AT REST. IF THE ACTUATOR IS NOT IN POSITION THEN THE CONTROLWILL THEN ATTEMPT TO DRIVE THE ACTUATOR TO THE CORRECT POSITION. (THIS WOULD BE THE CASE IF THE CONTROLLER WAS DISABLED FROM LOW VOLTAGE WHEN THE MOTOR WAS RUNNING).

FEEDBACK:

FEEDBACK FROM THE ACTUATOR IS A 1.0K OHM POTENTIOMETER ON THE ACTUATOR ASSEMBLY. IN THE FULLY RETRACTED POSITION THE POTENTIOMETER IS AT 120 OHMS AND AT THE FULLY EXTENDED POSITION THE POTENTIOMETER IS AT 650 OHMS.

ENABLE/DISABLE:

IF THE CONTROL SENSES A SHORT CIRCUIT ON THE MOTOR LEADS (TO GROUND, TO POWER, OR ACROSS THE MOTOR) WHEN THE MOTOR IS POWERED, THE CONTROL WILL IMMEDIATELY TURN OFF ALL OUTPUTS. THE CONTROL WILL REMAIN DISABLED FOR 30 SECONDS, DURING THIS TIME IT WILL THE GAGE OUTPUT WILL BE VARIED UP AND DOWN CAUSING THE GAGE TO "WIGGLE"; IT WILL THEN AGAIN ATTEMPT TO DRIVE THE MOTOR. IF A SHORT CIRCUIT IS DETECTED THREE TIMES THE CONTROL WILL REMAIN DISABLED UNTIL IT IS POWERED DOWN.

DISPLAY SELECT:

WHEN DISPLAY SELECT IS SWITCHED TO GROUND, IGNORE THE FIRM/SOFT COMMANDS AND PASS THE SIGNALS TO THE MODE/SET LINES.

SUSPENSION POSITION:

OUTPUT SIGNAL OF SUSPENSION POSITION IS 10HZ PWM, 10-90% ON TIME (ON=PULLED TO GROUND). POSITION 1 (SOFTEST) CORRESPONDS TO 10% ON TIME; POSITION 2 CORRESPONDS TO 20% ON TIME; ETC., TO POSITION 9, WHICH CORRESPONDS TO 90% ON TIME. WHILE SUSPENSION IS IN MOTION, SIGNAL SHOULD ALTERNATE BETWEEN THE SELECTED POSITION AND THE CURRENT SUSPENSION POSITION. SIGNAL PULSES SHOULD BE TRANSMITTED FOR 0.5 SECONDS (5 PULSES) AT THE SELECTED POSITION, AND THEN SIGNAL PULSES SHOULD BE TRANSMITTED FOR 0.5 SECONDS (5 PULSES) AT THE CURRENT SUSPENSION POSITION. THE ALTERNATING OF THE SIGNAL PULSES SHOULD CONTINUE UNTIL THE CURRENT POSITION AND THE SELECTED POSITION ARE THE SAME.

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