

Manual 51-1200

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Revision 3

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S&S Billet Pro Stock Engine Assembly

Designed by S&S Cycle, Inc.

SAFE INSTALLATION AND OPERATION RULES:

Before installing your new S&S part it is your responsibility to read and follow the installation and maintenance procedures in these instructions and follow the basic rules below for your personal safety.

- Gasoline is extremely flammable and explosive under certain conditions and toxic when breathed. Do not smoke. Perform installation in a well ventilated area away from open flames or sparks.
- If motorcycle has been running, wait until engine and exhaust pipes have cooled down to avoid getting burned before performing any installation steps.
- Before performing any installation steps disconnect battery to eliminate potential sparks and inadvertent engagement of starter while working on electrical components.
- Read instructions thoroughly and carefully so all procedures are completely understood before performing any installation steps. Contact S&S with any questions you may have if any steps are unclear or any abnormalities occur during installation or operation of motorcycle with a S&S part on it.
- Consult an appropriate service manual for your motorcycle for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgment when performing installation and operating motorcycle. Good judgment begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgment. Start installation when you are fresh.
- Be sure all federal, state and local laws are obeyed with the installation.
- For optimum performance and safety and to minimize potential damage to carb or other components, use all mounting hardware that is provided and follow all installation instructions.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

DISCLAIMER:

S&S parts are designed for high performance, closed course, racing applications and are intended for the very experienced rider only. The installation of S&S parts may void or adversely affect your factory warranty. In addition such installation and use may violate certain federal, state, and local laws, rules and ordinances as well as other laws when used on motor vehicles used on public highways, especially in states where pollution laws may apply. Always check federal, state, and local laws before modifying your motorcycle. It is the sole and exclusive responsibility of the user to determine the suitability of the product for his or her use, and the user shall assume all legal, personal injury risk and liability and all other obligations, duties, and risks associated therewith.

The words Harley®, Harley-Davidson®, H-D®, Sportster®, Evolution®, and all H-D part numbers and model designations are used in reference only. S&S Cycle is not associated with Harley-Davidson, Inc.

IMPORTANT NOTICE:

Statements in this instruction sheet preceded by the following words are of special significance.



WARNING

Means there is the possibility of injury to yourself or others.



CAUTION

Means there is the possibility of damage to the part or motorcycle.

NOTE

Other information of particular importance has been placed in italic type.

S&S recommends you take special notice of these items.

WARRANTY:

S&S Cycle Inc. does not offer any warranty on race only products.

S&S BILLET PRO STOCK ENGINE

The S&S Billet Pro Stock is the same engine you have seen used in competition at NHRA and AHDRA races. It is a 160-cubic inch four cam, 60 degree V-Twin pushrod engine. It is built with special S&S billet crankcases, cylinders, and heads, and features an integral 6-speed automatic transmission, and dual downdraft manifolds and large diameter EFI throttle bodies.

- 160ci four-cam, 60 degree pushrod V-Twin
- Billet crankcases with integral transmission housing
- Billet steel Pro Stock style flywheel assembly
- Billet aluminum rods with 1.500" crankpin
- Billet Pro Stock cylinder heads
- Six-speed automatic transmission

ACCOMPLISHMENTS

2004

Won NHRA's "Best Engineered Vehicle Award"

2005 - Current

- Every race had S&S Pro Stock teams in the 16 bike field on Sunday.

2007

S&S powered Buell® motorcycles won championships on three separate continents.

- Matt Smith Racing NHRA Pro Stock bike
- Brett Stevens Racing ANDRA Pro Stock bike
- Tim Tinndahn Racing UEM Pro Stock bike

2008

- Brett Stevens Racing ANDRA Pro Stock bike championship

2009

- Hector Arana Racing NHRA Pro Stock bike championship
- Ulf Ogge Racing UEM Pro Stock bike championship

2010

- Ulf Ogge Racing UEM Pro Stock bike championship

2013

- Matt Smith Racing NHRA Pro Stock Bike

SPECIFICATIONS AND OTHER INFORMATION

GENERAL SPECIFICATIONS

Crank Position Sensor Gap	0.030
Cam Position Sensor Gap.....	0.060
Intake Rocker Arm Ratio	2:1
Exhaust Rocker Arm Ratio	1.85:1
Primary Drive Ratio, 64-87	1.359:1
Transmission High (6th) Gear Output Ratio.....	1.053:1
Drive Sprocket	
16 Teeth 6-30 Chain x 43T Wheel.....	2.688:1
15 Teeth 6-30 Chain x 43T Wheel.....	2.867:1

Overall Drive Ratio, 41T- 46T, 43 Average	3.847:1
Normal Piston Size	5.1100" - 5.115"
Piston Fitment	0.0075" - .0080"
Top Ring Gap	0.023"
2nd Ring Gap	0.063"
Oil Ring Gap	0.070"
Valve Stem to Rocker Arm Clearance	
Cold	0.004
Hot	0.015"
Valve Stem to Guide Clearance	0.0015" - 0.0025"
Cam End Play	0.010" - .020"
Anticipated Valve lift;	
Intake	1.000"
Exhaust.....	0.925"

Torque Specifications:

Head Bolt ½".....	60 ft-lb
Head Bolt ⅜".....	35 ft-lb

See **Diagram 1** below.

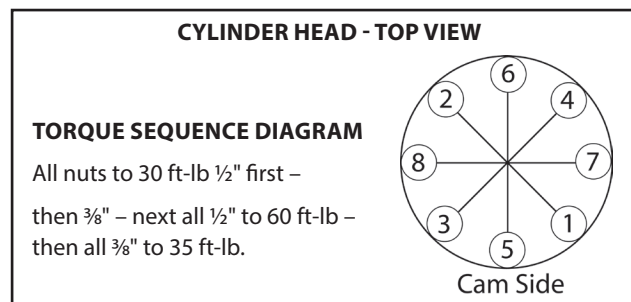


Diagram 1

Rocker Arm Stand Bolts	100 ft-lb
Use 272 red Loctite—requires TP55 Torx Plus wrench	
Rocker Arm Screws.....	28 ft-lb
Use 272 red Loctite—requires TP45 Torx Plus wrench	
Timing Cover Screws (Use 242 blue Loctite®)	96 in-lb
Bolts ⅝"	18 ft-lb
Screws ¼".....	120 in-lb
Pinion Gear Nut.....	33-2031 nut @ 200 ft-lb
Use 648 green Loctite on gear and 272 red Loctite on nut threads & face.	
Cam Gear Nut.....	33-2031 nut @ 200 ft-lb
Use 648 green Loctite on gear and 272 red Loctite on nut threads & face.	
Transmission Trap Door and Case Bolts (Use 272 red Loctite)	18 ft-lb
Left Side Main Bearing Nut -	
Coat Left Hand threads lightly with non-setting thread sealer such as 592 Loctite and torque with S&S Wrench (PN 53-0211) to 150 ft-lbs.	
Coat Right Hand threads lightly with 272 red Loctite and torque with S&S Wrench (PN 53-0211) to 150 ft-lbs.	

EXHAUST PIPES

Front & Rear Cylinders

Section 1 (2 $\frac{3}{8}$ " O/D X 7 $\frac{1}{2}$ " long)

Section 2 (2 $\frac{1}{2}$ " O/D X 1 $\frac{1}{4}$ " long)

Section 3 (2 $\frac{3}{4}$ " OD X 4 $\frac{3}{4}$ " long)

Section 4 (3" O/D X 12" long)

LUBRICATION

- Engine Oil - 0 or 5wt, 1 $\frac{1}{2}$ quarts
- Transmission and Primary Lube - 75w90, 2 ounces in primary, fill transmission fluid level to overflow hole, 12 to 14 ounces
- There is a .030 restrictor installed in the oil line that feeds the bottom end, in the cam cover fitting – check it often to ensure that it is free of debris
- There is a .015 restrictor in the left main bearing oil feed line – check it often to ensure it is free of debris
- Oil lines must be made from -4 AN braided hose

STARTING PROCEDURE

Due to the large displacement and high compression of this engine, it is important to make sure the front piston is just past TDC on the compression stroke before starting. This gives the starter a chance to get the crankshaft turning before it has to push the engine through a compression stroke.

1. Make sure the ignition switch is turned off.
2. Remove the timing plate in the primary cover.
3. Use a $\frac{3}{4}$ " RATCHET handle and a short extension if needed, insert extension into the engine sprocket and turn the engine counter clockwise (forward) until it rolls over TDC. The compression will make it snap over TDC with some force.
4. Check in the timing window to be sure the front cylinder is at TDC. You may have to turn the engine clockwise (backward) slightly to see the timing mark.
5. If the front TDC timing mark (TF) is visible, the engine is ready to start. If the rear TDC mark (TR) appears in the window, repeat the above procedure.
6. Mark the oil pump pulley for future reference. This eliminates the need to remove the timing window.

MAINTENANCE TIPS

VISUAL INSPECTION AFTER EACH RUN

- Moly valve coating for cracking or flaking
- Bottom spring collar for cracks
- Valve tips, lash caps
- Pushrod ends and rocker cups
- Top collar and keepers for excessive wear
- Check valve spring pressure - replace or shim if below 380 lbs. NOTE: Must maintain .060 minimum before coil bind at maximum lift. Recommend replacement of questionable springs rather than shim
- Drain and inspect oil and if necessary, pull pan and check for debris. If OK, oil may be re-used

VISUAL INSPECTION AS NECESSARY DURING EVENT

Cylinders/Pistons

- Check wristpin for straightness and coating integrity
- Visually inspect for cracks or signs of scuffing
- Verify ring land straightness
- Check piston domes for signs of detonation

Crankshaft

- Check rod side clearance against build sheet
- Visually inspect crankpin weld
- Check drive hub and pinion shaft runout – max is .007"

Cam Chest

- Inspect cam gears and keys
- Inspect cam shafts for excess wear
- Inspect tappets and tappet blocks for wear or bad bearings

REBUILD/REPLACEMENT SPECIFICATIONS

Heads

- Run out of valve, service limit is .005 T.I.R.
- Run out of seat, service limit is .005 T.I.R.
- Valve stem wear, service limit is .310 intake, .3105 exhaust
- Measure spring clearance to coil bind, service limit .060 or greater
- Measure spring installed pressure, service minimum is 380 lbs
- Set valve lash cold at .000 - .004, lash hot at approx. .015"
- Replace valves at 50 runs or sooner if necessary
- Replace valve springs at 15 runs or sooner if necessary
- Replace rocker arms at 50 runs or sooner if necessary

Cylinders/Pistons

- Measure piston/cylinders for fitment, service limit is .011"
- Measure piston ring land lateral clearance, service limit is .001 1st, .002 2nd
- New ring installation gaps .023, .063, .070
- Measure cylinders, service limit is 5.125"
- Hone cylinder as necessary without exceeding service limit for fitment
- Replace piston if collapsed, service limit is .002 smaller than specification on original build sheet
- Check wristpin/piston fitment, service limit is .002
- Replace pistons at 50 runs or sooner if necessary

Crankshaft

- Check rod side clearance against build sheet
- Visually inspect crankpin weld
- Drive hub and pinion shaft runout not to exceed .007
- Replace main bearing on crankshaft every 20 runs
- Replace the pinion bearing every 40 runs
- Replace crankshaft at 50 runs or sooner if necessary

Cam Chest

- Tappet blocks and lifters, service limit is .0040 maximum
- Inspect cam gears and keys
- Inspect cam shafts for excess wear and cracked welds
- Inspect tappets and tappet blocks for wear or bad bearings
- Replace cams at 50 runs or sooner if necessary
- Replace lifter at 50 runs or sooner if necessary
- Replace pushrods at 50 runs or sooner if necessary

Transmission

- Replace transmission bearings as necessary or after failure of any transmission component
- Replace shift forks after backing out of any gear except sixth or if routine inspection shows sign of wear
- Replace shift drum after backing out of any gear except sixth or if routine inspection shows sign of wear
- Replace detent arm spring as necessary
- Replace shift pawl as necessary

Oil Pump

- Replace pump if gears/rotors are scored or as necessary
- Replace pump belt if edges fray or contaminated by oil, etc.

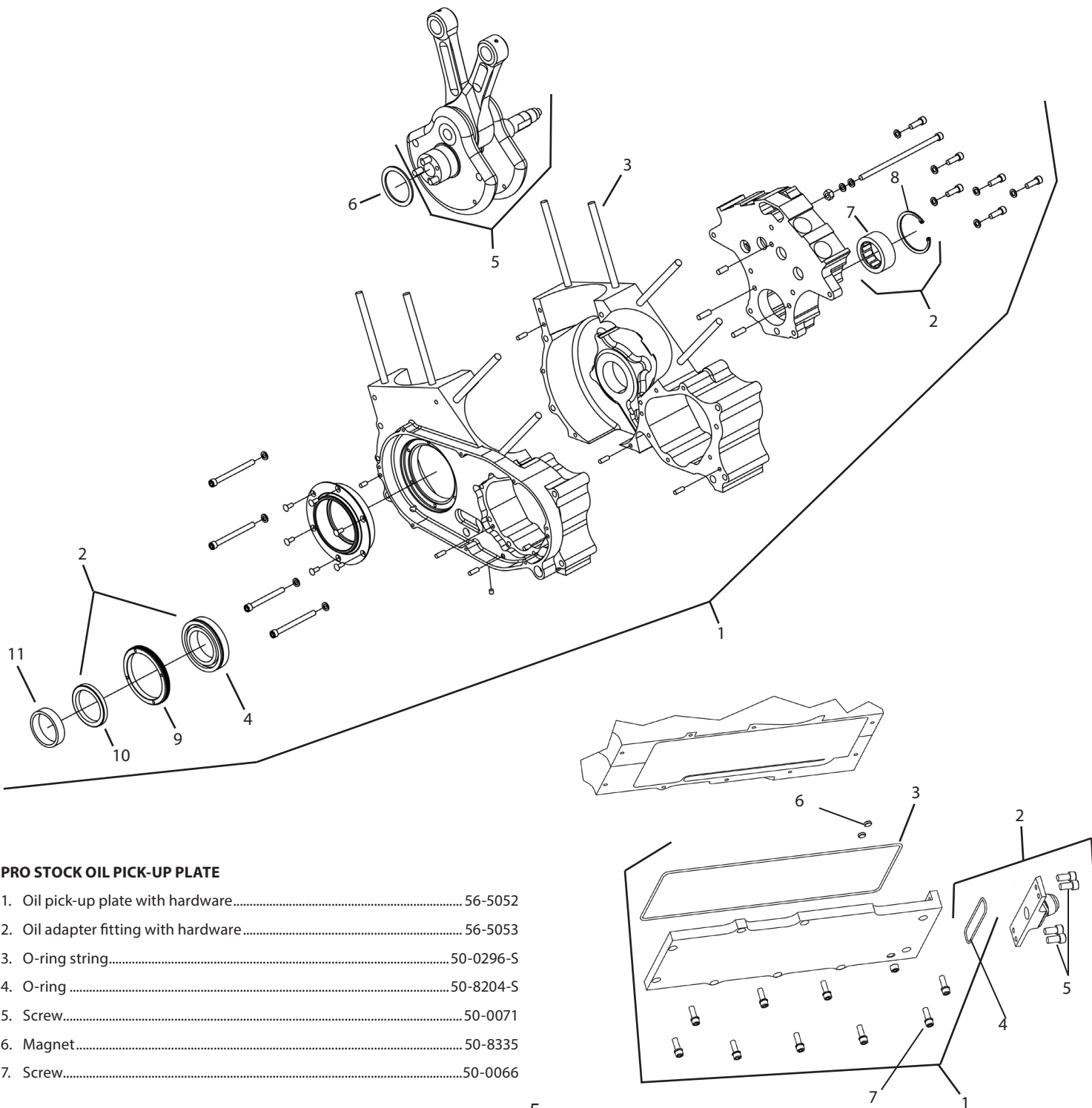
S&S BILLET PRO STOCK ENGINE ASSEMBLY

LOWER END PARTS

PRO STOCK CRANKCASE ASSEMBLY

1. Crankcase assembly	
With cam chest.....	31-1025
Without cam chest	310-0686
2. Mainshaft bearing rebuild kit.....	31-4100
*(Includes PN 31-4090-S and PN 33-4089-S)	
3. Cylinder stud	50-0320-S
4. Main bearing, drive side	31-4090-S

5. Flywheel assembly	
Standard porkchop	32-3008
Full diameter (R86).....	106-3648
Standard porkchop w/1" rods	320-0558
Full diameter (R86) w/1" rods.....	320-0559
6. Flywheel to main bearing spacer.....	50-0367
7. Bearing, Right, Main, 2000-2003 bt.....	31-4085
8. Retaining Ring, Internal, Notched, 2-9/16"	310-0730
9. Ring, Lock, Main Bearing	
RH thread	31-0423
LH thread.....	106-3372
10. Seal, Left, Main Bearing, Pro Stock	31-4091-S
11. Spacer, Driveside.....	33-3302

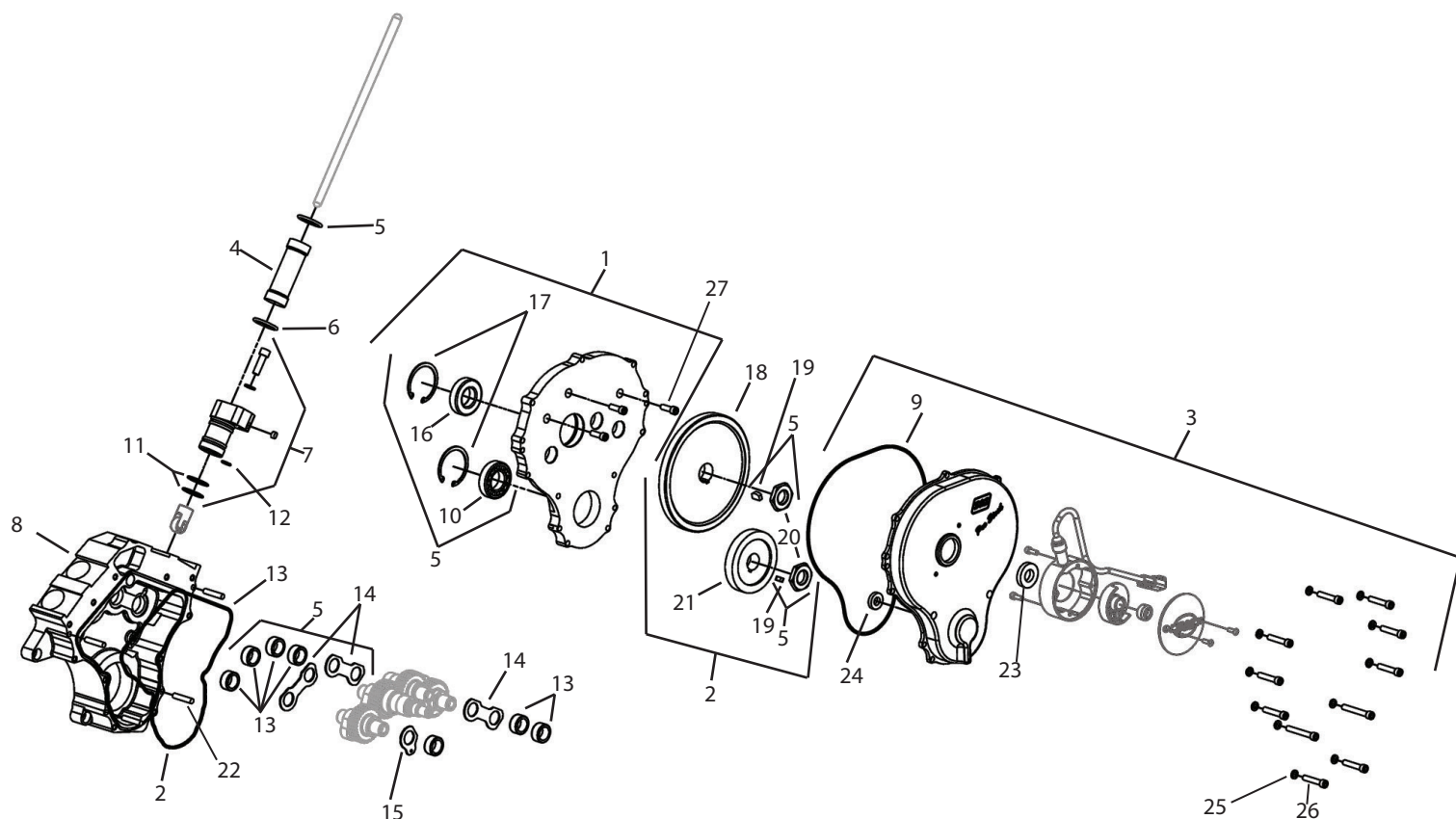


PRO STOCK OIL PICK-UP PLATE

1. Oil pick-up plate with hardware.....	56-5052
2. Oil adapter fitting with hardware	56-5053
3. O-ring string.....	50-0296-S
4. O-ring	50-8204-S
5. Screw.....	50-0071
6. Magnet.....	50-8335
7. Screw.....	50-0066

LOWER END PARTS PRO STOCK CAM CHEST

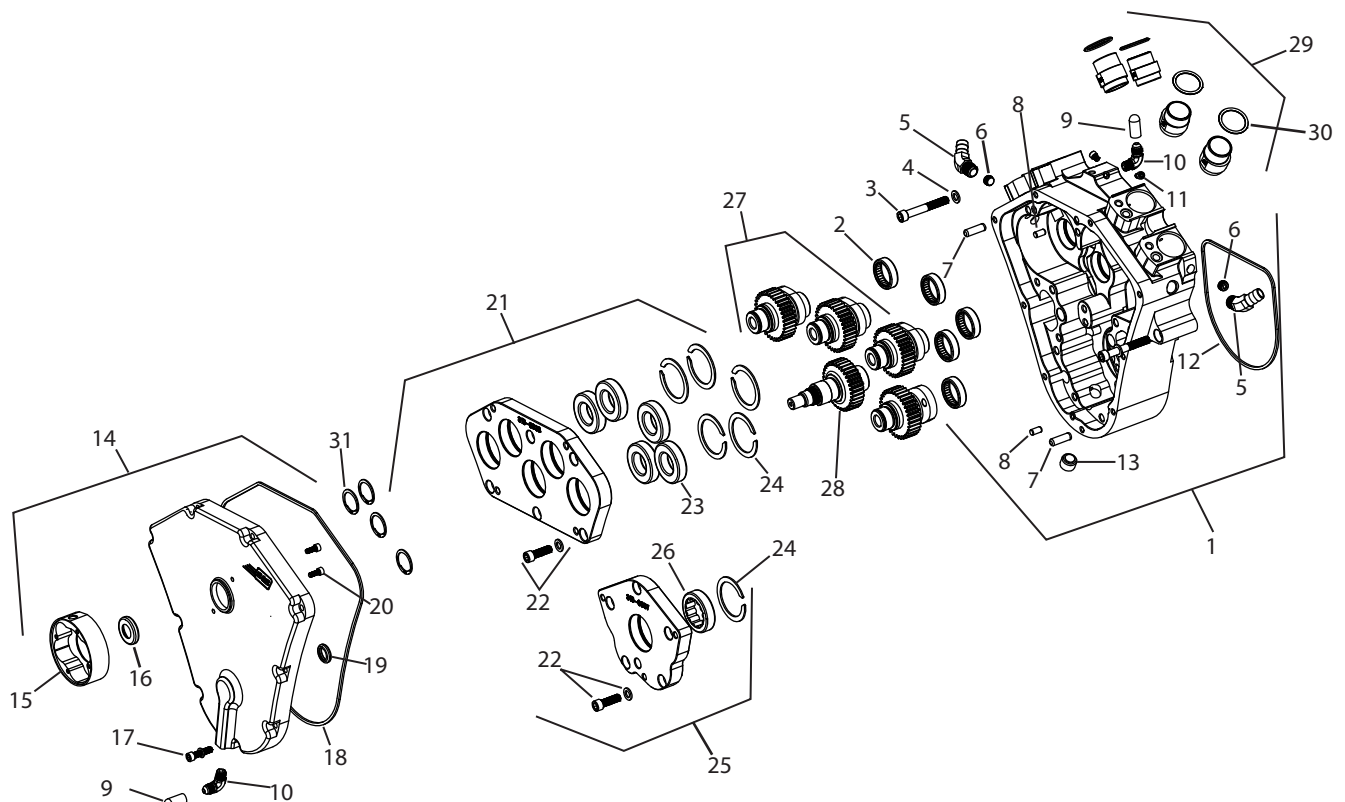
1. Intermediate plate assembly.....	31-6526	16. Bearing, #2 Cam, PS160.....	56-5100
2. Cam pinion/drive gear kit.....	33-4280	17. Retaining Ring, Internal, 2.054" x .062", Carbon Steel, SAE 1060-1090.....	50-8053
3. Cam chest cover assembly.....	31-6525	18. Gear, Cam Drive, #2, 96 Tooth, PS160.....	33-4282
4. Pushrod tube cover set (4 Pieces).....	93-4045	19. Key, Woodruff, .188" x .500", PS160.....	50-8236
5. Upper pushrod tube o-ring.....	50-7964-S	20. Nut, HH, 3/4-20 UNEF-3B x .233", Black, Steel, 4140.....	33-2031
6. Lower pushrod tube o-ring.....	50-8188-S	21. Gear, Pinion, 48 Tooth, PS160.....	33-4281
7. Tappet block set (Front & Rear).....	33-5400	22. Pin, Dowel, 1/4" x 1-1/4".....	50-8189-S
8. Cam chest (Part of 31-1025).....	N/A	23. Seal, Cam.....	31-4094-S
9. O-ring string.....	50-0296-S	24. Seal, Pinion.....	31-4096-S
10. Pinion shaft bearing.....	33-4089-S	25. Washer.....	50-7017
11. O-ring, (-022), Viton®.....	50-8005	26. Screw.....	50-0008
12. O-ring, (-012), .375" ID x .500" OD, Viton®.....	50-8006	27. Screw.....	50-0066
13. Bearing, Needle, Cam, Late 1958-'90 XL.....	31-4061		
14. Washer, Cam, Thrust, Double, .062", Steel.....	33-5210		
15. Washer, Cam, Thrust, Single, .062", Steel.....	33-5211		



PRO STOCK CAM CHEST KIT 310-0344 (CAMS NOT INCLUDED)

1. Cam chest, assembly, packaged, natural, billet, PS160, (1 Req)	310-0525
2. Bearing, assembly, needle, 2013 PS160, (5 Req)	310-0347
3. Screw, shc, 5/16-18 x 2-1/4", zinc, ASTM, A574-92A, (6 Req)	50-0115-S
4. Washer, flat, .325" X .548" X .062", Zinc, low carbon steel ,(6 Req)	50-7025
5. Fitting, pipe, 45°, 1/4-18 npt x .500", Zinc, brass PS160 ,(2 Req).....	50-0394-s
6. Plug, pipe, 3/4 taper, 1/8-27 nptf x .188", Zinc, steel, (2 Req)	50-8331a
7. Pin, dowel, .312" X 1", steel, (8 Req)	50-8171
8. Pin, dowel, .250" X .500", Steel, (2 Req)	50-8022
9. Plug, press-in, black, plastic, (2 Req).....	50-9928
10. Fitting, pipe, 90°, -4N to 1/8 NPT, dichromate, steel PS160, (2 Req).....	50-0412-s
11. SHCS, 10-32 x 1/4", (2 Req)	50-0476
12. O-ring, (-162), 5.750" Id x 5.937" OD, nitrile, PS160, (Req) 1	50-8205-s
13. Plug, drain, magnetic, zinc, steel, (1 Req).....	31-2006
14. Cover, assembly, cam chest, packaged, natural, billet, PS160, (1 Req).....	310-0523
15. Cup, cam position sensor, PS160, (1 Req).....	106-0144
16. Seal, cam cover/cam, .656" X 1.254" X .250", Nitrile, PS160, (1 Req)	31-4094-s

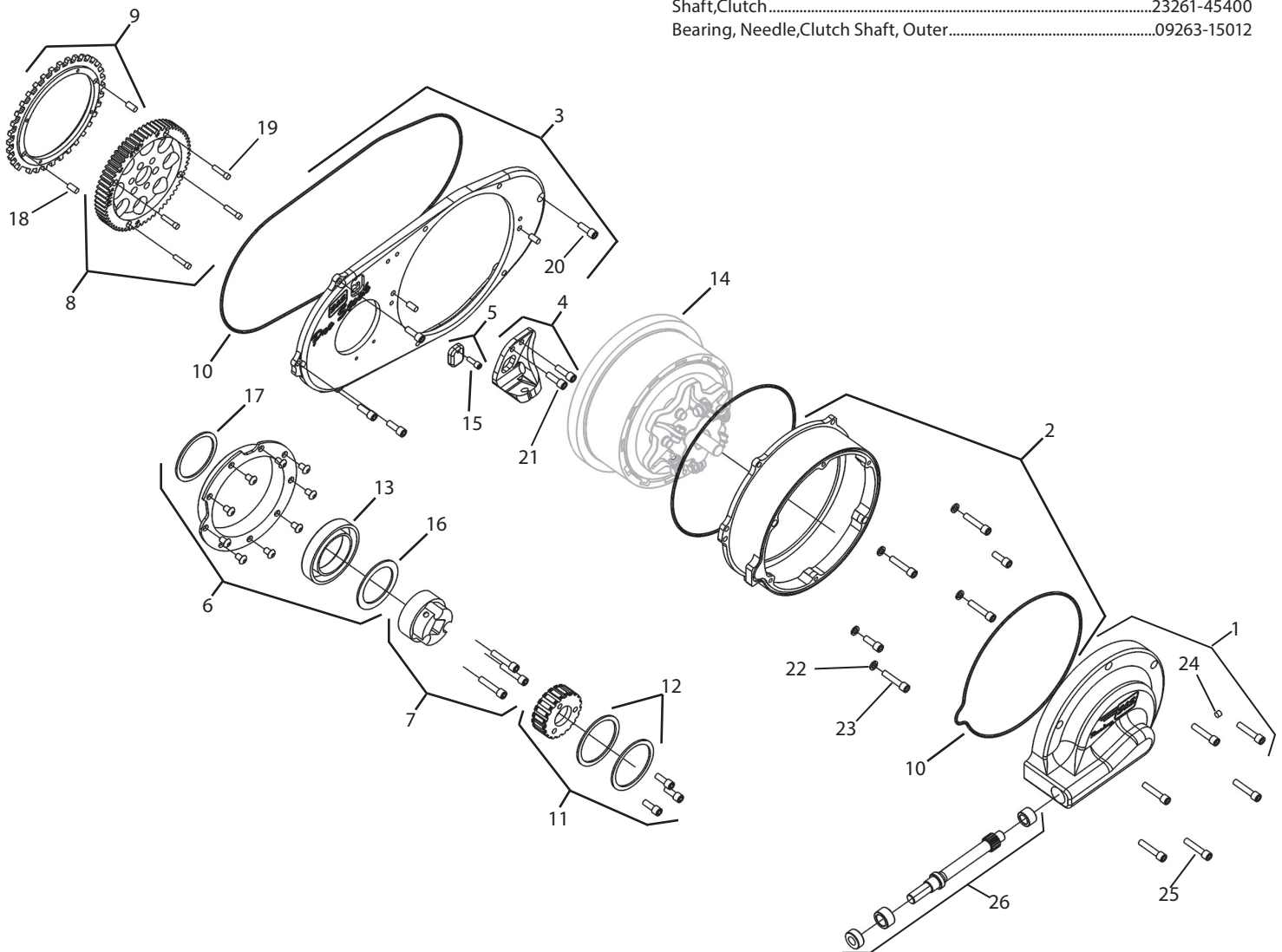
17. Screw, SHCS, w/ flat washer, 1/4-20 x 1", zinc, ASTM A574-92A, (9 Req)	50-0092-s
18. O-ring, cord stock, .103" Od x l, black, Viton, a75 durometer, (34" Req).....	50-0296-S
19. Seal, cam cover/pinion shaft, .469" X .840" X .188", PS160, (1 Req).....	31-4096-S
20. Screw, SHCS, 10-24 x 1/2", alloy, (2 Req).....	50-8211-S
21. Plate, assembly, cam support, packaged, PS160, (1 Req)	310-0519
22. Screw,SHCS,w/ Flat Washer,5/16-18 x 1" (11 Req).....	510-0125-S
23. Bearing, inner primary, 25mm x 47mm x 12mm, (5 Req)	56-5100
24. Retaining ring, internal, 2.054" X .062", Carbon steel, SAE 1060-1090, (6 Req).....	50-8053
25. Plate, assembly, pinion, packaged, natural, billet, PS160, (1 Req)	310-0521
26. Bearing, pinion shaft, PS160, (1 Req)	33-4089-S
27. Camshaft, set, 2013 PS160 (available seperately - not included in kit), (1 Req).....	310-0185
Special order, CTO, 2013 PS160, (1 Req).....	339-0003
28. Gear, idler, packaged, PS160, (1 Req)	330-0370
29. Pushrod cover, set, PS160, (1 Req).....	930-0031
30. O-ring, pushrod cover, 28mm x 34mm, Viton, 75 durometer, PS160, (4 Req).....	500-0278
31. Retaining ring, external, inverted, 25MM, (4 Req).....	500-0212



PRO STOCK PRIMARY COVER

1. Clutch cover with hardware	56-5050
2. Clutch hub cover spacer kit.....	56-3039
3. Primary cover with hardware	56-5051
4. Clutch cable tab with hardware	56-3024
5. Timing hole cover with hardware.....	31-4099
6. Outboard bearing support assembly	31-3906
7. Drive hub with hardware	33-2060
8. Primary drive gear, 64 teeth, with hardware	56-5041
9. Reluctor wheel with dowel pins.....	33-2064
10. O-ring string.....	50-0296-S
11. 20 tooth oil pump drive pulley	31-3901
12. 23/8" external retaining rings.....	50-8341-S
13. Outboard support bearing.....	31-0421-S
14. Clutch assembly, 87 teeth.....	NA

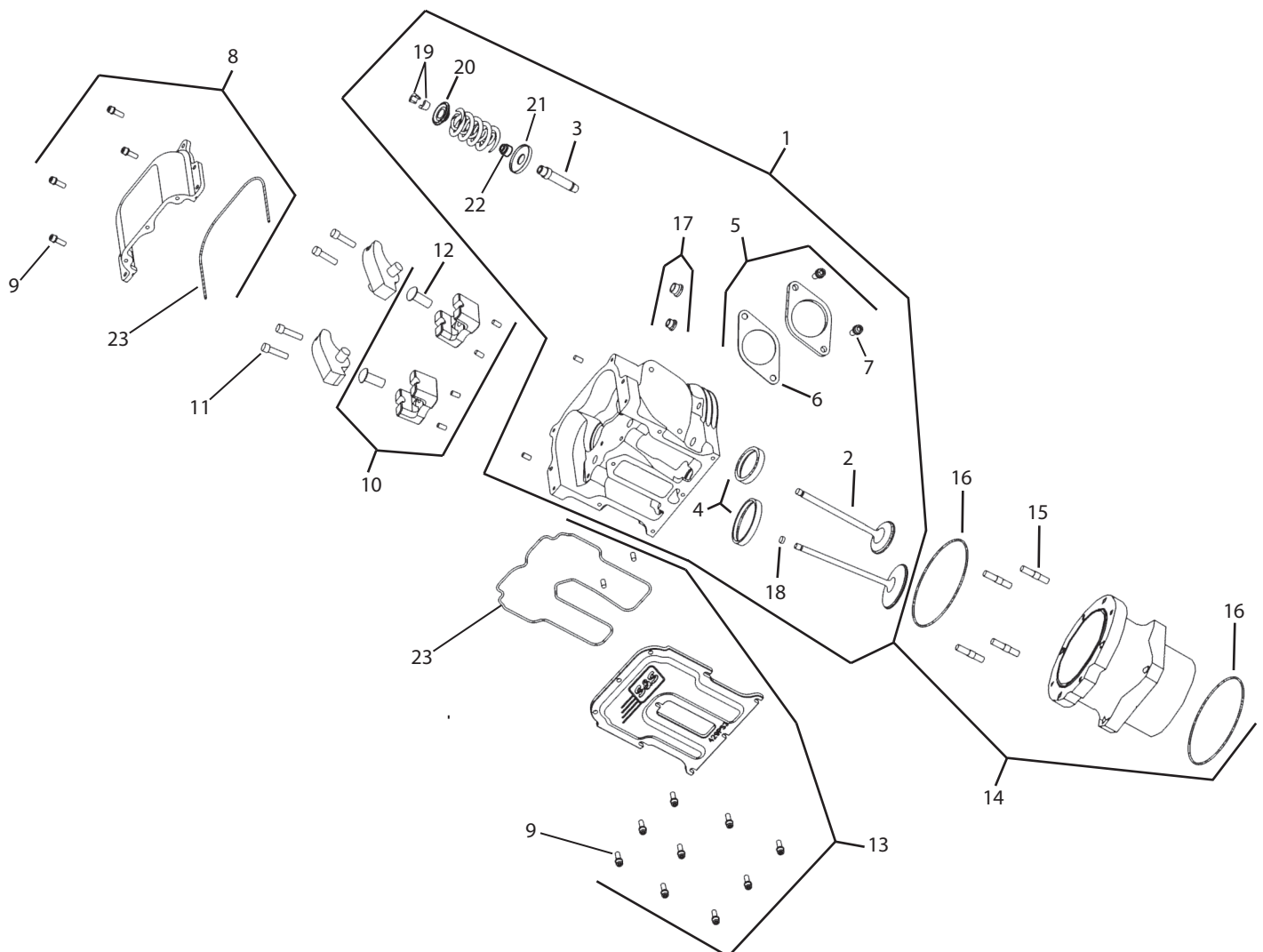
15. Screw, SHC, 10-24 x 1/2", Alloy	50-8211-S
16. Spacer, Outer, Primary Cover Bearing, 1.906 x 2.500 x .075.....	56-5049
17. pacer, Inner, Primary Cover Bearing, 2.170 x 2.500 x .075	56-5048
18. Pin,Dowel,.125" x .437",Alloy PS160	50-0431
19. Screw,SHCS,Machined,10-32 x 3/4",PS160	50-5052
20. Screw,SHCS,w/ Flat Washer,1/4-20 x 1",Zinc,ASTM A574-92A	50-0092-S
21. Screw,SHC,w/ Flat Washer,1/4-20 x 3/4",Zinc, ASTM A574-92A PS160	50-0066
22. Washer,Flat,.260" x .425" x .060",Chrome,Steel.....	50-7017
23. Screw,SHCS,1/4-20 x 1-1/4",Zinc.....	50-0008
24. Plug,Pipe,w/Sealant Patch,3/4 Taper,1/8-27 NPTF x .188",Zinc,Steel.....	50-8331A
25. Screw,SHCS,1/4-20 x 1-1/4",Zinc.....	50-0008
26. Suzuki parts not included:	
Seal, Clutch Shaft	09285-12002
Bearing, Needle, Clutch Shaft, Inner.....	09263-12014
Shaft,Clutch.....	23261-45400
Bearing, Needle,Clutch Shaft, Outer.....	09263-15012



CYLINDER HEADS AND PARTS

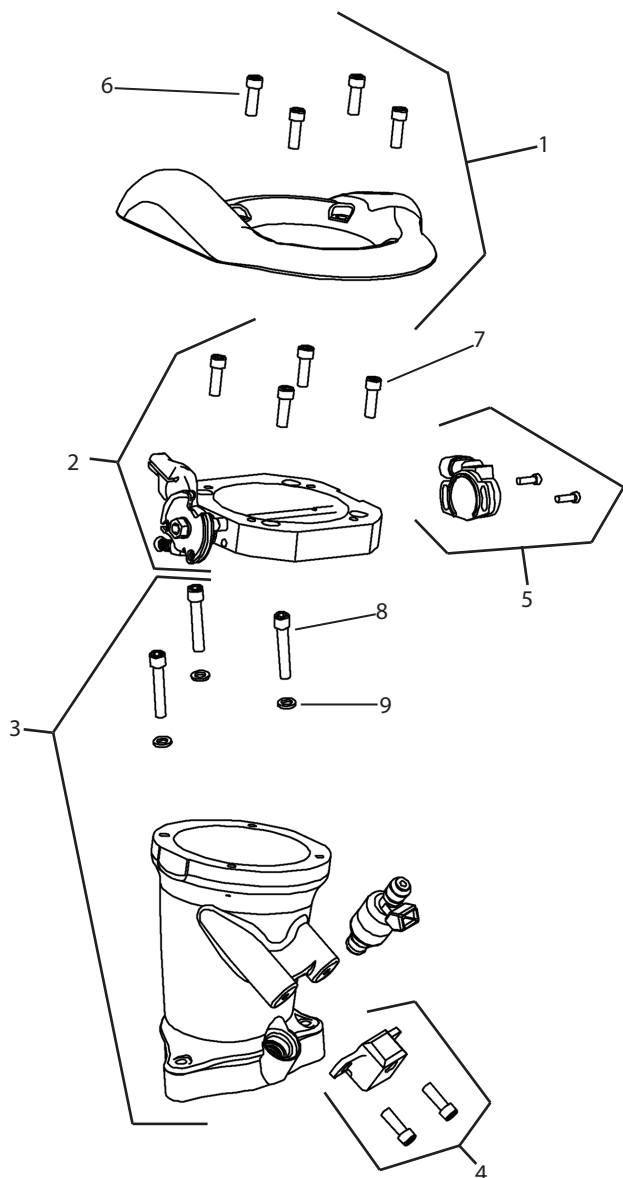
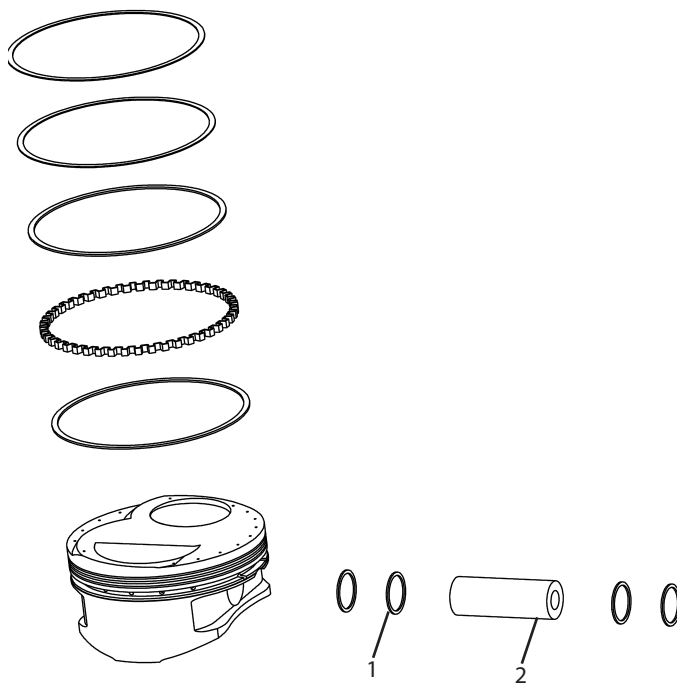
1. Head Assembly	
Front head assembly	90-1465F
Rear head assembly	90-1465R
2. Valve	
Intake	90-2131-S
Exhaust	90-2132-S
3. Valve Guide	
Intake	900-0932
Exhaust	900-0933
4. Valve Seat	
Intake	900-0860
Exhaust	900-0861
5. Exhaust flanges with gaskets and hardware - Front and rear	16-0251
6. Exhaust flange gasket	16-0253-S
7. Screw, SHC, 5/16-18 x 1", Zinc, ASTM A574-92A	50-0101
8. Rocker cover with hardware	90-4133
9. Screw, SHC, w/ Flat Washer, 1/4-20 x 3/4", Zinc, ASTM A574-92A PS160	50-0066
10. Rocker arm support set with hardware - Front and rear	90-4162
11. Bolt, rocker arm, Torx® head	50-0321-S
12. Button-head cap screw	50-0322-S

13. Pushrod cover with hardware	
Front	93-4098
Rear	93-4099
14. Cylinders	
Cylinder set - front and rear without pistons	91-4032
Front cylinder only	91-4032F
Rear cylinder only	91-4032R
15. Stud, cylinder head attachment	31-2327-S
16. O-ring, head and base	50-7953-S
17. Hardware, cylinder stud, billet PS	50-4000
18. Lash caps	90-2166-S
19. Keepers	900-0941
20. Titanium top collars (4 pack)	90-2134
21. Cup, spring	90-2162A
22. Seal, valve guide, 5/16"	900-0942
23. O-ring string	50-0296-S



PISTON PART

1. Circlips – Each..... 94-9276
2. Wristpin – Each..... 94-9281



INTAKE MANIFOLDS AND PARTS

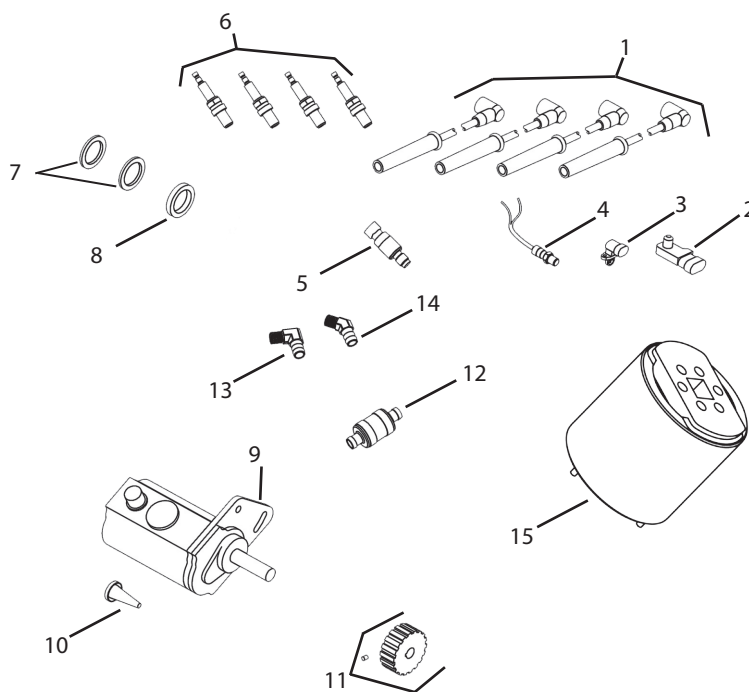
1. Radiused inlet and hardware
 - Front.....11-2158
 - Rear.....11-2159
2. Throttle body assembly
 - Front..... 16-5097
 - Rear..... 16-5098
3. Intake manifold with hardware
 - Front.....16-3574
 - Rear.....16-3575
4. Injector hat55-5053
5. Throttle position sensor – Rear manifold only550-5036
6. Screw.....50-0066
7. Screw.....50-0084
8. Screw.....50-0079
9. Washer.....50-7017

Miscellaneous Parts

1. MSD spark plug wires, 8.5mm (<i>Set of 4</i>)	55-1203
2. Map sensor	55-1037
3. Air temperature sensor.....	55-5041
4. Crank position sensor	31-2090
5. Head temperature sensor.....	55-1014
6. Champion spark plugs.....	55-1202-S
7. 1/8" Drive sprocket spacers	56-5046A
8. 1/4" Drive sprocket spacer.....	56-5047A
9. Dailey oil pump.....	31-6226
10. Oil pump trash screen	31-3922-S
11. 18 Tooth oil pump driven pulley with set screw	31-3900
12. Oil pre-filter, with hardware (<i>2 pack</i>)	90-2253
13. 90° fitting.....	50-0326-S
14. 45° fitting.....	50-0394-S
15. Threaded Lock Ring Tool.....	53-0211

Additional Parts Not Shown

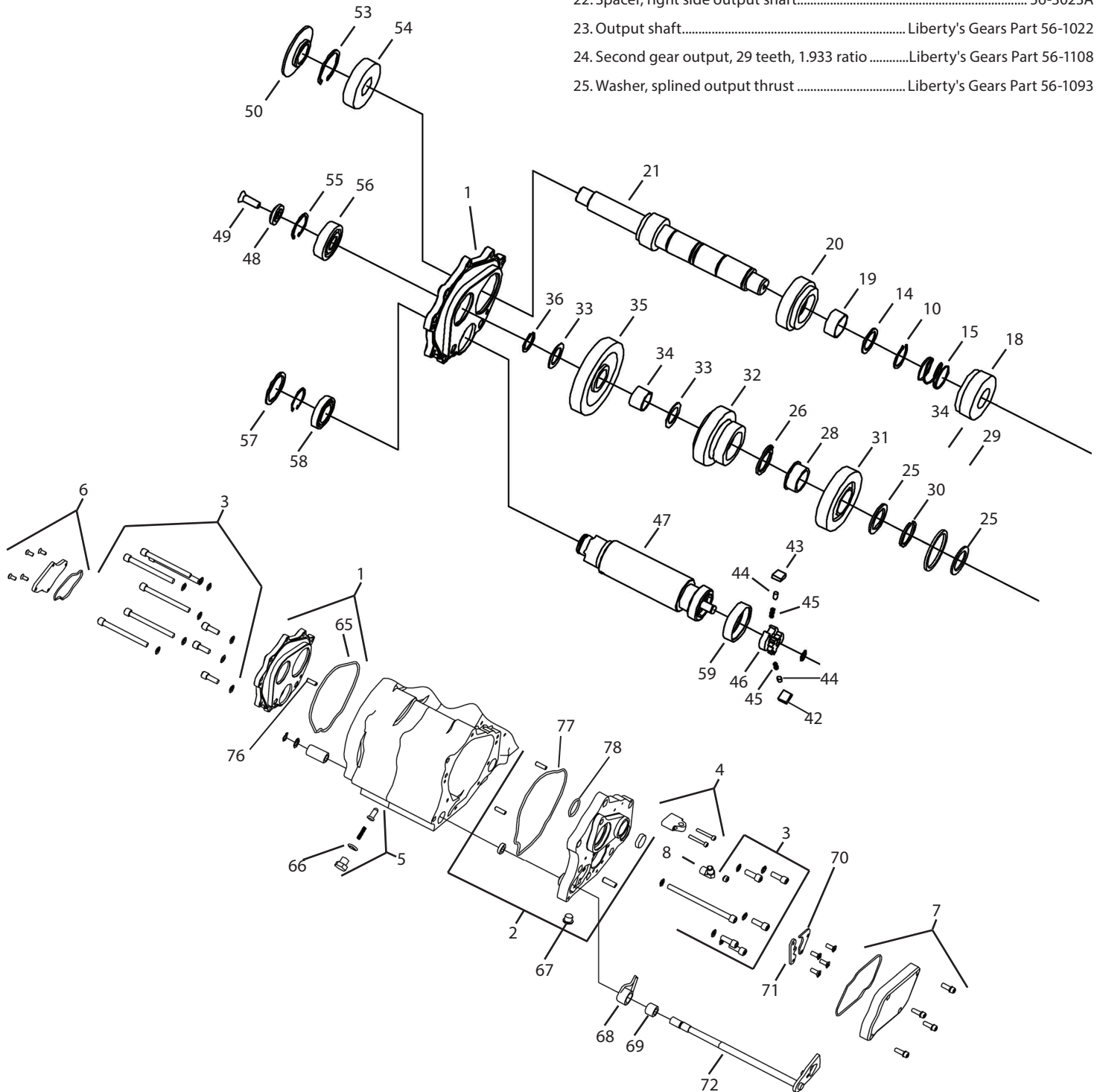
16. Plug, NPT 1/8-27.....	50-8331A
17. SCHS, 1/4-20 x 3/4.....	50-0066
18. O-Ring String	50-0296-S
19. #4 AN fitting, straight, .015" restrictor.....	50-0411
20. #4 AN fitting, 90°, .030" restrictor.....	50-0412
21. Woodruff key, 1/8" x 1/2"	50-8223
22. Washer.....	50-7017
23. Washer.....	50-7025



TRANSMISSION PARTS

1. Left side trap door assembly56-3010
2. Right side trap door assembly 31-0405
3. Hardware Kit, 56-5059
4. Transmission sensor bracket with screws..... 56-3005
5. Gear shift cam stopper with hardware 56-5062
6. Left shifting cover with hardware 31-0402
7. Right shifting cover with hardware 56-5063
8. 1/4 x 1/2 90 degree vent fitting 50-0326-S
9. Transmission speed sensor rotor with magnets 56-3036

10. Retaining ring Liberty's Gears Part 56-1116
11. Second gear input, 15 teeth..... Liberty's Gears Part 56-1113
12. Splined bushing..... Liberty's Gears Part 56-1036
13. Sixth gear input, 19 teeth..... Liberty's Gears Part 56-1112
14. Splined input thrust washerLiberty's Gears Part 50-7147
15. Spring, coilLiberty's Gears Part 50-8407
16. Fourth gear input, 18 teeth Liberty's Gears Part 56-1111
17. Gear spacer..... Liberty's Gears Part 56-1117
18. Third gear input, 18 teeth Liberty's Gears Part 56-1110
19. Bushing, fifth gear input Liberty's Gears Part 56-1099
20. Fifth gear input, 22 teethLiberty's Gears Part 56-1109
21. Input shaft..... Liberty's Gears Part 56-1021
22. Spacer, right side output shaft..... 56-3023A
23. Output shaft..... Liberty's Gears Part 56-1022
24. Second gear output, 29 teeth, 1.933 ratioLiberty's Gears Part 56-1108
25. Washer, splined output thrust Liberty's Gears Part 56-1093



26. Ring, external retaining, 1.077" diameter x .050" thick,	Liberty's Gears Part 56-1096
27. Sixth gear output, 20 teeth, 1.053 ratio	Liberty's Gears Part 56-1107
28. Bearing, splined-plain	Liberty's Gears Part 56-1095
29. Fourth gear output, 23 teeth, 1.278 ratio	Liberty's Gears Part 56-1106
30. Ring, external retaining, 1.093" diameter x .075" thick,	Liberty's Gears Part 56-1094
31. Third gear output, 27 teeth, 1.500 ratio	Liberty's Gears Part 56-1105
32. Fifth gear output, 25 teeth, 1.136 ratio	Liberty's Gears Part 56-1104
33. Thrust washer	Liberty's Gears Part 50-7146
34. Bearing, plain	Liberty's Gears Part 56-1098
35. First gear output, 31 teeth, 2.8185 ratio	Liberty's Gears Part 56-1103
36. Ring, external retaining, constant cross-section, .082" diameter x .050",	Liberty's Gears Part 56-1097
37. Spring long	Liberty's Gears Part 50-5066
38. Spring medium	Liberty's Gears Part 50-5064
39. Spring short	Liberty's Gears Part 50-5063
40. Output forks	Liberty's Gears Part 31-6107
41. Shift fork shaft out	Liberty's Gears Part 56-1023
42. Pole gear shift no. 1	Suzuki Part 25323-34201
43. Pole gear shift no. 2	Suzuki Part 25324-32401
44. Shifting pawl roller	Suzuki Part 09261-05003
45. Spring, shift pawl	Suzuki Part 09440-04003
46. Gear shift cam	Suzuki Part 25322-31310
47. Shift drum	Liberty's Gears Part 56-1020
48. Output shaft retaining washer	50-7006A
49. 1/4 -28 1" FHCS output shaft	50-0324-S
50. Spacer clutch, trans input, pro stock B60	56-3006
51. Input fork	Liberty's Gears Part 31-6108

52. 1/2" x .040 thick washer shaft input	Liberty's Gears Part 56-1024
53. Retaining Ring, Internal, 2.0702" x .0780", Carbon Steel, SAE 1060-1090	50-8052
54. Bearing, Ball, 20mm x 47mm x 14mm, 1991-2003 XL	56-3027
55. Retaining Ring, Internal, 2.054" x .062", Carbon Steel, SAE 1060-1090	50-8053
56. Bearing, Transmission Output Shaft	50-1120-S
57. Retaining Ring, Internal, 1.625"	94-9248-S
58. Bearing, Left, Transmission Shift Drum	31-3304-S
59. Bearing, Right, Transmission Shift Drum	31-3303-S
60. Bearing, Input Shaft	56-1119-S
61. Seal, Sensor, Right Side Trap Door	50-8216-S
62. Bushing, Output, Second Gear	Liberty's Gears Part 56-1035
63. Bearing, Output Shaft	56-1118-S
64. Seal, Transmission Output Shaft	56-3037-S
65. O-ring, (-162)	50-8205-S
66. Washer, Compression Release, .548" x .715" x .070", Zinc, Low Carbon Steel	50-7094
67. Plug, Drain, w/ O-ring, Magnetic, 1/2-20, Zinc, Steel	50-8335
68. Spring, Gear Shift Shaft, Transmission	Suzuki Part 09444-2610
69. Spacer, Return Spring, .473" x .781"	Suzuki Part 09168-14404
70. Guide, Gear Shift Cam, Drum Stopper	Suzuki Part 25331-49201
71. Guide, Gear Shift Cam, Pawl Stopper	Suzuki Part 25341-18000
72. Shaft, Gear Shift, Short	Suzuki Part 25510-00A00
73. Detent Arm	Liberty's Gears Part 11-2128
74. Detent Arm Spring	11-2157
75. Shift Fork Shaft, Input	Liberty's Gears Part 56-1024
76. Screw, Detent Arm Spring	56-5066
77. O-ring	50-8206-S
78. Oring	50-7964-S

NOTE: Parts indicated as "Liberty's Gears Part" or "Suzuki Part" are not available from S&S, and must be ordered directly from the manufacturer.

