

Instruction sheet No. 6250
Revised 10-28-98

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Technical Service



Installation Instructions for All S&S Big Twin Oil Pump Kits

Safe Installation and Operation Rules:

Before installing your new S&S oil pump 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.
- Compressed air and particles dislodged from using compressed air are harmful to eyes and body. Wear protective goggles when using compressed air and always direct air stream away from body parts such as hands and eyes and other people near you.
- Some solvents, degreasers and other chemicals are harmful to skin, eyes and other body parts. Many items are flammable and present a fire hazard. Read manufacturer's instruction label for proper use. Use in well ventilated area and wear protective clothing when using them to avoid personal injury.
- 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 S&S oil pump on it.
- Consult an appropriate authorized H-D service manual for correct disassembly and reassembly procedures for any parts that need to be removed to facilitate installation.
- Use good judgement when performing installation and operating motorcycle. Good judgement begins with a clear head. Don't let alcohol, drugs or fatigue impair your judgement. Start installation when you are fresh.
- For optimum performance and safety and to minimize potential damage to oil pump or other components, use the mounting hardware that is provided and follow all installation instructions.
- Be sure all oil lines, supply and return, are routed correctly with clamps in place and tightened. Lines must not contact exhaust pipes or other extremely hot surfaces where they could melt or leak and catch fire.
- Motorcycle exhaust fumes are toxic and poisonous and must not be breathed. Run motorcycle in a well ventilated area where fumes can dissipate.

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 oil pump or motorcycle.

NOTE

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

S&S recommends you take special notice of these

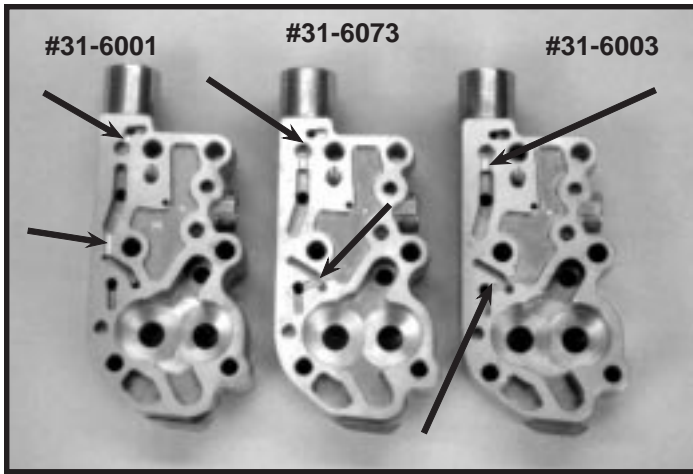
WARRANTY:

All S&S parts are guaranteed to the original purchaser to be free of manufacturing defects in materials and workmanship for a period of six (6) months from the date of purchase. Merchandise that fails to conform to these conditions will be repaired or replaced at S&S's option if the parts are returned to us by the purchaser within the 6 month warranty period or within 10 days thereafter.

In the event warranty service is required, the original purchaser must call or write S&S immediately with the problem. Some problems can be rectified by a telephone call and need no further course of action. A part that is suspect of being defective must not be replaced by a Dealer without prior authorization from S&S. If it is deemed necessary for S&S to make an evaluation to determine whether the part was defective, it must be packaged properly so as to not cause further damage and be returned prepaid to S&S with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem, how the part was used and the circumstances at the time of failure. If after an evaluation has been made by S&S and the part was found to be defective, repair, replacement or refund will be granted.

ADDITIONAL WARRANTY PROVISIONS:

- (1) S&S shall have no obligation in the event an S&S part is modified by any other person or organization.
- (2) S&S shall have no obligation if an S&S part becomes defective in whole or in part as a result of improper installation, improper maintenance, improper use, abnormal operation, or any other misuse or mistreatment of the S&S part.
- (3) S&S shall not be liable for any consequential or incidental damages resulting from the failure of an S&S part, the breach of any warranties, the failure to deliver, delay in delivery, delivery in non-conforming condition, or for any other breach of contract or duty between S&S and a customer.
- (4) S&S parts are designed exclusively for use in Harley-Davidson motorcycles. S&S shall have no warranty or liability obligation if an S&S part is used in any other application.



Picture 1



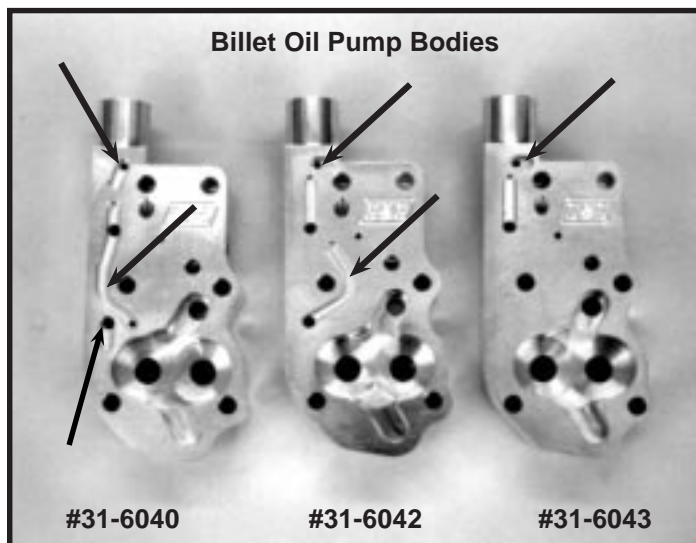
Picture 1A

Introduction

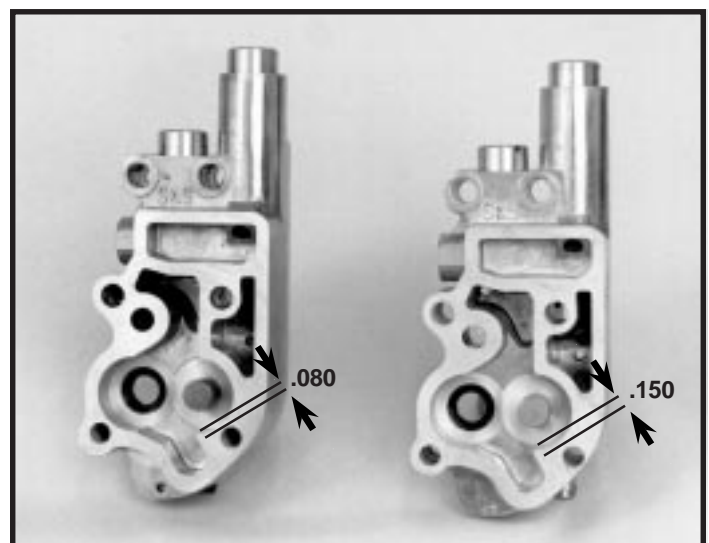
S&S manufactures oil pumps in both cast and billet aluminum. Cast oil pump kits are designed to replace stock H-D pumps on all OHV Big Twin engines from 1936 to present except Twin Cam 88. Cast pumps retain stock functions such as rear and primary chain oiling. Billet pumps have no provision for rear chain oiling.

All S&S oil pumps provide same oil volume and pressure as stock 1973 and later H-D pumps with stock gears. Installing any S&S oil pump on engine from 1936 to 1967 results in a 33% increase in supplied oil volume over stock cast iron pump. An additional 25% increase can be achieved on engines from 1939 to 1972 if optional S&S pinion and oil pump drive shaft drive gears are installed.

NOTE - Except for Knuckleheads, S&S recommends use of optional pinion and oil pump drive shaft gears because increased oil supply is usually beneficial. However, limited rate of oil return from Knuckle top end will likely cause problems if later drive gears are used. Even with standard drive gears, Knuckleheads with S&S pump may require restriction of top end oil supply. This is discussed in more detail under notes on page 13.



Picture 2



Picture 3

IMPORTANT NOTES

● *Chrome Plating - S&S does not recommend chrome plating oil pump body or cover. Proper preparation for plating requires abrasive buffing compounds. These materials can plug critical passages and otherwise damage oil pump. Also, it is extremely difficult to chrome plate an oil pump without altering critical machined surfaces. Chrome in these areas or on gasket surfaces can impair pump's performance by altering operating tolerances. In addition, chrome may flake and break loose causing damage to pump and engine.*

● *Powder Coating - In our experience, subjecting heat-treated alloys such as those used in S&S oil pumps, crankcases, cylinder heads and other parts to excessive heat can drastically alter their hardness, strength and other critical properties. The degree to which these properties are altered depends upon the temperatures reached and the duration of exposure. When powder coating or otherwise processing alloy parts, S&S exposes them to a maximum temperature of 370°F for no longer than 20 minutes. Under no circumstances should parts be heated past 400°F! S&S oil pump bodies and covers are also chemically treated to insure proper function. Excessive heat may alter treatment compounds resulting in poor pump performance and extensive engine damage due to insufficient lubrication.*

CAUTION - Plating or otherwise altering S&S oil pump may cause irreversible damage and interfere with engine lubrication. Damages caused by altering S&S oil pump will not be covered under warranty

● There are important differences in internal machining of oil pump bodies for each kit. Before beginning installation, compare pump body you received with those in **Pictures 1, 1A & 2**. Pump bodies are designed for specific year groups and must not be interchanged or installed on engines other than those they were designed for.

● Cast pump body #31-6003 for 1970-1991 models is identical to #31-6006 body for 1992-up models except for slightly different mounting bolt patterns. To positively identify bolt pattern, place known oil pump gasket against pump body and note whether lower bolt holes in gasket and body line up. Parts can also be identified by measuring thickness of material between bottom right bolt hole and supply gear cavity. **See Picture 3**. Measurement for 1991-earlier pattern is approximately .080". Measurement for '92-up pattern is approximately .150".

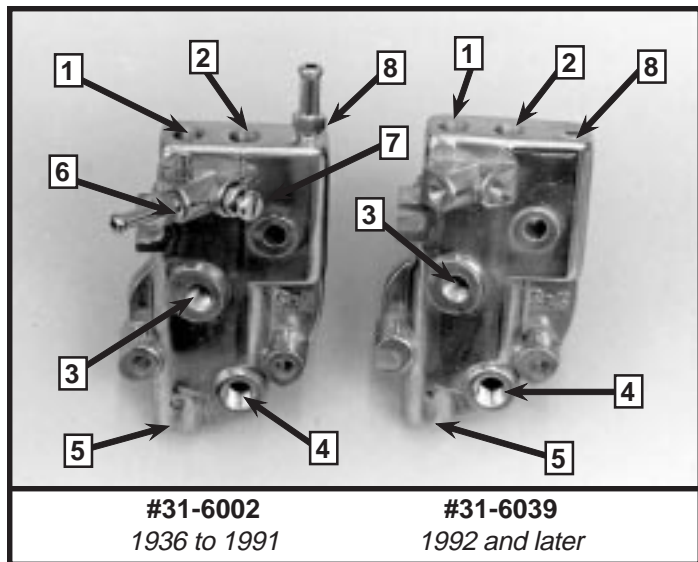
● Oil pump covers for 1992-up engines are machined differently from covers for earlier engines. 1992-up covers have slightly different bolt pattern, no provision for rear chain oiler, and slotted lower left bolt holes. To identify cast covers, compare cover you received to covers in **Picture 4**.

1. Top oil return hole.
2. Top oil supply hole.
3. Oil pressure switch or gauge hole.
4. Lower oil supply hole.
5. Lower oil return hole.
6. Rear chain oiler hose fitting.
7. Rear chain oiler adjusting screw.
8. Front chain oiler hole.

● Billet pump covers have essentially the same differences as cast covers as well as additional options for oil line fitting placement. Billet covers #31-6044 and #31-6047 have 1992-up mounting hole pattern. Billet covers #31-6041 and #31-6045 have '91-earlier mounting bolt pattern. **See Picture 5**. Additional information regarding billet covers can be found on pages 11 & 12.



Picture 5



Some oil pump kits include parts such as drive shaft gear, pinion drive gear and/or breather gear kit in addition to oil pump assembly itself. **Chart 1** lists part numbers of each kit, oil pump body, pump cover, and any additional components included in kit.

NOTE - Installation of some oil pump kits may require modification to engine crankcases that cause metal filings to

Pump Kit Part No.	Pump Body Part No.	Pump Cover Part No.	Drive Shaft Drive Gear Part No.	Pinion Shaft Drive Gear Part No.	Breather Gear Kit Part No.
31-6250	31-6001	31-6002			
31-6260	31-6003	31-6002			
31-6270	31-6073	31-6002			
31-6262	31-6003	31-6002			33-4239
31-6272	31-6073	31-6002			33-4239
31-6263	31-6001	31-6002	33-4230	33-4237§	33-4239
31-6264	31-6001	31-6002	33-4230	33-4232	33-4239
31-6265	31-6073	31-6002	33-4230	33-4232	33-4239
32-6266	31-6003	31-6002	33-4230	33-4232	33-4239
31-6267	31-6003	31-6002	33-4230	33-4232†	33-4251†
31-6261	31-6006	31-6039			
31-6269	31-6006	31-6039	33-4230	33-4232†	33-4251†
31-6251	31-6040	31-6041			
31-6252	31-6042	31-6041			
31-6253	31-6043	31-6044			
31-6254	31-6040	31-6041			
31-6255	31-6040	31-6041	33-4230	33-4232	33-4239
31-6256	31-6042	31-6041	33-4230	33-4232	33-4239
31-6257	31-6042	31-6041	33-4230	33-4232	33-4251
31-6258	31-6043	31-6044	33-4230	33-4232	33-4251
31-6259	31-6042	31-6041			33-4239

§ Pinion shaft drive gear, part #33-4237 for 1939 to 1953 engines, is easily distinguishable from 1954 and later gears by the inside diameter splines machined to fit early style splined pinion shafts.†

† Breather valve gear kit, part #33-4251 for 1977 and later engines, has a different pitch diameter from 1977 and earlier gears and can be identified by a circular groove machined in the gear face.

‡ #33-4232 pinion shaft pump drive gear is designed to fit S&S 1958 and later style tapered pinion shaft and stock 1954 to 1989 style tapered pinion shaft. Engines using stock 1990 and later style straight pinion shaft must use stock pinion shaft oil pump gear.

Note: "Bold type indicates billet oil pump kits."

Chart 1

be generated. It is imperative that all filings, dirt and other contamination be removed from crankcases, oil passages, oil pump and other engine components prior to final assembly. Blow out oil passages with compressed air.

CAUTION - Metal filings, dirt and other foreign matter can cause extensive damage to oil pump and engine.

WARNING - Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct air stream away from yourself and others nearby.
Pump Installation

Read instructions completely and familiarize yourself with installation before starting procedure. A summary chart of installation steps is provided to help simplify installation. All S&S oil pump kits are listed with the specific year groups they fit followed by steps required for proper installation. Select Kit Part # that corresponds to kit purchased and follow required steps.

NOTES

- Perform only those steps required for oil pump kit you will install. Installation steps vary between kits and year groups. S&S urges you to review installation steps for your oil pump and year group several times before beginning installation or performing any crankcase modifications!
- Optional steps will update 1948-1962 and 1966-1972 crankcases to 1973-later style oiling. Step 4 applies to all 1948-1969 crankcases except 1963-1965 models. Step 5 applies to 1970-1972 crankcases. Both procedures separate oil supplied to top and bottom ends to increase oil pressure

to hydraulic lifters and top end. This helps prevent hydraulic lifters from collapsing at low RPM. While these two steps are not mandatory, S&S strongly recommends them for all engines using hydraulic lifters except 1963-1965 outside oiler Panheads. It is also suggested that optional S&S high speed oil pump drive gears be used in all 1972 and earlier engines except Knuckleheads.

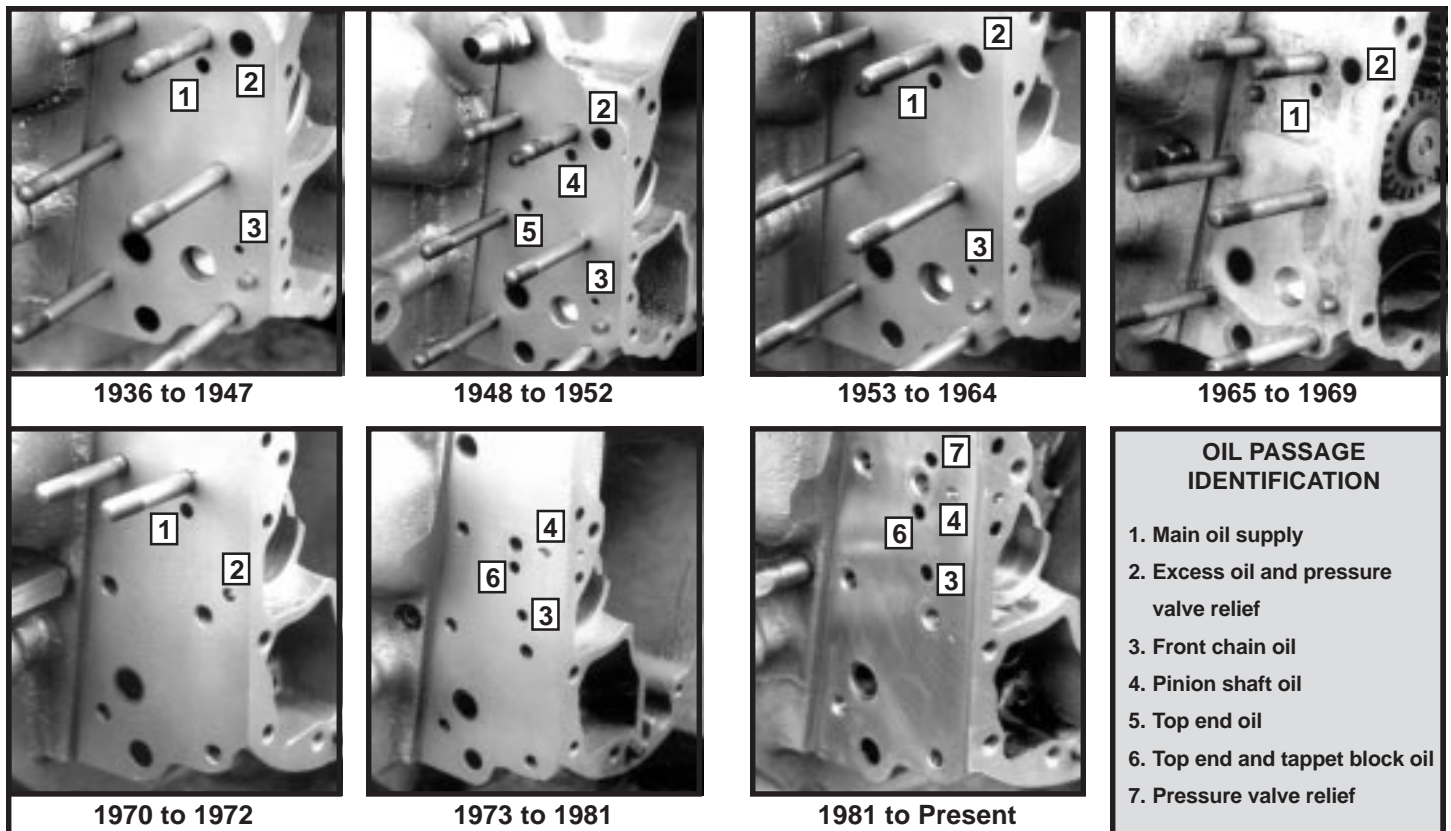
CAUTION - Failure to perform all required steps may result in engine damage.

1. Disassembly and Crankcase Identification - All Years.

- A. Remove old oil pump and mounting studs or bolts from crankcase.
- B. Identify crankcases by comparing them to those in photo. **See Picture 6.** Circle year group that matches your crankcases.

NOTES

- Proper identification of crankcase is imperative to insure correct assembly.
- Machining of some aftermarket crankcases may not be consistent with that of a specific stock year group. If in doubt about modifications required for aftermarket crankcases, contact crankcase manufacturer.
- S&S crankcases require no modification for S&S oil pump. S&S 1936-1969 generator style cases are machined to accept S&S or stock cast iron or early alloy pump. S&S 1970-later alternator style crankcases are machined for 1981-1991 or 1992-up oil pumps as specified at time of order. Both S&S and stock oil pump for specific year group can be installed without modification.



Picture 6

Kit Part No.	Year Group	Required Steps	Optional Steps
31-6250	Fits 1936 to 1972	1,2,3,7,8,9,10	4 (1948 to 1969 only) §
31-6251	Fits 1936 to 1972	1, 2, 3, 7, 8, 9, 10	4 (1948 to 1969 only) §
31-6252	Fits 1973 to 1991	1, 3, 7, 8, 9, 10	
31-6253	Fits 1992 and Later ‡	1, 7, 8, 9, 10	
31-6254	Fits 1948-1953	1, 7, 8, 9, 10	4 §
31-6255	Fits 1954 to 1969	1, 7, 8, 9, 10	4 §
31-6256	Fits 1970-1977	1, 2, 3, 7, 8, 9, 10	5
31-6257	Fits 1978 to 1991	1, 3, 7, 8, 9, 10	
31-6258	Fits 1992 & Later (Pre '89 shaft)	1, 7, 8, 9, 10	
31-6259	Fits 1970-1972	1, 2, 3, 6, 7, 8, 9, 10	5 §
31-6260	Fits 1970 to 1991	1, 2, 3, 6, 7, 8, 9, 10	5 (1970 to 1972 only) §
31-6261	Fits 1992 and Later	1, 7, 8, 9, 10	
31-6262	Fits 1970 to 1972	1, 2, 3, 6, 7, 8, 9, 10	5 §
31-6263	Fits 1948 to 1953	1, 7, 8, 9, 10	4 §
31-6264	Fits 1954 to 1964	1, 7, 8, 9, 10	4 §
31-6265	Fits 1965 to 1969	1, 6, 7, 8, 9, 10	4 §
31-6266	Fits 1970 to 1977	1, 2, 3, 6, 7, 8, 9, 10	5 (1970 to 1972 only) §
31-6267	Fits 1977 to 1991	1, 3, 7, 8, 9, 10	
31-6269	Fits 1992 and Later‡	1, 7, 8, 9, 10	
31-6270	Fits 1965 to 1969 †	1, 6, 7, 8, 9, 10	4 §
31-6272	Fits 1965 to 1969	1, 6, 7, 8, 9, 10	4 §

Chart 2

CAUTION - Improper oil pump installation due to incorrect identification of crankcase year group may result in engine damage.

2. Crankcase Modification - 1970-1972 Only - Plug $\frac{3}{16}$ " Oil Overflow Hole.

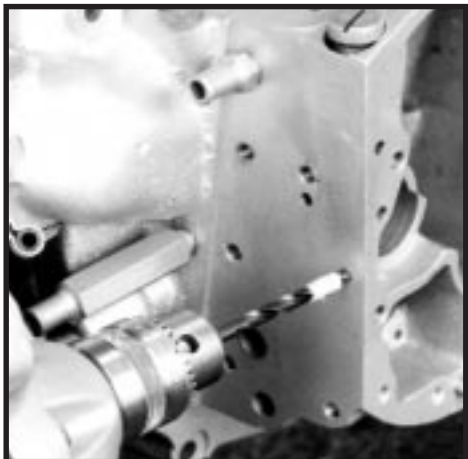
- A. If engine has been removed from chassis, CAREFULLY enlarge hole in Picture 7 with .203" ($\frac{3}{16}$ ") drill. If engine has not been disassembled apply grease to bit and both ends of hole to catch chips. Wrap masking tape around drill .225" from drill point to use as depth guide. If engine is in chassis, enlarging hole may be difficult. In this case hole may be tapped without enlarging, but extreme caution is required to avoid breaking tap off in hole.

NOTE - Drill bit o.d. is very close to hole size and may tend to distort hole if drill is not steadied.

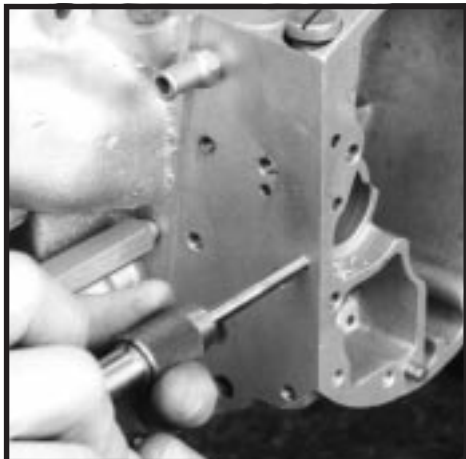
CAUTION - Distorting hole may cause poor thread fit after hole is tapped.

- B. Using $\frac{1}{4}$ -20 tap, carefully tap hole deep enough for $\frac{1}{4}$ -20 set screw provided with kit to rest flush with or slightly below gasket surface. Use straight edge to confirm set screw does not protrude above gasket surface. **See Pictures 8 and 9.** If necessary, reapply grease to both sides of hole before inserting $\frac{1}{4}$ -20 tap.

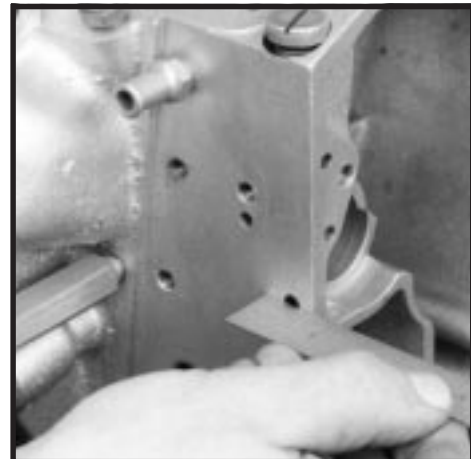
NOTE - Do not tap hole so deep that screw can be threaded completely through hole. Objective is to have screw tighten in



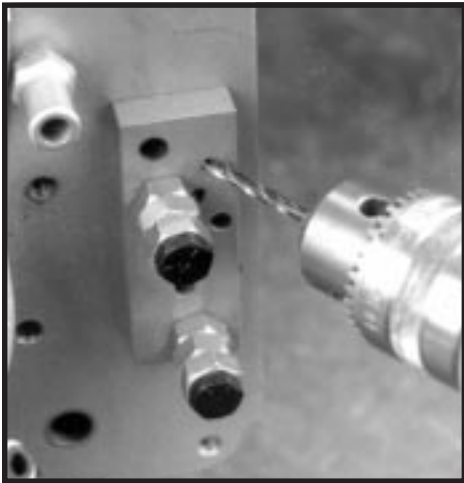
Picture 7



Picture 8



Picture 9



Picture 10



Picture 11



Picture 12

threads just as it becomes flush with or slightly below oil pump gasket surface.

- C. Install $\frac{1}{4}$ -20 set screw using Loctite on threads.

3. Crankcase Modification - 1970-1980 Only - Drill Pressure Valve Relief Hole.

- A. Install S&S Oil Pump Drill Jig, part #53-0013, or H-D Crankcase Oil Passage Drilling Jig, part #94461-81 or #94461-82, on oil pump gasket surface of crankcase.
- B. Use .125" ($\frac{1}{8}$ ") drill bit to drill pressure relief hole into gear cavity. **See Picture 10.** Apply grease to bit and both sides of case and withdraw drill frequently during procedure to clear chips.

CAUTION - Do not perform Step 3 on stock 1936-1969 crankcases or any crankcase with angled tappet screen. Drilled passage will intersect tappet screen oil passage resulting in loss of oil pressure. Loss of oil pressure will likely result in serious engine damage due to inadequate lubrication.

4. **Optional Crankcase Modification - 1948-1962 using #31-6001 cast or #31-6040 billet pump body, or 1966-1969 using #31-6001 or #31-6073 cast pump body - Plug and Redrill Crankshaft Feed Hole.**

NOTES

- Objective of this modification is to alter 1948-1962 and 1966-1969 crankcases to 1973-later style oiling. With this oiling system heads and lifters get primary, unrestricted oil supply first. Lower end main and rod bearings get secondary, low pressure oil after top end is supplied. This modification is recommended only if hydraulic lifters are used.
- 1948-1969 style S&S crankcases feature special machining leaving installation of plug as described in Section 4-D only step required to complete modification.
- 1963-1965 and other Panheads with outside oilers cannot utilize Step #4, Optional Crankcase Modification, due different oil supply system.

CAUTION - If performed on "outside oiler" Panheads, modification described in Step 4 will result in oil starvation to top end and extensive engine damage.

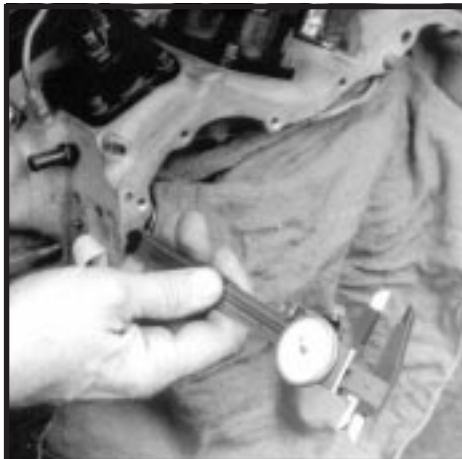
- A. Wrap masking tape around .203" ($\frac{13}{64}$ ") drill bit .850" from point to use as depth guide. Carefully drill hole in Picture 11 .850" deep. **See Pictures 11 and 12.**

NOTE - Drill size is very close to hole size and may tend to distort hole if drill is not steadied.

CAUTION - Distorting hole may cause poor thread fit after hole is tapped.



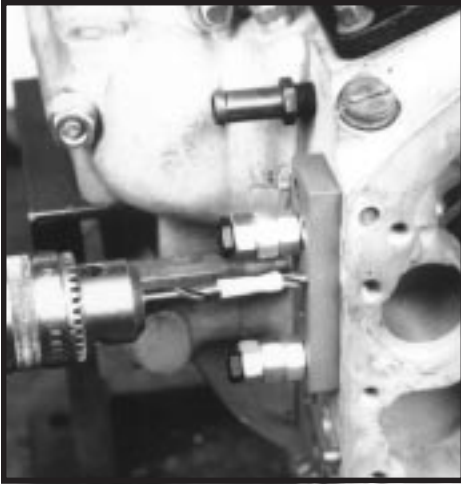
Picture 13



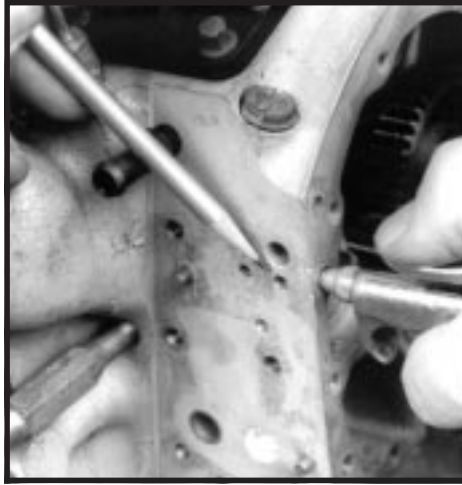
Picture 14



Picture 15



Picture 16



Picture 17



Picture 18

- B. Using ¼-20 tap, carefully tap hole deeply enough for ¼-20 set screw provided in kit to bottom out with screw head .540" to .600" below gear cover gasket surface. **See Pictures 13 and 14.** Remove tap periodically and install set screw to check depth.

NOTE - Do not tap hole deeply enough for set screw to block tappet screen oil feed passage. This will restrict oil supply to lifters and cylinder heads.

CAUTION - Restricted oil supply may cause extensive engine damage.

- C. On 1948-1952 crankcases blow air into intersecting hole in pump gasket surface to remove chips. On 1953-1969 crankcases remove oil plug and lifter screen filter assembly and blow air into passage to remove chips. **See Picture 15.**

NOTE - Before blowing chips out, set screw must be removed to allow them to escape.

WARNING - Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct air stream away from yourself and others nearby.

- D. Apply Loctite to threads of ¼-20 set screw provided and install to depth of .540" to .600" below gear cover gasket surface.
- E. Install S&S Oil Pump Drill Jig, part #53-0013, on crankcase oil pump gasket surface. **See Picture 16.**
- F. Wrap masking tape around .187" (⅜") drill bit .750" (¾") from drill point to use as depth guide. Using tape as guide, drill hole into pump gasket surface .375" (⅜") deep until it breaks into passageway just tapped. (Hole to be drilled is ⅜" deep and drill jig is ⅜" thick - ⅜" + ⅜" = ¾"). **See Picture 16.**

NOTE - Do not drill hole too deep. Hole must not extend into gear cavity side of crankcases.

CAUTION - Improperly drilled oil feed hole may cause oil to bleed off into gear cavity resulting in oil pressure loss and possible engine damage.

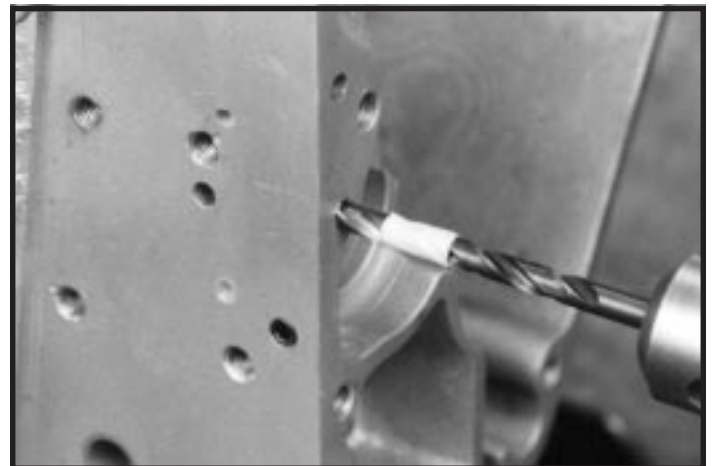
- G. Remove drill jig and blow air into passage to remove chips. **See Picture 17.**

CAUTION - Metal filings, dirt and other foreign matter can cause extensive damage to oil pump and engine.

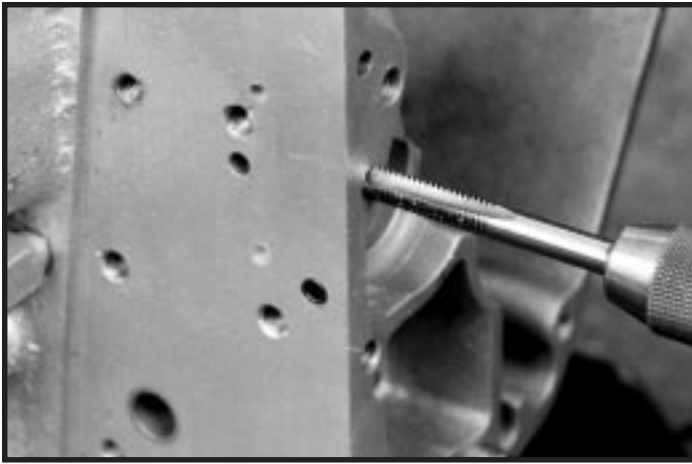
WARNING - Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct air stream away from yourself and others nearby.

5. Optional Crankcase Modification - 1970-1972 only, using #31-6003 cast pump body or #31-6042 billet pump body- Plug and Redrill Crankshaft Feed Hole

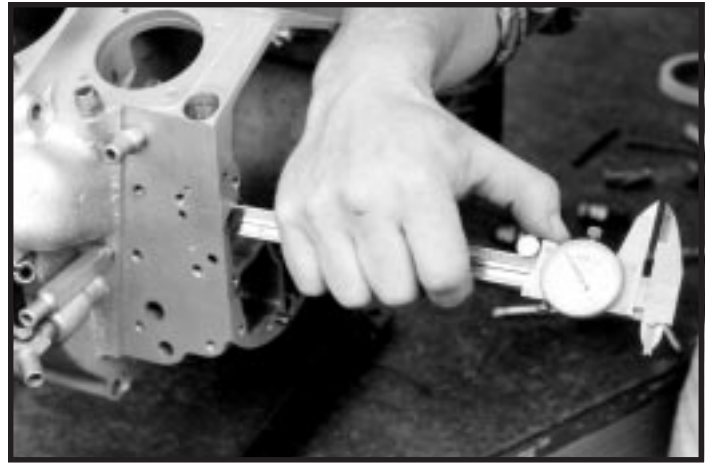
NOTE - Objective of this modification is to alter 1970-1972 cases to 1973 and later style oiling. With this oiling system lifters get primary, unrestricted oil pressure first. Lower end main and rod bearings get secondary, lower oil pressure after top end is supplied. This modification is recommended only if hydraulic lifters are used.



Picture 19



Picture 20



Picture 21

- A. Wrap masking tape around .203" ($\frac{1}{16}$ ") drill bit .375" ($\frac{3}{8}$ ") from drill point to use as depth guide. CAREFULLY enlarge hole in Picture 18. Using tape as guide, drill hole .375" ($\frac{3}{8}$ ") deep. See Pictures 18 and 19.

NOTE - Drill bit size is very close to hole size and may tend to distort hole if drill is not steadied.

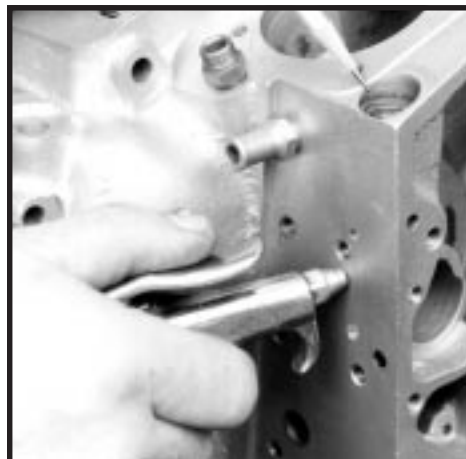
CAUTION - Distorting hole may cause poor thread fit after hole is tapped.

- B. Using $\frac{1}{4}$ -20 tap, CAREFULLY tap hole deep enough for $\frac{1}{4}$ -20 allen head set screw supplied in kit to bottom out with screw head .125" to .150" below gear cover gasket surface. See Pictures 20 and 21. Remove tap periodically and install set screw to check depth.

NOTE - Do not tap hole so deep that screw blocks tappet screen oil feed passage, inadvertently restricting oil supply to lifters and cylinder heads.

CAUTION - Restricting oil supply to cylinder heads may cause extensive engine damage.

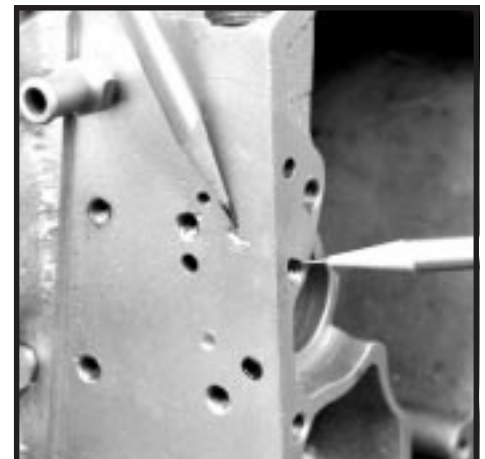
- C. Remove oil plug and lifter screen filter assembly. Blow air in top end supply hole directly below top right pump mounting bolt hole to remove chips and ensure that passage is not blocked. See Picture 22.



Picture 22



Picture 23



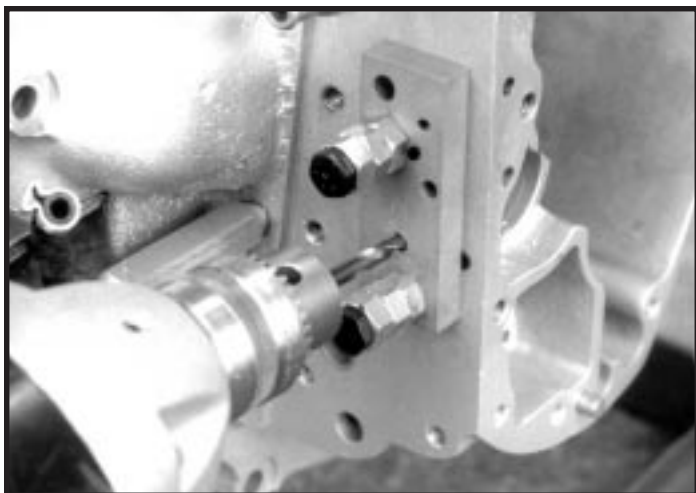
Picture 24

WARNING - Compressed air and particles dislodged by compressed air are potentially harmful. Wear protective goggles when using compressed air and always direct air stream away from yourself and others nearby.

- D. Remove $\frac{1}{4}$ "-20 set screw, apply drop of Loctite to threads and install to depth of .125" to .150" below gear cover gasket surface.
- E. Install S&S Oil Pump Drill Jig, part #53-0013, on gear cover gasket surface as in Picture 23.
- F. Using a .125" ($\frac{1}{8}$ ") drill bit drill angle hole from passage just plugged until it breaks through pump gasket surface. See Pictures 23 and 24. While drilling hole, withdraw drill frequently to clear chips.
- G. Remove drill jig and blow compressed air into passage to remove chips. Note previous cautions regarding compressed air.

6. **Crankcase Modification - 1965-1969 with kits using #31-6073 body, or 1970-1972 with kits using #31-6003 body - Drill Primary Chain Oil Supply Hole.**

NOTE - Objective of this modification is to update early engines to meter oil to primary chain automatically through breather gear rather than manually through metering screw device in pump body. This update requires use of 1973-later style breather gear such as S&S #33-4239. This gear is not included in kits #31-6260 or #31-6270



Picture 25

- A. Install S&S Oil Pump Drill Jig, part #53-0013, on oil pump gasket surface as in **Picture 25**.
- B. Using .187" ($\frac{3}{16}$ ") drill bit CAREFULLY drill hole into pump gasket surface until bit breaks out in breather valve gear cavity. **See Picture 25**. If modification is done while engine is still assembled, apply grease to both sides of case to help catch chips.

NOTE - Drill hole slowly and carefully to avoid contacting opposite wall of cavity when drill breaks through.

CAUTION - Contacting breather cavity wall with drill may damage machined surface.

- C. Remove drill jig and clear chips away.
- D. Carefully debur hole in breather valve gear cavity.

7. Oil Pump Cover Assembly

Customer must install oil line fittings in pump cover before installing oil pump. Section A applies to cast covers. Section B applies to billet covers.

A. Cast Cover

NOTE - Oil line fitting placement on S&S pump may differ from stock pump. Follow S&S instructions for installation of supply and return fittings. Prior to installation coat threads of steel fittings with anti-seize compound to prevent galling.

CAUTION - Improper installation of oil lines or fittings may result in parts damage not covered under warranty.

1. Oil Supply - Oil supply line fitting can be installed at either of two locations in most S&S oil pump covers. Hole #2 marked "S" on cast pump cover is normally used for 1991-earlier engines. **See Picture 4**. Hole #4 in face of pump cover is normally used for 1992-up engines. Holes #2 and #4 may be used interchangeably for custom applications but hole not used must be plugged with #31-6007 $\frac{1}{8}$ -27 pipe plug. Steps below are typical for year groups shown.
 - a. 1936-1991
 1. Install 90° elbow fitting #31-6008 in hole

#2 marked "S" in top of pump cover or hole #4 in face of pump cover.

2. Install hose fitting #31-6009 in elbow fitting installed in step a.
 3. Install #31-6007 $\frac{1}{8}$ -27 pipe plug in hole #4 in face of pump cover.
- b. 1992-up
 1. Install 90° elbow fitting #31-6008 in hole #4 in face of pump cover.

NOTE - Elbow fitting must be installed in hole #4 with opening pointing down for use with OEM rigid oil lines.

2. Install hose fitting #31-6009 in elbow fitting installed in step a.
3. Install #31-6007 $\frac{1}{8}$ -27 pipe plug in hole #2

2. Oil Return - Oil return line can be connected to pump at either of two locations. Hole #1 (marked "R") on top of cover is normally used for 1991-earlier engines. Hole #5 in bottom of pump cover is normally used for 1992-up engines. Return hole not used must be plugged with #31-6007 $\frac{1}{8}$ -27 pipe plug. Steps below are typical for year groups shown.

- a. 1936-1991
 1. Install 90° elbow fitting #31-6008 in hole #1 in top of pump cover.
 2. Install hose fitting #31-6009 in elbow fitting installed in step a.
 3. If applicable, install #31-6007 $\frac{1}{8}$ -27 pipe plug in hole #5 in bottom of pump cover.

NOTE - Earlier S&S oil pumps have only one location for oil return.

- b. 1992-up
 1. Install 90° elbow fitting #31-6008 in hole #5 in bottom of pump cover. Fitting should be directed toward flat, machined surface of cover for rigid OEM oil lines, otherwise position fitting for most convenient oil line installation.
 2. If rigid OEM lines are to be used, install compression fitting #50-8120 (H-D #63523-92A) in 90° elbow fitting. Otherwise install hose fitting #31-6009.
 3. Install #31-6007 $\frac{1}{8}$ -27 pipe plug in hole #1 in top of pump cover.

3. Primary Chain Oil Supply

- a. 1936-1964
 1. Install #31-6028 $\frac{1}{16}$ -27 pipe plug in hole #8 in top of cover.
 2. Install #31-6026 adjuster screw, #31-6035 brass washer, and #31-6027 lock nut into threaded hole in side of pump body. Bottom screw two or three times to seat properly. **See Picture 31**.

NOTE - Chain oiler adjusting screw has tapered end and must be used. Substituting standard machine screw for tapered screw will result in large oil loss out breather.

3. Turn screw out ½ turn and tighten locknut against brass washer and body.

NOTE - After engine has been run for a while it may be necessary to adjust screw to achieve desired oil flow to primary chain. Final screw setting is usually closer to fully closed position.

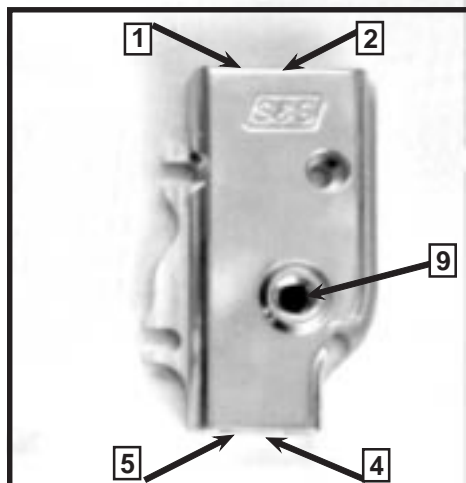
CAUTION - Overtightening screw may damage threads or adjusting screw seat in pump body.

- b. 1965-1984 engines with primary chain drive and dry clutch.
 1. Install #31-6010 hose fitting in threaded hole #8 on top of pump cover.
 2. Connect #31-6010 fitting to primary chain oiler line after pump is installed.
 3. For 1965-1972 engines using #31-6001 pump body, install #31-6026 adjuster screw, #31-6035 brass washer, and #31-6027 lock nut into threaded hole in side of pump body. **See Picture 31.** Bottom screw two or three times to seat screw. Turn screw out approximately 1½ turns and tighten locknut against brass washer and oil pump body.

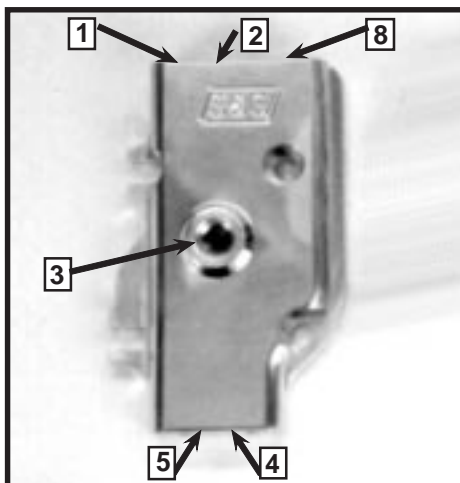
NOTE - Above setting should provide 1 to 1¼ oz's/minute oil flow to primary chain @ 2500 RPM. This can be confirmed after engine has reached operating temperature by disconnecting hose to primary chain, operating engine at 2500 RPM and measuring oil delivered into measuring container during one minute.

CAUTION - Overtightening adjustment screw may damage oil pump body.

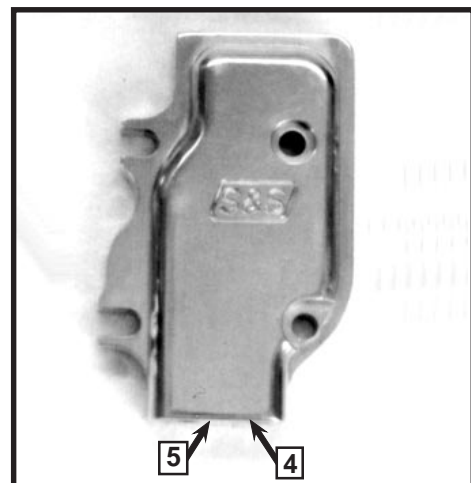
4. No adjusting screw is provided for 1965-1969 engines using #31-6073 pump body because primary chain oil is metered by breather gear.



Picture 26



Picture 27



Picture 28

NOTE - Use of #31-6073 oil pump body requires that Step #6 be performed and that 1973-later style breather gear such as S&S #31-4239 be used.

- c. 1984-later engines with sealed primary - Install #31-6028 ¼-27 pipe plug in hole #8 on top of pump cover.
- d. All engines with primary belt drive
 1. Install #31-6028 ¼-27 pipe plug in hole #8 on top of pump cover.
 2. For 1936-1964 engines using #31-0001 pump body, loosen locknut and screw adjusting needle into side of pump body until oil supply to primary chain is completely shut off, then retighten locknut. Do not overtighten locknut or adjusting screw.

NOTE - Installing machine screw #31-6029 in pump body instead of adjusting screw will result in large oil losses out crankcase breather. Tapered adjusting screw #31-6026 must be used for proper adjustment of oil flow to primary chain.

CAUTION - Overtightening adjustment screw may damage oil pump body.

4. Optional Rear Chain Oiler - 1936-1991 models with chain drive
 - a. Perform following steps if rear chain oiler is desired:
 1. Install #31-6038 hose fitting in hole #6 in pump cover. **See Picture 3.**
 2. Install #31-6026 adjuster screw, #31-6035 brass washer, and #31-6027 lock nut in hole #7 in pump cover.
 3. Attach hose fitting to rear chain oiler hose after oil pump is installed.
 4. Adjust screw to provide desired amount of oil to rear chain and tighten locknut.

CAUTION - Overtightening adjustment screw may damage oil pump cover.

- b. Perform following steps if rear chain oiler will not be used:

1. Install #31-6028 socket head pipe plug in hole #6 in pump cover. **See Picture 3.**
2. Install #31-6029 cap screw and #31-6035 brass washer in hole #7 in pump cover.

B. Billet Cover

S&S manufactures four different billet oil pump covers. Most obvious differences are in mounting bolt pattern and oil line fitting placement.

Pump covers #31-6041 and #31-6045 utilize '91-earlier bolt pattern. #31-6041 provides top and bottom options for placement of oil supply and return line fittings as well as provision for oil pressure gauge/switch and primary oil supply fitting. S&S Custom Billet Cover #31-6045 accepts bottom mount supply and return lines only and has no provision for primary oiling or oil pressure monitoring. **See Pictures 5, 27 and 28.**

CAUTION - Custom Billet Oil Pump Cover #31-6045 is not recommended for Dynas and other models with oil tank mounted below transmission because of possibility of cavitation or "air lock." Cavitation can prevent adequate oil circulation resulting in extensive engine damage. See page 13, section 9 for additional information on preventing cavitation.

Billet pump covers #31-6044 and #31-6047 utilize '92-up mounting bolt pattern. #31-6044 provides bottom location for placement of oil line fittings as well as central location for '92-up OEM rigid return line. "Universal" cover #31-6047 supplied with most S&S Long Blocks ordered with billet oil pump includes same features as #31-6044 as well as provision for placing oil line fittings in top of cover. **See Pictures 5, 26 and 29.**

CAUTION - To avoid cavitation in '92-up Dynas and other models with oil tank mounted below transmission, oil supply line should be installed in bottom location in all covers.

1. Oil Supply - Oil supply line fitting can be installed at any of three locations in #31-6047 billet pump cover normally supplied with S&S Long Blocks.

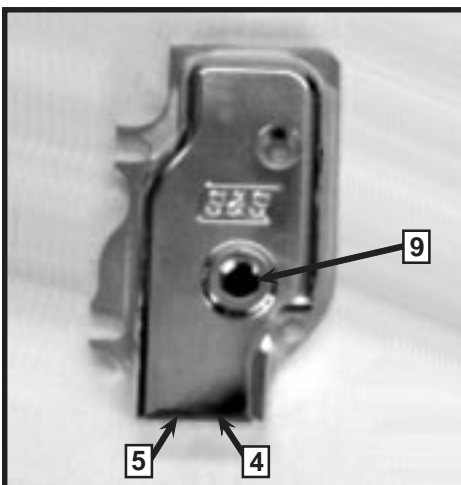
See Picture 26. Supply holes not used must be plugged with #31-6007 1/8-27 pipe plugs.

Pump cover #31-6041 for '91-earlier models provides top and bottom locations for oil supply fitting. (See Caution below.) Custom Billet cover #31-6045 for '91-earlier models provides only bottom location. Cover #31-6044 for '92-up models provides central and bottom locations for fitting. Following steps provide detailed instructions on installing fittings in different billet covers

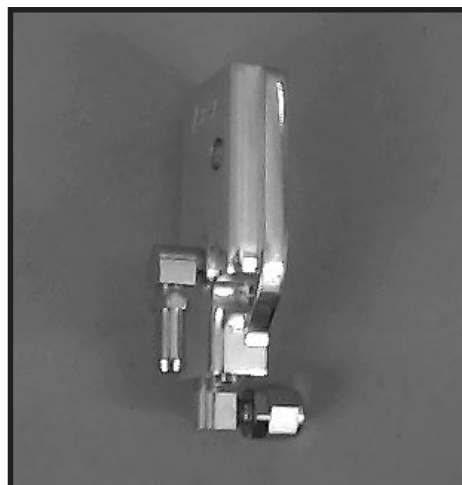
CAUTION - Hole #3 in billet pump cover #31-6041 is for oil pressure switch or gauge. See Picture 27. Although oil obtained from this site may provide adequate top end lubrication for some applications (Shovel top on Pan bottom), S&S recommends site be used for pressure monitoring only as oil from hole #3 does not go through lifter screen. Under no circumstance may oil return line be routed to hole #3.

Steps below are typical for year groups shown.

- a. 1936-1991 using pump cover #31-6041
 1. Install 90° elbow fitting #31-6008 in hole #2 in top of pump cover or hole #4 in bottom of cover. **See Picture 27.**
 2. Install hose fitting #31-6009 in elbow fitting installed in step a.
 3. Install 1/8-27 pipe plug #31-6007 in supply hole not used.
 4. Install oil pressure switch/gauge elbow (not supplied) or 1/8-27 pipe plug #31-6007 in hole #3 in face of cover. Do not attempt to use hole #3 for oil return line.
- b. 1936-1991 using Custom Billet cover #31-6045
 1. Install 90° elbow fitting #31-6008 in hole #4 in bottom of cover. **See Picture 28.**
 2. Install hose fitting #31-6009 in elbow fitting installed in step a.
- c. 1992-up using cover #31-6044
 1. Install 90° elbow fitting #31-6008 in hole #9 in face of pump cover or hole #4 in bottom of cover. **See Picture 29.**



Picture 29



Picture 30



Picture 31

NOTE - Elbow fitting must be installed in hole #9 with opening facing downward and angled toward lower left corner of cover for use with '92-up Dyna-type OEM oil lines.

2. Install hose fitting #31-6009 in elbow fitting installed in step a.
3. Install 1/8-27 pipe plug #31-6007 in supply hole not used.
- d. 1992-up using cover #31-6047 (Supplied with most S&S Long Blocks.)
 1. Install 90° elbow fitting #31-6008 in hole #2 in top of pump cover, hole #9 in face of pump cover, or hole #4 in bottom of cover.

NOTE - Elbow fitting must be installed in hole #4 with opening facing downward and angled toward lower left corner of cover for use with '92-up Dyna-type OEM oil lines.

2. Install hose fitting #31-6009 in elbow fitting installed in step a.
 3. Install 1/8-27 pipe plugs #31-6007 in supply holes not used.
2. Oil return - Oil return line can be connected to pump cover at either of two locations in oil pump covers #31-6041, #31-6044 and #31-6047. Hole in bottom of cover is normally used for 92-up models utilizing OEM rigid return line. Steps below are typical for year groups shown.
 - a. 1936-1991 using cover #31-6041
 1. Install 90° elbow fitting #31-6008 in hole #1 in top of pump cover or hole #5 in bottom of cover. **See Picture 27.**
 2. Install hose fitting #31-6009 in elbow fitting installed in step 1.
 3. Install 1/8-27 pipe plug #31-6007 in return hole not used.
 - b. 1936-1991 utilizing Custom Billet cover #31-6045
 1. Install 90° elbow fitting #31-6008 in hole #5 in bottom of pump cover. **See Picture 28.**
 2. Install hose fitting #31-6009 in elbow fitting installed in step 1.
 - c. 1992-up using cover #31-6044
 1. Install 90° elbow fitting #31-6008 in hole #5 in bottom of cover. **See Picture 29.**

*NOTE - Elbow fitting must be installed in bottom hole with opening facing forward toward engine for use with '92-up OEM rigid return line. **See Picture 30.***

2. Install compression fitting # 50-8120 or hose fitting #31-6009 in elbow fitting installed in step 1.

NOTE - Compression fitting must be used with '92-up OEM rigid return line.

3. Install #31-6007 1/8-27 pipe plug pipe plug in return hole not used.

- d. 1992-up using cover #31-6047
 1. Install 90° elbow fitting #31-6008 in hole in hole #1 in top of cover or hole #5 in bottom of cover.
 2. Install hose fitting #31-6009 in elbow fitting installed in step 1.
 3. Install 1/8-27 pipe plug #31-6007 in return hole not used.
3. Primary oil supply - Cover #31-6041 is only billet cover with provision for external primary chain oiling.

NOTE - S&S billet oil pumps have no provision for oiling rear chain.

- a. 1936-1964 models
 1. Install #31-6028 1/8-27 pipe plug in hole #8 in top of cover.
 2. Install #31-6026 adjuster screw, #31-6035 brass washer, and #31-6027 lock nut into threaded hole in side of pump body. Bottom screw two or three times to seat properly. **See Picture 31.**

NOTE - Chain oiler adjusting screw has tapered end and must be used. Substituting standard machine screw for tapered screw will result in large oil loss out breather.

3. Turn screw out 1/2 turn and tighten locknut against brass washer and body.

NOTE - After engine has been run for a while it may be necessary to adjust screw to achieve desired oil flow to primary chain. Final screw setting is usually closer to fully closed position.

CAUTION - Overtightening screw may damage threads or adjusting screw seat in pump body.

- b.. 1965-1984 engines with primary chain drive and dry clutch
 1. Install #31-6010 hose fitting in threaded hole #8 on top of pump cover.
 2. Connect #31-6010 fitting to primary chain oiler line after pump is installed.
 3. For 1965-1972 engines using #31-6041 pump body, install #31-6026 adjuster screw, #31-6035 brass washer, and #31-6027 lock nut into threaded hole in side of pump body. **See Picture 31.** Bottom screw two or three times to seat screw. Turn screw out approximately 1 1/2 turns and tighten locknut against brass washer and oil pump body.

NOTE - Above setting should provide 1 to 1 3/4 oz's/minute oil flow to primary chain @ 2500 RPM. This can be confirmed after engine has reached operating temperature by disconnecting hose to primary chain, operating engine at 2500 RPM and measuring oil delivered into measuring container during one minute.

CAUTION - Overtightening adjustment screw may damage oil pump body.

8. Oil Pump Installation - All Years.

- A. Thoroughly clean complete pump assembly with solvent and compressed air noting previous cautions. Recoat all moving parts with clean 20W50 engine oil.

CAUTION - Metal filings, dirt and other foreign matter can cause extensive damage to oil pump and engine.

- B. Install S&S oil pump, driveshaft and drive gear in normal fashion following standard H-D procedure. Use ¼-24 mounting bolts provided for 1948-1978 stock crankcase installations and ¼-20 mounting bolts provided for 1979-present stock and all S&S crankcase installations. Use flat washers provided only on 2¾" bolts and lock washers only on 1½" bolts. Final torque specifications of 90 to 120 in. lbs. are recommended with paper gaskets.

NOTES -

- ¼-24 mounting bolts provided with cast oil pump kits in the past were black. Mounting bolts presently provided with all kits are plated. Visually compare threads and gently screw oil pump mounting bolts into crankcase to confirm correct thread.
- S&S oil pump bodies, covers and gaskets may appear similar to other manufacturer's parts but should not be interchanged due possible differences in internal machining, etc.

CAUTION - Using oil pump components other than those provided by pump manufacturer may impair overall function of pump resulting in oil leaks, insufficient oil pressure and possible engine damage.

- C. Install pinion shaft oil pump drive gear, pinion gear and remaining parts in gearcase following standard H-D procedure.

9. Prevention of Air Lock

"Air lock" or cavitation can occur if trapped air is not released from oil pump after installation. It can occur with new pump as well as used pump that has been removed from engine, and interferes with oil circulation. It is owner's responsibility to remove trapped air prior to running engine and to confirm correct pump operation as explained on following page.

NOTE - Dyna Glides, late FL's and other models with oil tank below transmission require precautions to prevent air entering oil pump during oil changes if S&S Custom Billet pump cover #31-6045 is used or if top oil supply fitting location is utilized on "Universal Cover" #31-6047. If oil lines are rubber, supply line from tank should be clamped during oil changes on these models, and clamp removed after tank has been refilled. If it is not possible to clamp lines, oil circulation must be confirmed after each oil change.

CAUTION - Air lock can cause extensive damage not covered under warranty.

After pump has been installed, oil lines connected in

correct manner and oil tank filled to correct level, remove air from pump using following procedure:

- A. Remove check valve cover screw #15, check valve spring #12, and check valve ball #11 from oil pump body. **See drawing on last page.** Mechanic's magnet will be required to remove check ball.
- B. Oil from tank will usually fill exposed cavity in a few seconds. If not, fill cavity with clean engine oil and allow to sit for 3-4 minutes.

NOTE - Do not leave motorcycle with check ball removed as check ball prevents oil tank from emptying into crankcase when engine is not running.

- C. Replace check valve ball, spring and screw, and start engine.
- D. Confirm oil circulation with oil pressure gauge and by removing cap from oil tank and observing oil return to tank. If oil is not seen returning to tank, S&S recommends removing return line from tank and placing end in drain pan to confirm oil circulation.

NOTE - Engine oil circulates under pressure. Areas exposed to escaping oil should be covered with rags and engine turned off immediately after oil circulation is confirmed to minimize oil loss.

WARNING - Oil on tires or brakes can cause loss of control of motorcycle resulting in serious injury to operator and others.

10. Initial Startup and Post-operation Checks - All Years.

- A. Prime pump according to procedure described in Step 9 before initial startup.
- B. After confirming oil circulation run engine for several minutes and check for leaks.
- C. If applicable, adjust primary and rear chain oilers as needed.

NOTES:

● *Low oil pressure is often blamed on oil pump when actual cause is worn bearings, bushings or other internal component. A new oil pump will not repair worn parts and excessive operating clearances. If low oil pressure exists after new oil pump installation, check bearing clearances and other possible causes such as installation of different gear cover, tappet guides etc.*

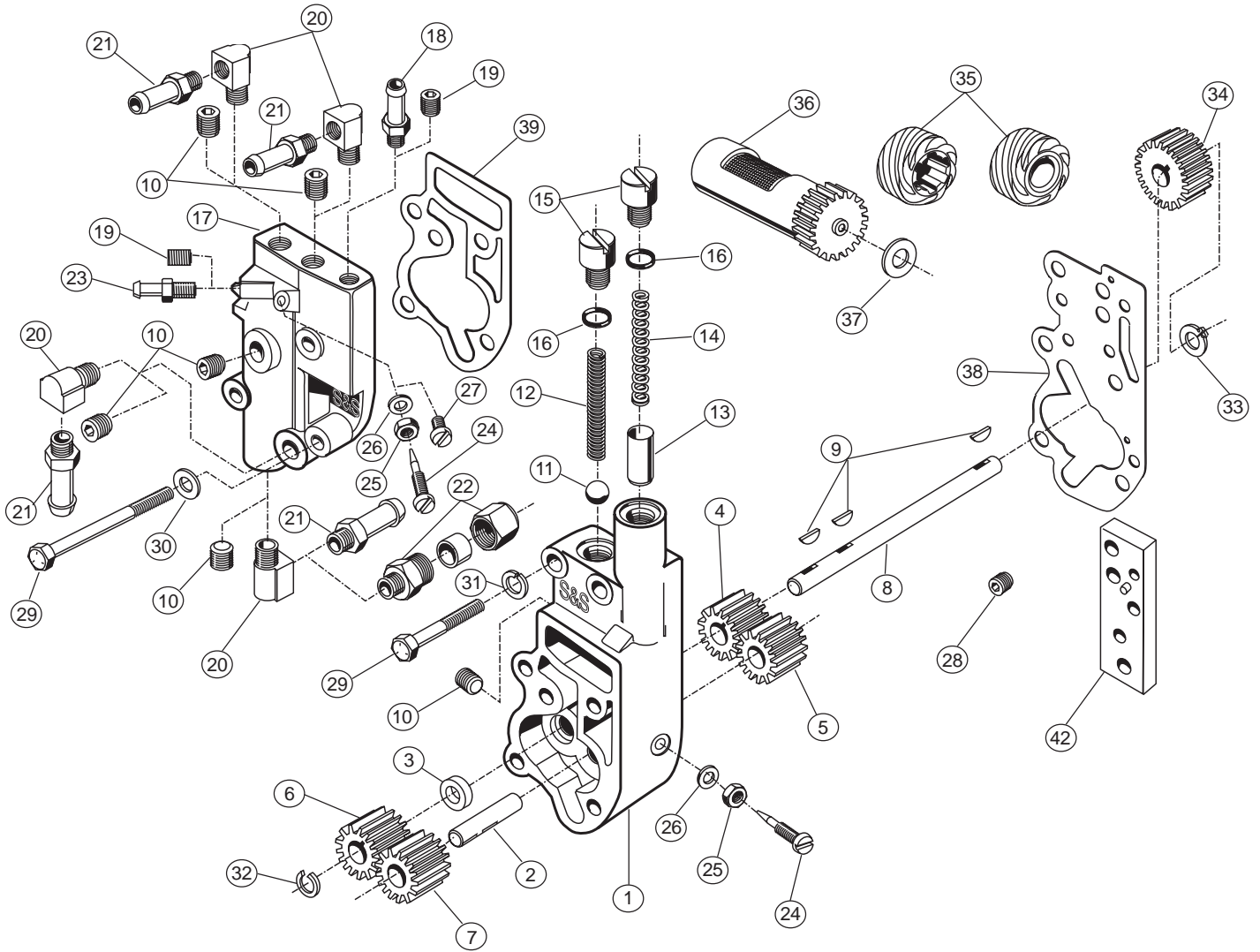
● *Increased oil volume generated by S&S pump may overwhelm stock scavenging system in Knucklehead top end. If oil return becomes a problem, it can be corrected by metering oil supply to heads. Oil fitting for top end supply line can be filled with solder and orifice drilled in solder for this purpose. S&S has performed tests and has successfully operated engines (Panheads and Shovelheads as well) with metering holes as small as .060". Some Knucklehead owners*

Replacement Parts for S&S Oil Pumps

have installed S&S carb main jet in cam cover top end oil supply fitting for same purpose, and adjusted oil flow with different size jets.

● Paper gaskets are supplied as standard with each kit. S&S prefers paper gaskets but can provide mylar gaskets for 1936 to 1991 engines if desired.

1. Pump body assembly
 - Cast, fits #31-6250 '36 - '72 Part #31-6001
 - Cast, fits #31-6270 '65 - '69 Part #31-6073
 - Cast, fits #31-6260 '73 - '91 Part #31-6003
 - Cast, fits #31-6261 '92 - up Part #31-6006
 - Billet, fits #31-6251 '36-'72,
 - Billet, fits #31-6254 '48-'53,
 - Billet, fits #31-6255 '54-'69 Part #31-6040
 - Billet, fits #31-6252 '73-'91,
 - Billet, fits #31-6257 '78-'91,
 - Billet, fits #31-6259 '70-'72 Part #31-6042
 - Billet, fits #31-6253 & #31-6258 '92-up Part #31-6043
2. Idler shaft - repl. HD#26327-68 Part #31-6004
3. Seal, drive shaft - repl. HD#26227-58 Part #31-6005
4. Gear, return drive - repl. HD#26315-68A Part #31-6013
5. Gear, return idler - repl. HD#26317-68A Part #31-6014
6. Gear, Supply drive - repl. HD#26328-74 Part #31-6015
7. Gear, supply idler - repl. HD#26326-62A Part #31-6016
8. Drive shaft - repl. HD#26346-70 Part #31-6011
9. Key, drive shaft - repl. HD#26348-15 Part #31-6012
10. Plug, 1/8-27 - repl. HD#45830-48 Part #50-8331
11. Ball, check valve - repl. HD#8866 & #8873 Part #50-8091
12. Spring, check valve - repl. HD#26262-80 Part #31-6022
13. Valve, relief - repl. HD #26400-82 Part #31-6019
14. Spring, relief valve - repl. HD#26207-83 Part #31-6018
15. Screw, check valve and relief valve cover - repl. HD#26263-80
..... Part #31-6021
16. O-ring - repl. HD#11105 Part #50-8008
17. Pump cover assembly
 - Cast, fits '36 to '91, repl. HD#26234-82 Part #31-6002
 - Cast, fits '92 and later Part #31-6039
 - Billet, fits all '36 to '91 Part #31-6041
 - Billet, fits '36-'91 custom applications only Part #31-6045
 - Billet, fits '92-up stock applications Part #31-6044
 - Billet, fits '92-up stock and other applications Part #31-6047
18. Fitting, front chain hose Part #50-8116
19. Plug, pipe 1/8-27 Part #50-8332
20. Elbow, supply/return - repl. HD#26338-68 Part #50-8114
21. Fitting, supply/return hose - repl. HD#63533-41 Part #50-8115
22. Fitting, compression return
repl. HD#63523-92A Part #50-8120
23. Fitting, rear chain hose Part #50-8117
24. Screw, chain oiler adjusting Part #31-6026
25. Locknut, chain oiler Part #50-5000
26. Washer, chain adjuster - repl. HD#6156 Part #50-7008
27. Plug, adjusting screw 10-32 x 1/4" Part #50-0046
28. Plug, 1/4-20 Part #50-0069
29. Screw, mounting
 - 1/4-24 x 1-1/2" - '36 - 78 Part #50-0082
 - 1/4-24 x 2-3/4" - '36 - '78 - repl. HD#5430W Part #50-0083
 - 1/4-20 x 1-1/2" - '79 - up - repl. HD#2782W Part #50-0080
 - 1/4-20 x 2-3/4" - '79 - up - repl. HD#3429 Part #50-0081
30. Washer, 1/4" - repl. HD#6703 Part #50-0029
31. Washer, lock 1/4" - repl. HD#7036 Part #50-7019
32. Ring, retaining - repl. HD#26348-36 Part #50-8058
33. Ring, snap - repl. HD#11002 Part #50-8059
34. Gear, pump drive, 24T - repl. HD#26345-73 Part #33-4230
35. Gear, pinion shaft pump drive '39 - '53 Part #33-4237
'54-'89 - repl. HD#26349-73, #26349-73A & #26349-84
..... Part #33-4232
36. Gear, steel breather valve
 - '36 - '64 std. size gear & shims repl. HD#25300-36
..... Part #33-4238
 - '36 - '64 - std. size gear only Part #33-4231
 - '36 - '64 - +.030" oversize gear & shims Part #33-4238
 - '36 - '64 - +.030" oversize gear only Part #33-4235
 - '48 to '77 - std. size, gear & shims - repl. HD#25313-73
..... Part #33-4234
 - 48 to '77 - std. size, gear only Part #33-4234
 - '48 to '77 - +.030" oversize gear & shims Part #33-4259
 - '48 to '77 - +.030" oversize gear only Part #33-4233
 - '77 - up std. size, gear and shims repl. HD#25313-77A
..... Part #33-4239
 - '77 - up std. size, gear only Part #33-4236
 - '77 - up +.030" oversize gear and shims Part #33-4261
 - '77 - up +.030" oversize gear only Part #33-4248
37. Shim, steel breather
 - .100" Part #33-4200
 - .110", repl. HD#25320-79 Part #33-4201
 - .120", repl. HD#25322-79 Part #33-4202
 - .130", repl. HD#25325-79 Part #33-4203



Replacement Parts for S&S Oil Pumps - *continued*

- | | | | |
|---|---------------|---|---------------|
| .140", repl. HD#25327-79 | Part #33-4204 | '36 - '91 (mylar) | Part #31-6054 |
| .150" | Part #33-4205 | 39. Gasket rebuild kit (not shown) Includes key & snap ring | |
| .160" | Part #33-4206 | '36 - '91 (paper) | Part #31-6271 |
| .170" | Part #33-4207 | '92 - up (paper) | Part #31-6273 |
| Shim kit (contains 1 ea. all sizes) | Part #33-4249 | '36 - '91 (mylar) | Part #31-6274 |
| 38. Gasket, pump body | | 40. Master rebuild kit (not shown) | |
| '36 - '91 (paper) | Part #31-6024 | Includes gasket rebuild kit, seal, retaining ring, relief valve | |
| '92 - up (paper) | Part #31-6030 | spring, check valve spring, check valve ball, and cover | |
| | | screw o-rings. | |
| | | '36 - '91 (specify paper or mylar) | Part #31-6275 |
| | | '92 - up (paper only) | Part #31-6278 |

