



BRIGGS & STRATTON
ANIMAL TECH MANUAL

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General Rules

1. The ONLY Briggs & Stratton stock Animal engine and the gearbox M series Model #124432 8203-01 and M updated series model # 8202-01 thru 206 will be used in these classes. All parts will be stock unaltered Briggs & Stratton Animal specifically made for this engine.
2. No modifications, alterations, additions, subtractions, deletions, or other changes are permitted to be done to these engines or their component parts specifically allowed in these rules.
3. The use of air filter during Qualifying at asphalt events is illegal. The Tech official reserves the right to allow filters at any event that is deemed necessary.
4. Direct Drive only: Clutches are not allowed.

PARTS ARE SUBJECT TO COMPARISON WITH A KNOWN STOCK PART. If it does not say it in this manual that you can then you cannot do it!

5. Fuel: Gasoline only, no additives. ALL PERTINANT PENALTIES WILL APPLY
6. Modifications or machining of any parts in order to bring them to minimum/maximum specs, (for any reason) is not legal.
7. NO welding, NO addition or removal of any material. NO painting or polishing of any part of engine or gearbox is allowed.

Required Modifications:

1. Gearbox: Only Briggs & Stratton gearbox part # 555721 or 555753 or new style replacement ring gear 555756 is allowed. Ring gear may not be altered in any way With the exception of the keyed end of the shaft that may be shortened, drilled or tapped or machined for the snap ring groove. Keyway may be cut deeper. No other machining allowed.
2. Electric Starter: blower-housing openings must be covered with a fabricated metal cover. You should not be able to see any of the flywheel.
3. Recoil Starter: The recoil starter must be removed. Starter cup may be cut down or replaced with a flat washer, Briggs Part number 691736 for flat washer. The M series engine comes with a black plastic flywheel-opening screen. This must be removed as airflow into the engine may not be impeded by this or any other means.
4. Exhaust: Any exhaust gasket will be allowed (NO SILICONE). Must use exhaust port extension in port. Minimum of a 0.520 length measured from the bottom of the exhaust flange to the end of the pipe using a depth mic. Any Deco style pipe(out the side nerf bar) max of four (4), B & S mufflers only. Briggs style mufflers may be cut and welded to the pipes baffle and center plug must remain unaltered. Optional candy cane style pipe (under the tail cone exhaust) may be used. Must use exhaust port extension in port: Minimum of a 0.520 length measured from the bottom of the exhaust flange to the end of the pipe using a depth mic. with RLV 4100 unmodified muffler. If this style is used muffler must be clamped to pipe so it may be removed this the only muffler that may be on this style exhaust. Welding a washer on muffler for safety wire is permitted. All 4- baffle plates must be in the proper location and unaltered. Holes measurements 0.1285 max. All exhaust must pass thru muffler or mufflers. Spec measurements on candy cane pipe 16.5 to

18.5 in length measured from port extension to end of pipe. 1-inch max OD straight walled no steps-tapers- butt welds or stages.

4. (A) Exhaust oxygen sensor or temp sensor attached to any part of the Animal exhaust system is illegal.
5. Oil Breather: Oil breather must be vented to catch can under the tail cone within the engine compartment.
6. Carburetor Overflow: Carburetor overflow may be vented to the ground. .
7. Scatter Shield: Scatter shield is required. Scatter shield can be altered for installation of motor bolts.

Allowed Modifications

1. Crankshaft Seal: Crankshaft seal PTO side non-tech.
2. Flywheel Cup: The flywheel cup may be cut or replaced with a washer; Briggs Part number 691736 Briggs flywheel nut #79273 may also be used.
3. Fuel Pump: The following Fuel pump, B & S part number 557033 may be used. If used, fuel pump must be pulsed from a pulse fitting installed in the engine crankcase cover the top oil fill hole.
4. ENGINE TOP COVER: You may use the Briggs metal cover or fabricate one from metal. Blower housing openings must be covered with a fabricated metal cover.
5. Rocker cover B & S part number 555528 may be modified for installation of the Briggs breather bypass system, part number 555688 per included ms-3742 sheet. Must be attached to a catch can. (Secondary drilling of holes in the breather valve area of the valve cover is allowed.) Valve cover may be altered for any style breather.
6. Heat Dispenser, Briggs part number 555690, may be installed per included ms-3758.
7. Head Gasket Fire Ring: Part Number 555698. Non fire ring Part number 555723.
8. The flywheel may be lapped stock key must be used. The key must have B&S logo.
9. Head may be re-cut to specs listed under the Head.
10. All pin-measuring gauges are plus tolerance.
11. Cryogenics of any Briggs & Stratton parts is illegal.
12. Any air filter is allowed. The air filter must attach directly to carburetor. No filter cups, velocity stacks etc.

Air filters must not exceed more than a 45 degree angle and cannot point forward. Air filters must attach to filter cup NO ADDITIONAL adaptors are allowed

GENERAL TECH PROCEDURE

General

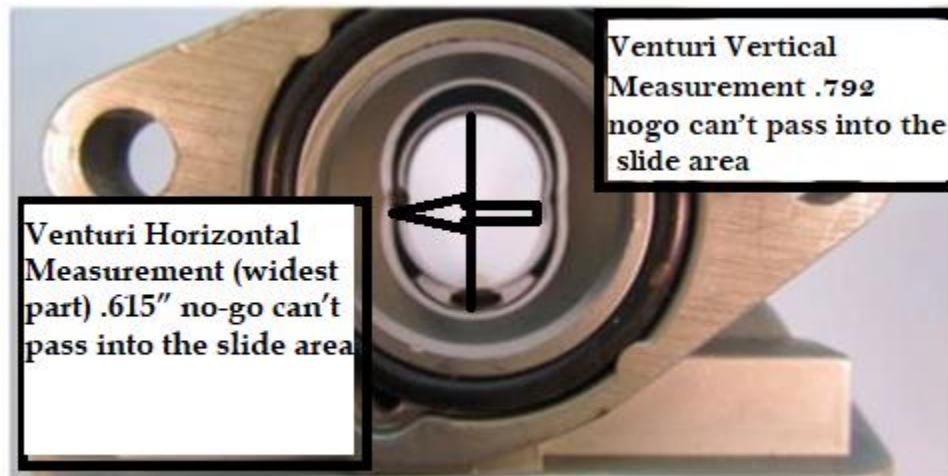
1. Heli-coiled threads for shrouds, (all), valve cover, oil drain, oil fill holes, blower housing, and exhaust pipe, attach studs on the head and lower brackets. Exhaust studs may be replaced with any size or style exhaust bolts.
2. Blocking airflow: No device may be used that will, or appears that it may impede airflow into the engine cooling system. This may require that the engine be run at a speed above idle by the tech personnel at the scale, after the car has qualified or raced. Black plastic flywheel cover supplied with the engine must be removed.

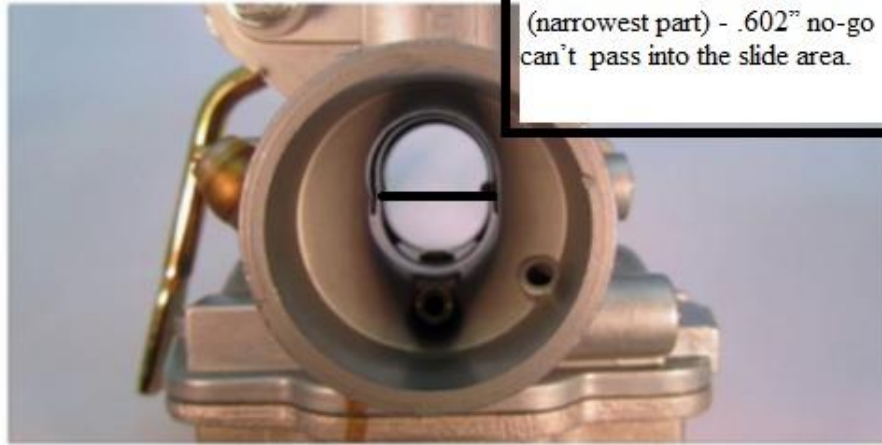
Carburetor & Intake Manifold

Remove Carburetor



1. Stock Walbro PZ22 carburetor ending in calibration number .15 or New Briggs with Briggs Logo. No alterations allowed. Except cutting choke lever down to clear for use on the curved intake manifold. Stock needle marked "BGB" is required.
2. The throttle cable cap on the top of the carburetor must be used and properly installed. SEALING GASKET MUST BE IN PLACE. CAP MUST BE TIGHT Choke: Unaltered, but may be fastened open with a spring, rubber band, or zip tie.
3. Idle Jets any size allowed.
4. Main Jets any size allowed.





Venturi Horizontal Measurement
(narrowest part) - .602" no-go
can't pass into the slide area.

The Pilot and main jets must be factory type- Installed and function as intended by Briggs. Only the orifice hole is non-tech.

Venturi Measurement:

1. Vertical: 0.792 inches Max.
2. Horizontal: 0.615 inches max at widest part, 0.602 inches Max at narrowest Part.
3. Carburetor Overflow: May be vented to the ground.
4. O-Ring part number B & S part number 555601 is required and must be unaltered.
5. Plate Opening
 - Jr. Animal: (Blue POWRI plate: three holes 0.251 max) May also use QMA & USAC Animal Plates.
 - Sr. Animal: (Gold POWRI plate: one hole 0.5725 max) May also use QMA & USAC Animal Plates.

No-Go gauges or caliper may be used to check restrictor plates
POWRI logo on top left of restrictor plate as viewed from carb inlet. Gasket must be correctly installed between restrictor plate and manifold. Gasket thickness 0.052 hole size 0.970 measurements on gasket are reference.

Main Nozzle

6. Main nozzle-OEM stock, unaltered-hole size=0.101 inches Min to 0.103 inches Max.
7. No drilling, slotting or oblong of the hole.

Emulsion Tube

8. OEM stock, unaltered. 4 small holes 0.018to 0.020 inches max. 4 big holes 0.026 to 0.028 inches max.

9. Air pick off hole 0.057 min to 0.061 inches max.

Intake Manifold

Straight Manifold

Straight intake manifold - max length=1.740 inches min to 1.760 inches max
intake manifold - bore diameter= 0.885 inches min. to 0.905 inches max
Any 6 mm or 1/4" bolt can be used to attach the carb to the intake manifold

Curved Manifold

Briggs and Stratton part number 555776 can be used. Must be as from factory with no Modifications except clearance for the bolts that holds the intake to the cylinder head. Any 6 mm or 1/4" bolt can be used to hold carb to the intake.



Engine Cooling Shrouds/Blower Housing

Remove the blower housing

10. All pieces of the stock engine cooling shroud/blower housing must be stock and properly installed. Blower housing thickness 0.115 (reference only) color non tech. No plating.
11. Starter cup may be cut down.

Remove valve cover

12. Max. Valve lift will be checked from the top of the valve spring retainer. Valves must be adjusted to zero clearance.
13. Valve Lift: First camshaft check will be taken at the valve spring retainers. With the lash set at zero, the movement of the valve spring retainers may not exceed the following: Intake and Exhaust: 0.258 inches max.
14. Install Degree wheel, using the positive stop method.

Check ignition timing. With the right edge of the magnet, (not the magnet holder), aligned with the right edge of the notch of the right leg of the coil, the engine must be from 23° BTDC to 27° BTDC. You must use stock key way and unaltered flywheel stock Briggs and Stratton only allowed. The key must have Briggs logo.

Cylinder Head & Head Gasket

Remove the cylinder head

Head Gasket:

15. Stock, B & S part numbers 555698 or 555621 or BSA -304-40 multi-later gasket. Minimum thickness 0.038
16. Minimum gasket thickness between head bolt holes 0.041 inches. Measurements are to be made with a dial caliper from inside of the fire ring.
17. May use aftermarket cometic rocker plate gasket EC1424060HTS 0.060 thickness.

Head

18. Cylinder head 555635 must be stock and unaltered and be in "as cast" and in factory - machined condition except head gasket deck surface may be machined to the following specs. Depth of head at the shallow part of head 0.011 inches min ref. (Measurement to be taken with a depth gage on both the combustion and spark plug sides of the cylinder head). Depth at floor of the head between the valves is 0.319 inches min. Depth to top of valve seat is 0.320 inches min to 0.360 inches max. Head thickness from head gasket surface to head plate gasket surface is 2.405 inches min. No additions to or subtractions from any part of head with the exception of Heat Disperser, Briggs Part number 555690 may be installed per included ms-3758.
19. Exhaust pipe attachment studs may be Heli - coiled. Or removed and replaced with any size or style exhaust bolts.
20. No alterations of any kind may be made to the intake or exhaust ports.
21. Intake Port: 0.918 inches max.
22. Exhaust Port AS CAST:
Maximum ID of shoulder in bottom of exhaust port = 0.855 inches.
23. Valve Seats, Intake and Exhaust: Must remain factory spec. with one 45 angle only. Multi angle valve seats are not permitted.
24. Intake valve seat diameter inside = 0.965 to 0.972 inches
25. Exhaust valve seat diameter inside = 0.838 to 0.850 inches.
26. Head surface to intake valve guide 1.255 inches max
27. Head surface to roof of combustion chamber between valves 0.319 inches minimum.
28. Head surface to top of the valve seat 0.320 to 0.360 inches.

Remove Valves

Inspect the retainers for alterations that would increase valve spring pressure. Both intake and exhaust must have stock B & S valve keepers.

- 29. Retainer Dia .0785 inches Max
- 30. Top thickness. 0.055 inches min to 0.075 inches max.

Valves

- 31. Check valves for dimensions and weight. Stock and unaltered B & S part #555552 (exhaust) and #555551 (intake). Valve surface must be unaltered factory ground and have one 45 angle only. There will be no other angles ground on any part of the valve.

Intake Valve

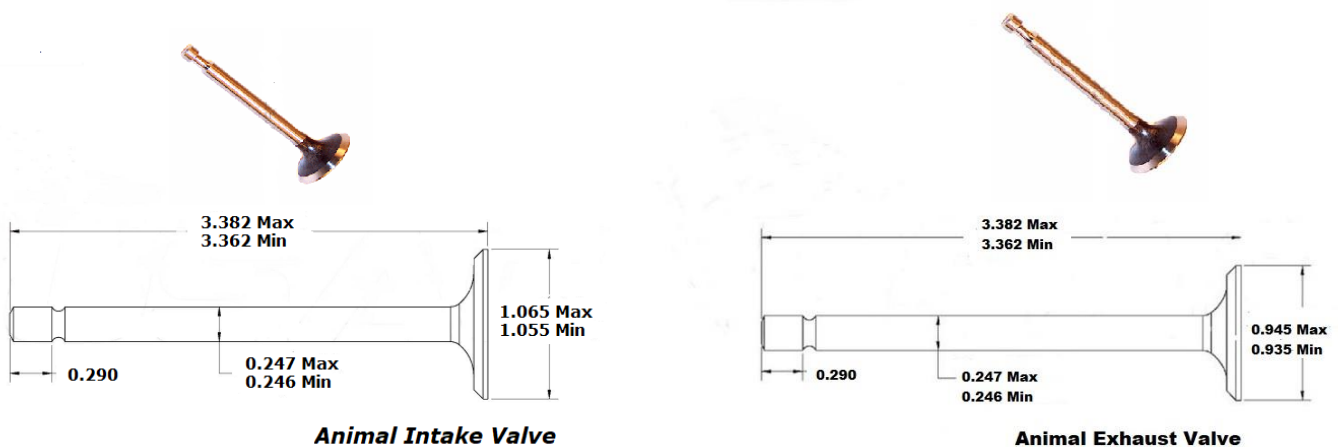
- 32. Intake Valve measurements:
 - 32. (a) Minimum Weight of Valve 28.26 grams min
 - 32. (b) Valve Length 3.372+/-0.010 inches
 - 32. (c) Diameter of Valve Stem 0.246 to 0.247 inches
 - 32. (d) Diameter of Valve Head 1.055 to 1.065 inches
 - 32. (e) Diameter of Valve Seat 0.964 to 0.972 inches ID

Top of valve stem to top of retainer groove 0.290 reference

Exhaust Valve

- 33. Exhaust Valve measurements:
 - 33. (a) Minimum Weight of Valve 28.00 grams min
 - 33. (b) Valve Length 3.372+/-0.010 inches
 - 33. (c) Diameter of Valve Stem 0.246 to 0.247 inches
 - 33. (d) Diameter of Valve Head 0.935 to 0.945 inches
 - 33. (e) Diameter of Valve Seat 0.844 to 0.850 inches

Top of valve stem to top of retainer groove 0.290 reference



Valve Springs

- 34. Valve spring measurements
 - 34. (a) Valve Springs will be single coil stock, unaltered B & S part # 555553
 - 34.(b) Coils : 4.25to 4.75coils.
 - 34.(c) Spring wire diameter 0.103 to 0.107 inches
 - 34.(d) Length : 0.965 inches max length
 - 34.(e) Weight : 15 lbs. at 0.812 inches

Rocker Arms and Rocker Arm Studs

- 35. Rocker Arms Measurements:
 - 35.(a) Rocker arms must be stock B & S part # 555546 or # 797443 and will not be altered in any way. Rocker arm length 2.825 inches Minimum.
 - 35.(b) Rocker studs must be stock, unaltered B & S part # 555549 or #797441 and in stock location. # 797443 and 797441 are part of rocker arm adjuster kit # 797440 old and new style parts may not be mixed.
 - 35.(c) Rocker Ball must be stock: Diameter 0.590 inch min. to 0.610 inch max.
 - 35.(d) Rocker arm mounting positions may not be altered in any manner. No Heli-coiling of mounting holes. No bending of studs. The rocker arm stud plate must be bolted to the head with one stock B & S gasket only, no alterations.

Push Rods

- 36. Push rod Measurements:
 - 36. (a) Push rods must be stock, unaltered B & S part # 555531 or 693517.
 - 36. (b) Push rod length 5.638 minimum to 5.656 inches maximum.
 - 36. (c) Push rod diameter 0.185 minimum to 0.190 inches maximum.

Engine Block

- 37. Engine Block Measurements:
 - 37. (a) Engine Block must be "as cast" stock factory machined condition with no alterations. There must be no addition or subtractions of metal or any substance to the inside or outside of the cylinder block. Only exception is deck surface.
 - 37. (b) Deck surface is a non-teachable item
 - 37. (c) There will be no polishing, sand blasting, or glass beading to any interior surface.
 - 37. (d) Cylinder bore cannot be bored oversize.
 - 37. (e) Cylinder bore cannot be re-sleeved.
 - 37. (f) Cylinder bore position will not be moved or tipped in any manner.
 - 37. (g) Cylinder Bore Dimension: 2.693 inches max. (Taken at the top or bottom of bore.)

- 37. (h) Check Stroke: 2.204 inch max push piston down to take up rod play
- 37. (i) Piston pop up 0.007 inch max (this measurement does not include Spru on piston top). Spru may be removed.

Cam Shaft Profile Limits

38. Cam shaft Limits

- 38.(a) First camshaft check will be taken at the valve spring retainers. With the lash set at zero, (0), the movement of the valve spring retainer may not exceed 2.56 inches. The camshaft must be supplied with compression relief. The counterweight may be cut on compression release to aid in starting.
- 38.(b) Install the fixture on cylinder block. The Cam profile to be ran from lifters.

INTAKE DEGREE	EXHAUST DEGREE
0.005 54 TO 65 BTDC	0.005 277 TO 284.5 BTDC
0.020 12 TO 19 BTDC	0.020 235 TO 241 BTDC
0.050 1 TO 5 ATDC	0.050 219 TO 224 BTDC
0.100 17 TO 21 ATDC	0.100 202 TO 206 BTDC
0.150 32 TO 37 ATDC	0.150 186 TO 190 BTDC
0.200 53 TO 57 ATDC	0.200 166 TO 171 BTDC
0.225 SPLIT ATDC	0.225 SPLIT BTDC
0.258 MAX (104 TO 107 CL.)	0.259 MAX (113 TO 116 CL)
0.225 SPLIT ATDC	0.225 SPLIT BTDC
0.200 154 TO 159 ATDC	0.200 58 TO 62 BTDC
0.150 174 TO 179 ATDC	0.150 38 TO 42 BTDC
0.100 191 TO 195 ATDC	0.100 22 TO 26 BTDC
0.050 208 TO 212 ATDC	0.050 5 TO 9 ATDC
0.020 225 TO 232 BTDC	0.020 7.5 TO 13 ATDC
0.005 269 TO 276.5 BTDC	0.005 47.5 TO 58 ATDC

Flywheel

39. Flywheel Spec

- 39. (a) No modifications allowed to flywheel
- 39. (b) Stock B & S part # 557126 only. No machining, glass beading, sand blasting, painting or coating of the flywheel is allowed.
- 39. (c) Flywheels with broken fins must be replaced.
- 39. (d) A stock, unaltered flywheel key is required. No offset key ways allowed. Min 0.182.
- 39. (e) Can use a Briggs part number 691736 flat washer under flywheel nut. You can use the factory cup to cut down for washer. Briggs flywheel nut # 792723 may be used.

Ignition System

40. Ignition System Spec

- 40. (a) Unaltered B&S stock ignition part # 555718 is mandatory. Only Green Coil allowed. Ignition Coil or its position, other than air gap may not be altered in any way. Coil mounting bolts must be stock and cannot be altered in any way to advance or retard timing. Attachment bolts and/or bolt holes may not be altered.
- 40. (b) Spark plug: Any automotive type 14mm ³/₄ inch reach with 14mm thread only, unaltered with stock washer allowed. Indexing washers are not allowed. No taper seat plugs allowed.
- 40. (c) The magneto air gap is non-tech.
- 40. (d) Timing:
 - Normal = 29 BTDC,
 - Min. = 27 BTDC
 - Max. = 31 BTDC
- 40. (e) Install Degree wheel, using the positive stop method.
Check the ignition timing. With the right edge of the magnet. Not the magnet holder), aligned with the right edge of the notch of the right leg of the coil, the engine must be from 23 BTDC to 27 BTDC. You must use stock key way and unaltered stock flywheel (Briggs and Stratton) only allowed. The key must have the Briggs logo.

Gear Box

41 Gear Box Specs

- 41. (a) Gearbox must be Briggs gearbox part number 555721 or 555753 or replacement gear 555756.
- 41. (b) Thread locking compound is permitted on the 4 gear box to crank case cover bolts and the 6 -5mm x .80 bolts on the new style ring gear. Honda gasket or no gasket may be used between gear box and engine side cover.

Crankcase Cover

42. Remove crankcase cover

- 42. (a) Cover must be in stock, unaltered, "cast in factory" condition. No alterations or subtractions of metal or any other substance to crankcase cover.
- 42. (b) The crankcase cover gasket must be stock B & S part # 555525. One gasket max, maybe installed.
- 42. (c) Thread locking compound is permitted on the 6 crank case cover to engine block bolts.

Piston

43. Piston Specs

- 43. (a) Remove rod and piston.
- 43. (b) Stock and unaltered B & S Animal piston Part number 555660 piston must be used. Must Briggs logo inside of piston near pin boss.
- 43. (c) Minimum from top of piston to top of wrist pin is 0.660 to 0.662 in.
- 43. (d) Minimum piston length is 1.762 in.
- 43. (e) Oversized pistons are not allowed.
- 43. (f) Weight: Complete combination includes piston, rings, rod, clip, cap, and bolts: 349 grams - min
- 43. (g) Complete assembly- average 352 grams.

Rings

44. Ring Spec

- 44. (a) Must be stock; unaltered B & S rings part # 555664 only.
This set contains file to fit top ring.
- 44. (b) No decreasing of ring tension by heating, machining or any other means. (This includes oil ring expander).
- 44. (c) Three rings mandatory
- 44. (d) Top compression ring must have chamfer or O toward top of piston.
- 44. (e) Second scraper ring must be installed with inside chamfer down and O toward the top of piston.
- 44. (f) Oil ring must be installed as from factory.
- 44. (g) Minimum width of top two rings is 0.095 inches.
- 44. (h) Thickness of top two rings is 0.059 to 0.064 inches. (Each ring)
- 44. (i) Minimum width of oil ring is 0.065 inches. Ring groove must be present.
- 44. (j) Thickness of oil ring is 0.098 to 0.102 inches.

Wrist Pin

45. Wrist Pin Specs

- 45.(a) Must be stock, unaltered B & S part # 555520 wrist pin and lock part # 555521
- 45. (b) Wrist Pin: Maximum I.D. = 0.414"
Max. O.D. = 0.626"
Minimum Length = 1.901"

Connecting Rod

46 Connecting Rod Specs

- 46. (a) Must be stock, unaltered B & S part # 555626 Briggs logo on rod beam.
- 46. (b) Rod length, measurement from bottom of wrist pin hole of top of crank journal hole is 2.419 inches minimum to 2.429 inches maximum.
- 46. (c) Diameter of Big End = 27.9476 mm - 1.003" Ref
- 46. (d) Diameter of small end - 15.89405 mm - 0.625" Ref

Crankshaft

47. Crankshaft spec

- 47. (a) Stock B & S part # 555722 crankshaft must remain unaltered. Briggs Logo is cast in the crankshaft. Briggs Key part # 798972 for updated Crankshaft.
- 47. (b) Crankshaft journal diameter = 1.094 inches to 1.100 inches.
- 47. (c) Stock, unaltered B & S part # 555573 bearings required.
- 47. (d) B & S part # 555054 key-flywheel. Min 0.182
- 47. (e) Shim, (s), Briggs Part number 55619, if used, must be installed as from Factory.
- 47. (f) Stock, unaltered part # 555574 timing gear installed in the stock location on crankshaft only.
- 47. (g) No offset keyways allowed on the cam gear for crankshaft.
- 47. (h) Splines are non tech. No welding on crankshaft.
- 47. (i) Crankshaft keyway for drive gear, maybe stacked & or locked tight.

Camshaft

48. Camshaft

- 48. (a) Stock, unaltered B & S part # 555532 OEM # 696813 camshafts only.
- 48. (b) There will be no additions or subtractions from any part of the camshaft. (Exception) Compression release counter weight tabs may be trimmed to ease starting.
- 48. (c) Compression release will remain intact.
- 48. (d) The lobe center angle will not be altered by any means.
- 48. (e) The lobe profile will not be altered in any way.

Tappets

49. Tappet Specs

- 49. (a) Stock, unaltered B & S part # 555307 tappets only
- 49. (b) Tappet diameter = 0.820 min to 0.860 max.
- 49. (c) Stock, unaltered B&S PART # 710530 tappet max be used on exhaust side only.
- 49. (d) Tappet diameter 0.964 min to 0.984 max.

Torque Specifications:		
Non-Tech, recommended by B & S		
Flywheel Nut		55-75 ft. lbs. (74.5– 101 Nm)
Cylinder Head		180-22- in. lbs. (20-25 Nm)
Connecting Rod		120-140 in. lbs. (13.5-15.8 Nm)
Crankcase Cover		120-140 in. lbs. (13.5-15.8 Nm)
Cylinder Head Plate		70-90 in. lbs. (8-10 Nm)
Rocker Arm Stud		70-11- in. lbs. (8-12.5 Nm)
Valve Cover		30-60 in. lbs. (3.5 -7 Nm)
Spark Plug		95-145 in. lbs. (11-16 Nm)
Intake and Exhaust		Measured at TDC .005 -.007 in. (.127 - .178mm)
Flywheel Holder Tool		Part # 19372
Valve Lash		Cold