
**This data sheet covers the recommended procedures for overhauling Model S1A/B and S1AG/S1BG Schwitzer Turbochargers. These instructions should be used in conjunction with the latest issue of the 'S Series Turbocharger Service Limits and Torque Values' Data Sheet.**

**System troubleshooting and failure analysis are not covered but detailed service procedure is given which is to be followed should the turbocharger need repair. The text is written with the assumption a Schwitzer Overhaul Kit will be used to rebuild the turbocharger.**

**Unauthorised field disassembly may nullify factory warranty. Ensure that the turbocharger is no longer under warranty before dismantling.**

**Please note that unless specialist dynamic balancing equipment is available no attempt should be made to service the cartridge assembly of the turbocharger. We urge you to contact your nearest Schwitzer location with regard to any warranty or turbo rebuilding questions.**

## Service Instructions

The shop requirements to undertake service and repair of Model S1A/B and S1A/BG turbochargers are given below. Some simple special tools are required as described herein. Also recommended is a securely mounted vice, a source of clean compressed air, a plastic scraper, a stiff natural or wire brush, a nonflammable safety solvent such as trichlorethylene, a "squirt can" of clean engine oil, a CLEAN work area, and the appropriate Schwitzer Service Parts.

1) Circlip Pliers.
2) 12 point sockets 10 mm, 12 mm, 13 mm, 7/16" A/F (actual socket size depends on turbocharger model size).
3) Open ended spanners 13 mm A/F.
4) Torque wrench 0-151b. ft. (2 Kg. M)

## Dismantling Procedure

1) Mark the relative positions of the compressor cover and turbine housing to the bearing housing. (Also actuator bracket for S1AG/S1BG models)
2) Fix the turbine housing in the vice using soft jaws with the turbocharger shaft vertical.
3) On S1AG/S1BG models remove the clip retaining the actuator rod to the wastegate lever arm, and disconnect the boost pipe from the compressor cover connection.
4) Remove the compressor cover retaining circlip or bolts and clamp plates (and actuator assembly on S1A/BG models).
5) Lift off the compressor cover.
6) Remove the set screws and clamp plates securing the turbine housing.
7) Lift the central core assembly out of the turbine housing.
8) Clamp a suitable 12 point socket wrench in the vice with the socket axis vertical.
9) Place the 12 point hub of the turbine wheel into the socket. Hold the core assembly in one hand and release the compressor wheel locknut using the correct size socket. (note left hand thread)
10) Remove the compressor nut and slide the compressor wheel from the turbine shaft.
11) Gently remove the turbine shaft and wheel by tapping with a small soft faced mallet on the compressor end of the shaft. Be careful not to bend or damage the shaft.
12) Sit the bearing housing on the turbine backplate on the bench and remove the insert retaining snap ring.
13) Remove the insert assembly by levering with 2 screwdrivers under the lugs provided.
14) Dismantle the insert assembly by pushing the flinger sleeve out of the insert.
15) Remove the oil deflector, thrust bearing, and thrust sleeve from the bearing housing.
16) Using suitable circlip pliers, remove the outer circlips from both ends of the bearing housing, remove the journal bearings and inner circlips.

## Cleaning of Parts

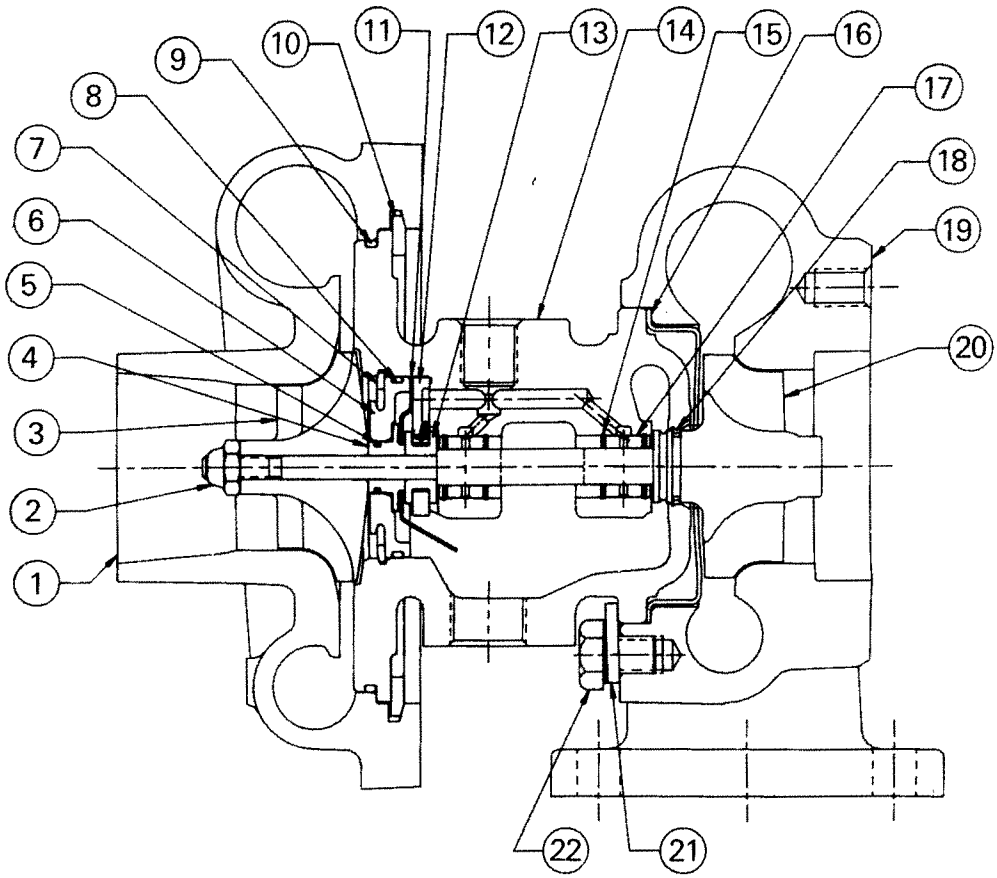
1) **Aluminium Parts**
   Soak in commercially available non-caustic solvent until all deposits have been softened. Clean surfaces with bristle brush and soft scraper. Vapour blast may be used providing bearing surfaces are protected.
2) **Cast Iron Parts**
   Soak in commercially available non-caustic solvent.
   Alternatively bead blast, taking care with internal profile surfaces.
3) **Shaft and Wheel Assembly**
   Soak in commercially available solvent to remove oily residue. Mask entire shaft section and vapour blast wheel and hub to total cleanliness. Avoid concentrating on piston ring seal groove.

## Inspection of Parts for Re-use

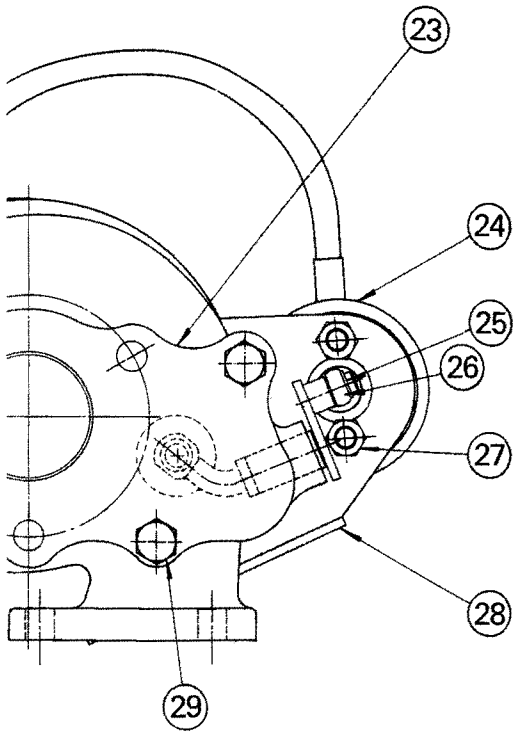
**Critical dimensions mentioned below are given in the latest issue of the 'S Series Turbocharger Service Limits and Torque Values' Data Sheet.**

1) **Bearing Housing**

a) Inspect bearing bore visually for sign of damage or wear.
b) Check turbine end seal bore for damage and marking.

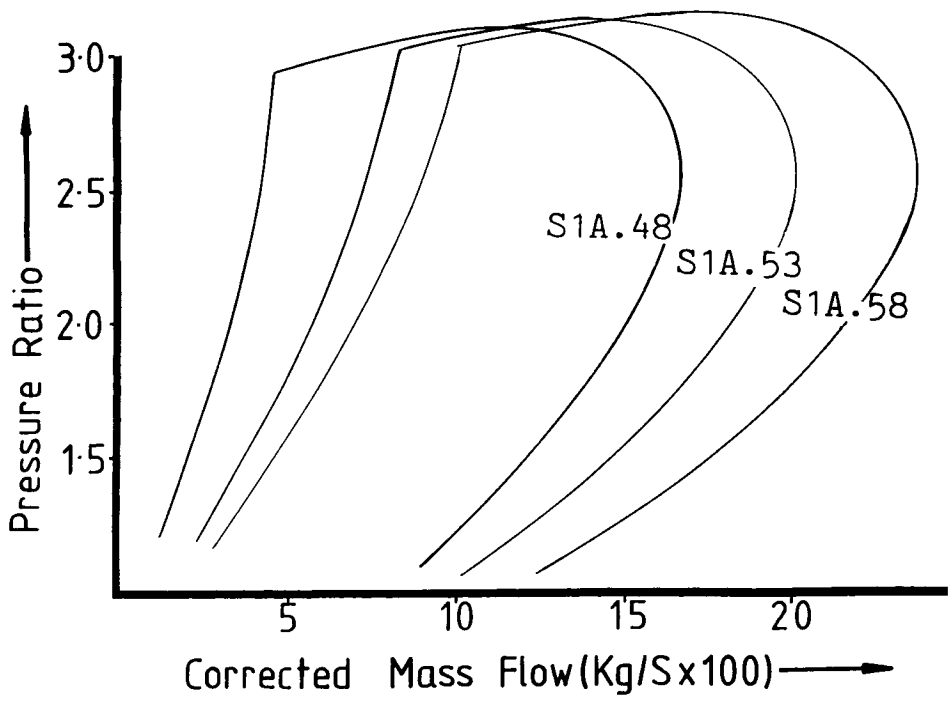


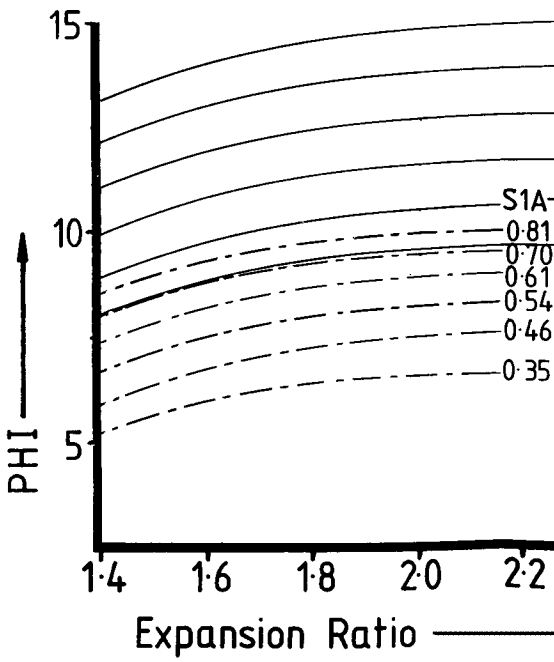

**Model S1A/B**



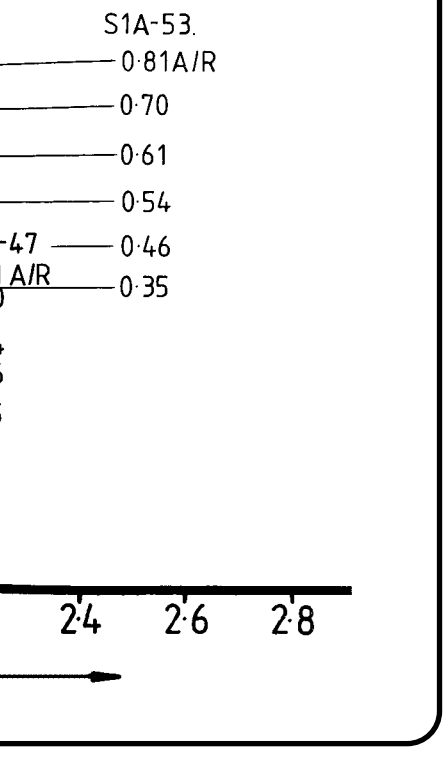

**Model S1AG/S1BG**

## Compressor and turbine performance



| Item No. | Description | Qty | O/H kit item |
|---|---|---|---|
| 1 | Compressor Cover | 1 | |
| 2 | Compressor Locknut | 1 | * |
| 3 | Compressor Wheel | 1 | |
| 4 | Flinger | 1 | |
| 5 | Piston Ring | 1 | * |
| 6 | Insert | 1 | |
| 7 | Circlip | 1 | |
| 8 | 'O' Ring | 1 | * |
| 9 | 'O' Ring | 1 | * |
| 10 | Circlip | 1 | |
| 11 | Oil Deflector | 1 | |
| 12 | Thrust Bearing | 1 | * |
| 13 | Thrust Sleeve | 1 | * |
| 14 | Bearing Housing assy. | 1 | |
| 15 | Circlip | 4 | * |
| 16 | Turbine Backplate | 1 | |
| 17 | Journal Bearing | 2 | * |
| 18 | Piston Ring | 1 | * |
| 19 | Turbine Housing | 1 | |
| 20 | Shaft and Wheel assy. | 1 | |
| 21 | Clamp Ring | 1 | |
| 22 | Setscrew | 3 | |
| 23 | Cover Plate (optional) | 1 | |
| 24 | Actuator assy. | 1 | |
| 25 | Retaining Clip | 1 | |
| 26 | Adjusting Rod | 1 | |
| 27 | Nut | 2 | |
| 28 | Actuator Mounting Bckt. | 1 | |
| 29 | Setscrew (optional) | 2 | |
| | Adjusting Rod Locknut (Not shown) | 1 | |




2) **Compressor Wheel**
Inspect visually for evidence of bent, burred, nicked or eroded blades, and for evidence of scuffing on the back face. Very minor damage is acceptable providing the dynamic balance is checked and correction made to bring it within the values specified in the 'S Range Limits' Data Sheet. Do not attempt to straighten any bent blades.

3) **Shaft and Wheel Assembly**

a) Check journal diameter for wear, referring to the 'Service Limits Tables'.

b) Check seal groove width

c) Measure eccentricity between large and small shaft diameter.

d) Check balance. Replace if outside limits.

**4) Compressor Cover**
Visually inspect for evidence of contour damage. Replace if damage is excessive.

**5) Turbine Housing**
Inspect visually for evidence of contour damage and evidence of overtemperature damage such as cracking, pitting, warping, erosion. Reject and replace if damage is excessive.

**6) Turbine Backplate**
Replace if cracked or warped.

**7) Flinger Sleeve**
Check piston ring groove width and for signs of taper or damage to groove. Reject if worn.

**8) Thrust Sleeve**
Replace if thrust surfaces are worn.

**9) Insert**
Check bore for wear and damage from the piston ring seal.
Replace the insert if more than slight marking is visible. Even a small amount of wear will detract from the sealing properties.

## Assembly Instructions

1) Use only the parts complying with the 'Inspection of Parts for Re-Use' instructions above plus an 'Overhaul Kit'.

2) All parts must be washed in clean solvent and dried with compressed air.

3) Fit the inboard snap rings to the bearing housing bore. Add a few drops of oil to the bore and fit the journal bearings and out-board snap rings.

4) Fit a new piston ring seal to the groove in the shaft and wheel assembly.

5) Fit turbine backplate over the shaft section and rest on the back of the turbine wheel.

6) Fit the shaft and wheel etc. into the bearing housing assembly after lubricating both shaft and piston ring. Take care not to damage the piston ring when entering the sealing bore.

7) Place this assembly into the turbine housing with the shaft vertical.

8) Fit the thrust sleeve to the thrust bearing and place over the shaft and locate the bearing on the dowel pin.

9) Fit the oil deflector on top of the thrust bearing.

10) Fit a new 'O' ring to the groove in the insert.

11) Fit a new piston ring onto the flinger sleeve.

12) Assemble the flinger sleeve assembly into the insert taking care not to damage the piston ring or insert bore.

13) Lubricate the 'O' Ring and assemble the insert assembly into the bearing housing and shaft assembly and retain with the snap ring, taking care to ensure the bevelled edge is uppermost.

14) Fit the compressor wheel and lock nut. (Note left hand thread)

15) Clamp the appropriate 12 point socket wrench in the vice with the socket axis vertical.

16) Place the 12 point hub of the turbine wheel into the socket.

17) Tighten the compressor locknut with a Tee handle wrench in accordance with the 'Fastener Torque Values Table'.

18) Test the core assembly on specialist dynamic balancing equipment.

19) Fit the 'O' ring to the groove in the bearing housing flange (as required)

20) Assemble the core assembly into the compressor cover and retain with the circlip or screws and clamp plates as appropriate.

21) Fit the core assembly into the turbine housing, orientate to the marks, fit the clamp plates and tighten the bolts.

22a) S1A/BG models now require the wastegate opening pressure setting. Refer to Schwitzer Application List for calibration details.
To set the pressure you will need some simple workshop equipment.
1) Surface plate and clamp for turbo.
2) Dial indicator with magnetic base.
3) Supply of compressed air.
4) Pressure Regulator.
5) Pressure Gauge capable of reading to an accuracy of .2 psi (0.015bar) .

22b) Mount the turbocharger on the surface plate and fit the actuator rod to the wastegate lever arm but do not fit the retaining clip.

22c) Position a dial indicator ball end on to the end of the actuator rod and zero.

22d) Apply a gradually increasing air pressure to the actuator (tapping the actuator gently to avoid hysteresis) until the dial indicator registers a movement of the actuator rod of 0.015 inch (0.4 mm).

22e) Adjust as necessary by screwing the actuator rod on or off the actuator shaft until the required pressure setting is achieved.

22f) When the correct setting is achieved lock the actuator rod to the actuator shaft with the locknut.

22g) Fit the actuator rod retaining clip to complete the assembly.

22h) Reconnect the actuator pipe to the compressor cover.

## Reinstallation Checklist

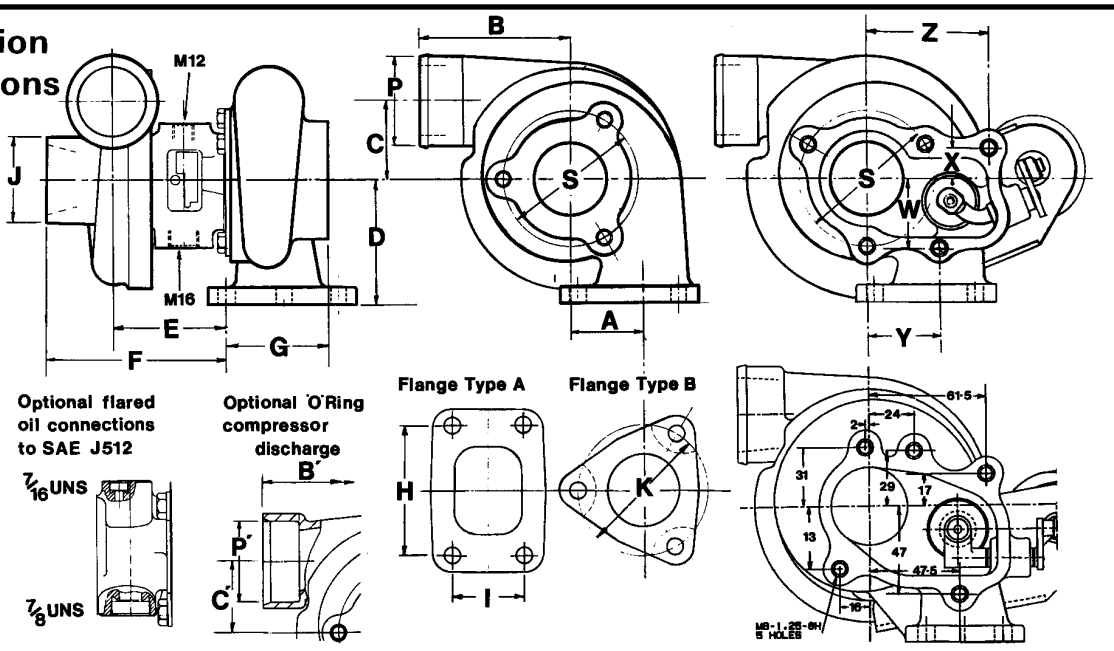
1) Inspect the intake and exhaust systems leading to and from the turbocharger to ensure absence of foreign material including burrs and loose lining fragments.
   Be thorough - even small particles entering the turbocharger during operation can cause severe rotor damage.
2) Use new, approved gaskets at the various air, oil and exhaust connections to the turbocharger. Do not use sealing or jointing compounds.
3) Use a high temperature antiseize compounds (such as Fel-Pro C5A) on all threaded fasteners connected to the turbocharger.
4) Limit drain port tilt to 20 degrees from bottom centre in either direction. Tilting in excess of this amount can create a leakage tendency at both the turbine and compressor seals.
5) Fill the oil inlet port to overflowing with clean engine oil before connecting the oil feed hose to the turbocharger. Avoid using any thread sealer on oil inlet - it can contaminate the oil system.
6) Before connecting the oil drain hose, crank the engine without firing until a steady stream of oil flows from the drain port.
7) Upon first start-up of engine, stand clear of vehicle and observe that turbo operates smoothly after installation. Run the engine at low idle for at least three minutes. This will prevent oil starvation damage to the bearing system, and will tend to purge residual contaminants from the bearing housing prior to unit acceleration.

## Important Safeguards

WARNING: Misuse or modification of the turbocharger can result in serious injury and property damage. Basic safety precautions including the following should always be practiced.

1) Read and comply with all instructions.
2) Install turbocharger only on an engine which has been approved for such application (check Schwitzer catalogue). The turbocharger is a precision built product which has been matched and tested for use on specific engines only.
3) Do not modify or substitute any parts of the turbocharger. Do not remove metal from any part of the turbocharger.
4) Service should be done only in accordance with the appropriate Schwitzer Technical Data Sheet for the specific turbocharger model.
5) Do not modify or substitute any parts of the engine except in accordance with the engine owner's manual. Do not modify engine fuel control system, restrict exhaust system or air inlet.
6) Do not operate at excessive altitudes.
7) Be sure that oil supply and drain lines are adequate and clean. Oil filtration should be 10 micron. maximum.
8) Always warm up the engine for 2-5 minutes to allow oil to reach the turbocharger before operating under load.
9) Perform all maintenance specified by the engine manufacturer at the recommended intervals.

## Installation Dimensions




**DIMENSIONS GIVEN BELOW ARE FOR GENERAL INFORMATION ONLY REFER TO SCHWITZER FOR EXACT DETAILS**

| MODEL | FLANGE TYPE | A | B | C | D | E | F | G | H | I | J | K | P | S | W | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1A/B | A | 50 | 70 | 48.6 | 72 | 44.8 | 83 | 76 | 73 | 40 | 60 | – | 50 | 75 | – | – | – | – |
| S1A/B* | B | 40 | 85 | 44 | 70 | 63.8 | 101.8 | 57.2 | – | – | 48 | 72 | 50 | 75 | – | – | – | – |
| S1A/BG* | A | 45 | 85 | 44 | 65 | 58.5 | 96.5 | 73 | 73 | 40 | 48 | – | 50 | 75 | 38.6 | 16.8 | 46.5 | 61.5 |
| S1A/BG* | B | 40 | 85 | 44 | 70 | 63.8 | 101.8 | 67.6 | – | – | 48 | 72 | 50 | 75 | 38.6 | 16.8 | 40 | 67.6 |
| S1A/BG* | A | 50 | 70 | 48.6 | 72 | 44.8 | 88 | 86.7 | 73 | 40 | 60 | – | 50 | – | See lower right diagram above | | | |
| *OPTIONAL 'O' RING COMPRESSOR DISCHARGE | | – | 80 | 40 | – | – | – | – | – | – | – | – | 45 | – | – | – | – | – |

Dimensions are in mm.

**Schwitzer**

**Schwitzer (Europe) Limited** Euroway Industrial Estate, Bradford, West Yorkshire BD4 6SE, England.
Telephone: +44 (0)1274 684915 Telefax: +44 (0)1274 689671

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