



BGI, INC.
WALTHAM, MA 02451

MARCH 2001

58 Guinan Street Waltham, MA 02451

Tel: 781-891-9380 Fax: 781-891-8151

SHARP CUT CYCLONE
INSTRUCTIONS FOR USE AND MAINTENANCE

1.0 Introduction

The Sharp Cut Cyclone (SCC) is designed to replace the US EPA WINS Impactor for PM_{2.5} sampling. It is a non-designated device which has proven advantages over the WINS insofar as it is a dry system and requires cleaning at infrequent intervals^{(1), (2)}. Inasmuch as speciation sampling, for particulates, is not governed by an EPA FRM, the SCC may be freely utilized.

BGI manufactures two versions of the SCC. They are the SCC-A, which is a direct replacement for the standards WINS. The SCC-B is intended for installation into the BGI PQ200A.

The flow path through an SCC-B is shown, in cut-away in Figure 1. PM₁₀ aerosol enters tangentially. Particles greater than PM_{2.5} are removed to the grit pot and PM_{2.5} material is ducted to the filter holder.

2.0 Installation – A Model.

The SCC-A is an exact replacement for the standard WINS as described in the FRM⁽³⁾. It may be substituted in any instrument, which currently utilizes a standard WINS. The dimensions of the socket and tenon are identical to the WINS and the overall height is the same. Therefore, the SCC may simply be “plugged in” as an exact replacement for the WINS in any instrument currently using the FRM standard. It may also be fitted to any instrument operating at 16.7-lpm, which utilizes the EPA standard socket and tenon dimensions. E.g. PQ100. A generic installation is shown in Figure 2.

2.1 Installation – B Model.

The SCC-B is internally identical to the A model, but is intended to be installed in the BGI PQ200, as a direct replacement for the PQ200 version of the WINS. The installation process is as follows.

Step 1. Remove the external first stage inlet and one foot down tube.

Step 2. Open the Impactor/Filter mechanism by turning the "T" handle counter clockwise. Remove the impactor cup and filter cassette.

Step 3. Loosen the round, knurled knob, which secures the lower WINS/upper filter housing and lift out this component.

Step 4. Firmly grasp the upper WINS housing, pull down and remove.

Step 5. Replace the upper WINS housing with the SCC upper adaptor.

Step 6. Install the SCC and rotate so the transfer tube is pointing outwards towards the operator. Tighten the round, knurled knob.

Step 7. Install the filter cassette and close the mechanism by rotating the "T" handle clockwise.

Step 8. Adjust the clamping pressure, if required and perform a leak test as described in the PQ200 manual.

The SCC-B is shown installed in Figure 3.

3.0 Operation.

After installation of the SCC, the instrument may be run in the normal manner at a flow rate of 16.7-lpm.

4.0 Maintenance.

The intervals between cleanings of the SCC are dependent upon the concentration at which it is subjected to. Experience indicates that at PM_{2.5} concentrations of around 10µg/M³, a three week interval is conservative ^{(1), (2)}. Cleaning, starting at once a week (7 operational days) is recommended until you have garnered sufficient observational information in your local to utilize longer intervals.

An exploded view of the SCC is shown in Figure 4. Recommended cleaning materials are clean mineral free water and lint free lab wipes. In cases where stubborn deposits are observed, ultrasonic cleaning is recommended. To disassemble:

Step 1. Remove the SCC from its installed position in the instrument.

Step 2. Pull off the transfer tube. If it is too tight to remove by hand, pry it off with a rigid plastic lever.

Step 3. Remove the top cap and grit pot by unscrewing.

Step 4. Wet a lint free wipe with water and remove all visible deposits. These are most likely to be found at the bottom of the cone and inside the grit pot.

Step 5. Inspect all "O" rings for shape and integrity. If at all suspect, replace, (with Buna-N elastomer). Lubricate all "O" rings with light grease. It is important to well lubricate the transfer tube to avoid difficult disassembly.

References:

- (1). L.C. Kenny "Investigation of the Effects of Loading on PM2.5 Selectors.", HSE Report IR/L/A98/13 (click here to download a copy).
- (2). L.C. Kenny, Gussman, R.A. and Meyer, M. "Development of a Sharp-Cut Cyclone for Ambient Aerosol Monitoring Applications. (In review).
- (3). Federal Register 40 CFR part 50, July 18, 1997. Figs. L-20 through L-24.

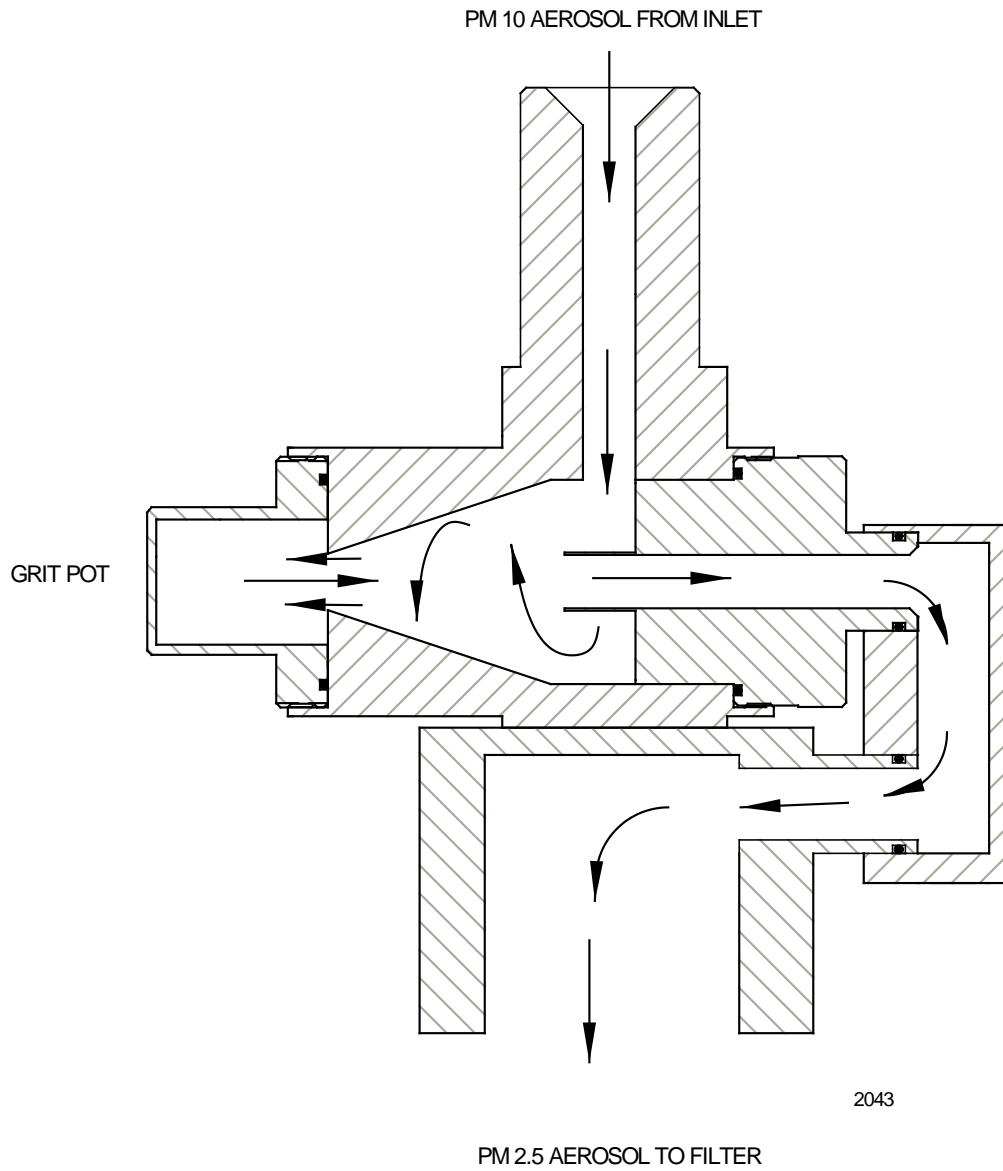


Figure 1: SCC-B Flow Path

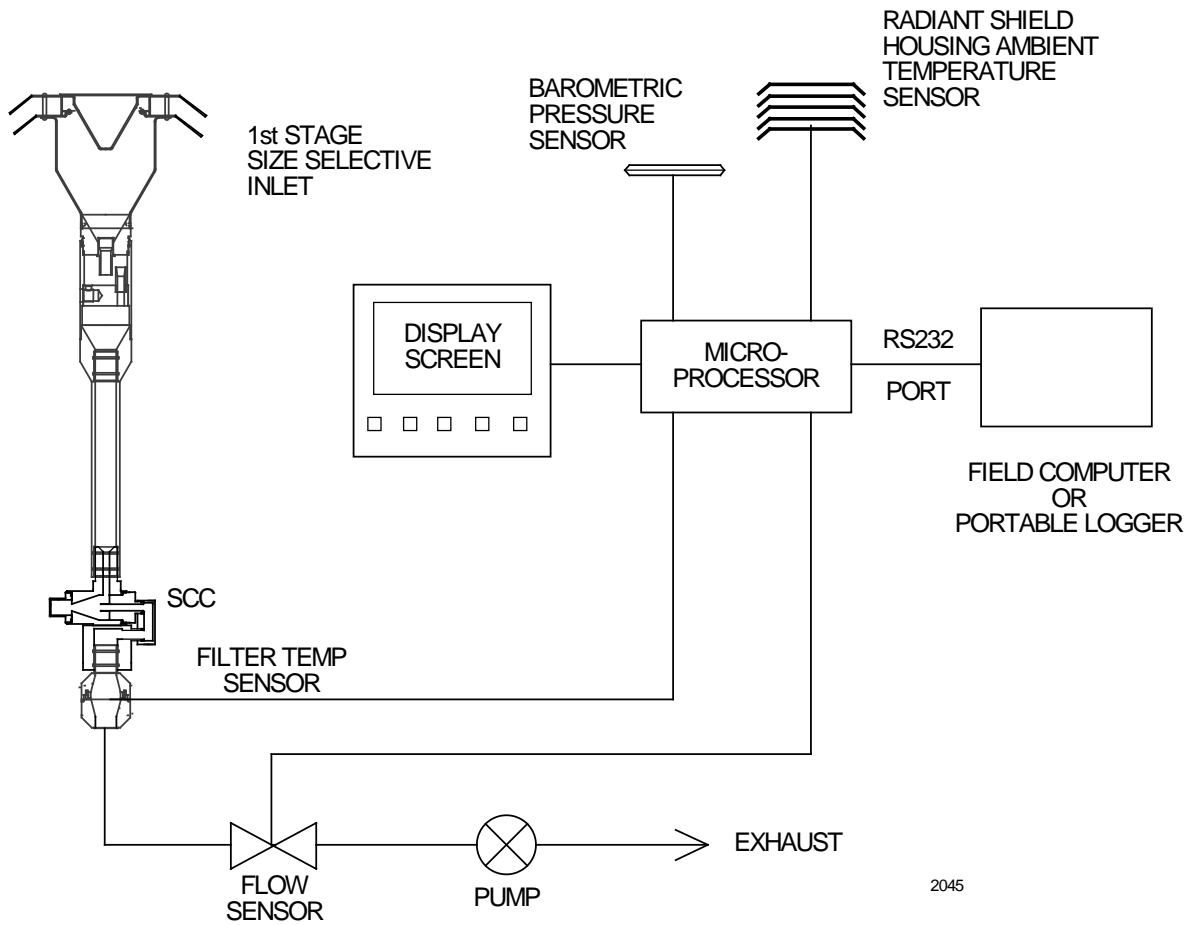
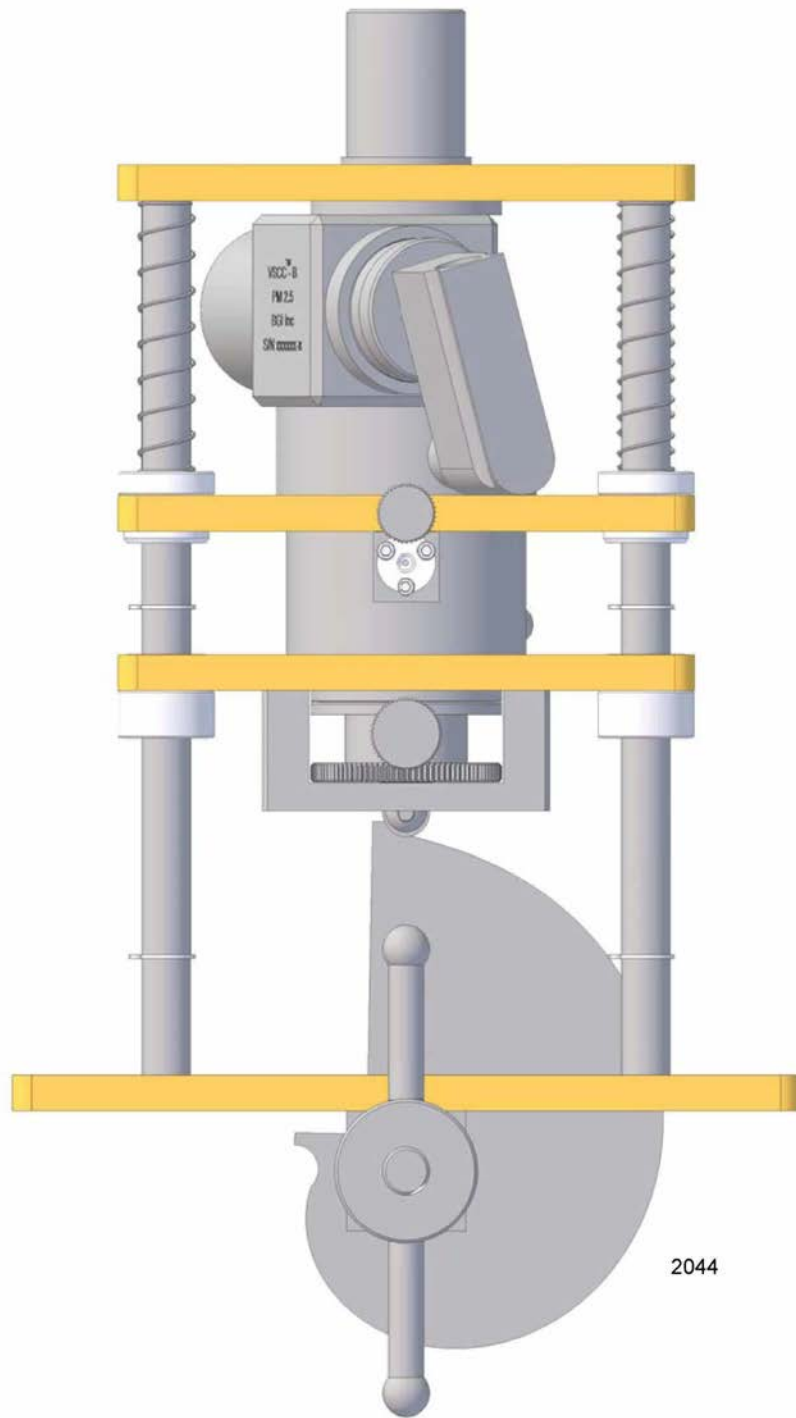
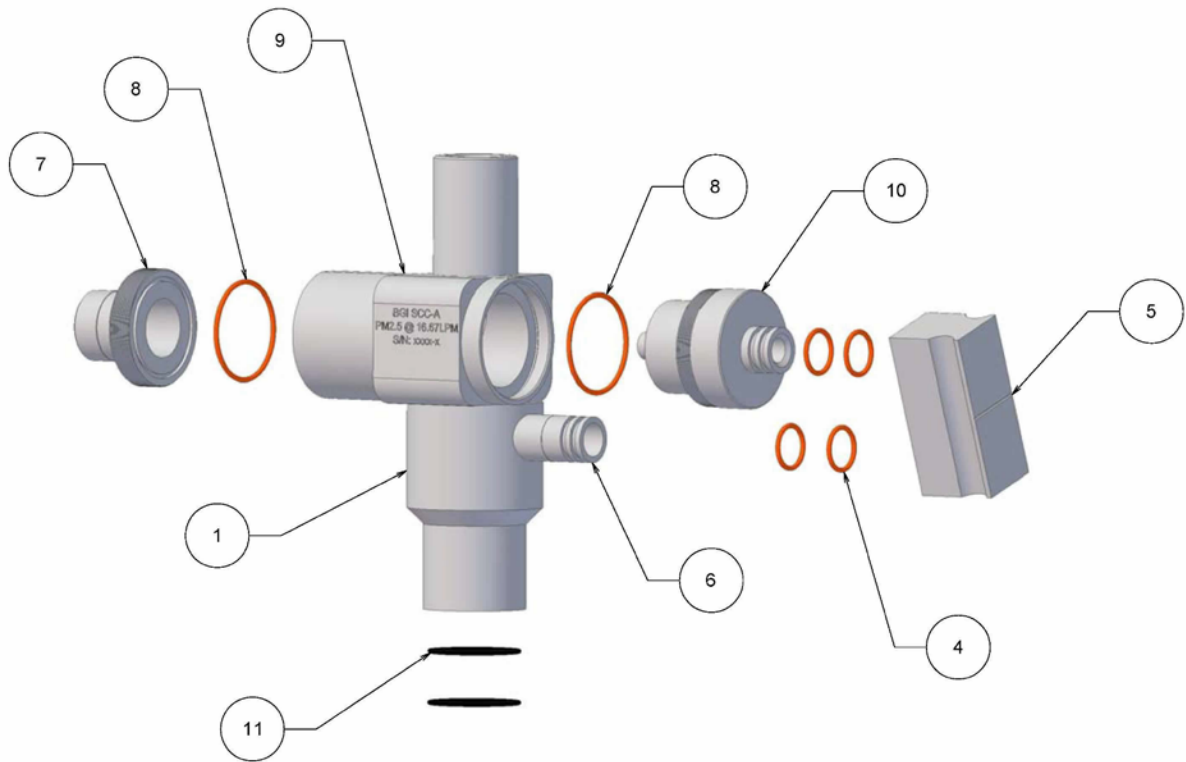


Figure 2: Generic Sampler Showing SCC Installed



2044

Figure 3: Drawing of SCC-B Installed



| Detail # | Part # | Qty. | Description |
|----------|-------------|------|--------------------------|
| 1 | 1988 | 1 | 1988 BOTTOM CHAMBER |
| 2 | 10001 | 2 | 10-32 x 1/4 SOCKET CAP |
| 3 | 008BUNA | 2 | 008 ORING |
| 4 | 015SILICONE | 4 | 015 ORING |
| 5 | 1992 | 1 | 1992 SIDE TUBE (SCCA) |
| 6 | 1987 | 1 | 1987 SIDE TUBE (VSCCA) |
| 7 | 1989 | 1 | 1989 DUST CUP (SCCA) |
| 8 | 028SILICONE | 2 | 028 ORING |
| 9 | 1993 | 1 | 1993 CYCLONE BODY (SCCA) |
| 10 | 1990 | 1 | 1990 CYCLONE TOP (SCCA) |
| 11 | 026BUNA | 2 | 026 ORING |

Figure 4: Exploded View of SCC



VERIFIED MANUFACTURE

March 2001

Verified Manufacture, a Mark of Origin and Quality.

What does it mean to you, the user of BGI Sharp Cut (SCC) and Very Sharp Cut Cyclones (VSCC)?

In addition to fabrication and testing in an ISO 9001 facility, BGI Inc. utilizes a “Verification Mark”. This mark is stamped on all ambient cyclones, of BGI manufacture, after March, 2001.

What BGI’s Quality Assurance efforts Mean:

1. As part of BGI’s continued pioneering efforts in the ambient particulate sciences, the mechanical design for the SCC and VSCC was engineered, developed and manufactured at BGI Inc.
2. The design and commercial product was verified, tested and computer modeled at the Health and Safety Laboratory, Sheffield, UK. (A U.S. EPA Equivalent Aerosol Testing Laboratory)¹
3. The SCC and VSCC Cyclones have been subjected to field trials and the results published, in peer reviewed journals^{2,3}.
4. The SCC and VSCC “family of cyclones” are manufactured in BGI’s ISO 9001 facility by experts serving the ambient sampling needs of science and industry for over 30 years.
5. Without the BGI Verified Manufacture Mark, the cyclone may be a back-engineered copy. A SCC or VSCC copy is not equivalent and not reference or design verified. Its application for any verifiable ambient air quality study is potentially problematic.

1. Effectiveness of the PM_{2.5} Federal Reference Method to Differentiate Fine and Coarse Mode Aerosol, NERL Report. EPA 600/R-00/33, August 2000.

2. L.C. Kenny *et al* (2000) Development of a Sharp Cut cyclone for Ambient Aerosol Monitoring Applications, Aerosol Science and Technology, Vol.32, No. 4, pp 338-358.

3. R.A. Gussman *et al* (2001) Design Calibration and Field Test of a Cyclone for PM-1 Ambient Air Sampling, Aerosol Science and Technology (In press).

BGI Cyclone Models:

SCC – A (In partnership with Rupprecht & Patashnick®, who’s product is also VM marked).

SCC - B

SCC 2.229

VSCC A & B