Solar Backscatter Ultraviolet
Spectral Radiometer Mod 2

NASA

NOAA

SBUV/2

Specification Compliance and Calibration Data Book for SBUV/2 Flight Unit #3 (S/N 004), Mod. 7

Volume I
Doc. No. B6802-105

SPECIFICATION COMPLIANCE AND CALIBRATION DATA BOOK

Volume I
for Flight Model No. 3, Mod. 7
Serial No. 004

Solar Backscatter Ultraviolet
Spectral Radiometer Mod. 2

Document No. B6802-105, Revision B
February 20, 1998

Prepared for
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Goddard Space Flight Center
Greenbelt, Maryland 20771
in accordance with
Contract NAS (5-26400, Item 35C)

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Section 1 - **Flight 3 Test History 1985 - 1997**

This listing provides a history of system-level tests and other major events of the SBUV/2 Flight Model 3, Mod. 6, Serial 004 instrument. Test procedure numbers have been included for reference. These tests will be described in greater detail in later sections of this book. Some of the major subsystems of the instrument have been changed, as have some of the procedures for collecting and reducing instrument data; therefore, test data collected from earlier tests is oftentimes not comparable to test data collected from later tests. This Data Book includes only the sections which have been updated since Rev. A. These updated sections include sections 1, 7, 9, 11, and 15 from Volume I, and sections 1, 4.2, 5, 6, and 7 from Volume II. In addition, the increased size of the Radiometric Calibration (originally section 5 of Volume II) has necessitated its move to a separate volume. Sections 3.2 and 4.3 have been included without updates for ease of reference, but all other sections without updates are not included in this Data Book.

Flight Model 3 was delivered in June 1989 and the grating mechanism appeared to be working properly, but later that year the grating did not lock into position during NOAA-I spacecraft tests. Ball technicians investigated this problem with FM3 still on the spacecraft and found that it affected both sweep and discrete modes with either primary or backup encoders. Consequently, we replaced FM3 with FM2 in June 1990. Despite thorough troubleshooting upon return to Ball, the grating servo mechanism refused to repeat the problem. Rather than dismantle the mechanism at that time, we decided to monitor its performance during the next series of instrument tests.

For the remainder of 1990, as well as 1991 and 1992, the instrument completed EMI testing, Dobson comparisons, rework to the on-board calibration lamp and power supply, radiometric calibrations, and rework to the ELM. The grating mechanism continued to work until the end of 1992. After additional troubleshooting in early 1993, we disassembled the mechanism, and identified contamination of the shaft bearings as the cause of loss of lock. An improved grating shaft (from later instruments) replaces the obsolete FM3 design. New methods assure the cleanliness of the shaft bearings. We installed the old gratings into the new shaft, using special procedures to preserve the monochromator optical alignment. A Mini-Functional, Signal-to-Noise, Radiance/Irradiance and Field-of-View were performed to assure proper re-assembly of the hardware. Nevertheless, this rework requires some re-calibration. A workmanship vibration was performed on both the Sensor Module and Electronics Module in the 'Z' Axis. Thermal Vacuum Calibration and Sphere Calibration were performed in late fall 1994 and spring 1995. Radiometric Calibration was not performed prior to Bench Test and delivery since delivery in March 1995 was requested without the calibration.

At the same time as the rework to the FM3 grating shaft, we modified all the SBUV/2 instruments by augmenting the baffles around the solar diffuser.

FM3 was returned to BASD in November 1995. The instrument was returned primarily because it had not had a Radiometric Calibration and because of a CCR failure on the Flight 5 instrument in orbit. The Cloud Cover Radiometer had a new Filter installed, Gain reset and Capacitor C-1 changed per GSFC Task No. 30. The Grating Shaft Assembly got a new Motor Spacer and Retainer installed to eliminate the grating shaft tolerance buildup. The EMI Skirt was modified to

facilitate easier installation of the spacecraft ground wire and maintain EMI integrity. In order to make the Calibration Lamp reflectance more consistent over time, the chromate conversion on the inside surface of the cal lamp cover was removed. A Grating Life Test was performed and the Instrument Calibrated prior to Bench Test and shipping in May 1996.
While in thermal vacuum at Lockheed Martin a susceptibility to microphonic noise at 400 Hz was noticed on Range 1 data. In March 1997 the instrument was shipped back to Ball Aerospace from Lockheed Martin. The susceptibility condition was reproduced at Ball and a fix was designed (notch filter) and installed on the electrometer board. The notch filter filtered out the microphonic susceptibility around 400hz without degrading the Range 1 data.

There also existed a grating slow lock condition which we analyzed and fixed at this time by reselecting and installing new components in the grating course loop servo circuit on the ELM A6 board.

A workmanship vibration was performed both on the ELM and on the electrometer. The electrometer was then re-installed on the sensor module. A special Out-of-Band test, Special CCR test, Temperature Response and Re-Calibration of the instrument were performed prior to the Bench test and shipping back to Lockheed Martin in August 1997.

At this time, there are no open issues with Flight Model 3. All out of specification measurements have been addressed and are detailed in the relevant sections. A summary of all measurements which exceed specification is included below.

<u>Instantaneous Field of View/Uniformity</u> Volume II, Section 3.2
Waiver SBUV-W-040
- Pointing Error (horizontal)
- CCR Field Uniformity (horizontal)
- Squareness

FLIGHT 3 TEST HISTORY

Year	Julian Day	Description
1984	032-121	Optical Alignment/68021
1984	245-366	Instrument Integration Completed, Including Signal-to-Noise and Preliminary Response Measurements/68025. Nearly all of these tests will be redone in the following three years.
1984	289-300	Dynamic Range and Linearity Tests/68029.
1984	305-307	Wavelength Calibration/68030.
1984	323	Field-of-View and Out-of-Field Tests/68027.
1984	348-352	Time Response Tests/68045.
1984	353	Pre-vibe Functional Performance Test/68042.
1984	354-355	Power Profile Test/68026 Para. 8.3.
1984	363	Electrical Functional Test, 28V/68033.
1985	002-008	3-Axis Vibration & Functional Performance Tests/68042, 68038: The cal-lamp power supply fails after 3rd axis, testing continues with Flt. 2 CLPS until Flt. 3 CLPS repaired 14 Jan. 85 (?). Ref. GSFCMalfunction Report (MR) No.F04125.
1985	032-059	"Flashlight" Time Response Tests Begin/68045: PMT response time still a problem with ITT Tube.
1985	073-074	SM & ELM Envelope Measurements/68037 Para.7.3.
1985	092-133	Engineering Tests/68044,68029: Time Response and Linearity with "off-the-shelf" Hamamatsu PMT. ITT PMT re-install after engineering tests completed.
1985	126	Power On, Grating Loses Lock During 68025/68042 Tests.
1985	135-147	Grating shaft shimmed to improve encoder signals, Ref. GSFC MR F04113.

1985	148-150	Electrical Functional Tests 28, 27, 29V/68033.
1985	154	Diffuser Mechanism retest/68033 Para. 8.3.2.
1985	155&156	Center-of-Gravity Measurements for SM & ELM/ 68037 Para. 7.2. Weights are measured also, but change with later rework.
1985	176-200	Engineering Tests/68042, 68029: Time Response and Linearity of the ITT PMT with various modifications to the bleeder string. Improvements are marginal.
1985	203	Diffuser & Cal-lamp mechanisms reinstalled/68025.
1985	205	Functional Performance Test/68042.
1985	210-212	Power Profile Test/68026 Para.8.3.
1985	213	Light Leak Test/68031 Para. 8.4, Hg lamp only.
1985	217-218	Light Leak "Sun" Test, and Out-of-Band "Sky" Test/68031 Para.8.3,68032.
1986	023-036	Engineering "Albedo" Tests: diffuser reflectance and position repeatability per contract NAS5-26400 modification #103.
1986	024	Mini- Functional/68042, Grating Loses Lock in Sweep mode.
1986	037-052	Heater added to cal-lamp housing, checked - out.
1986	052	Functional Performance Test/68042.
1986	060-090	SM structure reworked to provide attachment points for new lifting fixture.
1986	091-120	ITT PMT removed for installation of prototype Hamamatsu tube.
1986	121-151	Engineering tests of prototype Hamamatsu PMT: Linearity, Time Response and Gain-vs-Wavelength.
1986	152-181	Engineering albedo tests to develop "brassboard" lamp housing per contract mod. #110.

1986	182-201	Flight Hamamatsu PMT installed.
1986	202-206	New SM alignment mirrors installed/68021 Para. 8.2.1.
1986	211-234	Measurement and selection of PMT gain (voltage)/68025 Para.8.6, also anode preamp rework.
1986	225-230	Gain-vs-Wavelength measured and repeated with a "final" HVPS selection/68044.
1986	232&233	Baseline Radiance Response Test/68025 Para. 8.15. This data is used simply to calculate minimum expected signal for the SNR test which follows.
1986	234	Signal-to-Noise measurement/68025 Para. 8.16.
1986	232-235	Short Term Stability/68026 Para. 8.7.
1986	239-241	Dynamic Range and Linearity/68029 (three times).
1986	252-259	Temperature tests of brassboard cal-lamp housing.
1986	259-303	Rework to diffuser mechanism, and to ELM A10 & A11 boards to improve repeatability of diffuser position, ref. GSFC Request for Deviation (DD1694) No. SBUV-D-031 & SBUV-D-032.
1986	261-273	Range 3 linearity troubleshooting, no major improvements/ 68029.
1986	314&315	Functional Performance Test/68042.
1986	316&317	Linearity Equivalence Test/156184.
1986	323-325	Response Time Test/68045.
1986	330	Preliminary Field-of-View Measurement/68025 Para. 8.7.
1986	342-352	More brassboard albedo temperature tests.
1986	364	Engineering test with collimated source for goniometric calibration, results unsatisfactory/68034.
1987	037-040	ELM (A10 & A11) rework completed.

1987	041-043	Wavelength Calibration/68030.
1987	044-048	SM (diffuser & cal-lamp mechanisms) rework completed.
1987	050-057	Angle-of-Incidence Measurements/68025 Para. 8.14.
1987	075-077	Electrical Functional Tests, 28, 27, 29V/68033.
1987	078&079	Power Profile Test/68026 Para. 8.3, ref. GSFC Request for Waiver (DD1694) No. SBUV-W-018.
1987	082-084	Field-of-View & Out-of-View Tests/68027.
1987	085	Light Leak Test/68031, "fails" due to stray light reaching the entrance aperture around (and through) the new cal-lamp door. It is decided that the door is not required to be a perfect shutter, and future tests will eliminate this stray light in order to check for leaks into the monochromator.
1987	087-089	Goniometric Calibration/68034 (twice).
1987	092	Rework cal-lamp housing finish (to bare A1) to improve reflectivity, ref. GSFC SBUV-D-034.
1987	098	Engineering evaluation of cal-lamp assy./6804 Para. 8.3.
1987	099-101	Diffuser Reflectivity Test/157372.
1987	102-105	Hg lamp determined to be unstable, replaced with good lamp.
1987	106&107	Diffuser Reflectivity Test (with good lamp)/157372.
1987	107	Response Repeatability with FEL #131/68028.
1987	108-110	Pre-vibe Functional Performance Test/68042.
1987	111-113	Three Axis Vibration & Functional Tests/68042,68038; due to redesign of cal-lamp and diffuser mechanisms, and new Hamamatsu PMT.

1987	114-118	Minivac test/68040/MDR A45893 & A45904, Grating Loses Lock, A6 Component Failure. Thermal-Vacuum test aborted during pre-pumpdown functional, due to failure (from ESD) in the grating backup encoder power. ELM A6 board repaired, ref. GSFC MR F04118.
1987	119&120	Thermal-Vacuum test aborted during post-pumpdown functional, due to loss of lock in the grating servo loop. Failure is later found to be a cracked ball bearing retainer, ref. GSFC MR F04119.
1987	154-173	Troubleshooting of cal-lamp mechanism "hang-up" problem.
1987	233-240	Temperature tests of Flt. 3 depolarizer show no problems, Flt.3 depolarizer donated to save Flt. 4 instrument.
1987	296	Flt. 3 cal-lamp power supply donated to Flt. 4 (at GE), Flt. 4 CLPS installed on Flt. 3 after repair.
1987	220-227	Installation & alignment of gratings on repaired shaft mechanism. G1 replaced due to scratches on grating.
1988	004-012	Flt.-2 Depolarizer installed into Flt.-3.
1988	012	ELM A8 Board reworked for new PROM.
1988	014&015	Re-integration turn-on and check-out, chopper alignment, etc./68025.
1988	014	Power On, Post–Grating Bearing Retainer Replacement and Rework.
1988	015	Power On (Continued from "Day 14").
1988	018	Wave Cal Source PT.
1988	019	Wave Cal-Sources Hg, Mg-Ne, CU, CV, NE.
1988	020	Wavelength Calibration 68030, 114, 116, 206 PT ZN 1190 4 Wavelengths.
1988	021	Wavelength Calibration/68030.
1988	022	Linearity Set-Up.

1988	025	Dynamic Range & Linearity 68029.
1988	026	Repeat Linearity Test (Start=7:56 - Stop=16:32)After Depolarizer Change.
1988	032	Cal Lamp & Diffuser Check/68025 Para. 8.13 &8.14. Diffuser assy. was pinned before removal to maintain alignment when re-installed.
1988	034&35	Field of View & OOF/68027.
1988	036	Prom Data SER #59 & 60.
1988	041	Test of Flight Prom 48 Installed and QC.
1988	042	Pre-Vibe Mini Fun & Mini SNR Response w/FEL#190 & 191/68042 & 68028.
1988	043	Pre-Vibe Mini Fun & Mini SNR Response w/FEL #190 & 191.
1988	044	Pre-Vibe Mini Fun & Mini SNR Response w/FEL #190 & 191.
1988	046&047	SM & ELM Z-axis Vibration Test/68038 Para. 8.4.
1988	047	Post–Vibe 68042 Mini-Functional.
1988	048	Post–vibe/68042 Mini-Functional with FEL #191, also grating encoder signals verified in six different orientations.
1988	052	Pre Vacuum Checkout.
1988	053	Procedure Restart - Procedure Mini Vac, Vac Check w/ FEL #191.
1988	054	Labeled as Day 53- Thermal Vac - Zone 1.
1988	055	Thermal Vac Zone 3-6.
1988	056	Thermal Vac Zone 6-8.
1988	057	Thermal Vac Zone 9-11.

1988	058	Thermal Vac Zone 12-13.
1988	059	Thermal Vac Zone 15.
1988	060	Thermal Vac Zone 16 Transition to 0°.
1988	061	Thermal Vac Zone 17-19.
1988	062	Re–test Cal Lamp 20°C. Thermal-vacuum test has two minor problems: mechanical noise from heater/chiller units affects radiometric data (until units are turned off); and occasional loss of lock in the backup grating encoder at low temperatures, ref. GSFC SBUV-W-021.
1988	068	FOV 280 Post–Thermal Vac Elect. - Functional/68042 with FEL #191. Also R.F. antenna tests with foil shield.
1988	069	RF Noise Test - Range 3 Not Reading Properly.
1988	070	RF Noise Test (Foil Covered).
1988	071	Check & Radiometric Calib./68043 with FEL #191.
1988	074	Radiometric Calib./68043 with FEL #191, PTF.
1988	075	Radiometric Calib./68043 with FEL #190, PTF.
1988	076	Radiometric Calib./68043 with D2 Amp #YE 964.
1988	077	Radiometric Calib./68043 with PTF-Mini–arc II.
1988	078	Radiometric Calib./68043 Normal Incidence Test Fixture with FEL #191.
1988	081	Radiometric Calib./68043 Normal Incidence Test Fixture with FEL #190.
1988	082	Radiometric Calib./68043 Normal Incidence Test Fixture with D2 #YE 964.
1988	089	Light Leak/68031 - Out of Band/68032.
1988	092	R.F. Test, Foil Covered .
1988	095	R.F. Test, Foil Covered @ 1, 2, 4, & 8 Watts.

1988	103	Hg Portion (STRAYM) of Light Leak/68031.
1988	109	Range 3 Temperature Test Set-Up (Part 1).
1988	110	Range 3 Temperature Test Set-Up(Part 1, 2 & 3).
1988	131	Range 3 +20°C (Start=09:17 - Stop=22:37).
1988	132	Range 3 +20°C (Start=07:52 - Stop=21:43).
1988	133	Range 3 +30°C (Start=08:19 - Stop=22:57).
1988	134	Range 3 +30°C (Start=08:09 - Stop=13:53.
1988	136	Range 3 0° (Start=12:30 - Stop=20:10).
1988	137	Range 3 0° (Start=07:45 - Stop=22:41).k
1988	138	Range 3 20° (Start=07:44 - Stop=14:19).
1988	139	Range 3 20° (Start=08:18 - Stop=12:15).
1988	140 & 141	Flasher Test.
1988	178	Flasher Test.
1988	179	Range 3 Sweep Test Set-Up.
1988	180	Range 3 Sweep Test Data.
1988	181	Range 3 Sweep R1 Photo.
1988	182	Range 3 Sweep.
1988	183	Range 3 Sweep Instrument Upright on Table.
1988	210	STE Checkout 68016 (Start=209/14:27 - Stop=210/8:39).
1988	223	Pre-RF Screen Test (Start=14:35 - Stop=15:04).
1988	225	Pre-RF Screen Test (Part #1) (Start=9:34 - Stop=10:14).
1988	225	Pre-RF Screen Test (Part #2) Start=10:24 - Stop=13:32).

1988	226	RF Screen Test (Start=8:18 - Stop=10:24).
1988	236	RF Tests EMI Tests W/Screen (Start=15:37 - Stop=17:40).
1988	263	R3 Noise & Offset Int. & Ext. 25V to HVPS(Start-09:03 - Stop=15:40).
1988	264	Ext. 28V Pulse Buss (Start=11:24 - Stop=12:03).
1988	265	External 28V Regulated Buss (Start=09:49 - Stop=10:35).
1988	267	Ext. Regulator on 25V Input to HVPS (Start= 9:09 - Stop=10:22).
1988	267	Ext. Regulator on HVPS Input Set at 23.5 Volts (Start=15:15 - Stop=16:51).
1988	270	STE R3 - Noise (Start=14:24 - 16:22).
1988	288	Regulator at input of HVPS (Start=16:14 - Stop=16:58).
1988	291	Regulator on HVPS Set at 23.32 Volts output (Start=14:41 Stop=15:21).
1988	299	Range 1 Noise Test (Start=9:51 - Stop=17:05).
1988	300	Range 1 Noise Test (Start=13:36 - Stop=14:01).
1988	305	Range 1 Noise Test (Start=10:34 - Stop=15:16).
1988	306	Range 1 Noise Test (Start=13:55 - Stop=15:35).
1988	312	Range 1 Noise on 90° Fixture (Start=9:38 - Stop=9:52).
1988	342	(Start=15:37 - Stop=16:18).
1988	354	Electro/Optical Performance Turnon and Loss of Sync (Start=13:45 - Stop=15:35).
1988	354	DATA NO GOOD! Electro/Optical Performance Test 68042 (Start=15:44 - Stop=355/9:11).
1988	355	Electrical/Optical Performance (Mini functional Test) [Radiometric Data to be Re–tested] Start=10:45 - Stop=17:39).

1988	356	Electrical/Optical Performance (Mini functional Test) [Radiometric Data to be Re-tested] (Start=9:49 - Stop=14:18).
1988	357	Electrical/Optical Performance (Re-test) (Start=10:42 - Stop=15:30).
1989	045	Linearity Test (Start=13:38 - Stop=14:21).
1989	046	Linearity Test (Start=8:29 - Stop=15:10).
1989	048	Gain vs. Wavelength - DD68044 (Start=15:23-Stop=16:88)
1989	052 & 053	Electro/Optical Performance (Start=52/14:00 Stop=53/16:58).
1989	053 & 054	Light Leak Hg Goniometric Lamp Test D2 (Start=53/17:00 - Stop=54/18:24).
1989	096	Pre-EMI Turn-On (Start=9:05 - Stop=9:24).
1989	096	Pre-EMI Test (Start=10:39 - Stop=11:52).
1989	097	EMI Test with New Screen (Start=13:32 - Stop=16:09).
1989	101	EMI Test - Thermal Blanket Installed Dipole Antenna (Start=15:51 - Stop=16:24).
1989	102	Post–EMI Electrical - Optical Hi-Bay Light On (Start=9:50 Stop=16:24).
1989	110	Goniometric Calibration per 68034 (Start=13:37 - Stop=19:56).
1989	111	Goniometric Calibration per 68034(Start=7:01 - Stop=20:38).
1989	113	Turn-on Data (Start=19:50 - Stop=20:15).
1989	114	Goniometric Test - FEL Lamp (Start=7:23 - Stop=20:02).
1989	115	Post–"Gonio" Diff. Check (Start=11:00 - Stop=11:11).

1989	163	Pre-Ship BBench Test/69821 (Start=9:27 - Stop=14:20)
1989	170 & 171	Post–Delivery Bench Test/69821 (Start=13:35 Stop=15:10) & (Start=9:50 - Stop=14:14).
1989	242	During SEPET Test of the TIROS Spacecraft, the Grating Failed to Lock..
1989	283 & 284	Ball Field Trip to GE, Grating Fails to lock in Sweep and Discrete Modes using both Primary and Backup Encoders.
1990	157	Pre-Delivery to Ball, Bench Test/69821 & Grating Loss of Lock Troubleshooting.
1990	163	Post–Delivery to Ball, Bench Test & Troubleshooting (Start=11:17-Stop=11:44).
1990	164	Bench Test/69821& Troubleshooting (Start=9:38 - Stop=18:48)
1990	165	Bench Test/69821& Troubleshooting (Start=8:04 - Stop=8:48)
1990	166	Troubleshooting Grating (Start=13:28 - Stop=15:08)
1990	171-173	Grating Tests w/SM in 6 Different Orientations (Start=171/11:53 - Stop=172/08:45) (Start=172/14:17 - Stop=173/15:03)
1990	176 & 177	ELM & SM Temp. Tests (Start=176/10:32 - Stop=177/17:04).
1990	198	Grating Turn-on Test (Start=14:12 - Stop=15:40).
1990	199	Grating Test w/"G.E." Cables (Start=10:25 - Stop=15:56).
1990	242&243	BCU and NASTE Tests Also Playback AB (Start=242/15:44 - Stop=243/11:05).
1990	247	EMI Test (Start=10:46 - Stop=16:12).
1990	248	EMI Test 150 kHz - 10 MHz (Start=9:35 - Stop=16:04).
1990	249	Ground Plane Interference Test(Start=13:19 - Stop=14:12).

1990	250	More EMI Ground Plane - No Problems (Start=14:00 - Stop=15:43).
1990	255	EMI Spark Test/SER SBUV-RL-90-634 Rev.A (Start=9:39 - Stop=17:29).
1990	270	Mini functional Test Aborted Due to Cal Lamp Problem (Start=14:03 - Stop=15:45).
1990	281 & 282	Mini functional Test with new CLPS and Lamp (Start = 281/10:52 - Stop=282/13:38).
1990	284-289	Diffuser Reflectivity Test Procedure 157372 (Start = 284/14:16 - Stop = 289/07:07).
1990	292	Dobson Set-Up, No Data (Start = 8:55 - Stop = 15:22).
1990	295	Pre-Dobson Wavelength Check (Start = 8:55 - Stop = 11:38).
1990	296	Dobson Sun Test (Start = 15:31 - Stop = 18:53).
1990	297	Dobson Sun Test - Repeat (Start = 13:14 - Stop = 18:51).
1990	298	Dobson Sky Zenith and NOAA-11 Pass/Contract 30355; Tech. Dir. #3 (Start = 12:40 - Stop=21:17).
1990	299	Dobson Zenith Sky - AM Data Only (Start = 12:51 - Stop = 16:24).
1990	311-333	NASTE hardware and software test and troubleshooting.
1991	105-108	Fix-flex Memory Check.
1991	256	Albedo 69821.
1991	267	EMI Test/SER SBUV-RL-91-666.
1991	273	Angle of Incidence/68025 Para. 8.14.1.
1991	274	Albedo 69821.
1991	274	Radiometric Calibration/68043, PTF, Mini-Arc (Ball I), Collimating Mirror 'C', Flight Diffuser & 6061-T6 (Test Diffuser).

1991	275	Radiometric Calibration/68043, PTF, FEL #190 & #257, Collimating Mirror 'C', Test Diffuser 6061-T6.
1991	276	Radiometric Calibration/68043, PTF, D2 #YE939 & #YE964, Collimating Mirror 'C', Test Diffuser 6061-T6.
1991	277	Radiometric Calibration/68043, PTF, D2 #YE959, Test Diffuser #6061-T6 & Spectralon 'H1'.
1991	280	Radiometric Calibration/68043, PTF, Spectralon Diffuser 'H1'.
1991	281	Radiometric Calibration/68043 Para. 8.4.1, NITF, FEL #190 & #257, 12" Aluminum Test Diffuser.
1991	281	Radiometric Calibration/68043 Para. 8.4.2, NITF, D2 #YE939, 12" Aluminum Test Diffuser.
1991	282	Radiometric Calibration/68043 Para. 8.4.2, NITF, D2 #YE939 & #YE964, 12" Aluminum Test Diffuser.
1991	283	Radiometric Calibration/68043 Para. 8.4.2 , NITF, FEL #257, D2 #YE959, 12" Spectralon Test Diffuser 'D'.
1991	294-296	Dobson Comparison/Task assignment #10.
1992	029-051	Gain vs. Wavelength and Engineering Tests IRR23 Depressed by High Light Levels.
1992	073	Gain Check/Gain Recovery Measurement.
1992	093 & 094	Gain Check/Gain Recovery Measurement.
1992	282	Gain Check/Gain Recovery Measurement.
1992	286	Dobson Zenith Data.
1992	295	Sun Data.
1992	314-318	Grating Troubleshooting (Mini-Functional).
1992	321-358	Grating Troubleshooting.
1993	012 & 013	ELM Check/68017, Post–ELM Card Slot Rework.

1993	015-064	Grating Troubleshooting/Temperature Test of S/M.

Post–Grating & Diffuser Baffle Rework

1994	032	Field–of–View/68042 Para.8.8 FOV 280.
1994	054	Angle of Incidence/68025 Para. 8.14.1.
1994	061	Functional Test/68042.
1994	062	S/M Vibration 'Z' Axis/68038.
1994	066	Functional Test/68042.
1994	074	Wavelength Calibration/157359.
1994	076	Functional Test/68042 Para. 8.2.1.
1994	091	Field of View/68027.
1994	095	Functional Test/68042 Para. 8.2.1.
1994	101	Functional Test/68042 Para. 8.2.1.
1994	104	Goniometric Test/68034.
1994	117	Functional Test/68042.
1994	123	EMI Test/SER SBUV-PM-94-729.
1994	131	Electronics Box Vibration 'Z' Axis/68038.
1994	137	Functional Test/68042 Para. 8.2.
1994	168	Temperature Response/160859
1994	202	Weight S/M w/o Shield and Thermal Blanket = 59.19 Lbs./68037.
1994	266	Functional Test/68042 Para. 8.1 through 8.5, A6 Board Pre-Diode Installation.
1994	290	Functional Test/68042 Para. 8.1 through 8.5,

		A6 Board Post-Diode Installation.
1994	315	Thermal Vacuum/160861 and SER SBUV-KK-753.
1994	322	Functional Test/68042.
1995	075	Sphere Test w/Spectralon 'B' Diffuser & FEL #192.
1995	076	Sphere Test w/ RSI's FEL #428 & Spectralon 'B' Diffuser @ 50 cm. Gain-Vs-Wavelength w/Special Grating Positions.
1995	080	Pre–Ship Bench Test/69821 Special Sun Gun Test to Check Integrity of CCR Filter
1995	086	Post–Delivery Bench Test/69821.
1995	317	Returned Instrument to BASD from Lockheed-Martin.
1995	317-318	Mini-Functional/68042.
1995	340-348	Angle-of-Incidence/68025 Para. 8.14.1.
1995	349	CCR Post Rework, Installation & Test/68025 Para. 8.6i&k.
1995	353-354	Field-of-View/68027 Para.8.2.
1996	004-005	FOV280/68025, Realign CCR to PMT.
1996	005	Field of View/68027 Para.9.0.3 through 9.0.6 Post CCR Re-Alignment.
1996	009-011	Radiometric Calibration/68043 Para.8.3.3 w/ Mini-Arc s/n BALL 1. Note: Observed Grating Shaft going into Oscillation at each Grating Position and losing Lock.
1996	012-018	Troubleshooting Grating Lock Problem, Re-selected Resistors in Fine Loop Circuit on A6 Board. Ref. SER NO.: SBUV-96-PM-802.
1996	019	Performed Mini-Fuctional/68042 Para. 8.3/ P/N 67901-505 C/L #8486B OP. #R380.21.
1996	023	Performed Sphere Test/SER #SBUV-BT-93-707A

		Performed Sphere Radiance @ 50cm Performed Diffuser (Spectralon 'B') Radiance w/Integrating Sphere @ 50cm,75cm,100cm,&150cm w/FEL#190 @ 50cm,75cm,100cm,&150cm.
1996	024	Continued Sphere Test/SER #SBUV-BT-93-707A Performed Diffuser (Spectralon 'B') Radiance w/FEL#191 @ 50cm,75cm,100cm,&150cm w/D2#YE-964 @ 50cm,75cm,100cm,&150cm.
1996	025	Completed Sphere Test/SER #SBUV-BT-93-707A w/ Sphere Radiance @ 50cm.
1996	026	Performed Bench Test/173786 Calibration Lamp Closed Command Failure AB Report indicates noise on line caused Lamp Motor to stop, Ref: SER #SBUV-PM-96-808.
1996	029	Completed Bench Test/173786 Primary & Backup Albedos and CCR Response Check.
1996	030	Performed Radiometric Calibratio/68043 Para. 8.3.3 w/Mini-Arc S/N #Ball I, Test Diffuser Spectralon 'H1', Collimating Mirror S/N 'C'.
1996	031	Performed Radiometric Calibration/68043 Para 8.3.2 w/D2 Lamp S/N YE-959 and YE-964 w/Optronics P/S, YE-959, YE-964 w/Oriel P/S, Test Diffuser Spectralon 'H1', Collimating Mirror S/N 'C'.
1996	032	Performed Radiometric Calibration/68043 Para 8.3.2 w/D2 Lamps S/N YE-959, S/N RC0863 and S/N RC0876 w/Optronics P/S, Test Diffuser Spectralon 'H1', Collimating Mirror S/N 'C'.
1996	033	Performed Radiometric Calibration/68043 Para 8.3.1b w/FEL S/N 191, S/N 257, Test Diffuser Spectralon 'H1', Collimating Mirror 'C'.
1996	040	Performed Radiometric Calibration/68043 Para 8.4.2, w/D2 Lamps S/N YE-959 and S/N YE-964 w/Halon 'D' Diffuser, NITF.
1996	043	Performed Radiometric Calibration/68043 Para 8.4.2, w/D2 Lamps S/N RC0863 and S/N RC0876 w/Halon 'D'

		Diffuser, NITF.
1996	044	Performed Radiometric Calibration/68043 Para 8.4.1, w/FEL Lamps S/N 190, S/N 191 and S/N 257 w/Halon 'D' Diffuser, NITF.
1996	059-060	Performed Electrical/Optical Performance/68042 (Pre-Life Test)
1996	067	Started Grating Shaft LIFE TEST w/-Z Axis Up and Grating Shaft Vertical. Running Test using SWEETP computer. Performed "Procedure Great" and Photographed all 12 Discrete Channels.
1996	068	Performed "Procedure Great". Running Test using SWEETP.
1996	071	Performed "Procedure Great". Running Test using WIMPY.
1996	075	Performed "Procedure Great".
1996	086	Performed "Procedure Great".
1996	099	Shut off Life Test. Removed Calibration Lamp for Rework. Re-installed Calibration Lamp and staked wires. Restarted Life Test.
1996	100	Performed "Procedure Great". Started Diffuser Reflectivity Test/157372, Completed through RUN #3.
1996	101	Performed "Procedure Great". Completed Procedure Reflect/157372, RUNS #4 Through RUN #8.
1996	103	Completed LIFE TEST. Total Time ON is 822 hours 25 minutes.
		Performed Mini-Functional/173786 (Post-Lamp Rework)
1996	115	Pre-ship Bench Test/173786 Rev. A.
1996	116	Packaged SBUV/2 Instrument into Shipping Container.

1996	124	Shipped SBUV/2 Instrument to Lockheed Martin in New Jersey.
1996	129	Opened SBUV/2 instrument at Lockheed Martin. Performed Bench Test/173786 Rev. A.
1996	130	SBUV/2 Sensor Module and Electronics Module Degaussed By Lockheed Martin.
1997	062	Returned SBUV/2 Instrument to BASD from Lockheed Martin.
1997	070	Performed Bench Test/173786 Post Delivery to BASD from Lockheed Martin.
1997 2	071-072	Performed STINGER Test SER # SBUV-M0-97-858 Part 1 Para.
1997	073	Mini-Functional Test/68042 Para. 8.2-8.5 at Vacuum SER# SBUV-MO-97-858 SER# SBUV-CS-97-856.
1997	076	Performed Stinger Test in Vacuum and Ambient Temperature Repeat of Mini-Functional Test/68042 Para. 8.2-8.5
1997	078	Performed Mini-Functional Test/68042 at Vacuum and 0°C, SER# SBUV-MO-97-858 Part III Para. 3. Performed Stinger Test/SER # SBUV-MO-97-858 Part III Para. 5 At Vacuum and 0°C.
1997	079	Performed Stinger Test at Vacuum and 10°C, SER# SBUV-MO-97-858 Part III Para. 5&6.
1997	080	Performed Stinger Test at Vacuum and 30° (twice)
1997	081-083	Repeated Stinger Test at 20° in Vacuum.
1997	084	Performed Stinger Test/SER# SBUV-MO-97-858 Part IV at Ambient Pressure and Temperature. Performed Mini-Function Test/68042 SER# SBUV-MO-97-858 Part IV Step #3 Para. 8.2-8.5

1997	085	Performed Mini-Functional Test/68042 at Vacuum and Ambient Temperature/SER# SBUV-MO-97-858 Part V Performed Stinger Test at Vacuum and Ambient Temperature.
1997	086	Performed Stinger Test/SER# SBUV-MO-97-858 Part VI at Vacuum and 0°C.
1997	087	Performed Stinger Test/SER# SBUV-MO-97-858 Part VIa at Vacuum and 30°C.
1997	090	Performed Stinger Test at Ambient Temperature and Pressure SER# SBUV-MO-97-858 Part VIa.
1997	104	Performed CCR Response Check/173786 Para. 8.6 with Flight 6 Electrometer and Notch Filter Installed.
1997	105	Performed CCR Response Check/173786 Para. 8.6 with flight 3 Electrometer Installed.
1997	106	Performed Special CCR Test/SER# SBUV-KK-97-862 (three times)
1997	107	Performed Special OOB Test/SER# SBUV-KK-97-861.
1997	175	Performed Mini-Functional Test/68042.
1997	176	Performed Mini-Functional Test/68042 Para. 8.2.
1997	178	Performed MiniSNR3/68042 Para. 8.6 with Collimating Mirror C, uncalibrated FEL Lamp and Both Flight and Test Diffuser (H1) on Red Bracket Lamp Rack #165. Performed Radiance, Irradiance Response/68042 Para. 8.7
1997	182	Performed Radiometric Calibration/68043 Para. 8.3.1 with H1 Spectralon Test Diffuser on Red Bracket, Collimating Mirror C, and FEL Lamps, (S/N #190 & #191).
1997	183	Performed Radiometric Calibration/68043 Para. 8.3.1 with H1 Spectralon Test Diffuser, Collimating Mirror C and FEL Lamp (S/N #257) and Deuterium Lamps (S/N #RC863 & #RC876).
1997	184	Performed Radiometric Calibration/68043 Para. 8.3.26 with H1 Spectralon Test Diffuser on Red Bracket, Collimating Mirror C, and Deuterium Lamps (S/N #YE959 & YE964).

1997	188	Performed Continuity Check/173786 Para. 8.1.2
1997	189	Performed Mini-Functional Test/68042 Para 8.2/ SER# SBUV-MO-97-881 Performed Stinger Test/SER# SBUV-MO-97-881
1997	190	Performed Stinger Test/SER# SBUV-MO-97-881 Part III at Vacuum and Ambient Temperature.
1997	191	Performed Stinger Test/SER# SBUV-MO-97-881 Part III at Vacuum and 0°C.
1997	192	Performed Stinger Test/SER# SBUV-MO-97-881 Part III at Vacuum and 30°C.
1997	196	Performed Mini-Functional Test/68042 Performed Stinger Test/SER# SBUV-MO-97-881 at Ambient Temperature and Pressure.
1997	203	Performed Spectral CCR Test/SER# SBUV-MO-97-884
1997	204	Performed Procedure "OOBGLASS"/SER# SBUV-MO-97-885 with Uncalibrated FEL Lamp S/N B with No Filter (CCR Masked). Repeated Test with Uncalibrated FEL Lamp S/N B with Filter S/N #KG4-03FCG169
1997	205	Performed Procedure "OOBGLASS"/SER# SBUV-MO-97-885 with Uncalibrated Deuterium Lamp S/N YE939 with CCR Masked and No Filter Repeated Test with Uncalibrated Deuterium Lamp S/N YE939 with Filter #KG403FCG169.
1997	218	Performed Procedure "TEMPRES" at 0°C/160859
1997	219	Performed Procedure "TEMPRES" at 30°C/160859
1997	220	Performed Procedure "TEMPRES" at 20°C/160859
1997	223	Performed Procedure "OOBGLASS" /SER# SBUV-MO-97-885 with Frosted Uncalibrated FEL Lamp, No Filter, CCR Masked and Clear Uncalibrated FEL Lamp S/N B with filter #KG4-03FCG169 Performed Special CCR Test/SER# SBUV-MO-97-884 using Clear Uncalibrated FEL Lamp S/N B.

1997	224-225	Performed Dynamic Range & Linearity Test/157361
1997	227	Performed Out of Band Response Test/68032 in the Solarium with CCR masked and Filter #KG4-03FCG169 over the aperature. Removed the Filter and CCR Mask and Repeated Out of Band Response Test.
1997	231	Performed Continuity Test/173786
1997	232	Performed Pre-Ship Bench Test/173786
1997	234	Shipped SBUV/2 Instrument to Lockheed Martin.
1997	238	Performed Mini-Functional Test/173786 Post Delivery.

Configuration Comparison for SBUV/2 Instruments
November 1997

CONFIGURATION ITEM	EMU S/N 1 67901-1	FM 1 S/N 2 -501	FM 2 MOD 3 S/N 3 -503	FM 3 MOD 7 S/N 4 -505	FM 4 S/N 5 -507	FM 5 MOD 4 S/N 6 -509	FM 6 MOD 5 S/N 7 -511	FM 7 S/N 8 -513
Hamamatsu Photomultiplier tube, preamp, and bleeder string for 5 dynodes	Y	N	Y	Y	Y	Y	Y	Y
Diffuser drive at 80 Hz stepping frequency & mechanism modifications	N/A	N	Y	Y	Y	Y	Y	Y
Redesigned cal lamp housing &diffuser interlock	N/A	N	Y	Y	Y	Y	Y	Y
S/M TIROS location change	N/A	N	Y	Y	Y	Y	Y	Y
Chopper vibration clamps	N	N	Y	N	N	N	N	N
CCM Oscillation Fix	N	N	N	N	N	Y	Y	Y
Cal lamp polarity switching added, diffuser heater current tlm. deleted	N/A	N	Y	Y	N	Y	Y	Y
LVPS 25-volt regualtor	Y	N	Y	Y	N	Y	Y	Y
Increase cal lamp door comparitor reference current	N	N	Y	Y	N	Y	Y	Y
Aluminum foil EMI shield	N/A	N	N	N	Y	N	N	N
Mesh EMI shield	N/A	N	Y	Y	N	Y	Y	Y
Redesigned grating shaft/housing and encoder finger ring	N	N	N	Y	Y	Y	Y	Y
Redesigned grating bearing clamps	N	N	N	Y	N	Y	Y	Y
Alignment mirrors in place of cube	N	N	Y	Y	Y	Y	Y	Y
Cal lamp heater added, baseplate heater deleted	N/A	N	Y	Y	Y	Y	Y	Y
Additional lift fixture attach points	N	N	Y	Y	Y	Y	Y	Y
Blacken Ebert cover	N	N	Y	Y	Y	Y	Y	Y
Enlarge shroud, +Y side	N/A	N	Y	Y	Y	Y	Y	Y
Change grating memory PROM, from 6611 to 6641	N	N	N	Y	Y	Y	Y	N/A
Grating Servo telemetry deleted	N	Y	Y	Y	Y	Y	Y	Y
Anode preamp (range 2) gain roll-off added	N	N	Y	Y	Y	Y	Y	Y
J-Y Gratings, Max. Efficiency 250nm	Y	N	N	N	N	N	N	N
J-Y Gratings, Max. Efficiency 180nm	N	Y	Y	Y	Y	Y	Y	Y

Configuration Comparison for SBUV/2 Instruments
November 1997
(continued)

CONFIGURATION ITEM	EMU S/N 1 67901-1	FM 1 S/N 2 -501	FM 2 MOD 3 S/N 3 -503	FM 3 MOD 7 S/N 4 -505	FM 4 S/N 5 -507	FM 5 MOD 4 S/N 6 -509	FM 6 MOD 5 S/N 7 -511	FM 7 S/N 8 -513
Air spaced depolarizer (not contacted)	Y	N	N	N	N	Y	Y	Y
Square depolarizer	N	N	N	N	N	Y	Y	Y
Hammerhead grating shaft stop	Y	N	N	N	N	N	N	N
Short arm grating shaft stop	N	Y	Y	N	N	N	N	N
Motor rotor grating shaft stop and Beryllium Shaft	N	N	N	Y	Y	Y	Y	Y
Diffuser radiator covered by thermal blanket	N/A	N	Y	Y	Y	Y	Y	Y
Electrometer Radiation Shield	N	N	Y	Y	N	Y	Y	Y
Grating Servo DAC MOD	N	N	N	Y	N	Y	Y	Y
Grating Servo DAC Mod 1/2 gain	N	N	Y	N	N	N	N	N
Diffuser Baffle, +Y and +Z	N/A	N	N	Y	N	Y	Y	Y
Bearing Contamination Trap	N	N	N	Y	N	N	N	Y
Grating Power Transistor Protection	N	N	N	Y	N	N	Y	Y
A-67510 Diode Protection	N	N	N	Y	N	N	Y	Y
ELM Board Slots Enlarge	N	N	N	Y	N	Y	Y	Y
Grating Anti-contamination	N	N	N	Y	N	N	N	Y
37o Diffuser	N	N	N	N	N	N	Y	Y
Range 3A	N	N	N	N	N	N	Y	Y
2RAM (No PROM)	N	N	N	N	N	N	N	Y
Grating Motor Shaft New Stop and Staking	N	N	N	Y	N	N	Y	Y
Ball CCR Diode	N	N	N	N	N	N	N	Y
OCA CCR Filter	N	N	N	Y	N	N	N	Y
CCR Bias Cap Change	N	N	N	Y	N	N	Y	Y
Diffuser Encoder Radiation Protection	N/A	N	N	N	N	N	Y	Y
Diffuser Link Fine Adjust	N/A	N	N	N	N	N	Y	Y
EMI Skirt Ground Wire Slot	N/A	N	N	Y	N	N	Y	Y
Chromacoat off Cal Lamp Housing	N/A	N	N	Y	N	N	Y	Y
Barr CCR Filter	N	N	N	N	N	N	Y	N
Microphonic Fix	N	N	N	Y	N	N	Y	N
Slow Lock Mod	N	N	N	Y	N	N	Y	N
A6 Minimum Voltage Cap	N	N	N	N	N	N	Y	N

Section 7 - **Electrical Calibration and Stability**
(Reference Test Procedure 68026)
1990, 1994, 1995, 1996 and 1997

Table 7-1-a lists the mean E-CAL counts and percent errors for both the Cloud Cover Radiometer and PMT ranges in Discrete and Sweep Modes, before changing the Notch filter. Twenty four data points were used from June 1990 through March 1997. **Table 7-1-b** lists the mean E-CAL counts and percent errors for both the Cloud Cover Radiometer and PMT ranges in Discrete and Sweep Modes, after changing the Notch filter. Five data points were used from June through August 1997. **Table 7-2** lists the tests from which the data was gathered. **Figures 7-1** through **7-16** illustrate the stability of the system. Note that changing the Notch filter caused a change of E-CAL.

The E-CAL voltage measurements show good stability over the course of the test program. With the exception of the zero voltage input, all deviations in the data are less than 2%. Normal system noise at the very low count rates, from 43 to 153 counts, is responsible for the larger percent error.

Table 7-1a
Flight 3 Electronic Calibration (June 1990 - March 1997)
(Before changing the notch filter)

MODE:	DISCRETE								SWEEP	
RANGE:	2 Seconds AFTER RETRACE "A"	PERCENT ERROR*	4 Seconds SFTER RETRACE "B"	PERCENT ERROR*	6 Seconds AFTER RETRACE "C"	PERCENT ERROR*	8 Seconds AFTER RETRACE "D"	PERCENT ERROR*	10 Seconds AFTER RETRACE "E"	PERCENT ERROR*
1	Overrange	N/A	8908.08	0.42	Overrange	N/A	43	37.21**	N/A	N/A
2	10481.21	0.17	153.25	1.96	781.04	0.64	44.42	18.01**	N/A	N/A
3	65.33	4.59**	768.46	0.78	7219.42	0.18	37455.42	0.27	6087.67	0.31
CCR	44622.88	0.13	958.17	0.42	9140.88	0.14	43.25	18.5**	55979.08	0.09

* Percent Error = (Maximum - Minimum)*100 / Mean
** Normal system noise is responsible for the large percent error at the low counts.

Table 7-1b
Flight 3 Electronic Calibration (June - August 1997)
(After changing the notch filter)

MODE:	DISCRETE								SWEEP	
RANGE:	2 Seconds AFTER RETRACE "A"	PERCENT ERROR*	4 Seconds SFTER RETRACE "B"	PERCENT ERROR*	6 Seconds AFTER RETRACE "C"	PERCENT ERROR*	8 Seconds AFTER RETRACE "D"	PERCENT ERROR*	10 Seconds AFTER RETRACE "E"	PERCENT ERROR*
1	Overrange	N/A	8035.2	0.24	Overrange	N/A	51.2	37.11**	N/A	N/A
2	9438.2	0.06	145.4	0.69	711.4	0.14	48.6	2.06**	N/A	N/A
3	65.4	3.06**	767.8	0.13	7219	0.04	37470.6	0.13	6087.8	0.03
CCR	44607	0.02	957.6	0.21	9136	0.04	47.6	2.1**	55954	0.04

* Percent Error = (Maximum - Minimum)*100 / Mean
** Normal system noise is responsible for the large percent error at the low counts.

Table 7-2
Electronic calibration stability

Run No.	Procedure	Date	Name of Test
1	69821	6/6/90	Bench Test at GE-Astro
2	69821	6/13/90	Bench Test at Ball
3	69821	10/8/90	Post Cal Lamp Rework Functional Test
4	68042	3/1/94	Electrical/Optical Performance, Baseline Minifunctional
5	68042	3/7/94	Electrical/Optical Performance, Post Z-Axis Vibration Minifunctional
6	68042	4/26/94	Electrical/Optical Performance, Pre-ELM Vibration Minifunctional
7	68042	5/17/94	Electrical/Optical Performance, Post-ELM Vibration Minifunctional
8	68042	9/22/94	Electrical/Optical Performance, Diode Pre-Installation, Minifunctional
9	68042	10/17/94	Electrical/Optical Performance, Diode Post-Installation, Minifunctional
10	160863	10/27/94	Vacuum Functional-Zone 0
11	160863	11/1/94	Vacuum Functional-Zone 1
12	160863	11/2/94	Vacuum Functional-Zone 3
13	160863	11/3/94	Vacuum Functional-Zone 5
14	68042	11/15/94	Electrical/Optical Performance, Post T/V Minifunctional
15	69821	3/21/95	Pre-Ship Bench Test at Ball
16	69821	3/27/95	Post-Delivery Bench Test at GE-Astro
17	68042	11/13/95	Elect./Opt. Performance, Post Del. to Ball, Minifunctional
18	68042	1/19/96	Elect./Opt. Performance, Post Grating Shaft Rework, Minifunctional
19	68042	2/28/96	Elect./Opt. Performance, Minifunctional
20	173786	4/12/96	Pre-Ship Bench Test at Ball
21	173786	4/24/96	Pre-Ship Bench Test at Ball
22	173786	5/8/96	Post-Delivery Bench at Lockheed Martin
23	173786	2/17/97	Bench Test, Pre-Delivery, NJ
24	173786	3/11/97	Bench Test, Post-Delivery, CO
25	68042	6/24/97	Electrical/Optical performance, Minifunctional
26	68042	6/25/97	Electrical/Optical performance, Minifunctional
27	68042	7/15/97	Electrical/Optical performance, Minifunctional
28	173786	8/20/97	Bench Test, Pre-Ship, CO
29	173786	8/26/97	Bench Test, Post-Delivered, NJ

Figure 7-1
Flight 3 ECAL Range 1 Step B

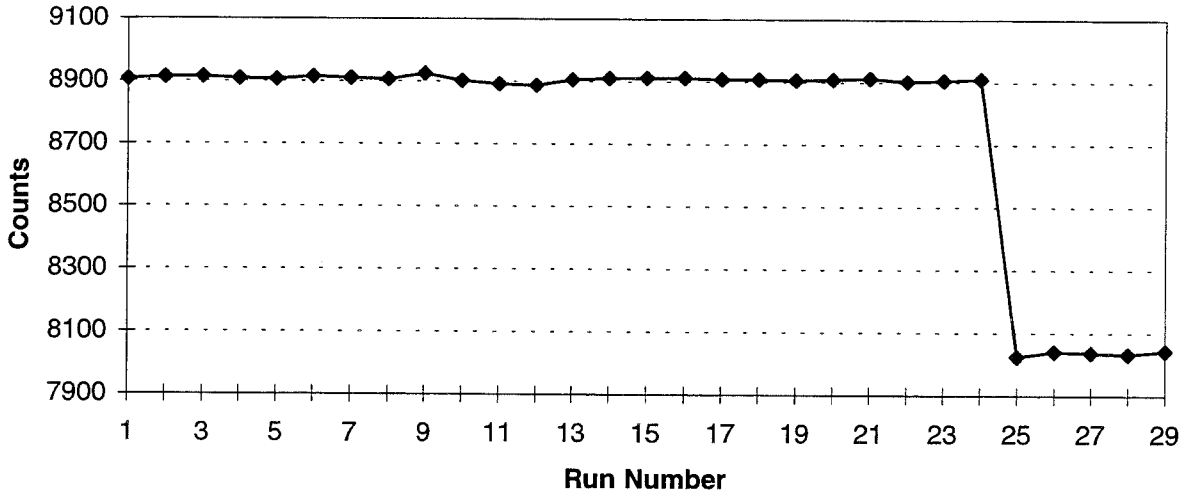


Figure 7-2
Flight 3 ECAL Range 1 Step D

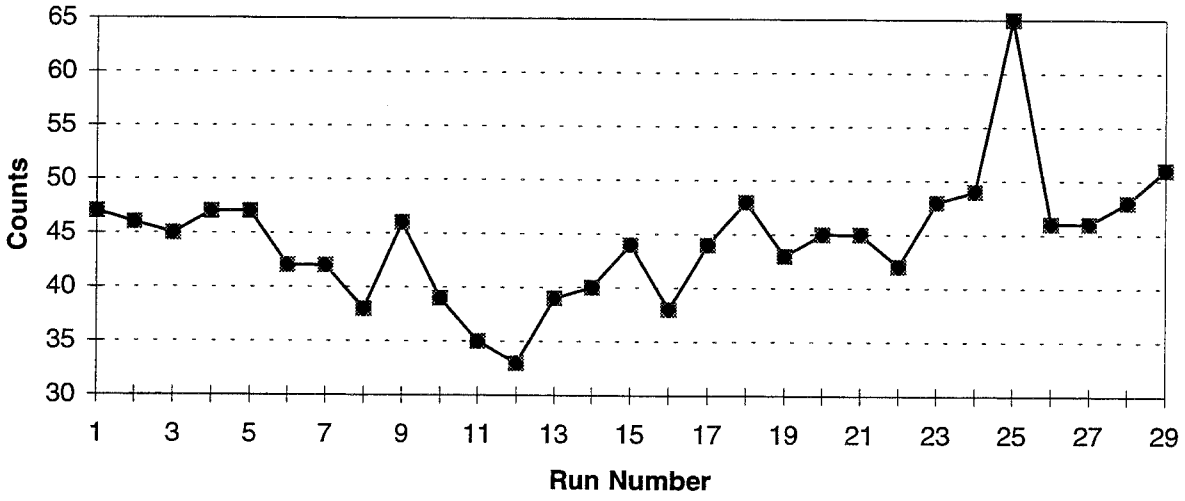


Figure 7-3
Flight 3 ECAL Range 2 Step A

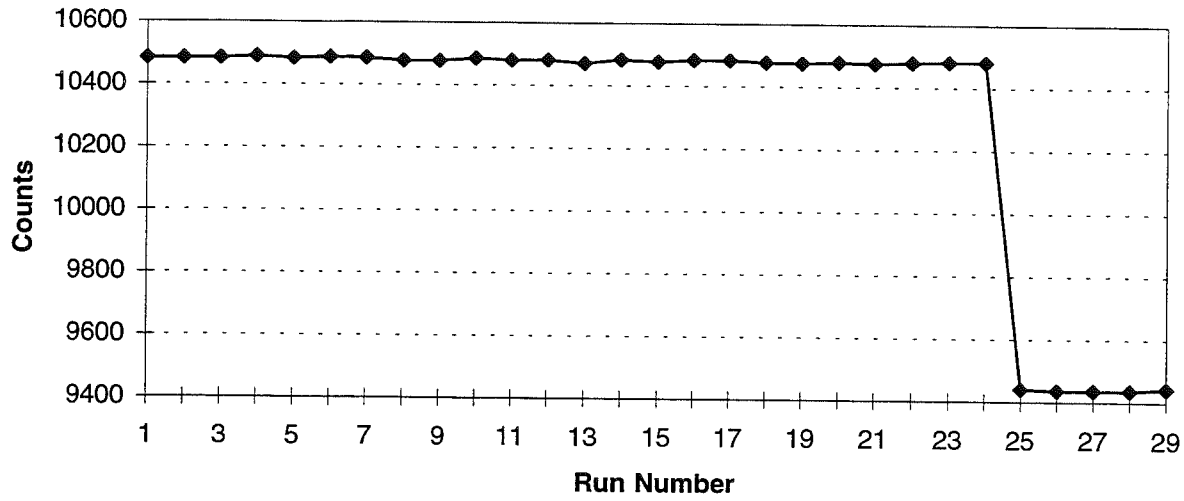


Figure 7-4
Flight 3 ECAL Range 2 Step B

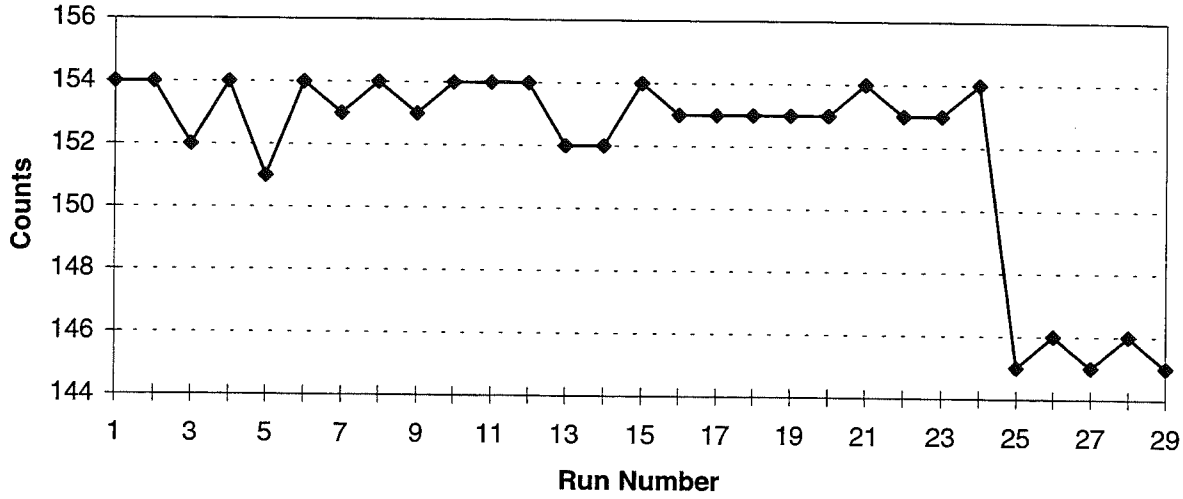


Figure 7-5
Flight 3 ECAL Range 2 Step C

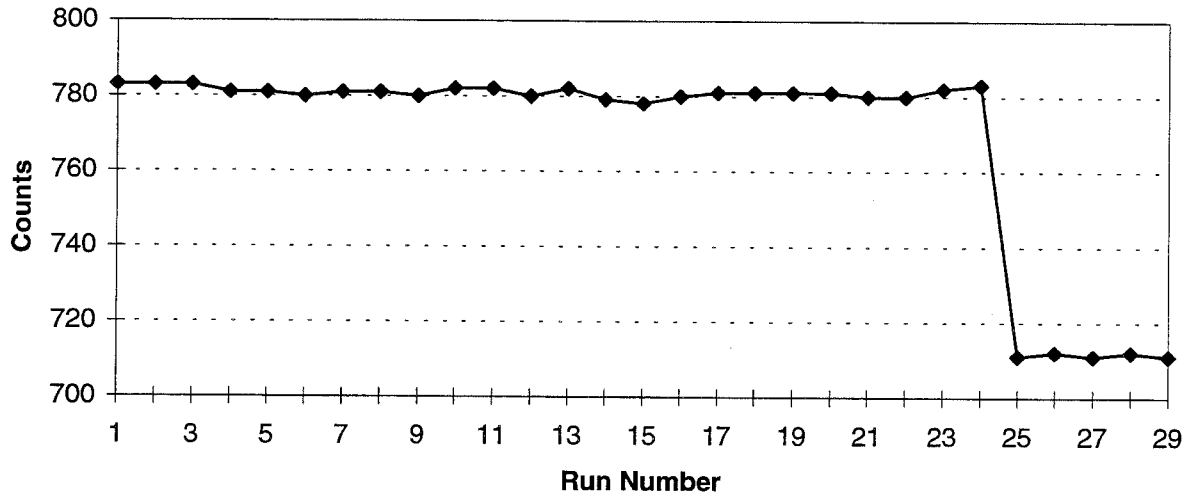


Figure 7-6
Flight 3 ECAL Range 2 Step D

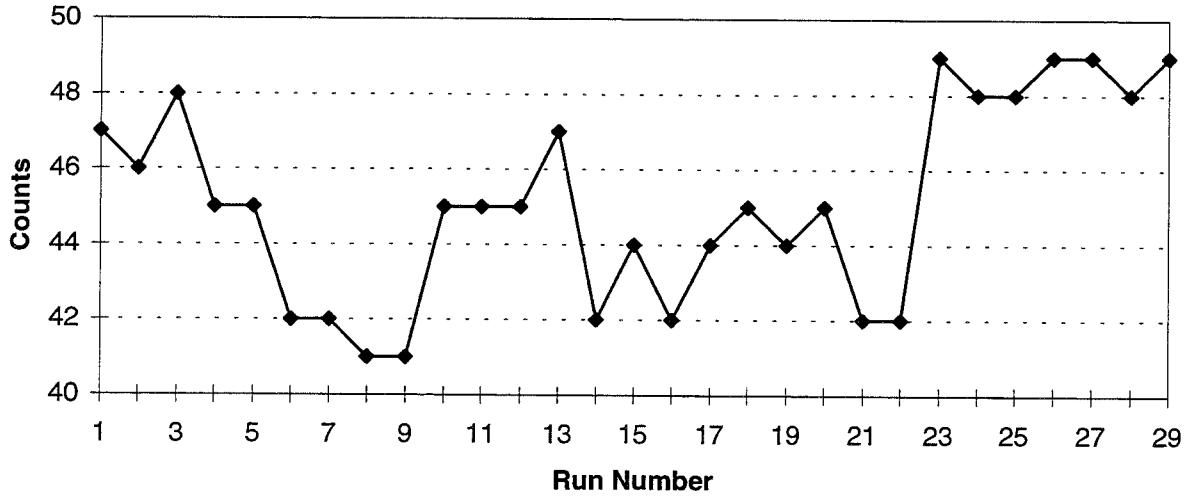


Figure 7-7
Flight 3 ECAL Range 3 Step A

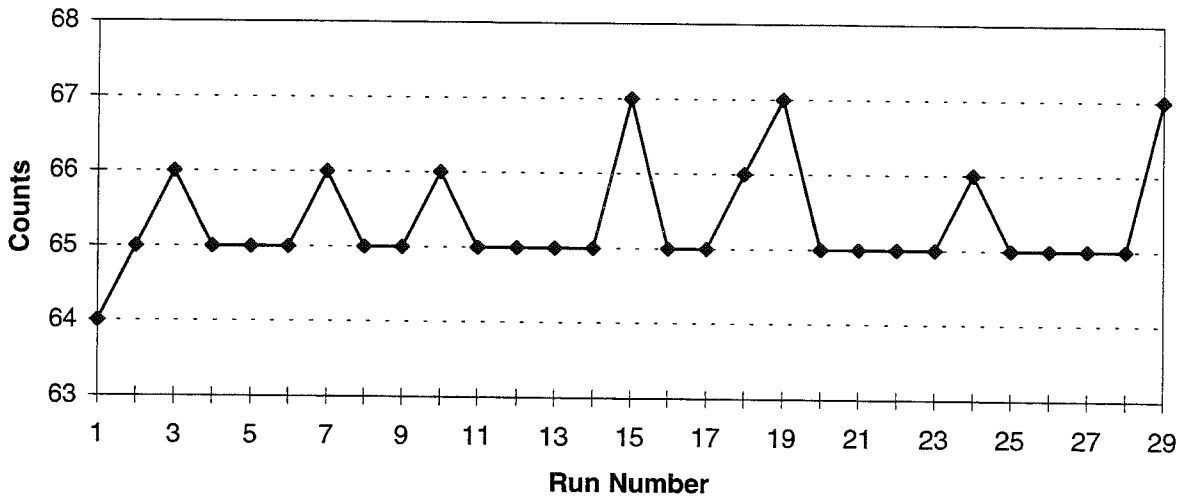


Figure 7-8
Flight 3 ECAL Range 3 Step B

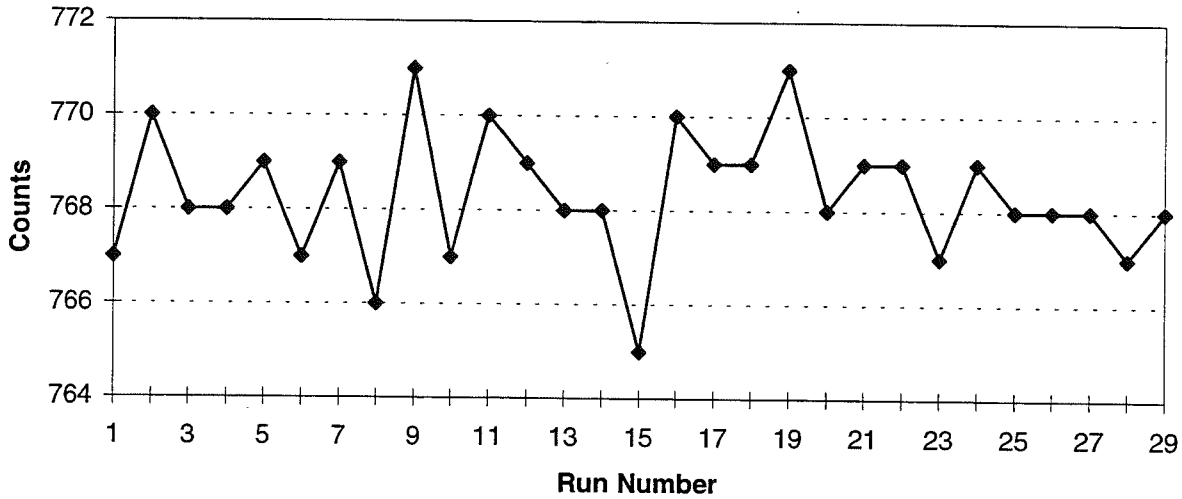


Figure 7-9
Flight 3 ECAL Range 3 Step C

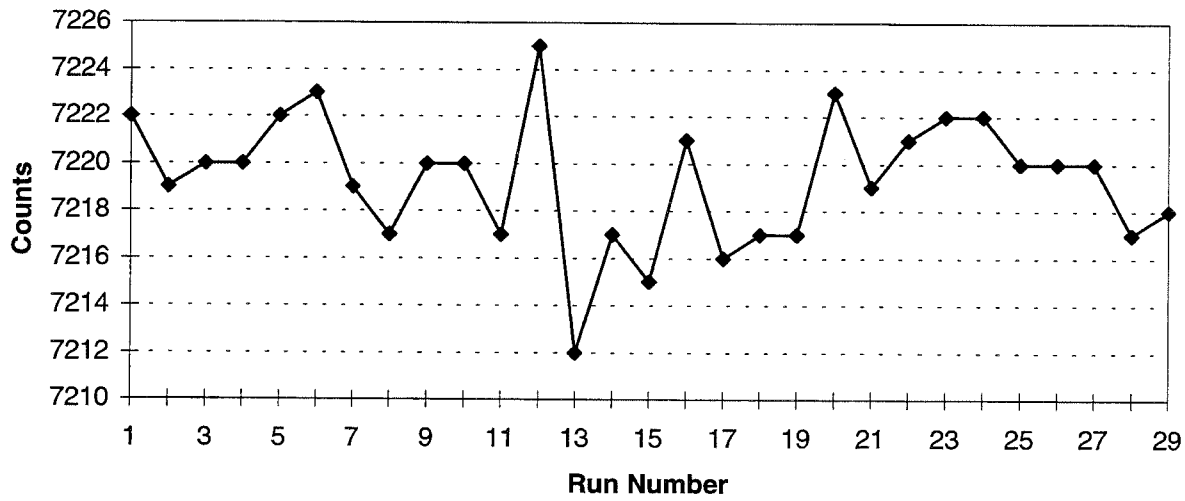


Figure 7-10
Flight 3 ECAL Range 3 Step D

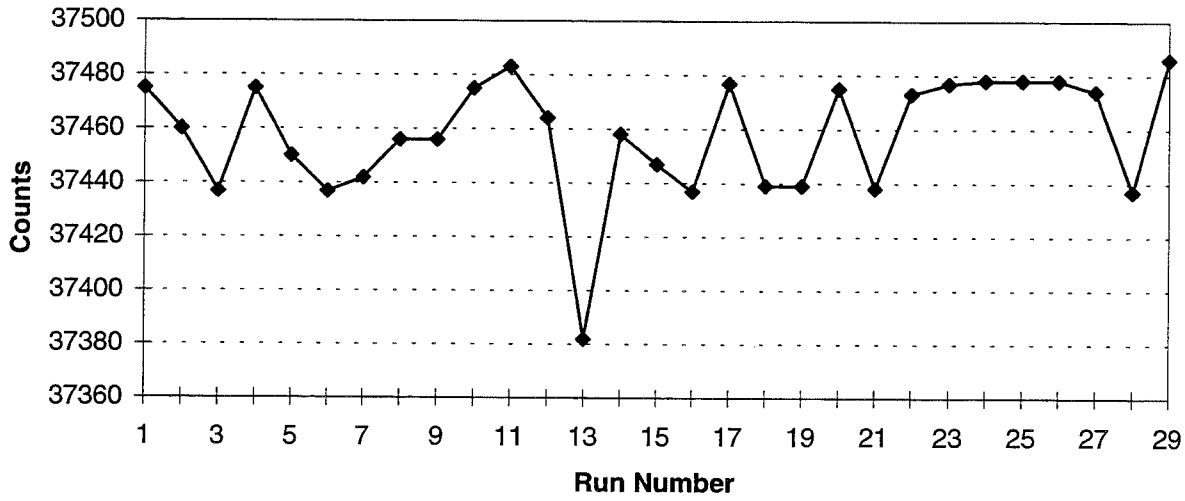


Figure 7-11
Flight 3 ECAL CCR Step A

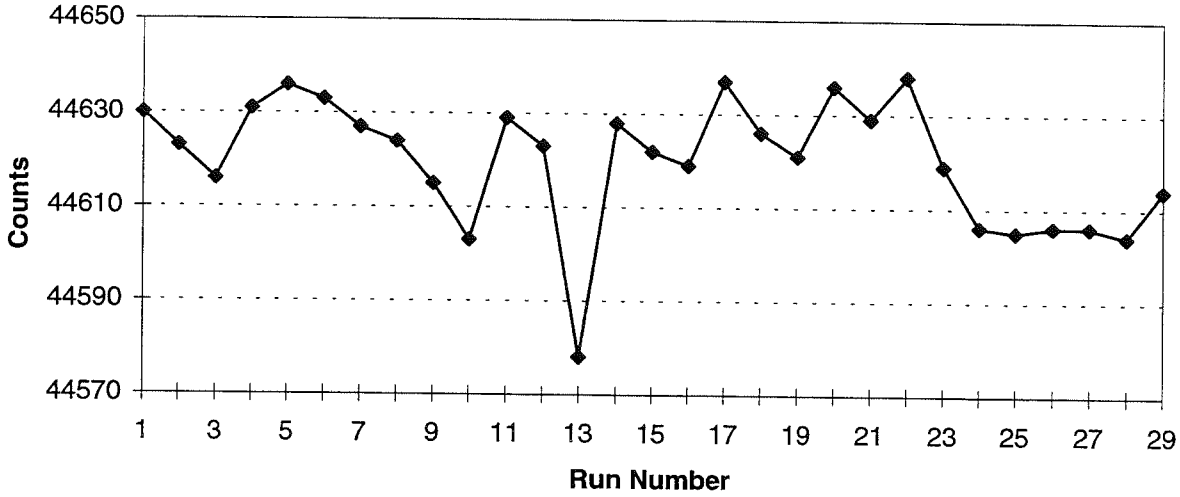


Figure 7-12
Flight 3 ECAL CCR Step B

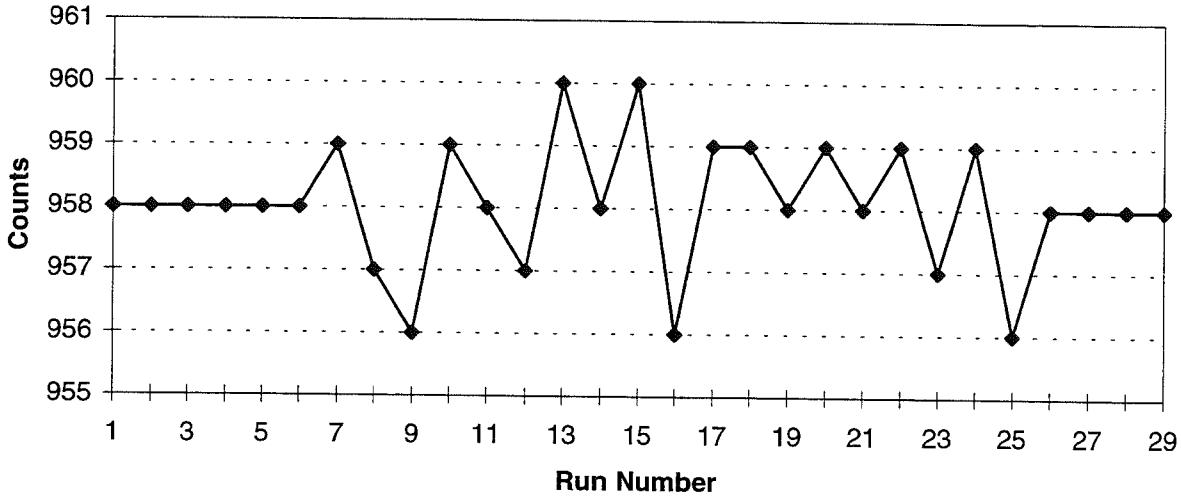


Figure 7-13
Flight 3 ECAL CCR Step C

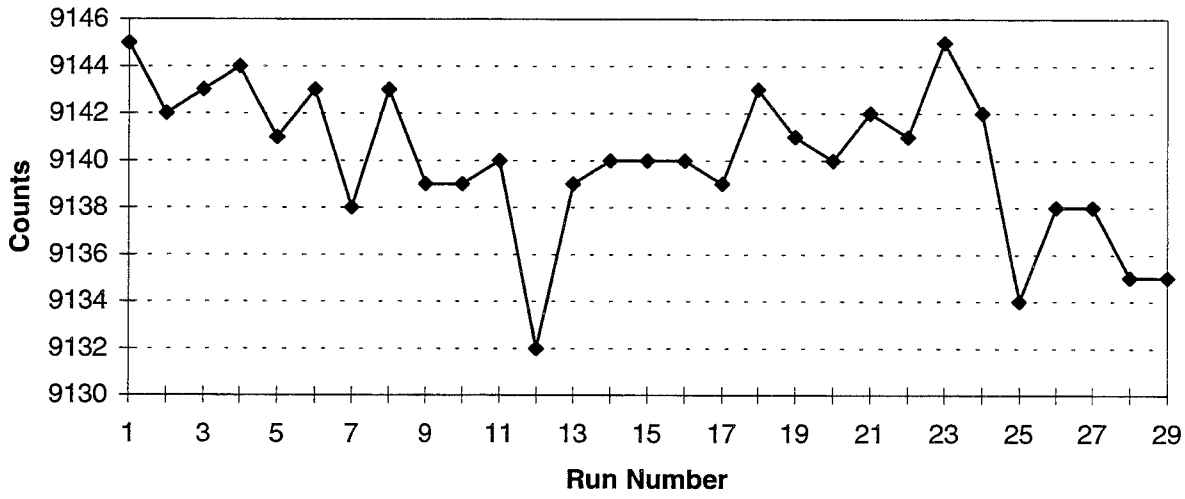


Figure 7-14
Flight 3 ECAL CCR Step D

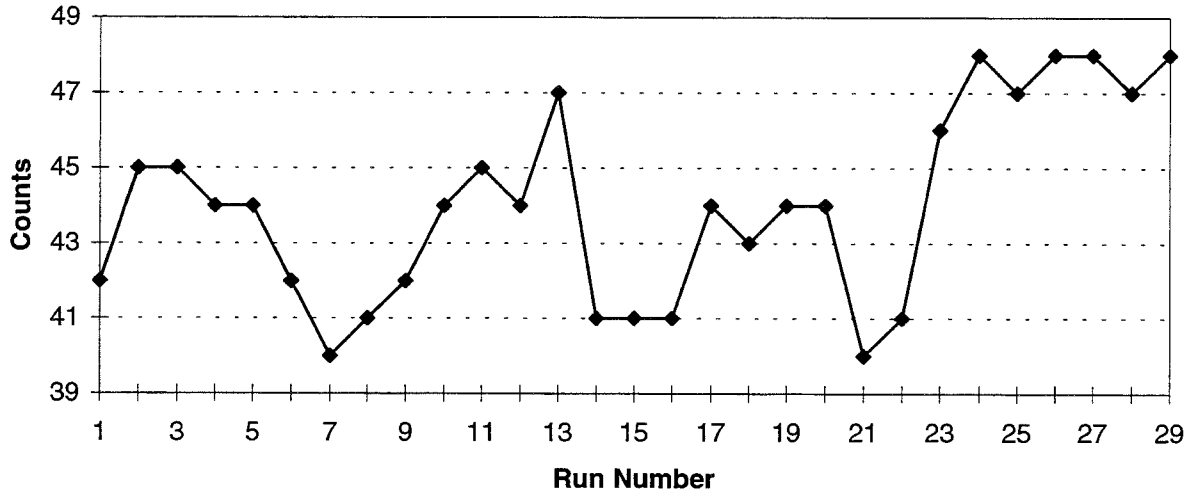


Figure 7-15
Flight 3 ECAL Range 3 Sweep

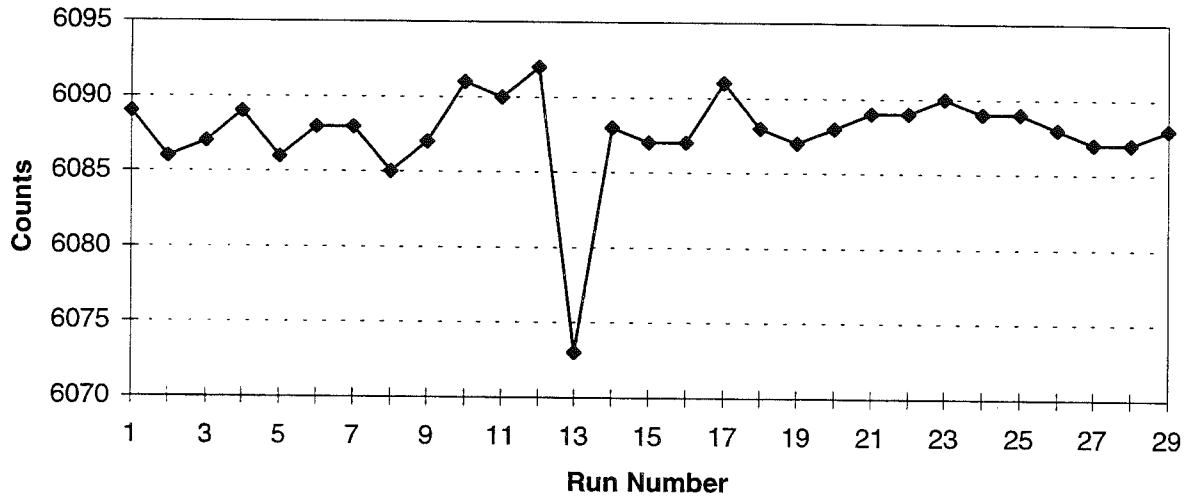
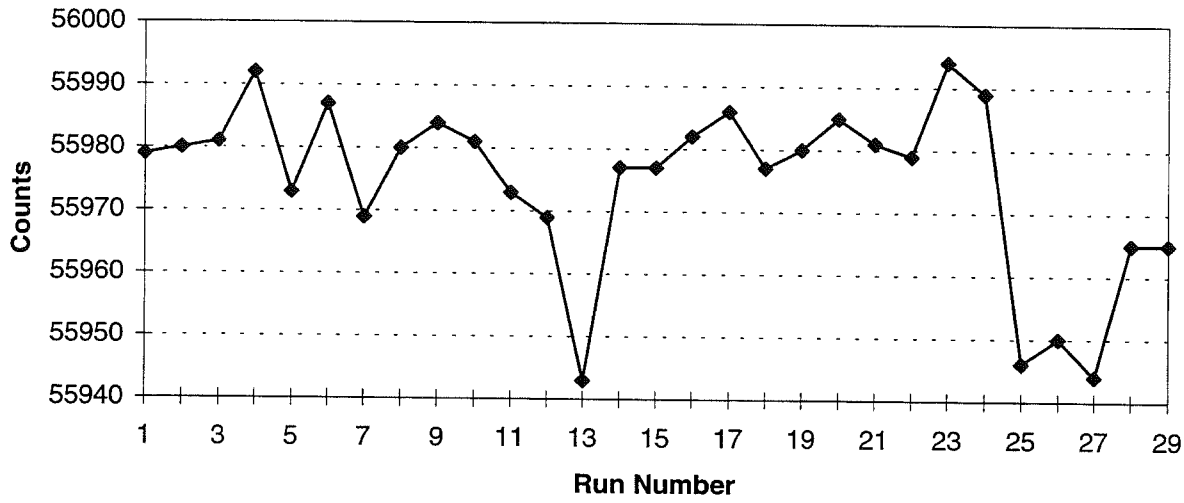


Figure 7-16
Flight 3 ECAL CCR Sweep



Section 9 - **Background Stability**
(Reference Test Procedure 68027)

The background stability of the Flight 3 SBUV/2 instrument is tabulated from June 6, 1990 through August 26, 1997. The results of the 155 tests with the averages and standard deviations are in **Table 9-1**. **Table 9-2** lists the tests from which background stability data was taken. Graphs of each range of the CCR are shown in **Figures 9-1** though **9-4**.

Table 9-1
Background Stability Data

Run	Range 1	Range 2	Range 3	CCR
1	65.26	65.49	65.19	64.43
2	65.68	65.52	66.07	64.34
3	65.97	65.47	65.50	64.44
4	65.50	65.57	65.33	64.43
5	65.69	65.54	65.30	64.47
6	65.53	65.61	65.10	64.49
7	64.47	65.50	64.38	64.60
8	64.02	65.74	65.70	64.42
9	64.24	65.65	65.46	64.44
10	64.72	65.53	65.51	64.40
11	64.75	65.58	64.86	64.53
12	65.03	65.57	65.39	64.38
13	64.85	65.46	64.77	64.52
14	64.63	65.52	65.12	64.48
15	66.57	65.57	65.72	64.38
16	65.71	65.60	64.86	64.29
17	63.15	65.40	65.13	64.70
18	63.19	65.46	65.68	64.45
19	65.89	65.68	65.37	64.39
20	65.94	65.57	65.30	64.34
21	62.53	65.70	65.16	64.35
22	65.38	65.68	64.50	64.40
23	65.95	65.47	65.34	64.39
24	66.62	65.46	65.39	64.32
25	65.42	65.63	64.93	64.36
26	66.17	65.57	65.15	64.36
27	66.10	65.65	65.62	64.44
28	65.62	65.49	65.29	64.36
29	66.00	65.74	65.21	64.48
30	63.27	65.61	65.38	64.25
31	64.93	65.57	64.75	64.48
32	65.63	65.54	65.13	64.49
33	65.88	65.58	64.13	64.39
34	55.87	65.77	65.06	64.49
35	53.97	65.53	65.05	64.54
36	55.56	65.26	65.66	64.54
37	53.96	65.54	64.73	64.53
38	53.72	65.64	65.27	64.61
39	53.03	65.57	65.21	64.68

Table 9-1 - (Continued)
Background Stability Data

Run	Range 1	Range 2	Range 3	CCR
40	52.67	65.54	65.57	64.68
41	55.76	65.66	65.12	64.75
42	55.28	65.75	65.31	64.79
43	51.42	65.23	65.18	64.21
44	50.51	65.25	65.54	64.28
45	53.60	65.27	65.15	64.31
46	50.22	65.18	65.75	64.26
47	49.91	65.15	65.46	64.19
48	49.10	65.21	65.88	64.24
49	50.11	65.20	64.80	64.19
50	49.78	65.14	65.43	64.26
51	49.63	65.17	65.43	64.21
52	50.43	65.29	65.47	64.38
53	51.10	65.32	65.61	64.38
54	50.74	65.39	65.57	64.21
55	50.85	65.36	65.67	64.38
56	50.61	65.38	65.14	64.32
57	51.01	65.35	64.71	64.42
58	52.78	65.56	65.29	64.56
59	52.99	65.53	65.14	64.64
60	55.28	65.64	65.48	64.57
61	54.65	65.59	65.47	64.66
62	55.85	65.59	64.53	64.65
63	55.26	65.58	64.94	64.67
64	57.26	65.58	64.86	64.60
65	53.06	65.61	65.36	64.54
66	53.26	65.65	65.00	64.57
67	56.35	65.56	65.31	64.52
68	62.20	65.58	64.86	64.70
69	67.42	65.67	65.75	64.40
70	64.65	65.51	65.50	64.43
71	65.29	65.89	63.59	64.69
72	64.74	65.79	64.69	64.39
73	66.49	65.94	63.24	64.79
74	66.39	65.49	69.54	63.94
75	65.34	65.54	69.19	63.84
76	66.09	65.59	64.29	64.49
77	64.69	65.34	65.39	64.54
78	64.74	65.64	65.79	64.69

Table 9-1 - (Continued)
Background Stability Data

Run	Range 1	Range 2	Range 3	CCR
79	66.59	65.54	61.74	64.94
80	64.84	65.59	70.59	64.09
81	65.54	65.59	64.54	64.54
82	65.99	65.89	67.49	64.34
83	65.49	65.79	63.44	64.74
84	64.99	65.74	64.19	64.49
85	68.34	65.74	65.59	64.54
86	65.84	65.29	64.24	64.19
87	66.39	65.59	65.49	64.59
88	67.89	65.59	64.14	64.49
89	64.54	65.59	64.49	64.24
90	67.69	65.69	66.99	64.64
91	65.68	65.58	65.57	64.60
92	64.50	65.57	64.74	64.47
93	65.79	65.47	65.75	64.36
94	66.27	65.39	65.13	64.44
95	66.36	65.57	65.51	64.43
96	65.03	65.46	64.71	64.50
97	65.57	65.54	65.25	64.48
98	65.70	65.40	64.89	64.49
99	65.07	65.47	65.17	64.51
100	65.75	65.56	64.84	64.42
101	65.08	65.61	65.14	64.35
102	65.53	65.43	65.90	64.39
103	66.00	65.56	65.19	64.26
104	66.60	65.39	65.76	64.50
105	65.21	65.50	65.36	64.50
106	65.54	65.50	65.15	64.49
107	65.74	65.53	65.07	64.44
108	65.45	65.33	64.97	64.43
109	65.44	65.47	64.79	64.39
110	65.89	65.44	64.75	64.39
111	64.99	65.47	65.74	64.46
112	65.68	65.50	65.27	64.46
113	66.17	65.61	65.22	64.40
114	65.24	65.58	65.25	64.46
115	66.10	65.74	65.27	64.43
116	65.74	65.54	65.00	64.40
117	65.24	65.46	64.75	64.50

Table 9-1 - (Continued)
Background Stability Data

Run	Range 1	Range 2	Range 3	CCR
118	65.60	65.50	65.36	64.39
119	65.43	65.47	65.13	64.40
120	65.58	65.53	65.00	64.40
121	65.50	65.43	65.43	64.47
122	65.07	65.49	65.49	64.35
123	65.64	65.46	64.86	64.38
124	65.68	65.56	65.09	64.31
125	65.57	65.46	65.07	64.31
126	66.18	65.43	65.10	64.31
127	65.61	65.47	65.34	64.39
128	65.27	65.46	65.53	64.44
129	65.34	65.40	65.14	64.43
130	65.89	65.33	65.00	64.29
131	64.68	65.34	65.16	64.24
132	64.79	65.33	64.79	64.27
133	64.61	65.37	65.13	64.39
134	64.93	65.32	65.11	64.31
135	64.99	65.40	65.07	64.33
136	64.53	65.46	65.18	64.31
137	64.54	65.44	65.44	64.33
138	65.44	65.56	65.11	64.39
139	67.50	65.40	65.64	64.47
140	65.54	65.42	65.45	64.28
141	65.65	65.42	65.15	64.35
142	65.71	65.48	65.31	64.34
143	65.96	65.53	65.29	64.38
144	66.88	65.58	65.00	64.40
145	65.82	65.51	64.99	64.42
146	65.88	65.37	64.99	64.39
147	65.83	65.75	65.25	64.51
148	67.88	65.53	65.03	64.48
149	66.01	65.50	65.17	64.48
150	66.53	65.47	64.76	64.39
151	65.07	65.50	64.00	64.36
152	67.29	65.54	64.00	64.40
153	65.73	65.32	65.61	64.38
154	65.46	65.43	65.25	64.36

Table 9-1 - (Continued)
Background Stability Data

Run	Range 1	Range 2	Range 3	CCR
155	65.81	65.47	64.97	64.39
156	66.00	65.50	64.93	64.47
157	62.99	65.51	65.60	64.41
158	63.09	64.83	65.39	64.43
159	62.27	65.47	65.36	64.33
160	61.51	64.86	65.40	64.46
161	62.69	64.86	65.06	64.46
162	63.22	65.58	65.44	64.36
163	63.22	65.48	64.97	64.36
164	63.83	65.54	65.25	64.25
165	64.46	64.56	64.99	64.45
166	64.44	65.37	64.76	64.37
167	64.46	65.46	64.60	64.50
168	64.49	65.42	64.86	64.57
169	63.97	65.24	65.18	64.47
170	64.24	65.71	65.39	64.37
171	64.25	65.80	64.85	64.49
172	62.65	65.44	65.04	64.40
173	63.40	65.47	65.51	64.30
174	63.33	65.49	65.01	64.49
175	63.18	65.32	64.83	64.50
176	63.26	65.51	65.42	64.50
177	64.00	65.51	64.41	64.43
178	63.63	65.50	65.20	64.40
179	63.97	65.57	64.99	64.31
180	74.11	65.69	64.84	
181	63.26	65.53	65.21	64.32
182	63.64	65.46	65.39	64.36
AVERAGE	62.93	65.50	65.21	64.07
STD DEV	5.28	0.23	1.27	0.59

Table 9-2
Background Stability Tests

Run	Date	Procedure	Name of Test
1	6/5/86	69821	Bench Test (MM)
2	6/12/86	68043	Bench Test (Ball)
3	10/10/86	157372	Diffuser Reflectivity
4	9/30/87	68043	Radiometric Calibration
5	10/3/87	68043	Radiometric Calibration
6	10/6/87	68043	Radiometric Calibration
7	10/7/87	68043	Radiometric Calibration
8	10/7/87	68043	Radiometric Calibration
9	10/7/87	68043	Radiometric Calibration
10	10/8/87	68043	Radiometric Calibration
11	10/8/87	68043	Radiometric Calibration
12	10/8/87	68043	Radiometric Calibration
13	10/9/87	68043	Radiometric Calibration
14	10/9/87	68043	Radiometric Calibration
15	1/31/90	157358	Turn On Procedure (Pre FOV Test)
16	2/27/90	157358	Turn On Procedure (Mini Functional)
17	3/1/90	68042	Electro/Optical Performance (Baseline)
18	3/1/90	157358	Turn On Procedure (FOV Test)
19	3/2/90	157358	Turn On Procedure (Pre Vibration)
20	3/3/90	157358	Turn On Procedure (Post Z-axis Vibration)
21	3/6/90	68042	Electro/Optical performance (Post Vibration)
22	3/6/90	157358	Turn On Procedure (Post Vibration)
23	3/7/90	157358	Turn On Procedure (Post Grating Work)
24	3/29/90	157358	Turn On Procedure (FOV Test)
25	4/10/90	157358	Turn On Procedure (Goniometric Test - FEL)
26	4/12/90	157358	Turn On Procedure (Goniometric Test - Hg)
27	4/17/90	157358	Turn On Procedure (Pre ELM Vibe)
28	4/18/90	157358	Turn On Procedure (Mini Functional)
29	4/25/90	157358	Turn On Procedure (ELM Pre-Vibration)
30	4/26/90	68042	Electro/Optical Performance (Pre ELM Vibe)
31	5/2/90	68032	Pre EMI Test
32	9/22/90	157358	Turn On Procedure (Pre A6 diode Installation)
33	10/16/90	157358	Turn On Procedure (Pre A6 diode Installation)
34	10/25/90	160862	Vacuum Shutdown and Restart (Pretest)
35	10/26/90	160866	Vacuum Calibration (Zone 0)
36	10/26/90	160862	Vacuum Shutdown and Restart (Zone 0)
37	10/27/90	160866	Vacuum Calibration (Zone 0)
38	10/27/90	160866	Vacuum Calibration (Zone 0)
39	10/31/90	160866	Vacuum Calibration (Zone 1)

Table 9-2 - (Continued)
Background Stability Tests

Run	Date	Procedure	Name of Test
40	10/31/90	160866	Vacuum Calibration (Zone 1)
41	11/1/90	160864	Radiometric Stabilization (Zone 3)
42	11/1/90	160862	Vacuum Shutdown and Restart (Zone 3)
43	11/2/90	160864	Radiometric Stabilization (Zone 5)
44	11/2/90	160864	Radiometric Stabilization (Zone 7)
45	11/2/90	160862	Vacuum Shutdown and Restart (Zone 5)
46	11/3/90	160864	Radiometric Stabilization (Zone 7)
47	11/3/90	160864	Radiometric Stabilization (Zone 7)
48	11/3/90	160864	Radiometric Stabilization (Zone 7)
49	11/3/90	160866	Vacuum Calibration (Zone 7)
50	11/3/90	160866	Vacuum Calibration (Zone 7)
51	11/3/90	160866	Vacuum Calibration (Zone 7)
52	11/4/90	160864	Radiometric Stabilization (Zone 9)
53	11/4/90	160864	Radiometric Stabilization (Zone 9)
54	11/4/90	160864	Radiometric Stabilization (Zone 9)
55	11/4/90	160866	Vacuum Calibration (Zone 9)
56	11/4/90	160866	Vacuum Calibration (Zone 9)
57	11/4/90	160866	Vacuum Calibration (Zone 9)
58	11/5/90	160866	Vacuum Calibration (Zone 11)
59	11/7/90	160866	Vacuum Calibration (Zone 11+)
60	11/7/90	160866	Vacuum Calibration (Zone 11+)
61	11/7/90	160862	Vacuum Shutdown and Restart (Zone 11)
62	11/8/90	160866	Vacuum Calibration (Zone 12)
63	11/8/90	160866	Vacuum Calibration (Zone 12)
64	11/8/90	160862	Vacuum Shutdown and Restart (Zone 12)
65	11/9/90	160866	Vacuum Calibration (Zone 13)
66	11/9/90	160866	Vacuum Calibration (Zone 13)
67	11/9/90	160862	Vacuum Shutdown and Restart (Zone 13)
68	11/14/90	68042	Electro/Optical Performance (Post T/V)
69	11/15/90	157358	Turn On Procedure (Post A6 diode Installation)
70	3/16/95	68043	Shere Test
71	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
72	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
73	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
74	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
75	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
76	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
77	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
78	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)

Table 9-2 - (Continued)
Background Stability Tests

Run	Date	Procedure	Name of Test
79	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
80	3/21/95	157358	Turn On Proc. (Pre-Ship Bench Test/69821)
81	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
82	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
83	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
84	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
85	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
86	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
87	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
88	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
89	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
90	3/27/95	157358	Turn On Proc. (Post-Ship Bench Test/69821)
91	11/13/95	157358	Turn On Proc. (Post-Delivery-VASD/68042)
92	12/15/95	157358	Angle-of-Incidence/68025 Para. 8.14.1
93	12/19/95	157358	Post Flight CCR Installation/FOV Test/68027
94	1/4/96	157358	Turn On Procedure (FOV Test)
95	1/5/96	157358	CCR Re-Alignment Check (FOV Test)
96	1/9/96	157358	Turn On Proc. (Radiometric Cal./68027)
97	1/11/96	157358	Turn On Proc. (Radiometric Cal./68027)
98	1/11/96	157358	Turn On Proc. (Radiometric Cal./68027)
99	1/19/96	157358	Turn On Proc. (Mini - Funct./68042)
100	1/23/96	157358	Turn On Proc. (Sphere Test)
101	1/23/96	68043	Procedure Sphere
102	1/23/96	68043	Procedure Sphere
103	1/23/96	68043	Procedure Sphere
104	1/23/96	68043	Procedure Sphere
105	1/23/96	68043	Procedure Sphere
106	1/24/96	68043	Procedure Sphere
107	1/25/96	157358	Turn On Proc. (Procedure Sphere)
108	1/25/96	68043	Procedure Sphere
109	1/26/96	157358	Turn On Proc. (Bench Test/173786)
110	1/29/96	157358	Turn On Proc. (Bench Test/173786)
111	1//30/96	15758	Turn On Proc. (Radiometric Calibration/68043)
112	1/30/96	68043	Radiometric Calibration
113	1/31/96	68043	Radiometric Calibration
114	1/31/96	68043	Radiometric Calibration
115	1/31/96	68043	Radiometric Calibration
116	2/1/96	68043	Radiometric Calibration
117	2/1/96	68043	Radiometric Calibration

Table 9-2 - (Continued)
Background Stability Tests

Run	Date	Procedure	Name of Test
118	2/1/96	68043	Radiometric Calibration
119	2/1/96	68043	Radiometric Calibration
120	2/2/96	68043	Radiometric Calibration
121	2/2/96	68043	Radiometric Calibration
122	2/9/96	157358	Turn On Proc. (Radiometric Calibration/68043)
123	2/9/96	68043	Radiometric Calibration
124	2/9/96	68043	Radiometric Calibration
125	2/12/96	68043	Radiometric Calibration
126	2/12/96	68043	Radiometric Calibration
127	2/13/96	68043	Radiometric Calibration
128	2/13/96	68043	Radiometric Calibration
129	2/13/96	68043	Radiometric Calibration
130	2/28/96	157358	Turn On Procedure
131	2/29/96	68043	Procedure Normfel (RTS Analysis)
132	3/1/96	157358	Turn On Procedure
133	3/1/96	68043	Procedure Normfel (RTS Analysis)
134	3/2/96	157358	Turn On Procedure
135	3/4/96	157358	Turn On Procedure
136	3/4/96	68043	Procedure Normfel (RTS Analysis)
137	3/7/96	157358	Turn On Procedure
138	3/11/06	157358	Turn On Procedure
139	3/11/96	68043	Procedure Normfel (RTS Analysis)
140	3/12/96	157358	Turn On Procedure
141	3/12/96	157358	Turn On Procedure
142	3/12/96	68043	Procedure Normfel (RTS Analysis)
143	3/13/96	68043	Procedure Normfel (RTS Analysis)
144	3/13/96	68043	Procedure Normfel (RTS Analysis)
145	3/14/96	68043	Procedure Normfel (RTS Analysis)
146	3/14/96	68043	Procedure Normfel (RTS Analysis)
147	3/18/96	157358	Turn On Procedure
148	3/26/96	157358	Turn On Procedure
149	4/2/96	157358	Turn On Procedure
150	4/3/96	68043	Procedure Normfel (RTS Analysis)
151	4/5/96	68043	Procedure Normfel (RTS Analysis)
152	4/5/96	68043	Procedure Normfel (RTS Analysis)
153	4/9/96	157358	Turn On Proc. (Diff. Reflect./157372)
154	4/24/96	157358	Turn On Proc. (Pre Ship Bench Test/173786)

Table 9-2 - (Continued)
Background Stability Tests

Run	Date	Procedure	Name of Test
155	5/8/96	157358	Turn On Proc. (Post Delivery Bench Test/173786)
156	2/27/97	157358	Turn On Procedure (Pre-Delivery Bench Test)
157	3/11/97	157358	Turn On Procedure (Post-Delivery to BASD)
158	4/14/97	157358	Turn On Procedure (CCR Response Check)
159	4/15/97	157358	Turn On Procedure (CCR Response Check)
160	4/16/97	157358	Turn On Procedure (Pre-Special CCR Test)
161	4/17/97	157358	Turn On Procedure (Special OOB Test)
162	6/24/97	157358	Turn On Procedure (Mini Funcitonal)
163	6/25/97	157358	Turn On Procedure (Mini Funcitonal)
164	7/1/97	157358	Turn On Proc. (Radiometric Calibration)
165	7/1/97	68043	Radiometric Calibration
166	7/1/97	68043	Radiometric Calibration
167	7/2/97	68043	Radiometric Calibration
168	7/2/97	68043	Radiometric Calibration
169	7/2/97	68043	Radiometric Calibration
170	7/3/97	68043	Radiometric Calibration
171	7/3/97	68043	Radiometric Calibration
172	7/8/97	157358	Turn On Procedure (Stinger Test)
173	7/9/97	157358	Turn On Procedure (Stinger Test)
174	7/14/97	157358	Turn On Procedure (Stinger Test)
175	7/15/97	157358	Turn On Procedure (Stinger Test)
176	7/16/97	157358	Turn On Procedure (Stinger Test)
177	7/22/97	157358	Turn On Procedure (Special CCR Test)
178	7/23/97	157358	Turn On Procedure (Special OOB Test)
179	8/12/97	157358	Turn On Procedure (Linearity)
180	8/15/97	157358	Turn On Procedure (Out of Band Test)
181	8/20/97	157358	Turn On Proc. (Pre-Ship Bench Test)
182	8/26/97	157358	Turn On Proc. (Post-Delivery Bench Test)

Figure 9-1
SBUV/2 Flight 3 Background Stability - Range 1

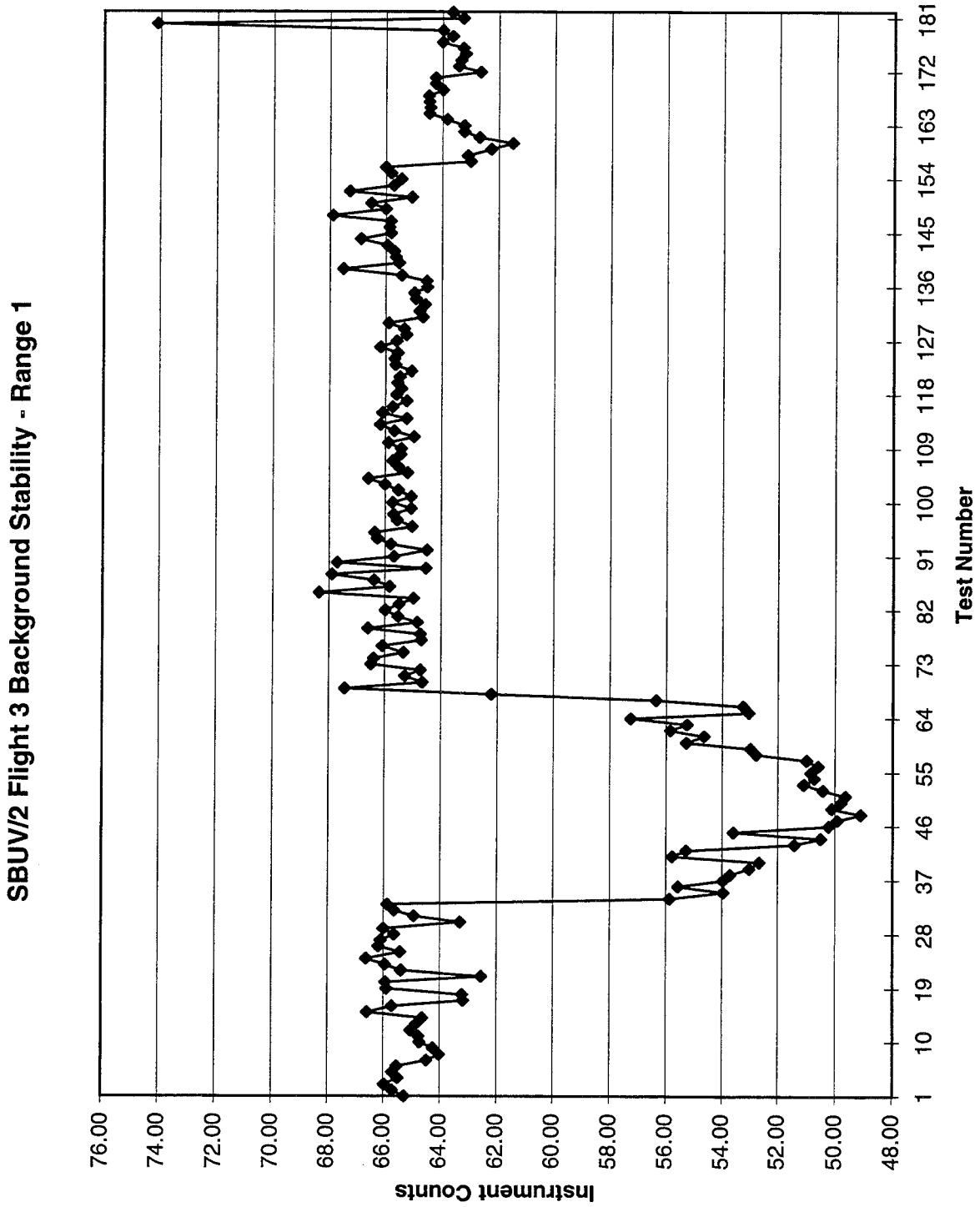


Figure 9-2
SBUV/2 Flight 3 Background Stability - Range 2

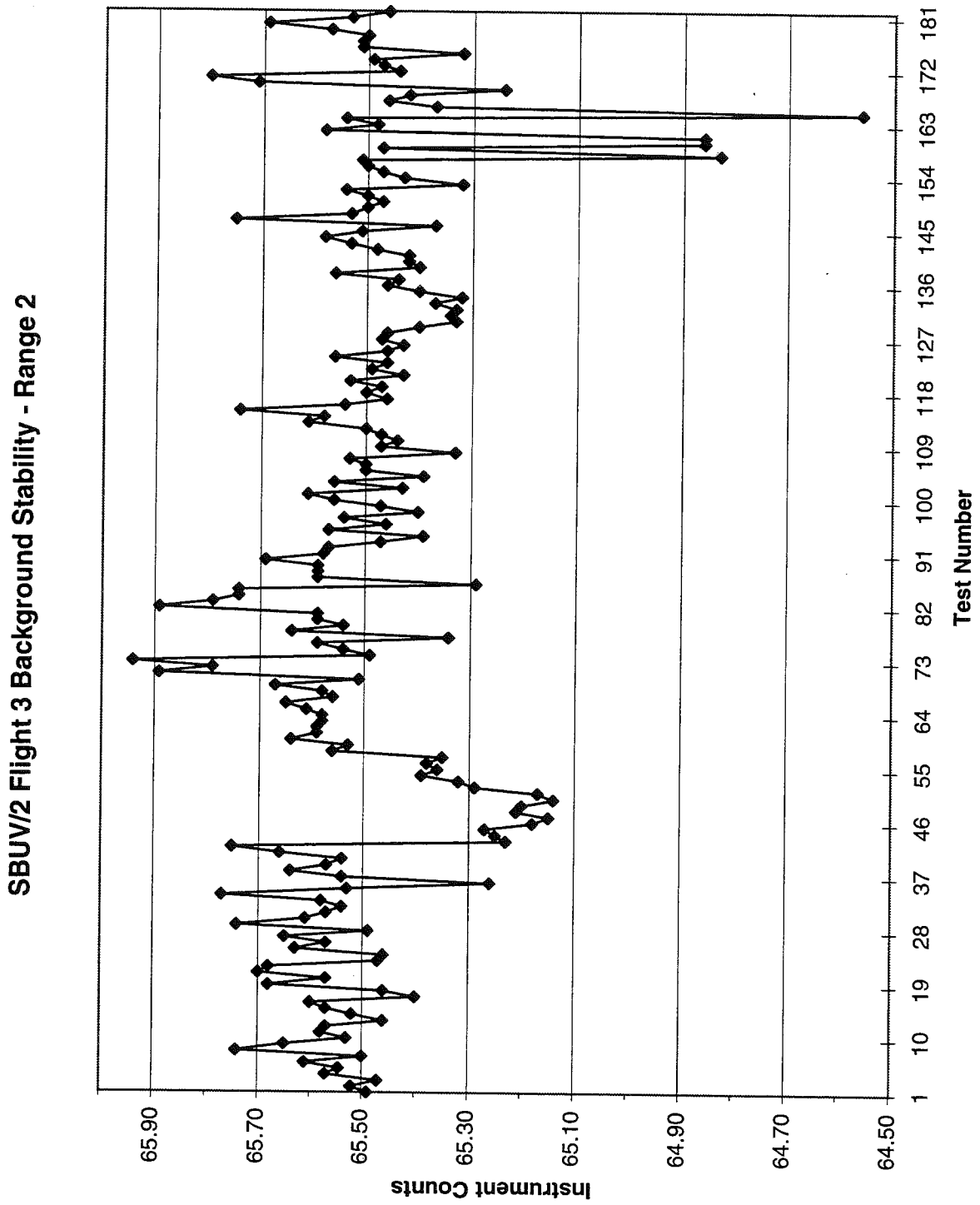


Figure 9-3
SBUV/2 Flight 3 Background Stability - Range 3

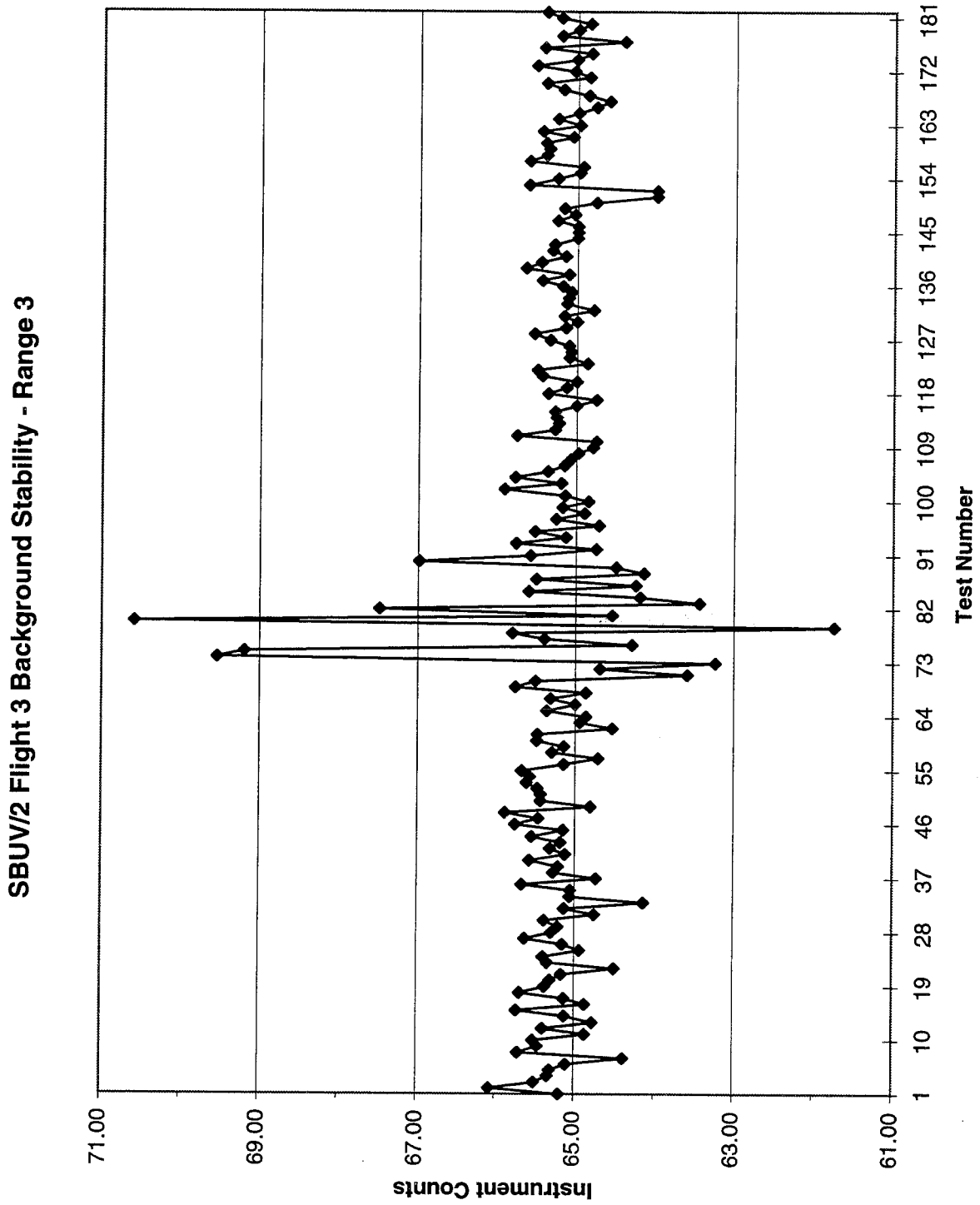
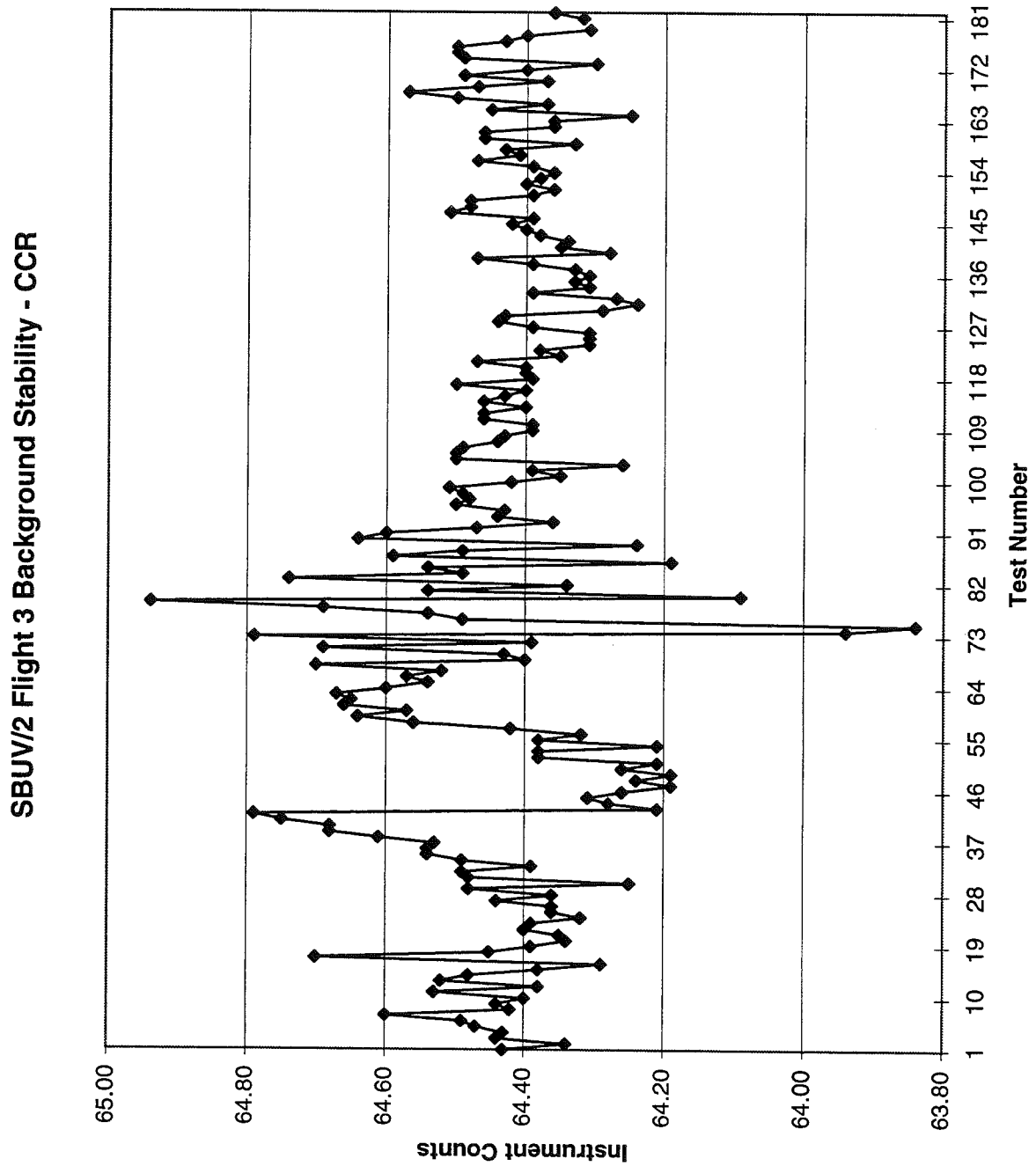


Figure 9-4
SBUV/2 Flight 3 Background Stability - CCR



Section 11 - **Diffuser Reflectivity**
(Reference Test Procedure 157372)
April 1996 - August 1997

This test was done to measure the relative reflectivity of the instrument's irradiance (solar) diffuser plate. Macro Albedo is the portion of the test software that retrieves diffuser reflectivity data. After a twenty minute warm-up of the on board mercury lamp, this macro enables the automatic wavelength calibration sequence (WLCAL). Which takes 10 sweeps of data with the diffuser in the monitor position. Sweeps 1 through 4 are with the cal lamp door open (reflected), sweeps 5 and 6 with door closed (direct), sweeps 7 and 8 with the door open, sweeps 9 and 10 with the door closed again.

The off-line utility program (Reflect) used to reduce the data, selects seven points on either side of the peak of spectral lines chosen. The counts from these data points are added and the sum represents the area under the envelops of each of the spectral lines. These areas are used to find the ratios of consecutive lamp open to closed sweeps. The ratios or "Albedos" are first calculated for each of the three open/closed pairs of sweeps and then the mean is calculated.

FM3 has a small set of diffuser reflectivity data, because rework to the cal lamp assembly invalidates earlier results. This rework should improve the stability of the diffuser monitoring system over time. However, this needs to be demonstrated with data from spacecraft ground tests of this instrument. Refer to SERs SBUV-KK-96-810, -811, and -813 for more information.

In the diffuser Reflectivity Test Procedure, Macro Albedo is run eight consecutive times and the average of these eight measurements is used as a baseline to measure future degradation of the diffuser. The test procedure requires that these averages have no more than 0.5 percent standard error. For Flight 3, the standard error ranged between 0.12% at 404.7 nm and 0.13% at 253.4 nm, well within the required specification. Because this is a repeatability test, the setup is held constant. The mercury lamp is warmed up for 20 minutes before data is taken and is allowed to cool down between the eight runs. This test is done on the primary test fixture using the instrument's primary encoders. **Table 11-1** contains test results.

In order to monitor diffuser reflectivity over time, Macro Albedo has also been incorporated into several of our system level test procedures. **Figure 11-3** shows diffuser reflectivity at 297 nm, 313 nm, 365 nm and 405 nm throughout the testing period of the Flight 3 instrument. Test numbers 1-14 in **Table 11-2** and **Figure 11-3** contain data found in Electrical Functional and Diffuser Reflectivity tests. Test numbers 1-8 are data from the Diffuser Reflectivity Test. Test number 9&10 contain data from a Mini-Functional. **Figure 11-1** is diffuser reflectivity at 254 nm and **Figure 11-2** is diffuser reflectivity at 265 nm. Test numbers 11-14 are data from Bench Tests. Test conditions can have a measurable effect on lamp output and reflectivity measurements. A brief description of the various test setups (other than Diffuser Reflectivity) follows:

Minifunctional: Minifunctional tests are run before vibration, after each axis of vibration, and after thermal vacuum testing. Usually the test is run with the instrument sitting in the primary test fixture. After a 20 minute lamp warm-up, Macro Albedo is run with encoders in the primary and then in the backup mode.

Bench Test. Similar to the Minifunctional test, the Bench Test collects two sets of data using primary and backup encoders, but the instrument is not in a test fixture. Test conditions at the delivery site vary greatly.

Table 11-1
Diffuser Relative Reflectivity (Open/Closed Signal Ratio)

Run Number	Wavelength					
	253.7 nm	265.2 nm	296.7 nm	313.2 nm	365.0 nm	405.7 nm
1	0.01442	0.01531	0.01626	0.01677	0.01806	0.01871
2	0.01484	0.01582	0.01663	0.01724	0.01854	0.01940
3	0.01489	0.01550	0.01658	0.01715	0.01859	0.01920
4	0.01381	0.01554	0.01660	0.01710	0.01837	0.01902
5	0.01372	0.01542	0.01646	0.01663	0.01872	0.01952
6	0.01374	0.01549	0.01637	0.01675	0.01818	0.01887
7	0.01383	0.01561	0.01659	0.01698	0.01858	0.01906
8	0.01375	0.01553	0.01639	0.01662	0.01807	0.01890
9	0.01383	0.01573	0.01655	0.01706	0.01860	0.01903
10	0.01372	0.01557	0.01641	0.01681	0.01824	0.01890
11	0.01383	0.01561	0.01662	0.01698	0.01853	0.01908
12	0.01373	0.01535	0.01642	0.01672	0.01807	0.01891
13	0.01398	0.01589	0.01682	0.01739	0.01872	0.01958
14	0.01402	0.01591	0.01683	0.01740	0.01885	0.01952
15	0.01355	0.01561	0.01654	0.01687	0.01828	0.01890
16	0.01357	0.01531	0.01636	0.01647	0.01818	0.01885
17	0.01350	0.01556	0.01651	0.01702	0.01855	0.01897
18	0.01342	0.01540	0.01635	0.01642	0.01816	0.01881
Mean:	0.01390	0.01556	0.01652	0.01691	0.01841	0.01907
Std. Dev.:	0.00042	0.00018	0.00016	0.00029	0.00025	0.00027
Std. Error:	0.00705	0.00275	0.00222	0.00401	0.00326	0.00329

Table 11-2
Flight 3 Relative Diffuser Reflectivity History

Run Number	Test Procedure	Test Describtion	Test Date	Open/Closed Signal Ratio 254 nm	365 nm	405 nm
1	173786	Bench Test NJ	97/02/27 11:44	0.01442	0.01806	0.01871
2	173786	Bench Test CO	97/03/11 10:42	0.01484	0.01854	0.01940
3	173786	Bench Test CO	97/03/11 11:22	0.01489	0.01859	0.01920
4	68042	Diffuser Reflect	97/06/25 15:49	0.01381	0.01837	0.01902
5	68042	Diffuser Reflect	97/06/25 16:30	0.01372	0.01872	0.01952
6	68043	PTF Calibration	97/07/01 10:42	0.01374	0.01818	0.01887
7	68043	PTF Calibration	97/07/01 14:57	0.01383	0.01858	0.01906
8	68043	PTF Calibration	97/07/02 06:21	0.01375	0.01807	0.01890
9	68043	PTF Calibration	97/07/02 10:31	0.01383	0.01860	0.01903
10	68043	PTF Calibration	97/07/02 14:37	0.01372	0.01824	0.01890
11	68043	PTF Calibration	97/07/03 06:15	0.01383	0.01853	0.01908
12	68043	PTF Calibration	97/07/03 10:24	0.01373	0.01807	0.01891
13	68042	Diffuser Reflect	97/07/15 10:59	0.01398	0.01872	0.01958
14	68042	Diffuser Reflect	97/07/15 11:39	0.01402	0.01885	0.01952
15	173786	Bench Test CO	97/08/20 12:11	0.01355	0.01828	0.01890
16	173786	Bench Test CO	97/08/20 12:51	0.01357	0.01818	0.01885
17	173786	Bench Test NJ	97/08/26 11:46	0.01350	0.01855	0.01897
18	173786	Bench Test NJ	97/08/26 12:27	0.01342	0.01816	0.01881

Figure 11-1
Diffuser Reflectivity at 254 nm
(Baseline is the average of tests 4 & 5:
0.013765 Relative Diffuser Reflectivity)

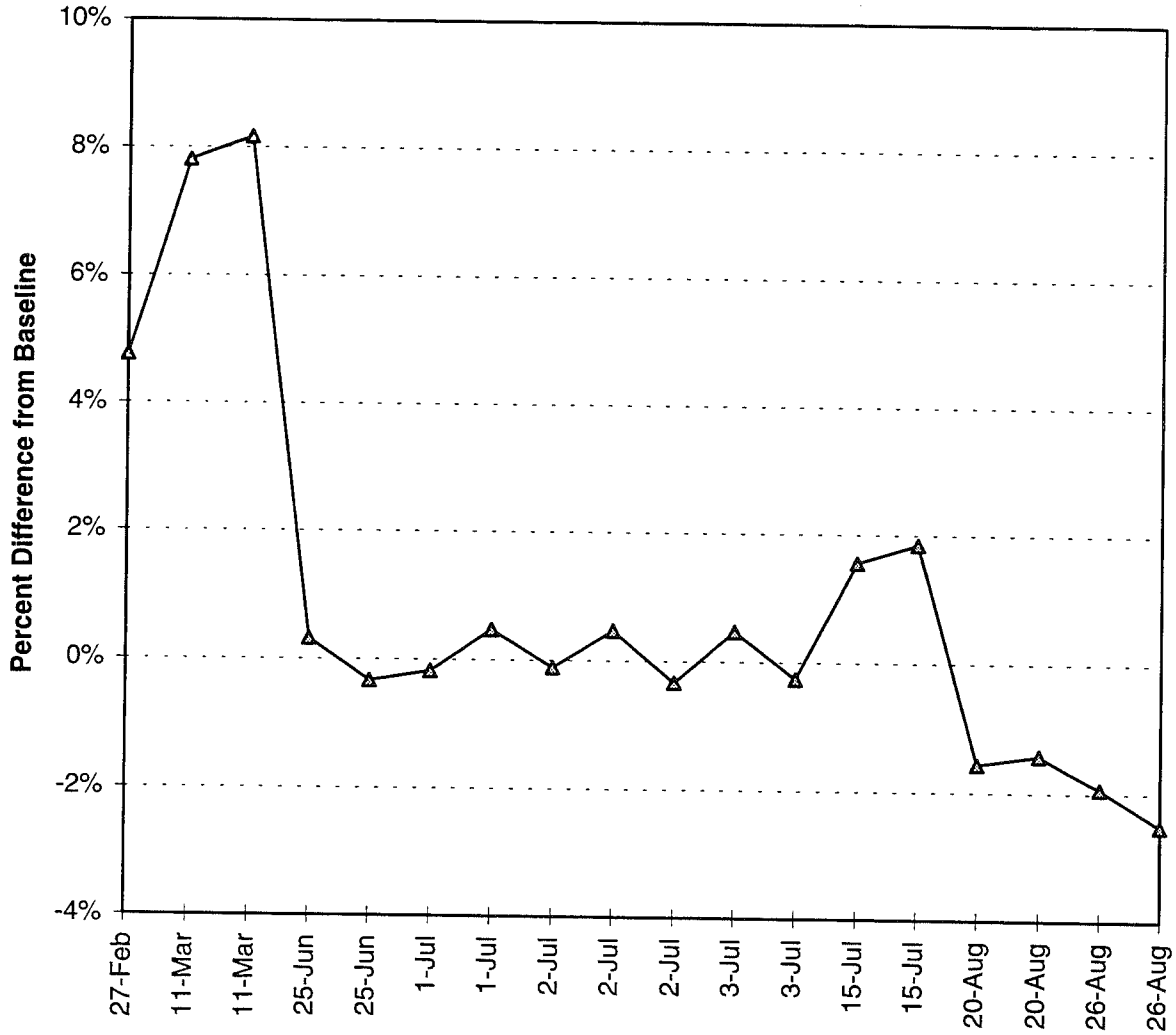


Figure 11-2
Diffuser Reflectivity at 265 nm
(Baseline is the average of tests 2 & 3:
0.01566 Relative Diffuser Reflectivity)

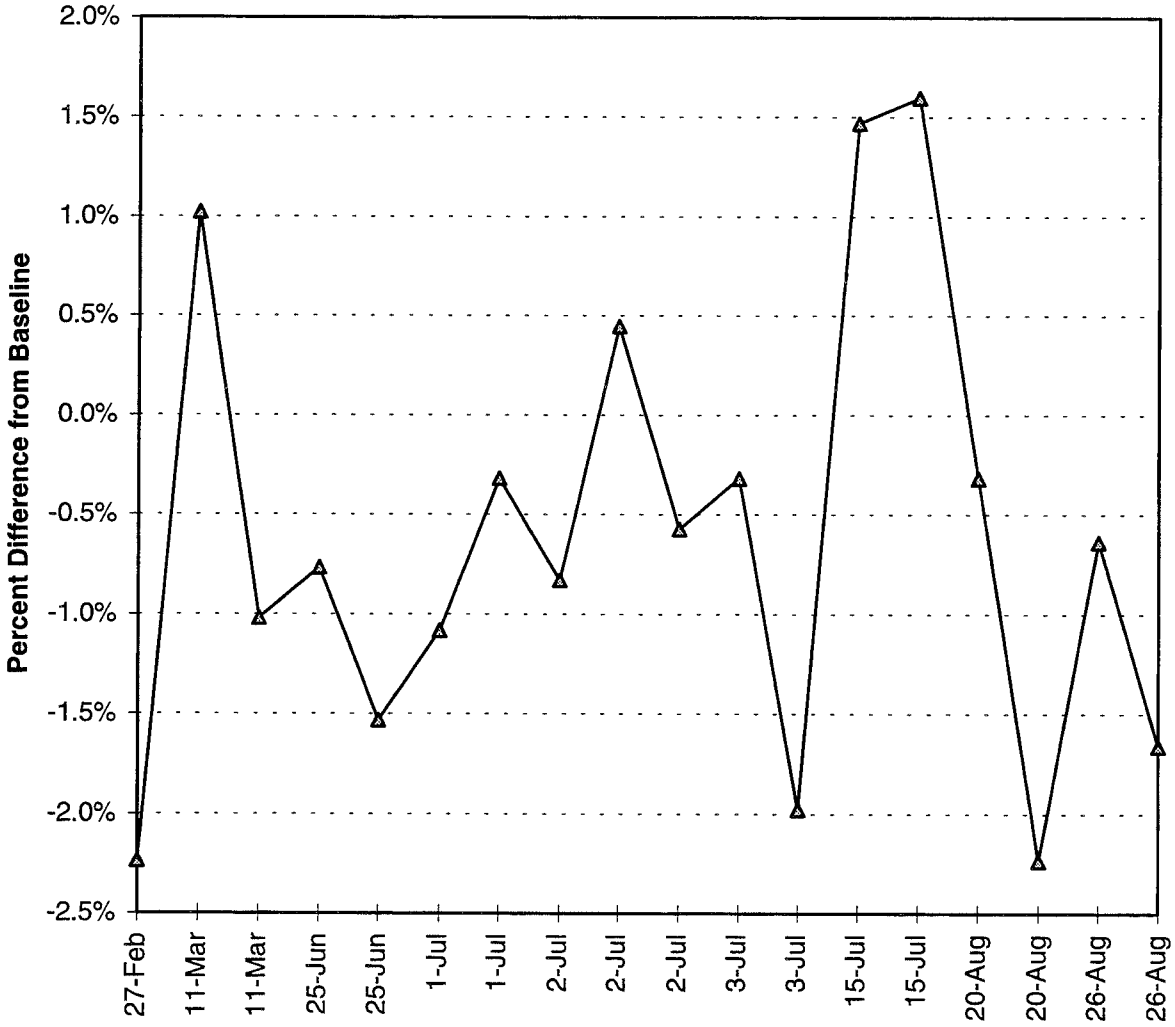
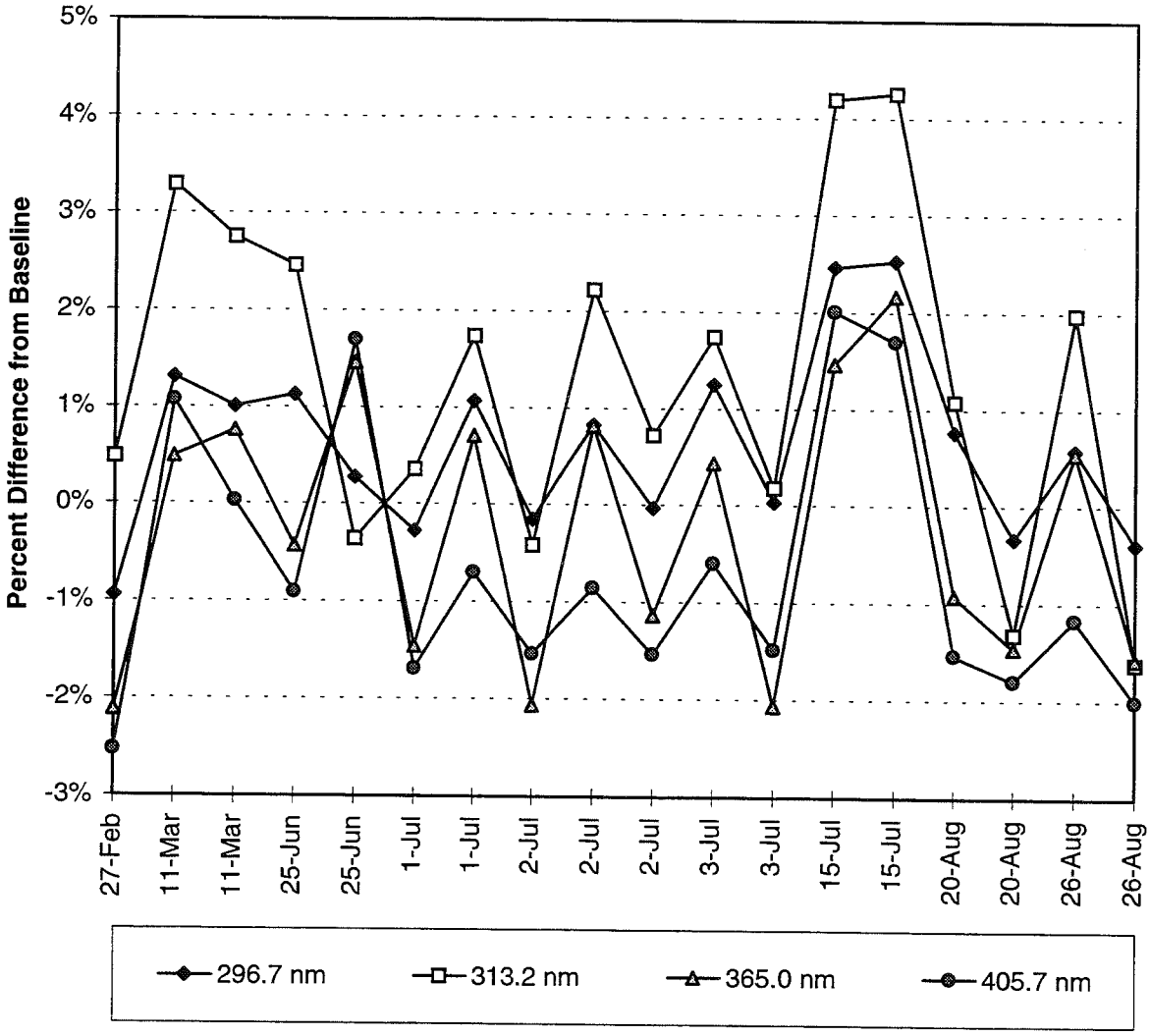


Figure 11-3
Diffuser Reflectivity at Longer Wavelengths
(Baseline is average of tests 5 & 6)



Section 15 - **Contamination Mirrors**
(January 1984 - July 1997)

The four Flight 3 contamination mirrors were measured many times from January, 1984 to July, 1997. **Table 15-1** lists the reflectances at 253.65 nm for these tests and **Figure 15-1** is a plot of the data. **Table 15-2** lists the reflectances at 160.80 nm for these tests, and **Figure 15-2** is a plot of the data. Measurement uncertainty is 1% RMS.

Table 15-1
Reflectances at 253.65 nm

DATE	MIRROR 16	MIRROR 20	MIRROR 25	MIRROR 27
5-Jan-84	85.90	85.90	86.50	81.70
16-Aug-85	85.50	85.40	85.90	81.60
15-Oct-86	86.20	85.70	86.30	82.30
15-Dec-86	86.10	86.10	86.40	81.60
15-Apr-87	86.20	86.10	86.40	82.00
11-May-87	85.80	85.70	86.00	81.80
8-Sep-87	86.00	85.80	86.20	82.00
7-Dec-87	86.10	85.50	86.20	82.10
16-Feb-88	85.92	85.86	86.37	82.12
23-Mar-88	86.01	85.60	86.30	81.78
10-Jun-88	85.93	85.84	86.21	81.87
8-Sep-88	85.90	85.60	86.10	81.90
25-May-89	85.80	85.90	85.80	81.50
25-Apr-91	85.89	85.61	86.06	81.52
17-Jan-92	85.57	85.12	85.99	81.93
19-Feb-93	86.25	85.23	85.59	82.06
17-Mar-93	86.33	85.55	86.07	82.41
11-Aug-93	85.16	85.14	85.86	81.54
28-Oct-93	85.48	85.50	85.93	81.71
18-Mar-94	85.77	85.69	85.97	81.77
24-Jun-94	85.74	85.67	86.08	82.08
19-Sep-94	86.25	86.19	86.42	82.11
17-Nov-94	85.79	85.78	86.01	81.90
13-Mar-95	86.41	86.18	86.39	82.40
5-Jan-96	85.59	85.45	85.83	81.92
7-Feb-96	87.05	88.58	87.53	83.50
5-Mar-97	86.04	86.15	86.03	81.98
4-Apr-97	86.19	85.69	85.98	81.79
23-Jul-97	86.28	86.31	86.73	82.24
Average	**85.97**	**85.82**	**86.18**	**81.97**
STD DEV	**0.356812403**	**0.613143319**	**0.358591789**	**0.385398993**

Table 15-2
Reflectances at 160.80 nm

DATE	MIRROR 16	MIRROR 20	MIRROR 25	MIRROR 27
25-Apr-91	70.64	71.47	70.15	65.35
19-Feb-93	69.14	71.38	69.98	64.13
17-Mar-93	69.61	71.18	70.02	65.07
11-Aug-93	70.65	71.77	70.60	65.89
28-Oct-93	70.66	71.83	70.61	65.67
18-Mar-94	70.64	71.72	70.46	65.48
24-Jun-94	70.89	71.87	70.76	66.04
19-Sep-94	71.25	71.79	70.92	65.89
17-Nov-94	70.67	71.68	70.56	65.57
13-Mar-95	71.32	72.15	70.75	65.96
5-Jan-96	70.10	71.37	69.36	65.34
7-Feb-96	72.22	70.31	70.50	65.64
5-Mar-97	70.55	71.56	70.28	65.51
4-Apr-97	70.80	71.75	70.41	65.57
23-Jul-97	70.96	71.92	70.56	65.71
AVERAGE	**70.67**	**71.58**	**70.39**	**65.52**
STD DEV	**0.71**	**0.43**	**0.39**	**0.46**

Figure 15-1
Contamination Mirror Reflectances - 253.6 nm

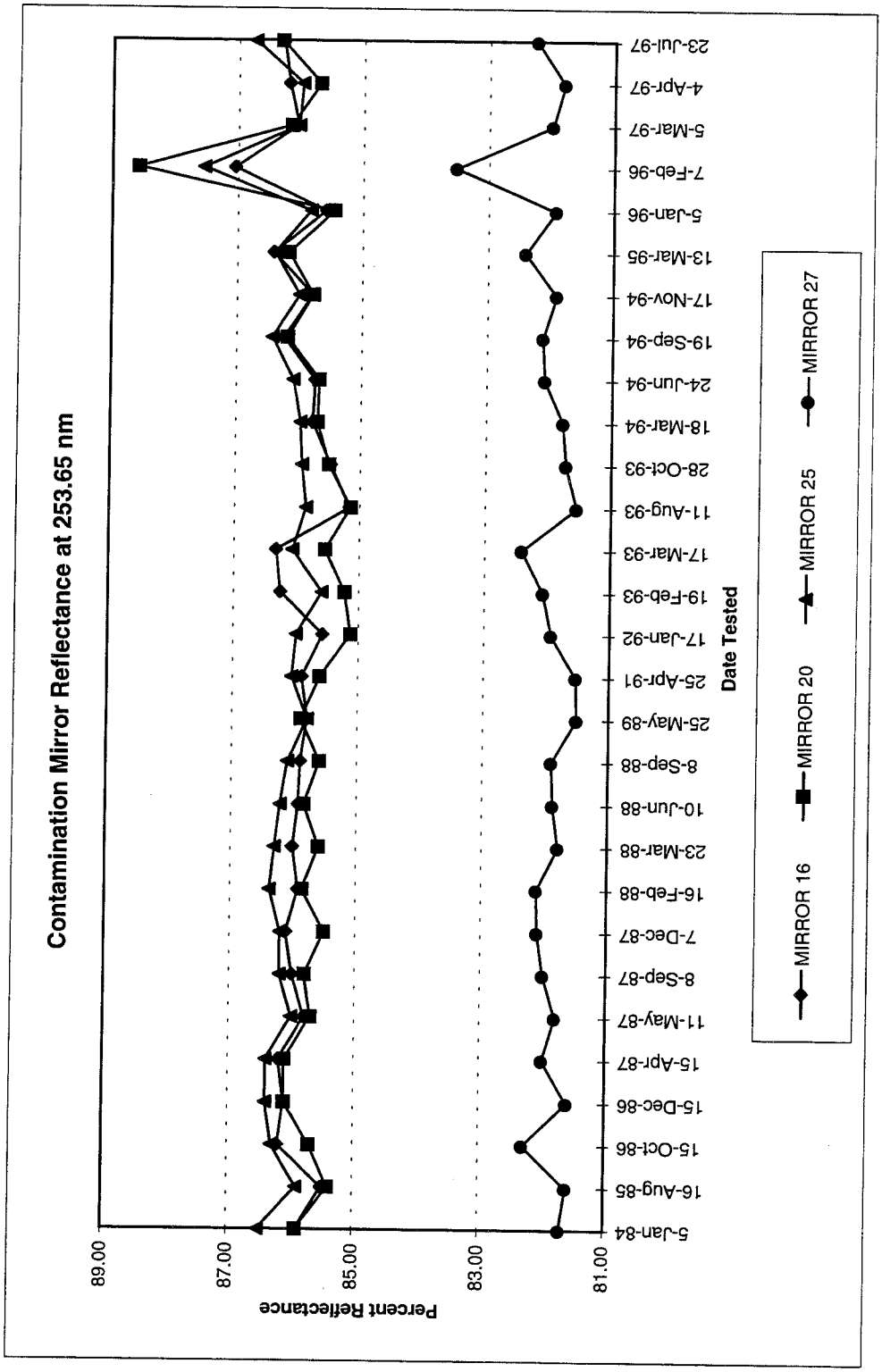
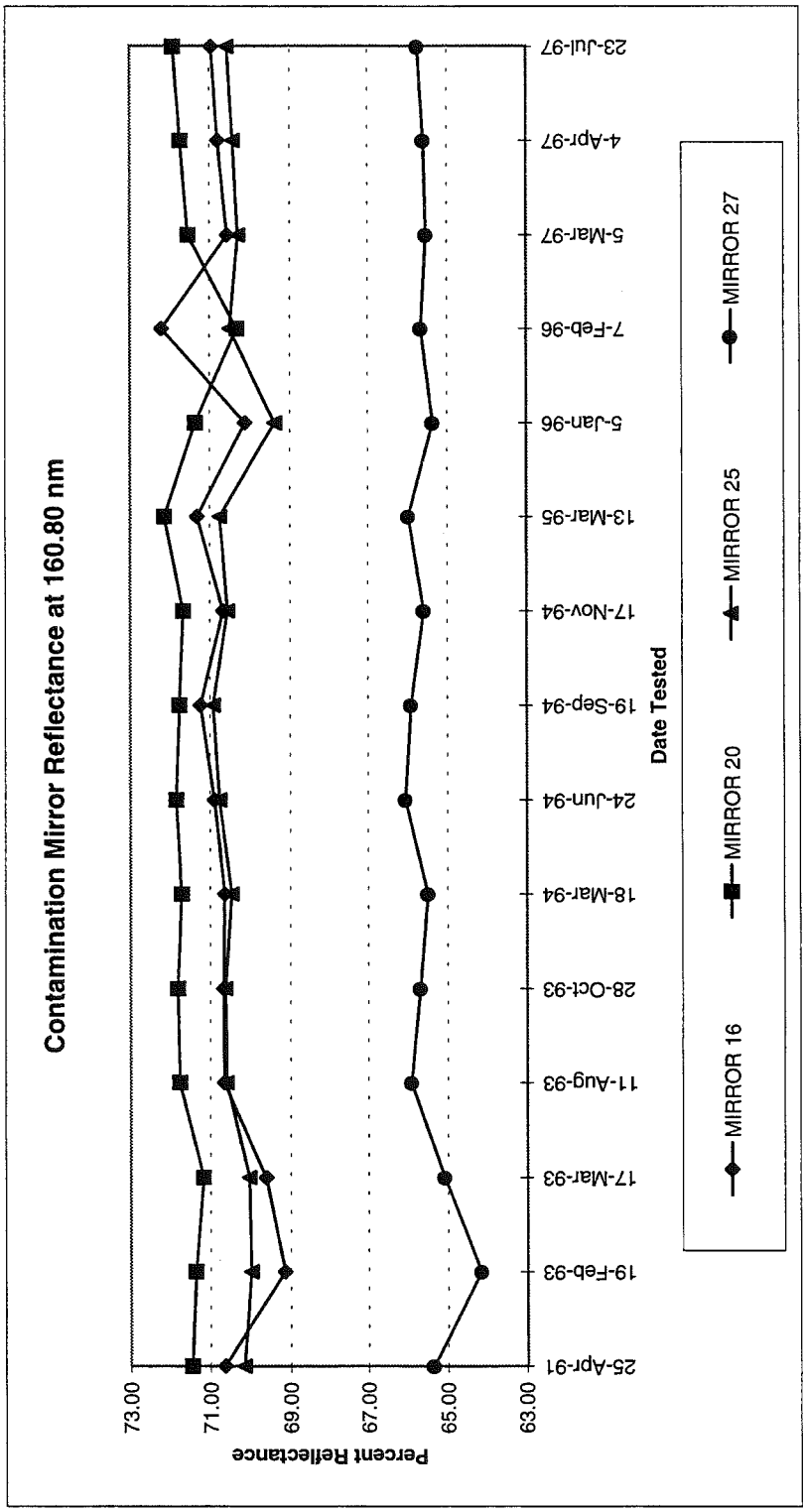



Figure 15-2
Contamination Mirror Reflectances - 160.80 nm