Varian Analytical Instruments
2700 Mitchell Drive
Walnut Creek, CA 94598-1675/usa

ProStar 345 UV-Vis Detector

Operation Manual

QUALITY SYSTEM ISO 9001 CERTIFIED

Printed in U.S.A. 03-914784-00:Rev. 2

VARIAN

Quality Systems At Varian, Inc.

The ISO 9000 series standards were created in Geneva in 1987 to cut through a morass of conflicting quality definitions. These standards define a model for quality assurance systems in product design, development, manufacturing, installation, service, and customer support. They are now the worldwide quality assurance benchmark used to gauge the strength of a company's commitment to quality, and the value of its quality systems.

Various organizations around the world, such as the British Standards Institution (BSI), provide certified, objective auditors to scrutinize quality procedures, product development, manufacturing processes, and customer satisfaction programs. No company can claim ISO 9000 series registration unless it receives a stamp of approval from the demanding quality assessors of BSI or similar accredited examining body. ISO 9000 series registration constitutes an objective third-party report to determine the level of a supplier's commitment to quality.

In 1992, Varian, Inc., Analytical Instruments became registered to the most comprehensive of the ISO 9000 series standards — ISO 9001. ISO 9001 registration means that every stage of our quality system, including product development, manufacturing, final test, shipping, and parts and supplies has been rigorously examined against the most exacting set of internationally recognized standards. It means we live up to a standard of quality that you can count on today, and into the future. Our Quality System has received ISO 9001 certification number FM21797.

The quality systems that earned us ISO 9001 registration have direct benefits for our customers:

- We can speed instruments to you faster than ever before. Emergency orders can be processed even faster.
- We fill your orders promptly and completely.
- We have implemented a system of continuous feedback from our customers — we are aware of your needs today and tomorrow.
- We have improved your productivity by cutting systems failure rates in half and speeding service response time.
- We have embedded continuous improvement into the fabric of our organization so that we can achieve even higher levels of quality in the future.
- We are embedding GLP requirements into our products and services to help you meet your regulatory compliance requirements.

ISO 9001 registration is not enough. For us, quality is defined by our customers. We are not satisfied unless you are satisfied. We are striving to understand customer needs, using independent surveys, user groups, customer advisory boards, and our “Hallmark of Quality” response program, in addition to individual face-to-face customer contact. Our products and our processes are configured to meet those needs.

We know that you are seeking more than the most advanced processes and top-notch applications expertise. You want to join forces with a partner committed to delivering world-class quality, reliability, and value — on time, every time.

QUALITY SYSTEM ISO 9001 CERTIFIED

Our overriding aim is to be that partner.

Varian, Inc. Analytical Instrument Warranty

Hardware Products

All analytical instruments sold by Varian, Inc. are warranted to be free from defects in material and workmanship for the periods specified and in accordance with the terms on the face of Varian's quotation or as otherwise agreed upon in writing between Varian and the Customer. The warranty period begins on the date of **shipment** from Varian to the original Customer. However, where installation is paid for by the Customer or included in the purchase price, the warranty period begins upon completion of installation. If the Customer schedules **installation** to start later than 30 days after delivery or if such delay is caused through the Customer's inability to provide adequate facilities or utilities or through failure to comply with Varian's reasonable pre-installation instructions or through other omissions by Customer, then the warranty period starts on the 31st day from date of shipment. Moreover Varian will charge the Customer for labor and other expenses involved in making multiple or follow-up installation service calls.

Software Products

Where software is provided within the frame of a license agreement concluded between the Customer and Varian, any warranty shall be strictly in accordance with the terms of such agreement.

In the absence of a license agreement and unless an alternate warranty period is agreed upon in writing between Varian and the Customer, the warranty period is as specified on the face of Varian's quotation. Varian warrants such software products, if used with and properly installed on Varian hardware or other hardware as specified by Varian to perform as described in the accompanying Operator's Manual and to be substantially free of those defects which cause failure to execute respective programming instructions; however, Varian does not warrant uninterrupted or error-free operation.

Remedies

The sole and exclusive remedy under hardware warranty shall be **repair** of instrument malfunctions which in Varian's opinion are due or traceable to defects in original materials or workmanship or, at Varian's option, **replacement** of the respective defective parts, provided that Varian may as an alternative elect to **refund** an equitable portion of the purchase price of the instrument or accessory.

Repair or replacement under warranty does not extend the original warranty period.

Repair or replacement under warranty claims shall be made in Varian's sole discretion either by sending a Customer Support Representative to the site or by authorizing the Customer to return the defective accessory or instrument to Varian or to send it to a designated service facility. The Customer shall be responsible for loss or damage in transit and shall prepay shipping cost. Varian will return the accessory or instrument to the Customer prepaid and insured. Claims for loss or damage in transit shall be filed by the Customer. To correct software operation anomalies, Varian will issue software revisions where such revisions exist and where, in Varian's opinion, this is the most efficient remedy.

Limitation of Warranty

This **warranty does not cover** software supplied by the Customer, equipment and software warranted by another manufacturer or replacement of expendable items and those of limited life, such as but not limited to: Filters, glassware, instrument status lamps, source lamps, septa, columns, fuses, chart paper and ink, nebulizers, flow cells, pistons, seals, fittings, valves, burners, sample tubes, probe inserts, print heads, glass lined tubing, pipe and tube fittings, variable temperature dewars, transfer lines, flexible discs, magnetic tape cassettes, electron multipliers, filaments, vacuum gaskets, seats and all parts exposed to samples and mobile phases.

This **warranty shall be void** in the event of accident, abuse, alteration, misuse, neglect, breakage, improper operation or maintenance, unauthorized or improper modifications or tampering, use in an unsuitable physical environment, use with a marginal power supply or use with other inadequate facilities or utilities. Reasonable care must be used to avoid hazards.

This warranty is expressly in lieu of and excludes all other express or implied warranties, including but not limited to warranties of merchantability and of fitness for particular purpose, use or application, and all other obligations or liabilities on the part of Varian, unless such other warranties, obligations or liabilities are expressly agreed to in writing by Varian.

Limitation of Remedies and Liability

The remedies provided herein are the sole and exclusive remedies of the Customer. In no case will Varian be liable for incidental or consequential damages, loss of use, loss of production or any other loss incurred.

Safety Information

Operating Instructions

This instruction manual is provided to help you establish operating conditions which will permit safe and efficient use of your equipment. Special considerations and precautions are also described in the manual, which appear in the form of **NOTES**, **CAUTIONS**, and **WARNINGS** as described below. It is important that you operate your equipment in accordance with this instruction manual and any additional information which may be provided by Varian. Address any questions regarding the safe and proper use of your equipment to your local Varian office.

NOTE

Information to aid you in obtaining optimal performance from your instrument.

CAUTION

Alerts you to situations that may cause moderate injury and/or equipment damage, and how to avoid these situations.

WARNING

Alerts you to potentially hazardous situations that could result in serious injury, and how to avoid these situations.

Warning Symbol	Warning Description
 **WARNING: SHOCK HAZARD**	Hazardous voltages are present inside instrument. Disconnect from main power before removing screw-attached panels.
 **WARNING: CHEMICAL HAZARD**	Hazardous chemicals may be present. Avoid contact, especially when replenishing reservoirs. Use proper eye and skin protection.
 **WARNING: BURN HAZARD**	Very hot or cryogenically cold surfaces may be exposed. Use proper skin protection.
 **WARNING: EYE HAZARD**	Eye damage could occur either from flying particles, chemicals, or UV radiation. Use proper eye and face protection.
 **WARNING: FIRE HAZARD**	The potential for fire may be present. Follow manual instructions for safe operation.
 **WARNING: EXPLOSION HAZARD**	The potential for explosion may exist because of type of gas or liquid used.
 **WARNING: RADIATION SOURCE**	Ionizing radiation source is present. Follow manual instructions for safe operation.
 **WARNING: MOVING PARTS**	Keep hands and fingers away.

General Safety Precautions

Follow these safety practices to ensure safe equipment operation.

- Perform periodic leak checks on all supply lines and pneumatic plumbing.
- Do not allow gas lines to become kinked or punctured. Place lines away from foot traffic and extreme heat or cold.
- Store organic solvents in fireproof, vented and clearly labeled cabinets so they are easily identified as toxic and/or flammable materials.
- Do not accumulate waste solvents. Dispose of such materials through a regulated disposal program and not through municipal sewage lines.

NOTICE: This instrument has been tested per applicable requirements of EMC Directive as required to carry the European Union CE Mark. As such, this equipment may be susceptible to radiation/interference levels or frequencies which are not within the tested limits.

WARNING This instrument is designed for chromatographic analysis of appropriately prepared samples. It must be operated using appropriate gases and/or solvents and within specified maximum ranges for pressure, flows, and temperatures as described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING It is the responsibility of the Customer to inform Varian Customer Support Representatives if the instrument has been used for the analysis of hazardous biological, radioactive, or toxic samples, prior to any instrument service being performed or when an instrument is being returned to the Service Center for repair.

Electrical Hazards

- Disconnect the instrument from all power sources before removing protective panels to avoid exposure to potentially dangerous voltages.
- When it is necessary to use a non-original power cord plug, make sure the replacement cord adheres to the color coding and polarity described in the manual and all local building safety codes.
- Replace blown fuses with fuses of the size and rating stipulated on the fuse panel or in the manual.
- Replace faulty or frayed power cords immediately with the same type and rating.
- Make sure that voltage sources and line voltage match the value for which the instrument is wired.

Compressed Gas Cylinders

- Store and handle compressed gases carefully and in strict adherence to safety codes.
- Secure cylinders to an immovable structure or wall.
- Store and move cylinders in an upright, vertical position. Before transport, remove regulators and install cylinder cap.
- Store cylinders in a well-ventilated area away from heat, direct sunshine, freezing temperatures, and ignition sources.
- Mark cylinders clearly so there is no doubt as to their contents.
- Use only approved regulators and connections.
- Use only connector tubing that is chromatographically clean (Varian Part Number 03-918326-00) and has a pressure rating significantly greater than the highest outlet pressure from the regulator.

GC Safety Practices

Exhaust System

No special exhaust ducting is necessary for GC detectors installed in a well-ventilated room except when the detectors are used to test hazardous chemicals. If you do install ducting:

- Use only fireproof ducting.
- Install a blower at the duct outlet.
- Locate duct intakes such that their vibration or air movement does not effect detector operation.
- Check periodically for proper operation of the duct.
- Ensure proper ventilation in lab area.

Radioactive Source Detectors

- Read carefully and comply with all NOTES, CAUTIONS, and WARNINGS in the Ni^{63} ECD manual.
- Perform the tests for removable radioactive contamination described in the Ni^{63} ECD manual.
- Comply with leak test schedules and procedures.

Burn Hazard

Heated or cryogenically cooled zones of gas chromatographs can remain hot or cold for a considerable time after instrument power is turned off. To prevent painful burns, ensure that all heated or cooled areas have returned to room temperature or wear adequate hand protection before you touch potentially hot or cold surfaces.

LC Safety Practices

High Pressure Hazard

- If a line ruptures, a relief device opens, or a valve opens accidentally under pressure, potentially hazardous high liquid pressures can be generated by the pump causing a high velocity stream of volatile and/or toxic liquids.

- Wear face protection when you inject samples or perform routine maintenance.
- Never open a solvent line or valve under pressure. Stop the pump first and let the pressure drop to zero.
- Use shatter-proof reservoirs capable of operating at 50-60 psi.
- Keep the reservoir enclosure closed when the reservoir is under pressure.
- Read and adhere to all NOTES, CAUTIONS, and WARNINGS in the manual.

Flash Chromatography

The operator should be familiar with the physico-chemical properties of the components of the mobile phase.

Keep solvents from direct contact with the polyurethane supply tubing as certain solvents will cause weakening and leaks with possible bursting.

All components of the system should be connected to a common power supply and common ground. This ground must be a true ground rather than a floating ground.

Non-polar solvents can develop a static charge when pumped through the system. All vessels that contain mobile phase (including tubing and collection vessels) must be grounded to dissipate static electricity.

Employ static measuring and static discharge devices (e.g., air ionizers) to safeguard against the buildup of static electricity.

Ultraviolet Radiation

Liquid chromatograph detectors that use an ultraviolet light source have shielding to prevent radiation exposure to personnel.

For continued protection:

- Ensure that protective lamp covers of variable and fixed wavelength detectors are in place during operation.
- Do not look directly into detector fluid cells or at the UV light source. When inspecting the light source or fluid cell, always use protective eye covering such as borosilicate glass or polystyrene.

Spare Parts Availability

It is the policy of Varian to provide operational spare parts for any instrument and major accessory for a period of five (5) years after shipment of the final production run of that instrument. Spare parts will be available after this five (5) year period but on an *as available* basis. Operational spare parts are defined as those individual electrical or mechanical parts that are susceptible to failure during their normal operation. Examples include relays, lamps, temperature probes, detector elements, motors, etc. Sheet metal parts, structural members or assemblies and castings, printed circuit boards, and functional modules are normally capable of being rebuilt to like-new condition throughout their useful life and therefore will be supplied only on an *as available* basis after the final production run of the instrument.

Service Availability

Varian provides a variety of services to support its customers after warranty expiration. Repair service can be provided by attractively priced service contracts or on a time and material basis. Technical support and training can be provided by qualified personnel on both a contractual or as-needed basis.

Varian, Inc. Analytical Instruments Sales Offices

For Sales or Service assistance and to order Parts and Supplies, contact your local Varian office.

Argentina
Buenos Aires
Tel. +54.11.4.783.5306

Australia
Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria
Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux
Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)
São Paulo
Tel. +55.11.820.0444

Canada
Mississauga, Ontario
Tel. 800.387.2216

China
Beijing
Tel. +86.106209.1727

Europe
Middelburg, The Netherlands
Tel. +31.118.671.000

France
Les Ulis Cédex
Tel. +33.1.6986.3838

Germany
Darmstadt
Tel. +49.6151.7030

India
Mumbai
Tel. +91.22.857.0787/88/89

Italy
Torino
Tel. +39.011.997.9111

Japan
Tokyo
Tel. +81.3.5232.1211

Korea
Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)
Mexico City
Tel. +52.5.523.9465

Russian Federation
Moscow
Tel. +7.095.937.4280

Spain
Madrid
Tel. +34.91.472.7612

Sweden
Solna
Tel. +46.8.445.1620

Switzerland
Varian AG
Tel. +41.848.803.800

Taiwan
Taipei Hsien
Tel. +886.2.698.9555

United Kingdom and Ireland
Walton-on-Thames
Tel. +44.1932.898000

Venezuela
Valencia
Tel. +58.41.257.608

United States
Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)

Tel. +1.800.367.4752
(LC)

VARIAN

www.varianinc.com

Sicherheitsinformationen

Arbeitsanleitungen

Diese Arbeitsanleitung will Ihnen bei der Aufstellung solcher Arbeitsbedingungen helfen, die einen sicheren und wirkungsvollen Gebrauch Ihrer Geräte ermöglichen. Besondere Überlegungen und Vorsichtsmaßnahmen erscheinen in diesem Handbuch in Form von **HINWEIS**, **ACHTUNG** und **WARNUNG,** wie unten beschrieben. Es ist wichtig, daß Sie Ihr Gerät in Übereinstimmung mit dieser Arbeitsanleitung und allen möglichen zusätzlichen Informationen von Varian betreiben. Alle Fragen bezüglich Sicherheit und Handhabung Ihres Gerätes richten Sie an Ihr Varian Büro.

HINWEIS

Eine Information, um einen optimalen Wirkungsgrad Ihres Instruments zu erzielen.

ACHTUNG

Weist auf Situationen, die zu mäßiger Beeinträchtigung und/oder zu Geräteschäden führen und auf die Vermeidung dieser Situationen hin.

WARNUNG

Weist auf mögliche Gefahrensituationen, die zu ernsthaften Verletzungen führen können und auf die Vermeidung dieser Situationen hin.

Warnungssymbol	Warnungsbeschreibung
WARNUNG ELEKTRISCHER SCHLAG	Gefährliche Spannungen bestehen innerhalb des Instruments. Trennen Sie das Gerät vom Netz, bevor Sie abschraubbare Paneele entfernen.
WARNUNG CHEMISCHE GEFAHR	Gefährliche Chemikalien können vorhanden sein. Vermeiden Sie jeden Kontakt, besonders beim Auffüllen der Reservoirs. Benutzen Sie wirksamen Augen und Hautschutz.
WARNUNG VERBRENNUNGSGEFAHR	Sehr heiße oder tiefstgekühlte Oberflächen können freigelegt sein. Benutzen Sie einen wirksamen Hautschutz.
WARNUNG AUGENVERLETZUNG	Herumfliegende Partikel, Chemikalien oder UV-Strahlung können Augenschäden verursachen. Tragen Sie deshalb einen geeigneten Schutz für Augen und Gesicht.
WARNUNG FEUERGEFAHR	Es besteht eine mögliche Feuergefahr. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.
WARNUNG EXPLOSIONSGEFAHR	Eine mögliche Explosionsgefahr besteht infolge der benutzten Gas- oder Flüssigkeitsart.
WARNUNG STRAHLUNGSQUELLE	Es besteht eine ionisierende Strahlungsquelle. Beachten Sie die Vorschriften im Handbuch für eine gefahrlose Benutzung.
WARNUNG BEWEGTE TEILE	Bleiben Sie mit Ihren Händen und Fingern weg.

Allgemeine Sicherheitsmaßnahmen

Befolgen Sie diese Sicherheitspraktiken für eine gefahrlose Gerätebenutzung.

- Prüfen Sie regelmäßig alle Versorgungs und Pneumatikleitungen auf Lecks.
- Gasleitungen dürfen nicht geknickt oder angestochen werden. Verlegen Sie die Leitungen außerhalb von Laufwegen und abseits von extremer Hitze oder Kälte.
- Lagern Sie organische Lösungsmittel in feuerfesten, belüfteten und eindeutig bezeichneten Schränken, damit sie leicht als toxische und/oder brennbare Materialien erkannt werden.
- Sammeln Sie keine Lösungsmittelabfälle. Entsorgen Sie solche Materialien über ein geregeltes Entsorgungsprogramm und nicht über die öffentlichen Abwasserleitungen.

HINWEIS: Dies Instrument wurde nach den zutreffenden Vorschriften der EMC Direktive getestet, die zum Führen des CE Zeichens der Europäischen Union berechtigen. Dieses Gerät kann an sich auf Strahlungs-/Störpegel oder Frequenzen außerhalb der getesteten Grenzen reagieren.

WARNUNG Dies Instrument ist für chromatographische Analysen entsprechend präparierter Proben gedacht. Es muß mit geeigneten Gasen und/oder Lösungsmitteln und innerhalb der im Handbuch spezifizierten maximalen Werte für Druck, Flüsse und Temperaturen betrieben werden.

WARNUNG Der Kunde ist vor der Durchführung irgendeines Geräteservices verpflichtet den Varian Kundendienstvertreter zu informieren, wenn das Instrument für Analysen gefährlicher biologischer, radioaktiver oder toxischer Proben benutzt worden ist.

Elektrische Gefahren

- Lösen Sie das Instrument von allen Stromquellen, bevor Sie Schutzpaneele entfernen, damit Sie nicht mit potentiell gefährlichen Spannungen in Berührung kommen.
- Wenn ein Nicht-Original Netzkabelstecker benutzt werden muß, muß das Austauschkabel die im Handbuch beschriebene Farbcodierung und Polarität beibehalten und alle örtlichen Sicherheitsvorschriften erfüllen.
- Ersetzen Sie durchgebrannte Sicherungen nur mit Sicherungen der Werte, die am Sicherungspaneel oder im Handbuch angegeben sind.
- Ersetzen Sie fehlerhafte oder durchgescheuerte Netzkabel sofort durch Kabel gleicher Art.
- Sorgen Sie dafür, daß Spannungsquellen und die Netzspannung den gleichen Wert haben, für den das Instrument verdrahtet ist.

Gasdruckflaschen

- Lagern und handhaben Sie komprimierte Gase vorsichtig und in strikter Einhaltung der Sicherheitsvorschriften.
- Befestigen Sie die Gasflaschen an feststehenden Aufbauten oder an Wänden.
- Lagern und transportieren Sie Gasflaschen in aufrechter Stellung. Druckregler zuvor abnehmen.
- Lagern Sie Gasflaschen in gut durchlüfteten Räumen, weit genug weg von Heizungen, direktem Sonnenschein, Frosttemperaturen und Entzündungszonen.
- Kennzeichnen Sie die Flaschen so eindeutig, daß kein Zweifel über deren Inhalt bestehen kann.
- Benutzen Sie nur geprüfte Druckminderer und Verbindungsstücke.
- Benutzen Sie nur chromatographisch reines Verbindungsrohr (Varian Part Number 03-918326-00), das wesentlich höheren Druck als den höchsten Ausgangsdruck des Druckminderers aushält.

GC Sicherheitspraktiken

Abgassystem

Für GC Detektoren, die in einem gut durchlüfteten Raum installiert sind, ist keine spezielle Abgasführung erforderlich, außer wenn die Detektoren zum Testen gefährlicher Chemikalien benutzt werden. Wenn Sie eine Abgasführung installieren:

- Benutzen Sie nur feuerfeste Führungen.
- Installieren Sie ein Gebläse am Ausgang.
- Ordnen Sie die Ansaugöffnung so an, daß ihre Erschütterungen oder Luftströmungen nicht die Detektorfunktion beeinträchtigen.
- Prüfen Sie regelmäßig die einwandfreie Arbeitsweise der Abgasführung.
- Sorgen Sie für gute Entlüftung im Laborbereich.

Radioaktive Detektoren

- Lesen Sie sorgfältig und befolgen Sie alle **HINWEISE**, **ACHTUNGEN** und **WARNUNGEN** im Ni^{63} ECD Handbuch.
- Führen Sie die Tests für zu beseitigende radioaktive Kontamination durch, die im Ni^{63} ECD Handbuch beschrieben sind.
- Erfüllen Sie die Zeitpläne und Verfahren zur Dichtigkeitsprüfung.

Verbrennungsgefahr

Beheizte oder tieftemperaturgekühlte Zonen des Gaschromatographen können beträchtlich lange heiß oder kalt bleiben, nachdem das Instrument bereits abgeschaltet ist. Zur Vermeidung schmerzhafter Verbrennungen müssen Sie darauf achten, daß alle beheizten oder gekühlten Zonen auf Raumtemperatur zurückgegangen sind oder Sie müssen ausreichenden Handschutz benutzen, bevor Sie möglicherweise heiße oder kalte Oberflächen berühren.

LC Sicherheitspraktiken

Gefahr durch hohen Druck

Wenn eine Leitung bricht, eine Entlüftungseinheit sich öffnet oder ein Ventil sich unbeabsichtigt unter Druck öffnet, kann durch die Pumpe möglicherweise ein gefährlich hoher Flüssigkeitsdruck entstehen, der einen Strahl flüchtiger und/oder toxischer Flüssigkeiten von hoher Stömungsgeschwindigkeit verursacht.

- Tragen Sie einen Gesichtsschutz, wenn Sie Proben injizieren oder Routinewartungen durchführen.
- Öffnen Sie niemals eine unter Druck stehende Lösungsmittelleitung oder ein Ventil. Halten Sie zuerst die Pumpe an und lassen Sie den Druck auf Null abfallen.
- Benutzen Sie splittersichere Reservoirs, die für einen Druck von 3,4 bis 4,1 bar ausgelegt sind.
- Halten Sie die Reservoirverkleidung geschlossen, wenn die Reservoirs unter Druck stehen.
- Lesen Sie und befolgen Sie alle **HINWEISE**, **ACHTUNGEN** und **WARNUNGEN** im Handbuch.

Blitzlicht-Chromatographie

Der Bediener sollte mit den physikalisch-chemischen Eigenschaften der Komponenten vertraut sein, aus denen sich die mobile Phase zusammensetzt.

Vermeiden Sie direkten Kontakt der Lösungsmittel mit den Zuführungsleitungen aus Polyurethan, da einige Lösungsmittel das Material der Leitungen schwächen und damit Undichtigkeiten oder Brüche hervorrufen können.

Alle Systemkomponenten sollten an der gleichen Netzstromquelle und einer gemeinsamen Erdung angeschlossen sein. Dabei muss es sich um eine echte, nicht um eine schwebende Erdung handeln.

Nicht-polare Lösungsmittel können sich beim Pumpen durch das System statisch aufladen. Alle Gefäße, die mobile Phase enthalten (einschließlich Leitungen und Sammelgefäße), müssen zur Ableitung elektrostatischer Aufladungen geerdet sein.

Setzen Sie Geräte zur Messung und Ableitung elektrostatischer Aufladungen (z.B. Geräte zur Luftionisierung) als Maßnahmen gegen den Aufbau statischer Elektrizität ein.

Ultraviolette Strahlung

Detektoren in Liquidchromatographen, die eine ultraviolette Lichtquelle benutzen, besitzen eine Abschirmung, die das Bedienungspersonal gegen Abstrahlungen schützt. Zum ständigen Schutz:

- Achten Sie darauf, daß die schützende Lampenabdeckung der Detektoren mit variablen und festen Wellenlängen während des Betriebs an ihrem Platz ist.
- Schauen Sie nicht direkt in die Flüssigkeitszellen im Detektor oder in die UV Lampe. Zum Inspizieren der Lichtquelle oder der Flüssigkeitszelle benutzen Sie immer einen wirksamen Augenschutz, wie er durch Borsilikatglas oder Polystyrol gewährleistet wird.

Verfügbarkeit von Ersatzteilen

Es ist Varian's Grundsatz, Ersatzteile für alle Instrumente und die wichtigsten Zubehöre für einen Zeitraum von fünf (5) Jahren nach dem Fertigungsauslauf dieser Geräteserie verfügbar zu haben. Nach diesem Zeitraum von fünf (5) Jahren können Ersatzteile auf der Basis *solange vorhanden* bezogen werden. Als Ersatzteil werden hier solche elektrischen und mechanischen Einzelteile verstanden, die unter normalen Bedingungen ausfallen können. Beispiele sind Relais, Lampen, Temperaturfühler, Detektorelemente, Motore usw. Metallbleche, Formteile oder Baugruppen und Gußteile, PC Boards und Funktionsmodule können normalerweise neuwertähnlich für eine brauchbare Lebensdauer instandgesetzt werden und werden deshalb nur auf der Basis *solange vorhanden* nach dem Produktionsauslauf des Instruments geliefert werden.

Serviceverfügbarkeit

Varian bietet seinen Kunden auch nach dem Auslaufen der Garantie eine Vielfalt von Serviceleistungen an. Reparaturservice kann zu attraktiven Preisen über eine Wartungsvereinbarung oder nach Zeit- und Materialaufwand zur Verfügung gestellt werden. Technische Unterstützung und Training bieten wir Ihnen durch qualifizierte Chemiker sowohl auf einer Kontraktbasis als auch nach Ihren Erfordernissen an.

Varian Analytical Instruments Verkaufsbüros

Für Verkaufs oder Servicehilfe und zum Bestellen von Teilen und Zubehören setzen Sie sich bitte mit Ihrem Varian Büro in Verbindung.

Argentina
Buenos Aires
Tel. +54.11.4.783.5306

Australia
Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria
Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux
Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)
São Paulo
Tel. +55.11.820.0444

Canada
Mississauga, Ontario
Tel. 800.387.2216

China
Beijing
Tel. +86.106209.1727

Europe
Middelburg, The Netherlands
Tel. +31.118.671.000

France
Les Ulis Cédex
Tel. +33.1.6986.3838

Germany
Darmstadt
Tel. +49.6151.7030

India
Mumbai
Tel. +91.22.857.0787/88/89

Italy
Torino
Tel. +39.011.997.9111

Japan
Tokyo
Tel. +81.3.5232.1211

Korea
Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)
Mexico City
Tel. +52.5.523.9465

Russian Federation
Moscow
Tel. +7.095.937.4280

Spain
Madrid
Tel. +34.91.472.7612

Sweden
Solna
Tel. +46.8.445.1620

Switzerland
Varian AG
Tel. +41.848.803.800

Taiwan
Taipei Hsien
Tel. +886.2.698.9555

United Kingdom and Ireland
Walton-on-Thames
Tel. +44.1932.898000

Venezuela
Valencia
Tel. +58.41.257.608

United States
Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)

Tel. +1.800.367.4752
(LC)

VARIAN

www.varianinc.com

Informations et mesures de sécurité

Instructions de fonctionnement

Ce manuel d'instruction est conçu pour aider l'utilisateur à créer des conditions opératoires lui permettant de faire fonctionner le matériel efficacement et en toute sécurité. Il contient entre autres certaines observations spéciales présentées sous forme de **NOTES, MISES EN GARDE** et **AVERTISSEMENTS.** Il est important de faire fonctionner ce matériel conformément aux instructions du présent manuel et à toute autre information émanant de Varian. S'adresser au bureau régional Varian pour toute question relative à la sécurité ou à l'utilisation correcte du matériel.

NOTE

Information destinée à tirer le meilleur parti du matériel sur le plan des performances

MISE EN GARDE

Attire l'attention sur une situation pouvant occasionner des dommages corporels légers et/ou des dégâts mineurs à l'appareil et indique comment remédier à cette situation

AVERTISSEMENT

Attire l'attention sur une situation potentiellement dangereuse pouvant occasionner des dommages corporels importants et indique comment remédier à cette situation

Symboles d'avertissement	Description
 **ATTENTION RISQUE D'ELECTROCUTION**	Exposition à des tensions dangereuses. Débrancher le matériel du secteur avant de dévisser les panneaux protecteurs.
 **ATTENTION SUBSTANCES CHIMIQUES DANGER**	Présence éventuelle de substances chimiques dangereuses. Eviter tout contact, en particulier lors du remplissage des réservoirs. Prendre les mesures de protection adéquates pour les yeux et la peau.
 **ATTENTION RISQUE DE BRÛLURES**	Exposition à des surfaces chaudes ou traitées cryogéniquement. Prendre les mesures de protection adéquates pour la peau.
 **ATTENTION DANGER POUR LES YEUX**	Les dommages causées aux yeux sont de deux natures différentes : jet de particules et de produits chimiques ou radiations UV. Utiliser des protections du visage et des yeux appropriées.
 **ATTENTION RISQUE D'INCENDIE**	Risque potentiel d'incendie. Se conformer aux instructions du manuel pour faire fonctionner le matériel en toute sécurité.
 **ATTENTION RISQUE D'EXPLOSION**	Risque potentiel d'explosion en raison du type de gaz ou de liquide utilisé.
 **ATTENTION SOURCE DE RADIATION**	Présence d'une source de radiation ionisante. Se conformer aux instructions du manuel pour faire fonctionner le matériel en toute sécurité.
 **ATTENTION PIECES EN MOUVEMENT**	Garder les mains et les doigts hors de portée.

Précautions générales en matière de sécurité

Les pratiques suivantes garantissent une utilisation sans risques du matériel:

- Effectuer régulièrement des essais d'étanchéité de tous les conduits d'alimentation et de tous les tuyaux du système pneumatique.
- Ne pas travailler avec des conduits de gaz déformés ou percés. Installer les conduits de gaz à l'écart des allées et venues et à l'abri du chaud ou du froid.
- Conserver les solvants organiques dans des récipients à l'épreuve du feu, bien ventilés et portant mention de la nature de leur contenu, en particulier lorsque lesdits solvants sont toxiques et/ou inflammables.
- Ne pas accumuler les solvants de rebut. Les éliminer conformément à un programme agréé d'élimination des déchets et non via les égouts municipaux.

NOTE: Ce matériel a été testé conformément aux dispositions de la directive CME afin de pouvoir porter le sigle CE de l'Union européenne. Il en résulte qu'il peut être sensible à des niveaux de radiation/d'interférence ou à des fréquences se situant hors des limites testées.

ATTENTION Ce matériel est conçu pour effectuer des analyses chromatographiques d'échantillons préparés selon des méthodes appropriées. Il convient de le faire fonctionner avec les gaz et/ou les solvants adéquats et dans les limites des pressions, des débits et des températures maximales spécifiées dans le présent manuel.

ATTENTION Le client est tenu d'informer le service Varian d'assistance à la clientèle que son matériel a été utilisé pour l'analyse d'échantillons biologiques dangereux, radioactifs ou toxiques avant que n'en soit effectué la maintenance.

Risques de chocs électriques

- Déconnecter le matériel de toute source d'alimentation avant d'en démonter les panneaux de protection, sous peine de s'exposer à des tensions dangereuses.
- En cas d'utilisation d'un cordon d'alimentation n'étant pas d'origine, s'assurer que celui-ci soit conforme à la polarité et au codage des couleurs décrits dans le manuel d'utilisation ainsi qu'à toutes les normes régionales de sécurité régissant le secteur de la construction.
- Remplacer les fusibles sautés par des fusibles de même type que ceux stipulés sur le panneau des fusibles ou dans le manuel d'utilisation.
- Remplacer les cordons d'alimentation défectueux ou dénudés par des cordons d'alimentation de même type.
- S'assurer que les sources de tension et la tension de secteur correspondent à la tension de fonctionnement du matériel.

Bouteilles à gaz comprimé

- Ranger et manipuler les bouteilles à gaz comprimé avec précaution et conformément aux normes de sécurité.
- Fixer les bouteilles à gaz comprimé à un mur ou à une structure inamovible.
- Ranger et déplacer les bouteilles à gaz comprimé en position verticale. Avant de transporter les bouteilles à gaz comprimé, retirer leur régulateur.
- Ranger les bouteilles dans un endroit bien ventilé et à l'abri de la chaleur, des rayons directs du soleil, du gel ou des sources d'allumage.
- Marquer les bouteilles de manière à n'avoir aucun doute quant à leur contenu.
- N'utiliser que des connexions et régulateurs agréés.
- N'utiliser que des tuyaux de raccordement propres sur le plan chromatographique (Varian P/N 03-918326-00) et pouvant supporter des pressions sensiblement plus élevées que la plus haute pression de sortie du régulateur.

Mesures de sécurité en CPG

Système d'échappement

Les détecteurs CPG installés dans une pièce bien ventilée ne nécessitent pas de conduits spéciaux d'échappement excepté lorsqu'ils sont destinés à analyser des substances chimiques dangereuses. Lors de l'installation de tels conduits:

- N'utiliser que des conduits à l'épreuve du feu
- Installer un ventilateur à la sortie du conduit.
- Placer les orifices d'aspiration de manière à ce que les vibrations ou les mouvements d'air n'affectent pas le fonctionnement du détecteur.
- Vérifier périodiquement l'état du conduit.
- S'assurer que le laboratoire est correctement ventilé.

Détecteurs à source radioactive

- Se conformer au manuel d'utilisation de l'ECD Ni^{63}, en particulier à ses **NOTES**, **MISES EN GARDE ET AVERTISSEMENTS**.
- Effectuer les tests de décontamination radioactive décrits dans le manuel d'utilisation de l'ECD Ni^{63}.
- Se conformer aux procédures et au calendrier des essais d'étanchéité.

Risque de brûlures

Les zones des chromatographes à gaz chauffées ou traitées cryogéniquement peuvent rester très chaudes ou très froides durant une période plus ou moins longue après la mise hors tension du matériel. Pour éviter les brûlures, s'assurer que ces zones sont revenues à température ambiante ou utiliser un dispositif adéquat de protection des mains avant de les toucher.

Mesures de sécurité en CPL

Risques liés aux hautes pressions

En cas de rupture d'un tuyau ou en cas d'ouverture accidentelle d'une vanne alors que le système est sous pression, la pompe peut occasionner des dommages en expulsant à grande vitesse des jets de liquides volatiles et/ou toxiques.

- Mettre un masque de protection lors de l'injection des échantillons ou en effectuant les opérations de maintenance de routine.
- Ne jamais déconnecter un conduit de solvant ou une vanne sous pression. Arrêter préalablement la pompe et laisser la pression descendre à zéro.
- Utiliser des réservoirs incassables à 50-60 psi.
- Laisser l'enceinte du réservoir fermée lorsque le réservoir est sous pression.
- Se conformer aux **NOTES**, **MISES EN GARDE ET AVERTISSEMENTS** du manuel d'utilisation**.**

Chromatographie Flash

L'utilisateur aura la connaissance des propriétés physico-chimiques des constituants de la phase mobile.

Eviter le contact direct des solvants avec les tuyaux en polyuréthane : certains solvants sont susceptibles de provoquer des faiblesses et des fuites avec risques d'explosion.

Tous les constituants du système devront être connectés à une source de courant commune et à une prise de terre commune. Cette prise de terre devra être fixe et non mobile.

Les solvants non-polaires peuvent produire de l'électricité statique lorsqu'ils passent au travers du système. Les bouteilles qui contiennent la phase mobile (incluant les tuyaux et les flacons de collecte de fractions) doivent être mises à la terre pour éliminer l'électricité statique.

Utiliser des appareils de mesure et de décharge d'électricité statique (par exemple des ionisateurs d'air) pour combattre la formation d'électricité statique.

Radiations ultraviolettes

Les détecteurs CPL utilisant une source lumineuse ultraviolette comportent un écran destiné à se prémunir contre les expositions aux rayonnements.

Pour s'assurer une protection permanente:

- Vérifier que le couvercle de protection de la lampe des détecteurs opérant à des longueurs d'onde variables et fixes soit bien en place durant le fonctionnement du matériel.
- Ne pas regarder directement les cellules du détecteur ou la source d'UV. Se protéger systématiquement les yeux lors du contrôle de la source lumineuse ou des cellules, par exemple au moyen de verres borosilicatés ou en polystyrène.

Disponibilité des pièces de rechange

La politique de Varian consiste à fournir des pièces de rechange pour tous les appareils et accessoires majeurs durant une période de cinq (5) ans après livraison de leur production finale. Les pièces de rechange ne sont fournies au terme de cette période de cinq (5) ans que suivant les disponibilités. Il faut entendre par pièces de rechange les pièces individuelles électriques ou mécaniques susceptibles de défaillance au cours de leur utilisation normale. Par exemple, les relais, les lampes, les sondes thermiques, les éléments de détecteur, les moteurs, etc. Les parties en tôles, les éléments ou assemblages structurels et les pièces de fonderie, les cartes à circuits imprimés et les modules fonctionnels sont normalement susceptibles d'être remis à l'état neuf pendant toute la durée de leur vie utile et ne sont dès lors fournies, au terme de la production finale des appareils, que suivant les disponibilités.

Service d'assistance à la clientèle

Varian fournit divers services destinés à aider sa clientèle après expiration de la garantie: service de réparation sur base de contrats de maintenance à prix attractifs ou sur base d'accords à durée limitée portant sur du matériel spécifique; support technique et service de formation assurés par des chimistes qualifiés sur base contractuelle ou en fonction des besoins spécifiques.

Points de vente des instruments analytiques Varian

Contactez votre point de vente régional Varian pour toute question commerciale ou de service d'assistance à la clientèle ou pour passer commande de pièces et de fournitures.

Argentina
Buenos Aires
Tel. +54.11.4.783.5306

Australia
Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria
Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux
Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)
São Paulo
Tel. +55.11.820.0444

Canada
Mississauga, Ontario
Tel. 800.387.2216

China
Beijing
Tel. +86.106209.1727

Europe
Middelburg, The Netherlands
Tel. +31.118.671.000

France
Les Ulis Cédex
Tel. +33.1.6986.3838

Germany
Darmstadt
Tel. +49.6151.7030

India
Mumbai
Tel. +91.22.857.0787/88/89

Italy
Torino
Tel. +39.011.997.9111

Japan
Tokyo
Tel. +81.3.5232.1211

Korea
Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)
Mexico City
Tel. +52.5.523.9465

Russian Federation
Moscow
Tel. +7.095.937.4280

Spain
Madrid
Tel. +34.91.472.7612

Sweden
Solna
Tel. +46.8.445.1620

Switzerland
Varian AG
Tel. +41.848.803.800

Taiwan
Taipei Hsien
Tel. +886.2.698.9555

United Kingdom and Ireland
Walton-on-Thames
Tel. +44.1932.898000

Venezuela
Valencia
Tel. +58.41.257.608

United States
Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)

Tel. +1.800.367.4752
(LC)

www.varianinc.com

Informazioni sulla Sicurezza

Instruzioni per l'Uso

Questo manuale ha lo scopo di aiutare l'operatore ad utilizzare lo strumento in modo sicuro ed efficiente. Le considerazioni e le precauzioni speciali vengono presentate in questo manuale sotto forma di avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE**. E' importante che lo strumento venga utilizzato rispettando le istruzioni fornite in questo manuale o che verranno fornite successivamente dalla Varian. Per ogni eventuale chiarimento sull'uso o sulla sicurezza, si prega di contattare la Varian di Leinì (TO).

NOTA

Sono informazioni utili ad ottenere le prestazioni migliori da parte dello strumento.

ATTENZIONE

Allerta l'operatore su situazioni che potrebbero causare ferite leggere e danni limitati allo strumento ed il modo di evitarle.

ATTENZIONE

Allerta l'operatore su situazioni potenzialmente pericolose che possono causare danni molto seri ed il modo di evitarle.

Segnali di ATTENZIONE	Descrizione del Pericolo
 **ATTENZIONE** **Pericolo di folgorazioni**	Nello strumento sono presenti tensioni pericolose. Scollegare il cavo di alimentazione prima di togliere il pannello fissato con le viti.
 **ATTENZIONE** **ESPOSIZIONE A SOSTANZA CHIMICHE**	Possono essere presenti composti chimici pericolosi. Evitare il contatto, specialmente quando si riempiono i contenitori. Usare protezioni opportune per la pelle e per gli occhi.
 **ATTENZIONE** **Pericolo di scottature**	Pericolo di esposizione a superfici molto calde o raffreddate criogenicamente. Usare protezioni opportune per la pelle.
 **ATTENZIONE** **PERICOLO PER GLI OCCHI**	Particelle volanti, agenti chimici o radiazioni UV possono danneggiare gli occhi. Vanno quindi utilizzate le opportune protezioni per gli occhi e per il volto.
 **ATTENZIONE** **Pericolo di incendio**	Pericolo potenziale di incendio. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.
 **ATTENZIONE** **Pericolo di esplosioni**	C'è pericolo di esplosioni a causa del tipo di gas o liquido utilizzato.
 **ATTENZIONE** **Pericolo di radiazioni**	E' presente una radiazione ionizzante. Seguire le istruzioni del manuale per lavorare con una maggiore sicurezza.
 **ATTENZIONE** **Parti in movimento**	Non tenere le mani o le dita vicino.

Norme di Sicurezza

Per lavorare in modo sicuro sullo strumento, Vi consigliamo si adottare le seguenti procedure.

- Verificare periodicamente che non ci siano perdite sulle linee e sui raccordi pneumatici.
- Evitare che le linee dei gas vengano piegate o forate. Le linee vanno posizionate in modo tale da non essere calpestate e lontane da sorgenti o troppo calde o troppo fredde.
- I solventi organici vanno conservati in armadi speciali antiincendio, ventilati e con indicazioni chiare sul contenuto di materiali tossici e/o infiammabili.
- Non accumulare i solventi utilizzati. Adottare un programma regolare di smaltimento, ma mai nelle acque di scarico.

AVVERTENZA: Questo strumento è stato testato secondo le Direttive EMC allo scopo di poter utilizzare il Marchio CE della Comunità Europea. Questo strumento può essere suscettibile a radiazioni/interferenze o frequenze che non sono entro i limiti collaudati.

ATTENZIONE Questo strumento è progettato per l'analisi cromatografica di campioni opportunamente preparati. Deve essere utilizzato usando gas e solventi adatti a questo scopo ed entro i limiti massimi di pressione, flusso e temperatura riportati in questo manuale. Se lo strumento non viene utilizzato secondo le modalità specificate dal costruttore, le condizioni di sicurezza previste potranno non essere sufficienti.

ATTENZIONE E' responsabilità del Cliente informare il Servizio Tecnico Varian, prima di qualsiasi intervento di riparazione, se lo strumento è stato utilizzato per l'analisi di campioni biologicamente pericolosi, radioattivi o tossici.

Pericoli Elettrici

- Prima di togliere i pannelli di protezione, scollegare lo strumento da tutte le alimentazioni elettriche in modo da evitare l'esposizione a voltaggi potenzialmente pericolosi.
- Quando si rende necessario sostituire il cavo di alimentazione, assicurarsi che il nuovo cavo rispetti sia le codifiche di colore e di polarità riportate nel manuale di istruzioni che quelle stabilite dalle norme di sicurezza del laboratorio.
- Sostituire i fusibili bruciati solo con fusibili che abbiano le stesse caratteristiche; queste ultime sono riportate sul pannello dei fusibili e/o nel manuale di istruzioni.
- Sostituire immediatamente i cavi di alimentazione difettosi o consumati con cavi dello stesso tipo e con le stesse caratteristiche.
- Assicurarsi che il voltaggio del pannello di alimentazione corrisponda a quello dello strumento da collegare.

Bombole dei Gas

- Occorre prestare molta attenzione quando si spostano bombole di gas compressi. Rispettare tutte le norme di sicurezza.
- Assicurare le bombole ad una parete o ad una struttura fissa.
- Spostare e conservare le bombole sempre in posizione verticale. Togliere i manometri prima di spostare le bombole.
- Conservare le bombole in un'area ben ventilata, non infiammabile, lontana da sorgenti di calore, non esposta a temperature troppo fredde o alla luce diretta del sole.
- Evidenziare in modo chiaro e che non lasci dubbi il contenuto di ogni bombola.
- Usare solo manometri e raccordi di qualità.
- Usare solo tubazioni cromatograficamente pulite (Numero di Parte Varian 03-918326-00) e calibrate per pressioni superiori a quella massima di uscita dal manometro.

Procedure di Sicurezza in GC

Scarico dei Gas

Per i rivelatori GC non è richiesto alcun sistema particolare di scarico dei gas, se lo strumento è installato in una stanza ben ventilata e se non viene utilizzato per l'analisi di sostanze chimiche pericolose. Se si deve installare un sistema di scarico dei gas:

- Usare condutture non infiammabili
- Installare un aspiratore in uscita
- Posizionare la presa d'aria in modo che le vibrazioni e il movimento dell'aria non disturbino il rivelatore.
- Eseguire verifiche periodiche per garantire un funzionamento corretto.
- Garantire una buona ventilazione nel laboratorio.

Rivelatori a Sorgente Radioattiva

- Leggere e rispettare tutte gli avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE** riportati nel manuale del rivelatore ECD al Ni^{63}.
- Eseguire tutti i test di contaminazione radioattiva rimovibile descritti nel manuale dell'ECD al Ni^{63}.
- Rispettare tutte le procedure e le scadenze di verifica per eventuali perdite.

Pericolo di Scottature

Le zone calde o raffreddate criogenicamente del gascromatografo possono mantenere la loro temperatura per parecchio tempo, dopo aver spento lo strumento. Per evitare scottature, assicurarsi che le zone riscaldate o raffreddate siano a temperatura ambiente oppure indossare delle protezioni adeguate prima di toccare tali superfici.

Procedure di Sicurezza in LC

Pericolo di Alte Pressioni

In caso di rottura di una linea o di apertura accidentale di una valvola, quando il sistema è sotto pressione, la pompa può liberare liquidi tossici e/o volatili molto pericolosi.

- E' opportuno adottare un sistema di protezione del viso quando si inietta il campione o si esegue una manutenzione routinaria del sistema.
- Non smontare mai una linea del solvente od una valvola quando il sistema è sotto pressione. Fermare prima la pompa ed aspettare che la pressione scenda a zero.
- Usare dei contenitori per solventi infrangibili ed in grado di lavorare a 50-60 psi.
- Quando i contenitori sono sotto pressione, usare una protezione esterna.
- Leggere e rispettare tutti gli avvisi di **NOTA**, **CAUTELA** e **ATTENZIONE.**

Cromatografia Flash

L'operatore deve conoscere le proprietà fisico-chimiche delle componenti della fase mobile.

I solventi non vanno messi in contatto diretto con il tubo di erogazione in poliuretano, dal momento che alcuni solventi possono causare indebolimento e perdite con possibili scoppi.

Tutte le componenti del sistema vanno collegate ad una fonte di alimentazione e ad una messa a terra comuni. E' meglio che per quest'ultima venga utilizzata una spina con polo di terra.

I solventi non-polari possono sviluppare una carica statica quando vengono pompati attraverso il sistema. Tutti i recipienti che contengono la fase mobile (inclusi i tubi e i recipienti di raccolta) devono avere una messa a terra per disperdere l'elettricità statica.

Vanno utilizzati dispositivi di misurazione e scarico (ad esempio ionizzatori d'aria) per evitare l'aumento di elettricità statica.

Radiazioni Ultraviolette

I rivelatori di cromatografia liquida che usano sorgenti a luce ultravioletta montano degli schermi di protezione per evitare che gli operatori siano esposti a radiazioni pericolose.

Per una protezione sicura:

- Assicurarsi che i coperchi delle lampade dei rivelatori a lunghezza fissa e variabile siano sempre al loro posto, quando si lavora.
- Non guardare mai direttamente dentro le celle o alla sorgente di luce UV. Quando si vuole ispezionare la lampada o le celle, usare sempre delle protezioni adatte per gli occhi, quali vetro in borosilicato e polistirolo.

Disponibilità delle Parti di Ricambio

E' politica della Varian il fornire le parti di ricambio per lo strumento ed i suoi accessori per un periodo di cinque (5) anni a partire dalla data di produzione dell'ultima unità della serie. Le parti di ricambio saranno disponibili anche dopo questo periodo di cinque (5) anni ma solo in base alla disponibilità delle stesse. Per parti di ricambio si intendono i componenti elettrici e meccanici soggetti ad usura durante l'uso, in condizioni normali, dello strumento. Come esempio, citiamo i relay, le lampade, i probe di temperatura , i componenti del rivelatore, i motorini, ecc. Le parti strutturali o da fusione, le schede elettroniche ed i moduli funzionali possono essere ricostruiti e rimessi a nuovo durante tutto il loro periodo di vita e perciò sarà possibile acquistarli, dopo la produzione dell'ultima unità delle serie, solo in base alla loro disponibilità.

Servizi Tecnico

La Varian, alla scadenza del periodo di garanzia, è in grado di fornire ai suoi clienti un'ampia scelta di opzioni. Le riparazioni possono essere effettuate sulla base di contratti di manutenzione particolarmente vantaggiosi od in base ad una tariffa oraria piu' il costo delle parti. A richiesta, si possono avere corsi per operatori sia sotto forma di contratto che a tariffe da concordare.

Uffici Vendite della Divisione Strumenti Analitici della Varian

Per informazioni relative alla Vendita, al Servizio Tecnico o all'acquisto di Parti di ricambio, si prega di contattare l'ufficio Varian piu' vicino.

Argentina
Buenos Aires
Tel. +54.11.4.783.5306

Australia
Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria
Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux
Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)
São Paulo
Tel. +55.11.820.0444

Canada
Mississauga, Ontario
Tel. 800.387.2216

China
Beijing
Tel. +86.106209.1727

Europe
Middelburg, The Netherlands
Tel. +31.118.671.000

France
Les Ulis Cédex
Tel. +33.1.6986.3838

Germany
Darmstadt
Tel. +49.6151.7030

India
Mumbai
Tel. +91.22.857.0787/88/89

Italy
Torino
Tel. +39.011.997.9111

Japan
Tokyo
Tel. +81.3.5232.1211

Korea
Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)
Mexico City
Tel. +52.5.523.9465

Russian Federation
Moscow
Tel. +7.095.937.4280

Spain
Madrid
Tel. +34.91.472.7612

Sweden
Solna
Tel. +46.8.445.1620

Switzerland
Varian AG
Tel. +41.848.803.800

Taiwan
Taipei Hsien
Tel. +886.2.698.9555

United Kingdom and Ireland
Walton-on-Thames
Tel. +44.1932.898000

Venezuela
Valencia
Tel. +58.41.257.608

United States
Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)

Tel. +1.800.367.4752
(LC)

VARIAN

www.varianinc.com

Instrucciones de Seguridad

Instrucciones de Operación

Este Manual de Instrucciones está diseñado para ayudarle a establecer las condiciones de operación que le permitan operar su instrumento de forma segura y eficaz. Así mismo, se describen consideraciones especiales ó precauciones, que aparecen en forma de **NOTA**, **PRECAUCION**, y **ATENCION** como se indica más abajo.Es importante que utilice el instrumento de acuerdo con este Manual de Operación y cualquier otra información que le proporcione Varian. Remita a la Oficina Local de Varian cualquier cuestión que tenga respecto al correcto uso de su equipo.

NOTA

Información para ayudarle a obtener unas prestaciones óptimas de su instrumento.

¡PRECAUCION!

Le alerta de situaciónes que pueden causar daños moderados a la salud ó al equipo, y cóm evitar esas situaciones.

ATENCIÓN

Le alerta de potenciales situaciones peligrosas que pueden causar serios daños, y cómo evitar esas situaciones.

Símbolo	Descripción
 **ATENCIÓN PELIGRO DE DESCARGA ELÉCTRICA**	El instrumento utiliza voltages peligrosos. Desconecte el interruptor general antes de retirar los paneles atornillados.
 **ATENCIÓN PELIGRO QUÍMICO**	Peligro de productos químicos. Evite el contacto, especialmente cuando rellene los depósitos. utilice protección de ojos y piel.
 **ATENCIÓN PELIGRO DE QUEMADURAS**	Superficies posiblemente calientes ó frías (criogénico). Utilice protección para la piel.
 **ATENCIÓN PELIGRO PARA LOS OJOS**	Las partículas volátiles, productos químicos o radiación UV pueden causar daños en los ojos. Usar las debidas protecciones para la cara y los ojos.
 **ATENCIÓN PELIGRO DE FUEGO**	Peligro potencial de fuego. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.
 **ATENCIÓN PELIGRO DE EXPLOSIÓN**	Peligro potencial de explosión debido al tipo de gas ó líquido empleado.
 **ATENCIÓN PELIGRO DE RADIACIÓN**	Peligro por Fuente de radiación. Siga las instrucciones del Manual de Operación para su seguro funcionamiento.
 **ATENCIÓN PARTES EN MOVIMIENTO**	Mantenga alejados los dedos y las manos.

Precauciones Generales de Seguridad

Siga estas indicaciones de seguridad para una correcta operación del equipo.

- Realice verificaciones periódicas de fugas en todas las líneas de suministro y tuberías.
- No permita que las líneas de gas se doblen ó pinchen. Manténgalas alejadas de zonas de paso y del calor ó frío excesivo.
- Guarde los disolventes orgánicos en cabinas ventiladas, a prueba de fuego, y etiquetadas para que puedan ser fácilmente identificadas como material tóxico y/ó inflamable.
- No acumule disolventes inservibles. Deseche todo el material inservible a través de un programa especial de desechos y no a través del sistema convencional.

NOTA: Este instrumento ha sido testado bajo las normas de la Directiva EMC según requerimientos de la Marca CE de la Unión Europea. Por lo tanto, este equipo puede ser sensible a niveles de radiaciones / interferencias ó frecuencias que no estén incluidas dentro de los límites testados.

ATENCIÓN Este instrumento está diseñado para análisis cromatográfico de muestras preparadas apropiadamente. Debe ser operado usando gases y/ó disolventes apropiados y con unos niveles máximos de presión, flujos y temperaturas, según se describe en este manual.

ATENCIÓN El Usuario tiene la obligación de informar al Servicio Técnico de Varian cuando el instrumento vaya a ser empleado para análisis de muestras peligrosas de origen biológico, radioactivo ó tóxico, antes de comenzar a realizar cualquier análisis.

Peligros Eléctricos

- Desconecte el instrumento de todos las conexiones eléctricas a la red antes de retirar los paneles para evitar la posible exposición a peligrosos voltages.
- Cuando sea necesario emplear una clavija eléctrica no original, asegurese de colocar los cables de acuerdo con el código de colores y polaridades descritos en el manual y los códigos de seguridad de la red eléctrica.
- Sustituya los fusibles fundidos con fusibles del tipo y tamaño estipulados en el panel de fusibles ó en el manual.
- Sustituya los cables deteriorados inmediatamente con cables del mismo tipo y graduación.
- Asegureses de que los valores de las líneas de electricidad se ajustan a los valores para los que el Instrumento ha sido preparado.

Botellas de Gas Comprimido

- Guarde y maneje las botellas de gas con cuidado y de acuerdo con las normas de seguridad.
- Asegure las botellas a una estructura inmovil ó a la pared.
- Guarde y mueva las botellas en posición vertical. Retire los reguladores antes de transportarlas.
- Guarde las botellas en un área ventilada, lejos de fuentes de calor, de luz solar directa y de temperaturas extremadamente bajas.
- Identifique las botellas claramente para evitar cualquier duda sobre su contenido.
- Utilice sólamente reguladores y conexiones aprobadas.
- Utilice sólo tubos de conexión cromatográficamente límpios (Varian p/n 03-918326-00) y que tengan una graduación de presión significativamente mayor que la mayor presión del regulador.

GC Prácticas de Seguridad

Sistema de Extracción

No se necesita un sistema de extracción para los detectores GC instalados en un laboratorio bien ventilado, excepto cuando se analicen muestras químicas peligrosas. Si instala un sistema de extracción:

- Utilice conductos a prueba de fuego.
- Instale un ventilador al final del sistema.
- Instale entradas de aire cuya vibración no afecte al trabajo del detector.
- Compruebe periódicamente el correcto funcionamiento del sistema.
- Asegurese de una correcta ventilación del laboratorio.

Detectores con fuentes radioctivas

- Lea con cuidado y cumpla todas las **NOTAS**, **PRECAUCION**, y **ATENCION** del Manual del Detector Ni^{63} ECD.
- Realice los test de contaminación radioactiva descritos en el Manual del Detector Ni^{63} ECD.
- Cumpla con los plazos y procedimientos de test de fugas.

Peligro de Quemaduras

Las zonas de calor ó frío (criogénicas) del Cromatógrafo de Gases pueden permanecer calientes ó frías durante bastante tiempo después de apagar el instrumento. Para evitar quemaduras asegureses de que todas las áreas que se calienten ó enfríen han vuelto a la temperatura ambiente, ó protejase adecuadamente las manos, antes de tocar las superficies potencialmente calientes ó frías.

LC Prácticas de Seguridad

Peligro de Alta Presión

Si se rompe una línea de presión, ó se abre una válvula de seguridad accidentalmente bajo presión, la bomba puede generar líquidos a alta presión potencialmente peligrosos, produciendo un chorro a alta velocidad de líquidos volátiles y/ó tóxicos.

- Lleve protección facial cuando inyecte muestras ó realice mantenimiento de rutina.
- Nunca abra una línea ó una válvula bajo presión. Apague la bomba antes y deje que la presión baje a cero.
- Utilice depósitos irrompibles que sean capaces de operar a 50-60 psi.
- Mantenga cerrada la junta del depósito cuando se haye bajo presión.
- Lea y cumpla todas las **NOTA**, **PRECAUCION**, y **ATENCION** del manual.

Cromatografía Flash

El operador debe familiarizarse con las propiedades físico-químicas de los componentes de la fase móvil.

Alejar los disolventes del contacto directo con los tubos de poliuretano ya que ciertos disolventes pueden causar reblandecimiento de los tubos o posibles fugas con riesgo de explosión.

Todos los componentes del sistema deben estar conectados a un enchufe común con toma de tierra común. Esta toma de tierra debe ser una toma de tierra verdadera en lugar de flotante.

Los disolventes no-polares pueden originar carga estática cuando son bombeados por el sistema. Todos los recipientes que contienen fase móvil (incluyendo los tubos y los recipientes de recogida) deben estar conectados a tierra para disipar la electricidad estática.

Utilizar medidores de carga estática y los debidos dispositivos de descarga (por Ej., ionizadores de aire) para salvaguardarse contra la creación de electricidad estática.

Radiación Ultravioleta

Los detectores del Cromatógrafo de Líquidos que utilizan una fuente de luz ultravioleta disponen de protección para prevenir exposiciones radioactivas al personal.

Para una correcta protección:

- Asegurese de que las cubiertas de protección de la lámpara de los detectores está correctamente situada durante su funcionamiento.
- No mire directamente a las celdas del detector ó a la fuente de luz UV. Cuando inspeccione la fuente de luz ó la celda, utilice siempre una protección para los ojos como gafas de borosilicato ó poliestireno.

Disponibilidad de Recambios

Es Política de Varian disponer de Recambios para cualquier instrumento y la mayoría de los accesorios por un periodo de cinco (5) años después del último instrumento fabricado. Los recambios durante esos cinco años estarán disponibles, pero siempre bajo el sistema *"Según disponibilidad"*. Los Recambios están definidos como todas aquellas partes individuales mecánicas ó eléctricas que son susceptibles de fallo durante su normal proceso de operación. Por ejemplo, relés, lámparas, sondas de temperatura, elementos del detector, motores, etc. Las planchas de metal, partes de la estructura, placas de circuitos integrados, y otros módulos funcionales son normalmente susceptibles de reparación y por lo tanto sólo estarán disponibles bajos el sistema *"Según disponibilidad"* después del último instrumento fabricado.

Disponibilidad de Servicio

Varian ofrece una gran variedad de sistemas de Servicio para mantener el soporte a sus usuarios tras el periodo de garantía. El Soporte de Servicio se ofrece a través de atractivos Contratos de Servicio ó bajo un sistema de facturación de mano de obra y materiales. El mantenimiento y el entrenamiento se realiza por ingenieros cualificados bajo Contrato ó petición.

Oficinas de Instrumentación Analítica Varian

Para cualquier consulta sobre Instrumentación Analítica, Servicio Técnico ó Recambios y Accesorios, contacte con su oficina local:

Argentina
Buenos Aires
Tel. +54.11.4.783.5306

Australia
Mulgrave, Victoria
Tel. +61.3.9566.1134

Austria
Vösendorf bei Wien
Tel. +43.1.699.9669

Benelux
Bergen Op Zoom
Tel. +31.164.282.800

Brazil and Latin America (S)
São Paulo
Tel. +55.11.820.0444

Canada
Mississauga, Ontario
Tel. 800.387.2216

China
Beijing
Tel. +86.106209.1727

Europe
Middelburg, The Netherlands
Tel. +31.118.671.000

France
Les Ulis Cédex
Tel. +33.1.6986.3838

Germany
Darmstadt
Tel. +49.6151.7030

India
Mumbai
Tel. +91.22.857.0787/88/89

Italy
Torino
Tel. +39.011.997.9111

Japan
Tokyo
Tel. +81.3.5232.1211

Korea
Seoul
Tel. +82.2.345.22452

Mexico and Latin America (N)
Mexico City
Tel. +52.5.523.9465

Russian Federation
Moscow
Tel. +7.095.937.4280

Spain
Madrid
Tel. +34.91.472.7612

Sweden
Solna
Tel. +46.8.445.1620

Switzerland
Varian AG
Tel. +41.848.803.800

Taiwan
Taipei Hsien
Tel. +886.2.698.9555

United Kingdom and Ireland
Walton-on-Thames
Tel. +44.1932.898000

Venezuela
Valencia
Tel. +58.41.257.608

United States
Walnut Creek, California, USA
Tel. +1.800.926.3000
(GC and GC/MS)

Tel. +1.800.367.4752
(LC)

VARIAN

www.varianinc.com

Table of Contents

Introduction

Startup Checklist

This is a brief summary of the steps that must be completed for the proper installation of your ProStar 345 detector. Complete installation information is provided in the next section.

- Unpack and inspect your instrument
- Read the Safety Information at the front of this manual
- Position the detector appropriately
- Select voltage and check fuses
- Connect the power cord
- Complete rear panel connections
- Connect the flowcell
- Switch on the instrument
- Check initial response to power-on
- Check operation with a test sample

Manual Conventions

This manual uses several conventions. Among them are menu displays, text conventions (brackets, slashes, etc.), standard words, and several different icons.

Displays

Displays with two lines or less are shown in the manual as they appear on the instrument. Frequently the two lines shown on the display are only part of a longer display. In this manual, displays having more than two lines are represented as in the screen below.

```
Zero on λ change                Yes
Cursor Speed                    Medium
-----------------------------------------
Status Lock                     Off
READY Output                    Active Hi
```

Text

Three typographic conventions are used to differentiate between keys, menus, and fields.

Brackets, Slashes, and Capitalization

Brackets, [ ], indicate instrument keys. For example: Press [MENU].

Slashes, / /, are used around menu choices, e.g., *From the Main Menu, select /FILES/.*

Capitalization is used to make field and menu names appear just as they do on the display. Generally the first letters of field names are capitalized. For example:

Select /FILES/, /Copy/, Copy File #.

Standard Words

For the purposes of this manual, the meanings of two words: “select” and “enter” have been standardized.

Select is used when you need to choose from among available options. For example, to “select” a particular menu choice, you would move the cursor to the appropriate choice and press [ENTER]. To “select” a field entry, move the cursor to the

appropriate field and use the [+] and [-] keys to scroll to the desired preset value.

Enter is used when you need to specify individual alphanumeric digits. To “enter” a particular value, move the cursor to the desired field and use the [+] and [-] keys to increment or decrement each digit in the field until the desired value or letter appears.

Installation

Unpacking

Carefully remove the detector from the shipping container and inspect both the detector and packing for any signs of damage. Keep the shipping container as it provides excellent protection for your detector for any future transit or storage.

Any evidence of damage should be reported immediately to the carrier and to:

Varian Chromatography Systems
2700 Mitchell Drive
Walnut Creek, CA 94598-1675
Attention: Customer Service
1-800-FOR HPLC or your local Varian office

Check the contents against the enclosed packing list. Any discrepancies or missing items should be reported to the carrier and to Varian.

Installation

The following tools are required for installation:

- narrow-tip screwdriver (2 mm wide)
- #2 Phillips screwdriver

The ProStar 345 detector is a sensitive instrument and should always be handled with the degree of care appropriate to

laboratory instrumentation. After unpacking, place the detector near the column outlet to minimize the length of tubing necessary for connection to the flowcell inlet. The flow cell compartment is on the left when facing the front of the ProStar 345. For normal operation, the detector should be located on a firm flat surface away from:

- heat sources (such as direct sunlight or a heater vent)
- drafts (such as an open doorway, window, or air-conditioner vent)
- smoke or other vapor
- corrosive or dusty atmosphere
- vibration
- potential liquid spills

Allow at least five inches of clear space at the back of the instrument to allow a free flow of cooling air through the detector and access to the rear panel.

Voltage Selection

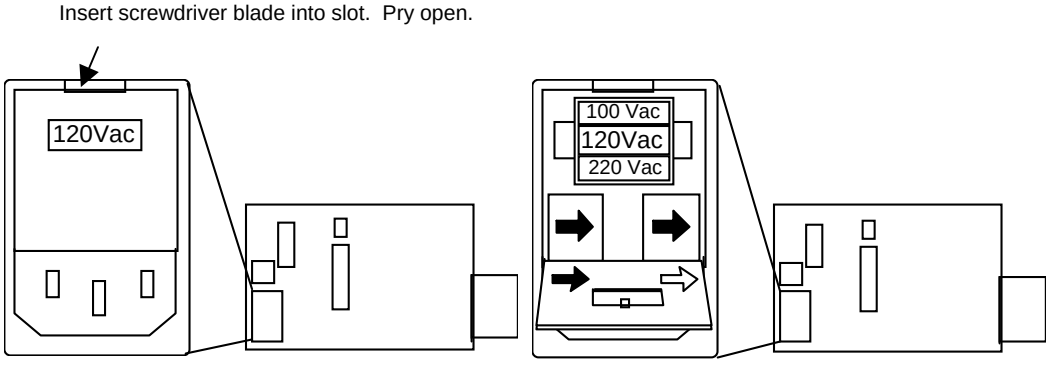
The detector is shipped with the voltage and fuses preset for 110 Vac. Verify the setting by looking through the cut-out window on the voltage selector cover, Figure 1. The cover is located at the bottom left of the detector rear panel. If the voltage setting satisfies your local site requirements, skip to Fuses, page 9. If not, proceed to the next section

WARNING

Do not plug in the instrument without first verifying that the voltage is properly set for your location. Never run the detector at more than 10% below the nominal line voltage.

Ensure that the voltage selector at the back of the instrument is set correctly before making electrical connections. Turn the detector so that you are facing the rear panel.

The connector for the power cord is at the lower left corner. The voltage selector cover panel, above the power connector, displays the current voltage setting through a cut-out panel. The voltage selector was factory set to the for the line voltage at the detector destination. If the voltage setting is not correct for your area, you must set it correctly before proceeding.



A. Power Connector/Voltage Selector with access panel closed.

B. Power Connector/Voltage Selector with access panel open.

Figure 1 Power Connector/Voltage Selector

1. Insert a small screwdriver blade into the slot at the top of the voltage selector access panel and gently pry the panel downward. Once unlatched, the panel will swing downward to reveal the voltage selector barrel and the two fuses.

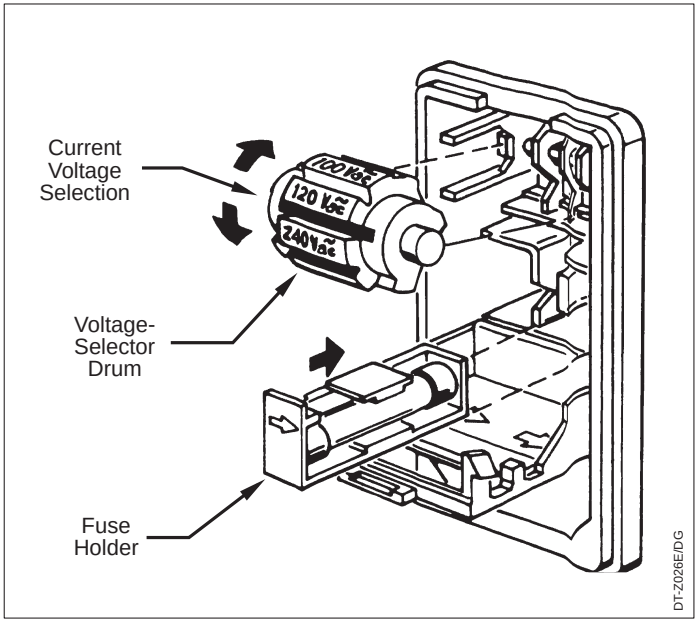


Figure 2 Voltage Selector and Fuse Holders

2. Remove the voltage selector barrel from the detector. The selector resembles a drum imprinted with four settings: 100, 120, 220, and 240V.

3. Rotate the barrel such that the desired voltage setting will be visible through the cut-out in the cover when replaced.

4. Replace the barrel in the detector. Before closing the cover, check the fuses according to the procedure below.

Fuses

Verify that your detector is fitted with the correct fuses.

1. Pull each fuse holder straight toward you. The fuse holders are the black squares with arrows located directly beneath the voltage selector.

2. Remove each fuse from its holder. Check the fuse amperage, voltage, and type according to the following description. You should have either:

   two 2-amp, sloblow fuses (for 100/120V), or

   two 1-amp, sloblow fuses (for 220/240V)

3. Assuming that you have the proper fuses, reinsert them and the fuse holders, making sure that the arrows on the holders point the same direction as the arrow on the cover panel.

4. Close the cover panel by swinging it upward and pressing it in until it snaps shut. The correct voltage should appear in the cut-out opening.

CAUTION

To avoid damaging the instrument, verify that the new voltage setting (displayed in the cut-out window) is correct before you switch on power.

Rear Panel Connections

Attach the power cord at the lower left of the detector rear panel. Do not switch on the power yet. Locate the two in-line connectors (8-pin and 12-pin) in your accessory kit and insert them in the appropriate sockets on the detector rear panel, Figure 3 or Figure 4. Note that the connectors are both keyed to their sockets, making it impossible to insert them incorrectly.

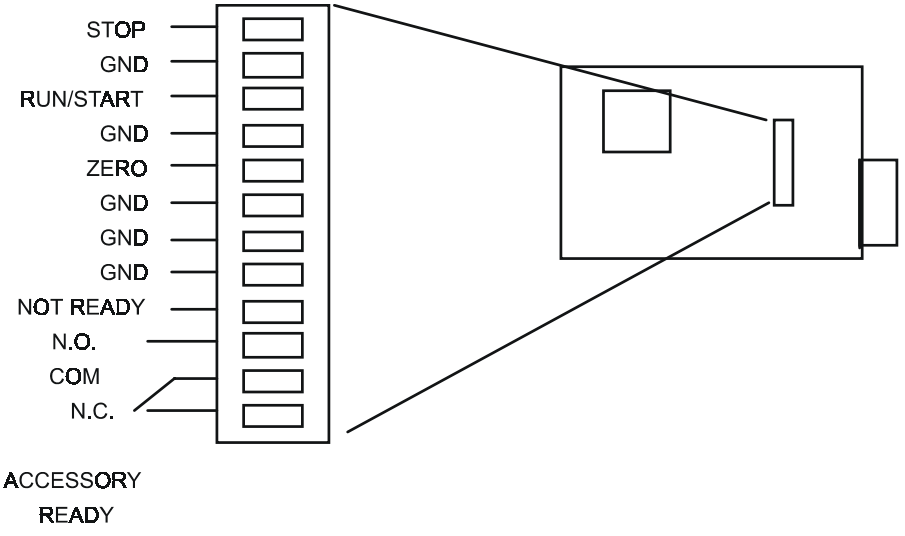


Figure 3 ProStar 345 Analog-Input Connections

The larger connector (Figure 3) is for analog inputs. It allows the detector to communicate with other devices in your liquid chromatographic system. The smaller connector (Figure 4) delivers two analog outputs (CH1 and CH2). Use the cables supplied with your detector to complete the connections described in this section. For each connection, loosen the small setscrew located next to the appropriate terminal, insert the cable bare wire, and hold it in place while you tighten the screw.

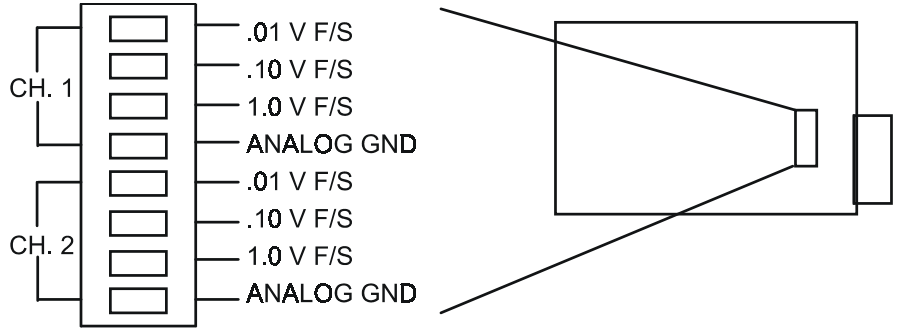


Figure 4 ProStar 345 Analog-Output Connections

Connecting an Integrator, Workstation, or Recorder

Connect your integrator/workstation to the 1.0V F/S and corresponding ANALOG GND terminals.

NOTE: The 0.01 and 0.10V F/S terminals are provided for recorders and special applications. We recommend that you use only the 1.0V F/S terminal for an integrator or workstation.

Connect the positive input from your recorder to the full-scale voltage (0.01, 0.10, or 1.0V) appropriate for your recorder. Connect the recorder floating-ground input to the corresponding ANALOG GND terminal.

NOTE: Do not connect the detector ANALOG GND to any earth ground on your recorder. This would lead to creation of a ground loop resulting in an increased noise level and a decrease in sensitivity.

Remote Communications Connections

The ProStar 345 can accept inputs from, and send inputs to, remote devices through the Analog Output connector, Figure 4. If your chromatographic system has programmable timed events you can use one to zero the detector signal automatically during a run.

The terminals available on the ProStar 345 remote communications connector are labeled STOP, RUN/START, and ZERO (each with a ground terminal), and Accessory Relay.

STOP — You can use a timed event from your chromatographic system to take the detector out of run by connecting the system event to the detector STOP and ANALOG GND terminals.

RUN/START — You can use the remote-start event on your injector or autosampler to put the detector into run automatically whenever an injection occurs by connecting the event to the detector

RUN/START and ANALOG GND terminals.

ZERO	You can zero the detector signal automatically by connecting a timed event on your chromatograph to the detector ZERO and ANALOG GND terminals.
NOT READY	The detector is capable of driving one TTL load through the NOTREADY terminals each time it goes to its READY state. This ability to signal other instruments is particularly useful with autosamplers, where the detector can signal that it is ready for the next injection in an automated series of runs. To hook up the NOTREADY terminals, connect the one input lead from the other instrument to the detector NOTREADY and GROUND terminals.

Flowcell Connections

1. Although the flowcell assembly is located behind the forward enclosure (Figure 5) you need not remove the enclosure to connect your inlet and outlet lines.

2. Using finger-tight nut and ferrule sets connect the column outlet directly to the detector fluid inlet on the left side of the flowcell, Figure 5. If additional tubing is required to reach the inlet, use a zero dead-volume union.

3. Connect the detector fluid outlet to the supplied low-pressure union and waste tubing.

NOTE: If you have several detectors hooked up in series, place the ProStar 345 closest to the column outlet; its flowcell can withstand high pressure.

4. Replace the side enclosure of the detector, making sure that the tubing passes through the slots without being pinched.

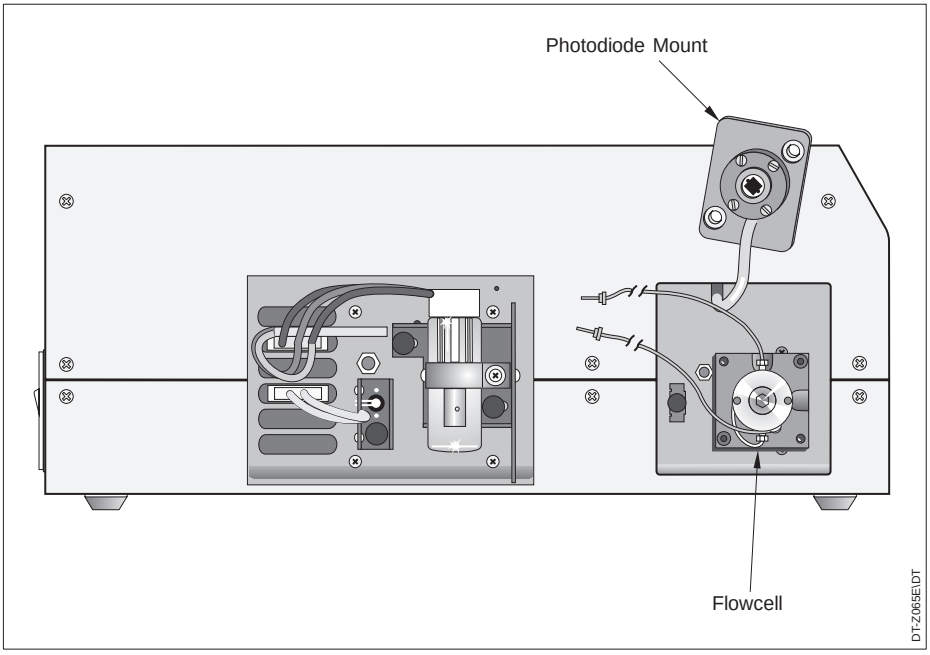


Figure 5 ProStar 345, Inside the Side Enclosure

Optional Flowcells

Several different flowcells are available for use in different applications. Each flowcell has distinct design characteristics and performance specifications. These characteristics are compiled in Table 1.

Table 1 Design and performance specifications for optional flowcells

Flowcell	Path length (mm)	Volume (µL)	Tubing Dia (in.)	Material*	Max Flow (mL/min)	Max Press (bar)
Analytical LC	6	9	.01	SS	50	68
Analytical LC	10	15	.01	SS	50	68
Microbore	3	1.2	.005	SS	10	68
Microbore	6	7	.007	SS	20	68
Semi-Prep	3	4.5	0.02	SS	100	68
* All cells have sapphire windows. All but the prep cells have a heat exchanger.						

Flowcell Orientation

The flowcell shipped with your ProStar 345 detector is properly oriented on its black-anodized backing plate. However, should you subsequently order one or more additional cells to enhance the versatility of your instrument, the cell(s) you receive may be configured for vertically-oriented applications. As shown in Figure 6, this orientation is characterized by the photodiode standoffs being positioned at the upper right and lower left corners of the flowcell assembly and the tapered cut-away areas being positioned at the top and the right of the assembly.

In order to use any of the vertically-oriented flowcells with your ProStar 345, you must remove the two flowcell mounting screws and rotate the flowcell 90° on the flowcell holder as described in the following instructions.

Figure 7 shows the vertically-oriented flowcell as shipped. Note the vertical orientation of the flowcell inlet and outlet connections relative to the photodiode standoffs and the tapered cut-aways at the top and right of the cell holder.

NOTE: Figure 6 and Figure 7 show the tubing clamp as an aid to the proper positioning of the inlet and outlet tubes. The tubing clamp is actually mounted on the detector and is not part of the flowcell assembly. To ensure proper alignment, always hold the cell holder and flowcell in the orientation shown in the illustrations.

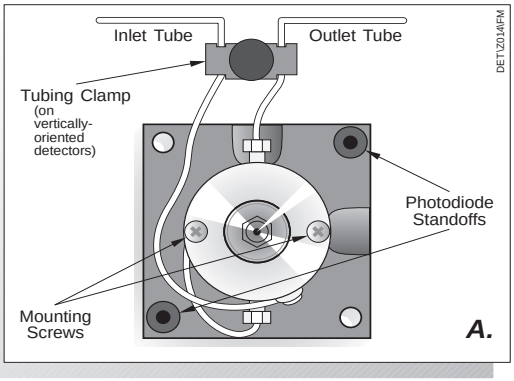


Figure 6 Alignment of vertically-oriented flowcells

Re-orienting the Flowcell

Use the following steps to re-orient a flowcell:

1. Remove the two Phillips-head mounting screws that secure the flowcell to the black-anodized flowcell holder and set them aside.

2. Maintaining the flowcell in the vertical position shown in Figure 6 and Figure 7, rotate the black cell-holder 90° clockwise. Don't rotate the flowcell body itself. Part B of Figure 7 shows the cell holder in its new horizontally-oriented position. Note, in particular, the new position of the photodiode standoffs and the tapered cut-aways.

3. Reattach the flowcell body by replacing and securing the mounting screws.

4. Bend the inlet and outlet tubes gently as shown in Part C of Figure 7. The inlet tube (wound around the cell body) should always enter at the bottom of the flowcell; the outlet tube should always exit at the top of the flowcell.

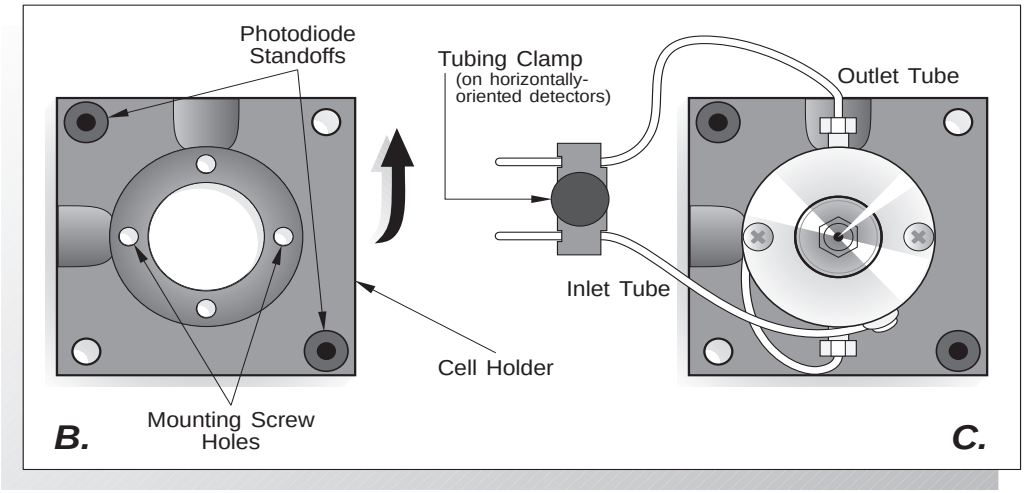


Figure 7 Changing the Alignment of a Vertically-Oriented Flowcell

Turn the cell holder as shown in Part B. Align the inlet and outlet tubes with the tubing clamp as shown in Part C.

Using the ProStar 345

This section describes the three basic rules for using your ProStar 345 detector. It also introduces the instrument and describes the conventions in this manual. Before you start this section, read the Safety Information located at the beginning of this manual and install your detector as described on the previous pages. While you read these descriptions, you can explore the general architecture of the ProStar 345 menus and screens, using the Menu Tree, page 103.

Finding Your Way Around

When using your ProStar 345 detector, remember these three rules:

1. The arrow keys, [▲] [▼] [◀] [▶] move the cursor in the direction printed on the key.

NOTE:	Press [MENU] to move quickly to the top of the menu structure.

2. The shape of the cursor determines how a selection is made:

   If a *triangular* cursor appears, press [ENTER]

   If a *blinking square* cursor appears, press [+] or [-] to change values. Depending on the field, you will scroll up or down through preset choices, or change alphanumeric entries one letter or digit at a time.

3. There are four ways to accept (and automatically save) an entry. Just move the cursor out of the field by any of the following methods:

   - Pressing [ENTER].
   - Using the arrow keys: [▲] [▼] [◀] [▶]
   - Pressing [MENU].
   - Pressing [STATUS].

NOTE:	You cannot leave a menu if there are errors present or if all necessary entries are not completed.

Visual Clues

The following conventions are used on the ProStar 345 display:

1. Top-level menu choices are displayed in CAPITAL letters.
2. A square cursor in a field (■) changes to an underscore cursor (_) when you scroll through preset choices or enter numerical values and characters.

3. A solid down-arrow (▼) on the right side of some displays indicates that the current menu continues on additional screens. To access additional menu lines, press the down-arrow key, [▼].

4. The last line of a longer menu is frequently a blank display line without a solid down-arrow, (▼).

Instrument Control

Menus and control operations are accessed from the key pad and two-line display on the front panel. A brief explanation of the keys and the main menus and screens follows.

The keypad of each ProStar 345 detector consists of twelve keys Four keys directly control the ProStar 345 operation: [START], [STOP], [STATUS], and [ZERO]. The remaining keys either access commands, [MENU] and [ENTER], or are used to set parameters and move around the display: [▲] [▼] [◀] [▶] [+] [-].

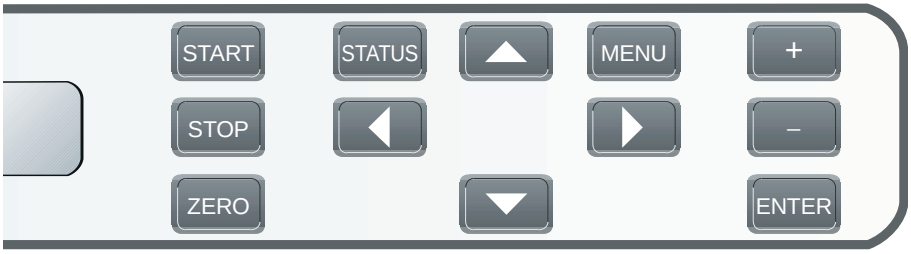


Figure 8 The ProStar 345 Keypad

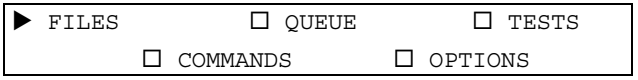
[START]	Pressing [START] begins a run. The detector must be in the READY state (or QREADY if a queue is loaded), indicating that the detector is stabilized and waiting to begin a run.
[STOP]	Pressing [STOP] halts a run, stops the internal clock, and returns the detector to a READY state. If a wavelength program is operating, pressing [STOP] halts the program and returns the detector to its initial conditions.
[STATUS]	Pressing [STATUS] displays the Status Screen. From the Status Screen you can monitor the run in progress. You can also access the Status Menu.
[ZERO]	Pressing [ZERO] resets the detector output to zero volts, plus or minus any offset.
[MENU]	Pressing [MENU] displays the Main Menu
[ENTER]	Pressing [ENTER] accepts a selected choice or menu entry. The [ENTER] key also advances the cursor to a new field, either on the same line of the display or in the line below.
[▲] [▼] [▶] [◀]	Pressing any arrow key moves the cursor in the direction indicated on the key. The up and down arrow keys also move the cursor between menus and displays.
[+] [-]	Pressing the [+] and [-] keys scrolls the available choices in a field or changes the value of alphanumeric entries. Holding down either key will continuously scroll the list of choices forward or backward until you release the key. In fields that require numerical entries, the value of each digit is increased or decreased by one unit each time you press the [+] or [-] key. In fields that accept either numeric or character entries, the [+] and [-] keys scroll through the alphabet from A to Z, then through the numbers 0 to 9, and finally to a slash, hyphen, and blank space. In other fields, the [+] key advances you through a preset list of choices while the [-] key takes you backward through the list.

Menus, Screens, and Messages

The ProStar 345 display shows three kinds of information: menus, screens, and messages. Menus require you to make selections or enter specific values. Screens display information that cannot be edited. Messages confirm actions and point out errors. The Menu Tree on page 103 outlines the structure and content of the detector menus and screens, three of which are discussed here.

Main Menu

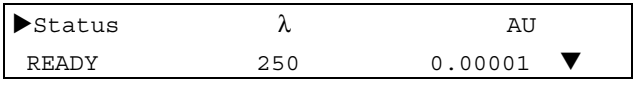
The Main Menu is the top level of the menu structure. It gives you access to five menus: FILES, QUEUE, TESTS, COMMANDS, and OPTIONS. To see the Main Menu, press the [MENU] key at any time.



From the Files Menu you can edit, load, copy, or delete files. The Commands Menu lets you insert an event mark onto your chromatogram, short outputs, or shut down the detector. The Tests Menu lets you run built-in instrument tests and diagnostics. In the Options Menu you can set up or change your instrument configuration. From the Queue Menu you can edit or change the order of files in the sample queue. See the sections on *Basic Operations, Advanced Operations* and *Maintenance* and *Troubleshooting* for more information on menus.

Status Screen

The Status Screen displays the detector status, wavelength setting, and the absorbance reading. It appears automatically whenever the instrument is powered on or the [STATUS] key is pressed. No entries are made on the Status screen.



Status Menu

Just below the Status Screen is the Status Menu. To access the Status Menu, press [▼] from the Status Screen. The Status Menu lets you review and edit run parameters during a run. See *Basic Operations* for more infomration on Status Menus.

Messages

There are three kinds of messages that can appear on the display: user messages, confirmation messages, and error messages.

User Messages

User messages, indicated on the display by two sets of double asterisks, tell you about an existing instrument condition or ask for further actions. Some of these messages will only appear on the display for three seconds. An example of a message requiring further action is shown below.

```
** Protected File **
 No Editing Allowed
```

Confirmation Messages

Confirmation messages also indicated on the display by two sets of double asterisks, appear for one second after an operation has been carried out successfully.

```
** File Loaded **
```

Error Messages

Error messages are indicated on the display with capital letters and two sets of double exclamation points. Error messages are shown when a condition exists that prevents completion of an operation. Error messages remain on the display until you press a key.

```
!! RAM ERROR !!
```

Basic Operation

A Quick Example

This example shows how to prepare a file and how to load the file into the detector operating parameters. After a practice run, we will add a stop-time. To keep the instructions simple, we will use the single-wavelength mode.

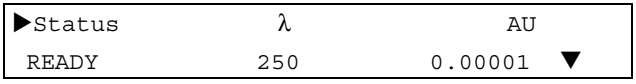
You may wish to keep the Menu Tree in the Appendix on hand as you work through this example. If you lose your place at any time, you can:

1. Press [▲] to move back to a previous screen.

2. Or, press [STATUS] to return to the Status Screen and retrace your steps.

Startup

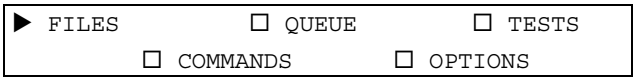
Set the power switch (on the rear panel) to On. After a series of power-up tests, the Status Screen appears on the display. The Status Screen is discussed after operating parameters have been set up.



Setting Parameters

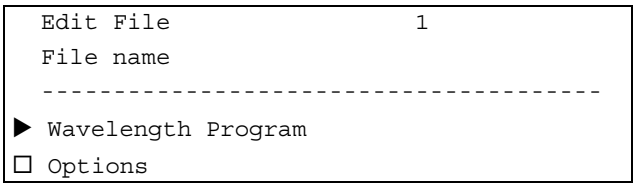
Parameters are set in an edit file. To access the Edit Menu and prepare the file:

1. Press the [MENU] key. The Main Menu is displayed.



2. Select /FILES/ to display the Files Menu.

3. Select /Edit/ to display the Edit Menu .

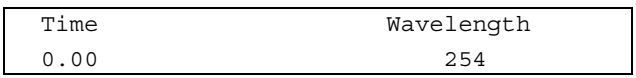


This example uses a file designation of 1 and the File Name field is left blank.

Wavelength

Wavelength is an example of a field that requires a numeric entry. To set each wavelength:

1. From the Edit Menu select /Wavelength Program/ to display the Wavelength Program.



2. Scroll to the Wavelength field. Using the [+] and [-] keys, set each wavelength field to the desired setting for your analysis. Each digit must be edited individually.

3. Press [ENTER] to accept the new wavelength settings.

Range

Range is an example of a field with a preset list of choices. Note that Range 1 and Range 2 correspond to the Analog Outputs 1 and 2 on the rear panel. To set Range:

1. Select /Options/ from the Edit Menu to display the Options Menu.

```
Rise Time                          1.0
Autozero Time                     0.00
---------------------------------------
Range 1                            1.0
Range 2                            1.0
```

2. Move the cursor to Range 1 using [▼]. With the [+] or [-] key, select the desired setting from the list of choices.

3. Press [ENTER] to accept the new Range 1 setting.

For this example, default settings are used for the remaining parameters. You will learn more about setting these parameters in *Basic Operations*.

Loading the File

You are now ready to load the settings from File 1 into the ProStar 345 operating parameters. To load the file:

1. Return to the Files Menu using [▲].

2. Select /Load/. The screen following appears.

```
▶ Load File              1: (filename)
```

3. You will be able to select from several files in the Load File field. Depending on whether or not your detector has ever been used before, these files will either contain previously-stored settings or default settings. Use [+] and [-] to move the cursor through the available choices. When the file you wish to load appears, (we are using the default settings for this example), press [ENTER] to execute the load command. The confirmation message shown below appears for one second.

```
            ** File Loaded **
```

The Status Screen is displayed, ready to run the detector.

Practice Run

The Status Screen now displays your wavelength setting, the detector status, and the absorbance reading. If the Status reads READY, the detector is stabilized and ready to run. If NRDY (Not Ready) appears, the detector lamp may need additional time to warm up.

When the detector is stabilized:

1. Press the [ZERO] key to zero the detector analog output signal.

2. Inject your sample.

During this setup, there was no stop time entered in the detector parameters. In this case, the detector stays in the READY state and continually monitors the column eluant. You do not need to manually start or stop a run with this set-up.

Adding a Stop Time

To add a stop-time, you need to use the following steps to modify the detector operating parameters. Then start and stop a run with the new setting.

1. From the Status Screen, press the [▼] key to move down to the Status Menu which is the programming area below the Status Screen.

```
File 1:
---------------------------------------
Time                      λ1       λ2
0.00                     250      280
                                    ▼
Rise Time                 1.0
Autozero Time            0.00
Range 1                   1.0
Range 2                   1.0
```

2. Using the [▼] key, move the cursor to the blank line below the 0.00 time line and press [+]. This adds a second line,

with a time of 1.00 and the same wavelength settings as the first. Change 1.00 to the desired stop-time for the run, and leave the wavelengths unchanged.

3. To save your changes to the file, scroll down to the words "Save File" (which now appear below PMT Voltage), and press [ENTER].

The message shown below appears and the Status Screen is displayed.

```
** File Saved **
```

Once a stop time is entered, the run is started with each injection. To do this:

1. Zero the detector analog output signal by pressing the [ZERO] key.

2. When the detector is stabilized, inject sample and press [START].

Notice that Status now shows the run time. To stop your run before the set stop-time, press [STOP].

NOTE: Your display values may differ from those presented in this manual, especially if the detector has been programmed previously.

Single and Dual Wavelength Operation

You can operate the detector in either single or a dual wavelength mode. In the dual-wavelength mode, the detector simultaneously monitors two wavelengths in a single run in either the UV range or the visible range.

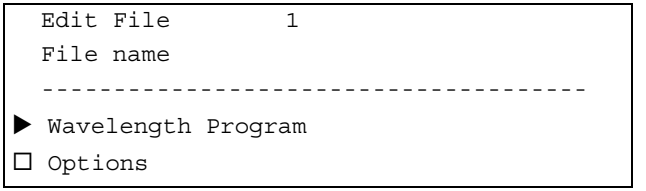
To perform a single or dual wavelength operation, you need to be able to identify and enter a file, load that file into the detector current operating parameters, and start and stop a run. This section will also show you how to modify the detector current operating parameters.

Setting Parameters

Before setting any detector parameters, the file to be edited must be identified. To do this, access the Files Menu by first pressing [MENU].

The Main Menu is displayed. Select /FILES/.

Select /Edit/ from the Files Menu to display the Edit Menu.



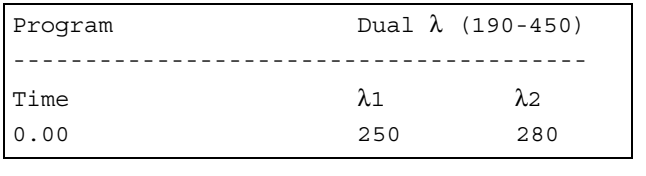
File Identification

Enter the number of the file to be edited in the Edit File field. The ProStar 345 can store up to four files in memory, so file numbers from 1 to 4 are allowed. You may also enter a name of up to eight characters in the File Name field.

In /Edit File/, the file choices of “S” and “D” represent Scan and Develop files, respectively. These files are some of the advanced features described in *Advanced Operations*.

Wavelength Program

From the Edit Menu, select/Wavelength Program/. The Wavelength Program designates dual or single wavelength operation, and also contains a table of time and wavelength. A wavelength program for dual-wavelength operation appears below.



Select Single λ, Dual λ (190-450) or Dual λ (366-700) in the Program field. The table for time and wavelength(s) will appear. (For single-wavelength operation, there is only one wavelength field.)

You can operate with either a one-line or a two-line wavelength program. Using a one-line program, the detector is always in the READY state and you can monitor the chromatographic eluant continually. Using a two-line program, you can add a stop-line and you can start and stop the detector during a chromatographic run. (Stop-lines are useful, for example, in a series of automated runs where you want to autozero the detector baseline after each injection.)

For a one-line program, enter the wavelength(s) for your analysis in the λ1 and λ2 (or Wavelength) fields that correspond to the time of 0.00.

For a two-line program, add an additional line (the stop-line) by scrolling down to the blank line below the time 0.00 line and pressing. [+]. The second line automatically will have a time setting of 1.00 and the same wavelength setting(s) as the first. Change 1.00 to the desired stop-time for the run, and leave the wavelength value(s) unchanged.

An example of a dual-wavelength, nine-minute run at 254 and 283 nm is shown.

Time	λ1	λ2
0.00	254	283
9.00	254	283

Options

Select /Options/ from the Edit Menu to display the Options Menu. Use this menu to set the detector rise time, autozero time, and ranges.

```
Rise Time                              1.0
Autozero Time                         0.00
----------------------------------------
Range 1                                1.0
Range 2                                1.0
```

Rise Time

This field affects the detector response time. Rise time is inversely proportional to the amount of baseline noise. For example, the longer the rise time, the less noise detected. The two-second default value is appropriate for most applications.

NOTE: To minimize baseline noise while retaining maximum resolution, select a rise time at least one-tenth of the peak width at the base of the narrowest peak of interest.

Autozero Time

This parameter tells the detector when to perform an automatic zero of the baseline. If you don't want to set an automatic autozero and you are using a stop-line in your wavelength program, simply set the autozero time to a value greater than your stop-time.

NOTE: It is good practice to zero the detector automatically at the start of each run. This will keep the detector output in range throughout an automated series of runs.

Range 1 and 2

These parameters range the signal from Analog Output 1 and Analog Output 2 (shown as CH 1 and CH 2 on the detector rear panel). Set each range to an appropriate full-scale absorbance for your sample.

NOTE: We recommend a range of 1.0 when you are using an integrator or data system.

Loading a File

When you're ready to load a file, select /Load/ from the Files Menu. The screen will display the words "Load File 1:(filename)." Enter the desired file number and press [ENTER]. The message shown below will appear for one second. You are then returned to the Status Screen.

```
** File Loaded **
```

Running The ProStar 345

Once detector parameters have been set in the designated file and the file loaded into the detector operating parameters, you're ready to run your analysis. First check the detector status by pressing [STATUS] to view the Status Screen. If you're using a stop-line in your wavelength program, you'll start and stop the run with each injection.

Status Screen

You can check the detector status, wavelength setting(s), and absorbance reading(s) by pressing [STATUS] to view the Status Screen. The Status Screen for the Model 205 in dual-wavelength mode appears.. Note that, in the single-wavelength mode, the third line does not appear.

```
▶Status          λ           AU
  READY          250         +0.00001 ▼
-----------------------------------------
                 280         -0.00001
```

If the Status reads READY, the detector is stabilized and ready to run. If NRDY appears, the detector lamps may need additional time to warm up, or a wavelength outside the selected lamp range may have been chosen.

Inject Sample

When the detector is stabilized and you are ready to inject sample, manually zero the detector by pressing [ZERO].

If you are not using a stop-line in the wavelength program, the detector remains in the READY state throughout your chromatographic runs. When using a stop-line, you must start and stop the run with each injection, following the procedures in the next few pages.

Starting a Run

When using a stop-line in your wavelength program, you need to start the run with each injection. There are two ways to start a run using the ProStar 345:

1. Manually, by pressing [START] each time you make an injection.

2. Automatically, by interfacing the detector with a remote run-signal from the injector (see *Installation* for details). In this scenario, a signal equivalent to pressing the START button is sent from the injector to the detector automatically with each injection.

During the run, you can monitor the run time from the Status Screen.

Stopping a Run

There are two ways to stop a run:

1. Manually, by pressing [STOP] before the programmed stop time.

2. Automatically, by allowing the run to finish at the preset time.

If you are conducting a dual-wavelength run, you can also stop the run by loading a single-wavelength file.

Regardless of how you stop the run, the detector returns to READY.

Changing Run Parameters

There are two ways to change the detector run parameters:

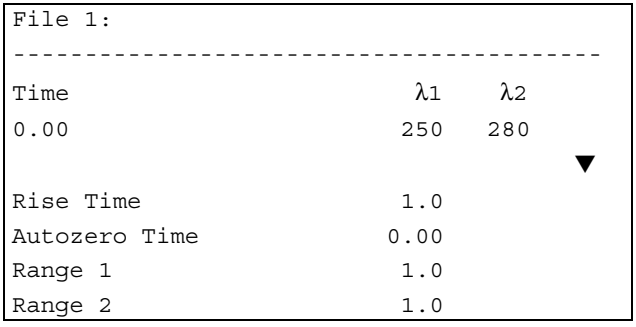
1. You can use the Files Menu and follow the procedures outlined under *Setting Parameters* on page 23.

2. You can use the Status Menu, which is the programming area below the Status Screen.

Each has a distinct advantage. Programming in the Status Menu allows you to change the detector current operating parameters, even while the detector is running. Programming in the Files Menu allows you to prepare a file containing the changes without altering the current detector settings. The file may then be loaded at a later time.

Status Menu

From the Status Screen, move the cursor down to the Status Menu. The Status Menu contains the loaded file identification (its number and name), Wavelength Program, Rise Time, Autozero Time, and Ranges.



The detector parameters are set following the same instructions previously given under *Wavelength Program* on page 28 and *Options* on page 29. However, you cannot modify the file identification or wavelength mode while in the Status Menu.

NOTE: When you modify file parameters from the Status Menu, you do not change the contents of the same file number stored in the detector memory. Only the copy of the active file is modified.

Saving the File

When you change settings form the Status Menu, each change is effective as soon as you leave the field. You will also see that the File identification on the first line of the Status Menu now reads “File N:xxxx changed” (where N:xxxx is the file number and name) and that the words “Save File” now appear below Range 2.

To save the changed file, press [ENTER]. The confirmation message below will appear briefly.

```
** File Saved **
```

If you wish to keep the original file without saving the changes, do not press the ENTER key. Instead, reload the unaltered file by using the Files Menu as follows:

1. Press [MENU].
2. Select /FILES/.
3. Select /Load/.
4. The words “Load File N: (filename)” will appear on the screen. Enter the desired file number and press [ENTER].

The confirmation message will appear for one second. You are then returned to the Status Screen, where all settings will contain their original values.

More About Files

How to edit and load files from the Files Menu was described earlier. The Files Menu also allows you to copy and delete files in a few easy steps as shown in the following section. The

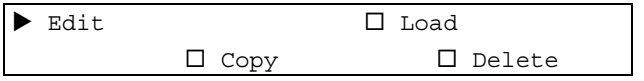
section also describes how to protect files from being edited, copied to, or deleted.

Copying Files

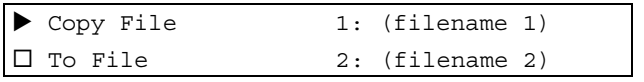
To copy a file:

1. Press [MENU].

2. Select /FILES/ to display the Files Menu.



3. Select /Copy/. The Copy Menu will appear on the screen.

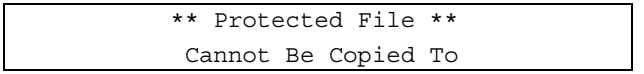


4. Enter the identification number for the file you wish to copy in the Copy File field.

5. Enter the number of the file to which you wish to copy to in the To File field.

6. Press [ENTER]. The message shown below appears briefly, and you're returned to the Files Menu.

If you attempt to copy to a protected file (see the section below, titled *Protecting Files*), you will see the message shown below. If a file isn't protected, make sure it is empty or unwanted before you copy to it, as it will be overwritten.



Deleting Files

1. Press [MENU].

2. Select /FILES/ to display the Files Menu .

3. Select /Delete/. The words “Delete File N:(filename)” will appear on the screen.

4. Enter the identification number of the file you wish to delete. When you press [ENTER], the message shown below appears briefly, and the display returns to the Files Menu. (The parameters in the file you’ve just deleted return to their default values.)

```
** File Deleted **
```

If you attempt to delete a protected file (see the next section, *Protecting Files*), the message below will be displayed.

```
** Protected File **
  Cannot Be Deleted
```

The ProStar 345 allows you to protect files from being edited, copied to, or deleted. To access the file protection operation, follow these steps:

1. Press [MENU].
2. Select /OPTIONS/. The Options Menu appears.

```
▶ Lamps
☐ Analog Outputs
☐ More
```

3. Select /More/ to display the More Menu.

```
Zero on λ change                    Yes
Cursor Speed                     Medium
---------------------------------------
Status Lock                         Off
READY Output                  Active Hi
File Name                       Protect
1:                                  Off
2:                                  Off
3:                                  Off
4:                                  Off
```

4. Scroll down to the table containing the fields /File Name/ and /Protect/. To protect a file from being edited, copied to,

or deleted, select On in the Protect field that corresponds to the appropriate file number. To remove the file protection, select Off.

Analog Output Operations

The ProStar 345 has two outputs, Analog Output 1 and Analog Output 2. Labeled CH1 and CH2 on the rear panel, these outputs are useful for monitoring analyses at two different sensitivity settings simultaneously. For example, analog outputs allow you optimally to detect very small peaks and very large peaks in the same sample run.

Analog Outputs

ANALOG OUTPUT 1 — By default, Analog Output 1 is either the absorbance reading for single-wavelength operation, or the absorbance reading of wavelength one (λ1) for dual-wavelength operation.

ANALOG OUTPUT 2 — Analog Output 2 is selectable (AU, AU1-K*AU2, and AU1/AU2), and so can be used to monitor several different outputs. To access these options:

1. Press [MENU].
2. Select /OPTIONS/.
3. Select /Analog Outputs/. The menu shown appears:

```
Analog 1 Offset %                    0
Analog 2 Offset %                    0
----------------------------------------
Analog 2                            AU
K Factor                         1.000
```

4. Scroll down to Analog 2. The selections are:

   AU: which is either the same absorbance reading you got from Analog Output 1 in single-wavelength operation, or the

absorbance reading of Wavelength Two (λ2) for dual-wavelength operation.

AU1-K*AU2: which is the readout of the suppressed signal using the K-Factor technique. See page 63 for further details.

AU1/AU2: which is the ratio of absorbances for dual-wavelength. This ratio is sometimes used to check peak purity. See Absorbance Ratios on page 68 for more details.

Analog Offsets

Both analog outputs 1 and 2 can be offset. Analog offsets may be used in cases where there is a high background absorbance reading, or when there is considerable baseline drift from your chromatographic system and you're unable to keep your integrator (recorder) signal on-scale.

Because integrators have very limited capacity for handling negative signals, you may wish to set a small positive offset (1%) when using an integrator.

Negative offsets are available for use with recorders, where you may wish to set the pen at either side of the strip-chart.

The offset options are selectable from the Analog Outputs Menu.

NOTE:	We recommend a 1% offset setting for use with your data system or integrator.

Advanced Operation

This section describes using the ProStar 345 more advanced capabilities, such as wavelength programming, automatic zeroing, scanning, and queues. You should be familiar with *Basic Operation*, before you begin.

Wavelength Programming

Your detector can change wavelength as a function of time: Wavelength Programming. This feature gives you maximum detection sensitivity for each component in a mixture without making multiple injections of the sample.

Building the Program

In wavelength programming, time lines are entered into a "Wavelength Program." Each time line specifies the time at which you want a wavelength change to occur.

You can build a wavelength program in either the Status Menu or the Files Menu using the procedure outlined in this section. The following instructions are for single-wavelength operation, but you can build a dual-wavelength program in the same way. Display the Wavelength Program in either the Status Menu or the Files Menu.

Time	Wavelength
0.00	254

The initial time entry is 0.00. Move the cursor to the wavelength field(s), and enter the initial wavelength(s) for your analysis.

Entering Subsequent Time Lines

To add a second time line, scroll down to the first blank line and press [+]. The second line automatically will have a time setting of 1.00 and the same wavelength settings as the first. Change the Time and corresponding wavelength field(s) to the desired values.

A wavelength program may contain as many as ten lines for a single run. You can cross between the UV and visible ranges (in single-wavelength mode only).

If you enter time lines out of sequence, the detector will automatically sort the lines and place them in chronological order.

Stop Line

The last line of the program (the stop-line) lists the time at which the detector automatically will end the run and return to initial conditions. Since wavelengths are not important in the stop-line, they can be set to any value(s).

NOTE: Remember, the last line of the program is always the detector signal to end a run; it is not a programmed wavelength change.

Deleting a Line

To delete an entire time line, place the cursor in the Time field and press [-] repeatedly until the value goes blank. When you leave the line, it will be deleted. The display below shows a completed wavelength program.

```
Time                          Wavelength
0.00                             254
---------------------------------------
5.00                             280
7.00                             265
10.00                            265
```

In our example, the initial detection wavelength is 254 nm. At 5.00 minutes into the run, the wavelength changes to 280 nm. At

7.00 minutes, it changes to 265 nm. The run ends at 10.00 minutes, and the detector returns to its initial wavelength of 254 nm and to its READY state.

Running a Program

After you set the rest of your parameters, the detector is ready to run. It is good practice to zero the detector at the beginning of every run and at each wavelength change. See the next section, titled *Programmed Autozero*, for details.

Once you start the run, you may edit any timed event (wavelength change, autozero, or stop-time) that has not yet taken place. These changes can be made only from the Status Menu. Each edit is entered immediately into the detector operating wavelength program.

For example, for the program displayed as in *Deleting a Line* the stop time is 10.0 minutes. If, at 7.00 minutes into the run, you determine that the run should be 9.00 minutes long, you can edit the last line of the program and the current run will stop at 9.00 minutes.

Programmed Autozero

The ProStar 345 can be programmed to perform an automatic zero with each wavelength change during a run using the Zero on λ Change field. To access this feature:

1. Press [MENU] and select /OPTIONS/ to access the Options Menu.

3. Select /More/ to display the More Menu.

4. Place the cursor on the Zero on λ Change field. This field appears on the first line of the More Menu.

5. Select Yes, to zero the detector response automatically with each wavelength change during a run, or No, to turn this feature off.

You can also use this automatic zero feature to add autozeros into your wavelength program without changing the detector wavelength settings. To do this, simply add additional time lines. Adding autozeros in this way is convenient in cases such as solvent programming, where the detector baseline may drift due to changes in solvent background.

Time	Wavelength
0.00	254
2.00	254
5.00	280
7.00	280
10.00	280

With the Zero on λ Change field set to Yes, the detector will autozero at 2.00, 5.00 and 7.00 minutes into the run. The wavelength will only change once (at 2.00 minutes into the run).

Automatic Lamp Operations

The Lamps Menu allows you to select lamps, track lamp life, and turn the lamps on and off automatically. It contains the fields described below.

Lamps Menu

To access the Lamps Menu:

1. Press [MENU] and select /OPTIONS/.

2. Select /Lamps/.

```
Lamp                          D2 (190-365)
D2 Lamp Hours                        0
---------------------------------------
W Lamp Hours                         0
Current Time                         0:00
Startup                              Manual
Startup Time                         0:00
Shutdown                             Manual
Shutdown Time                        0:00
Time from READY                      1:00
```

Lamp

The Lamp field allows you to select from the following:

- D2 (190-365), for deuterium
- W (366-800), for tungsten
- D2 + W (190-800), for dual-lamp operation
- or OFF, to shut the lamp(s) off.

In actuality, the wavelength setting in the loaded file selects the appropriate lamp for you automatically. In fact, the wavelength setting you choose in your file has priority over any selection you make here in the Lamp field.

For example, if the loaded file designates a wavelength in the UV range, but you selected W (366-800) in the Lamp field manually, the detector display will read NRDY (not ready) for the deuterium lamp.

Lamp Hours (W and D2 fields)

These fields track automatically the number of hours each lamp has been in operation. For the value to be accurate, you have to set the appropriate Lamp Hours field to zero each time you install a new lamp.

NOTE:	If you change lamps before they are burned out (with the intention of using them again at a later date), keep a record of how many hours they have been in operation and remember to recalibrate the detector immediately following each lamp change.

Startup and Shutdown

When you set the Startup and Shutdown fields to “Manual”, the lamp designated in the Lamp field turns on and off when the detector power is switched on and off.

Startup and Shutdown Times

When you set the Startup and Shutdown fields to “Time” (see above), the designated lamp will turn on and off automatically at the local time set in the Startup Time and Shutdown Time fields, respectively.

NOTE:	For the detector to perform automatic lamp startup and shutdown correctly, the detector 24-hour clock must be set to your local time. Set the clock in the Current Time field.

Time from READY

If you prefer, you can use the Time from READY feature to program the detector to shut the lamp off after a series of automated runs. Time from READY is a preset time interval that begins automatically each time the detector returns to its READY state. If the Time from READY interval elapses without a run signal being received from either the keypad or the detector Run (Input) terminal, the detector lamp turns itself off. To use the Time from READY feature:

1. Select Time from READY in the Shutdown field.

2. In the Time from READY field, enter the length of time during which a run signal must be received by the detector before the lamp turns off.

For example, the chromatographic system is set up for an automated run and the autosampler signals the detector to run

after each injection. With the detector settings shown in the display below the lamp will turn off 10 hours after the last run is completed.

```
Shutdown                    Time from READY
Shutdown time                         00:00
 ---------------------------------------
Time from READY                       10:00
```

You can also program the lamps to turn off at the end of a queue by selecting End of Queue in the Shutdown field. For more information on the Queue feature, see page 59

Other Features

Additional features include the abilities to lock the Status Screen, to short the detector outputs, to place an event mark on the chromatogram, and to send a ready signal to external devices. You can also control the display contrast and cursor speed, and make a quick shutdown of the detector lamps and motors.

Status Lock

You can lock the detector display using the Status Lock field. This feature lets you prevent accidental changes to a file currently being run. You can move the cursor down from the Status Screen as far as the Status Menu File Name field. However, you'll still be able to access the Main Menu and the rest of the menu structure using [MENU} .

To access Status Lock:

1. Press [MENU].
2. Select /OPTIONS/.
3. Select /More/.
4. Scroll down to /Status Lock/. Select On or Off to turn the lock on or off, respectively.
5. Press [STATUS].

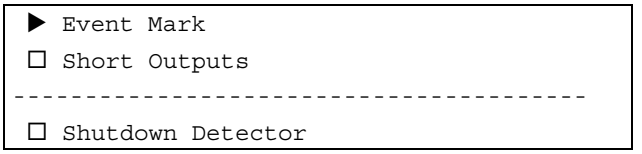
Short Outputs

When zeroing a readout device such as an integrator or recorder, it is convenient to be able to short the detector outputs. You can do this using the Short Outputs feature as follows:

To access Short Outputs:

1. Press [MENU].

2. Select /COMMANDS/. The Commands Menu appears.



When you select Short Outputs, the detector analog outputs are shorted together (zero volts) and the field name changes to "Unshort Outputs." To return the outputs to their normal (unshorted) operating state, select Unshort Outputs, and the field changes back, now reading "Short Outputs." (When you leave this screen, the field returns to Short Outputs automatically.)

Event Mark

Using the event mark feature, you can place an event mark on your chromatogram to note various occurrences, such as the turning of a sampling valve. The event mark is a spike (15% of full-scale for one second) in both detector output signals.

To access Event Mark:

1. Press [MENU].

2. Select / COMMANDS/. The Commands Menu appears.

3. Place the cursor on Event Mark. Press [ENTER] each time you wish to place an event mark on your chromatogram.

NOTE: You may not want to use event marks if your data will be analyzed by an integrator. Integrators can misinterpret event marks as peaks.

Ready Output

Using the NOT READY terminal on the detector back panel, the detector can send a signal to other devices each time it goes to its READY state. This feature is used frequently with autosamplers to signal that the detector is ready for the next injection.

To access the READY Output field:

1. Press [MENU]
2. Select /OPTIONS/.
3. Select/More/.
4. Scroll down to the READY Output field. Select Active Hi or Active Lo, depending on which signal you wish to send.

NOTE: Refer to the appropriate reference manual for the instrument being connected.

For details on interfacing the detector NOT READY terminal with other devices.

Display Contrast

You can vary the display contrast to make it easier to read. To change the display contrast, first press [STATUS] to access the Status Screen. Then press the [▶] key and the [+] key simultaneously to increase the contrast, or the [▶] key and the [-] key to reduce the contrast.

Cursor Speed

You can control the display cursor speed to make it easier to use. To access Cursor Speed:

1. Press [MENU].
2. Select /OPTIONS/.

3. Select /More/.

4. Scroll down to Cursor Speed and select Fast, Medium, or Slow.

Shutdown Detector

This feature offers a quick shutdown, and subsequent startup, of the detector lamps and motors. The electronics stay on to maintain the detector memory. To shut down the detector:

1. Press [MENU]

2. Select /COMMANDS/.

3. Scroll down to the Shutdown Detector field.

4. Press [ENTER]. The confirmation message appears on the display.

```
** Detector Shutdown **
```

To restart the detector, press any key on the keypad. The detector will restart under the same conditions present when the Shutdown Detector command was activated.

Scanning

The detector can perform a spectral scan on eluting peaks without stopping the eluant flow. This unique feature simplifies greatly the determination of wavelength maxima for individual compounds in your sample during method development work.

How it Works

When a scan in initiated, the monochromator moves from the run-wavelength to the scan start-wavelength. The detector scans by stepping through a defined spectral range at specified wavelength increments. Individual absorbances are read at each increment until the monochromator has reached the last wavelength.

The detector can collect and store in its memory as many as ten spectra from a single chromatographic run. The actual number of spectra is determined by the number of data points in each scan. Since the number of data points varies with the wavelength interval and the scanning range, first calculate the number of data points using Equation 1, then use either Equation 2 or Equation 3 to determine the number of spectra you'll be able to collect.

Equation 1. Use this equation to calculate the number of data points for any scan between 1 (the lower wavelength), and 2 (the higher wavelength):

$$\text{\# of data points} = \frac{\lambda\ 2 - \lambda 1}{\lambda\ \text{interval}} = \quad +1$$

Equation 2. Use this equation to calculate the number of spectra you can collect when using wavelength intervals of 2 nm or greater. Round the resulting number down to the nearest integer.

$$\textit{\# of spectra} = \frac{5{,}000 - (\text{\# of data points} * 12)}{(\text{\# of data points} * 4) + 14}$$

Equation 3. Use this equation to calculate the number of spectra you can collect when using wavelength intervals of 1 nm. Round the resulting number down to the nearest integer.

$$\textit{\# of spectra} = \frac{5{,}000 - (\text{\# of data points} * 4)}{(\text{\# of data points} * 4) + 14}$$

NOTE: To approximate the scan time (in seconds) for a given run, divide the number of data points by twenty.

For example, if you want to scan from 190 to 564 nm in 2-nm steps, there would be 188 data points and the ProStar 345 would be able to store up to 3 spectra.

$$\textit{\# of spectra} = \frac{5{,}000 - (188 * 12)}{(188 + * 4) + 14} = \frac{2744}{766} = 3.58 = 3$$

Each scan is corrected for baseline absorbance before being played back either as individual data points, or a smoothed, continuous spectrum.

Selecting the Scan File

To select spectral scanning, follow these step-by-step instructions.

1. Press [MENU]. Select /FILES/.

2. Select /Edit/.

3. Use the [+] key to increment the Edit File field until an “S” is displayed. The File Name field is named SCAN automatically. (You cannot edit the Scan File name.)

```
  Edit File                              5
  File Name                           SCAN
----------------------------------------
☐ Scan
☐ Replay
```

6. Select/Setup/ to set up your spectral scanning parameters.

The Scan File Setup Menu is shown in the display below.

```
Start λ                             220
End λ                               365
 ------------------------------------
λ Interval                            5
Run λ                               250
Rise Time                           1.0
Scan Zero Time                     0.00
Range 1                             1.0
Range 2                             1.0
```

1. In the Start λ field, enter the wavelength at which each scan should start.

2. In the End λ field, enter the wavelength at which each scan should end.

3. In /λ Interval/, enter the wavelength interval to be used. To perform a scan, the ProStar 345 takes individual absorbance readings at wavelengths incremented by this interval.

NOTE: Five nanometers is an excellent wavelength interval for most applications. At this interval you get very rapid scans and you can still display the Max to 1 nm accuracy.

4. In /Run /, enter the wavelength at which the chromatographic run will be monitored.

5. In /Scan Zero Time/, enter the runtime at which you wish the detector to perform an automatic baseline scan. If you use an automatic baseline scan, make sure no peaks are eluting during the designated scan time.

6. Fill in entries for Rise Time, Range 1, and Range 2 as for any chromatographic run.

When you're finished setting up the Scan File, you're ready to load it and run. When the Scan File is loaded, you'll notice the fields /Zero/ and /Scan/ in the Status Screen.

Status	λ	AU	☐Scan
READY	250	0.0001	▶Zero▼

Zero

/Zero/ is used to perform baseline scans of the solvent background absorbance. With the detector baseline stabilized and the cursor on the Zero field, press [ENTER]. The ProStar 345 performs and stores a baseline scan using the parameters you set in the Scan File. While the detector is performing a baseline scan, the Status field displays SCAN 0.

Baseline scans may be taken at any time during the run, as long as no peak is eluting at that time. Subsequent sample scans are corrected using the last baseline scan taken. This is especially

advantageous for gradient elution, where the background absorbance of the eluant may be changing constantly.

For example, let us say you perform a baseline scan before you initiate a run, and then again at 5.00 minutes into the run. You also perform sample scans of you eluting peaks at 2.4 minutes will be corrected using the baseline scan taken before the run began. The sample scan taken at 5.6 minutes will be corrected using the baseline scan taken at 5.0 minutes.

Scan

Once you begin the run, the cursor will move from /Zero/ to /Scan/ in the Status Screen. Each time you wish to perform a sample scan, press [ENTER].

NOTE: There is a one-second delay from the time the detector takes its absorbance readings to the time you see the same reading on the analog readout. Keep this in mind when choosing you scan times.

Each time you perform a sample scan, the detector monochromator moves from the run wavelength to the start wavelength. The detector performs each scan (from the start wavelength to the end wavelength) by taking individual absorbance readings at wavelengths incremented by the interval you set in the Scan File. When the scan is finished, the monochromator returns to the run wavelength.

For example, using the default Scan File Setup Menu the detector would monitor the run at 250 nm. Each scan would include absorbance readings for wavelength settings of 220, 225, 230, 235, and so on, up to 350 nm.

NOTE: If you chose starting and ending wavelengths that weren't an exact multiple of your wavelength interval, the ending spike (event mark) on your chromatogram would be placed at the last multiple of the wavelength interval that falls within the scanning range. For example, with a starting wavelength of 200 nm, an ending wavelength of 365 nm, and a wavelength interval of ten, the end spike on your chromatogram would be at 360 nm, the last full wavelength multiple within the range.

While the detector is scanning, the Status field displays SCAN.

CAUTION

During scanning, the output signal will hold at the last absorbance value taken before the scan was initiated until the scan is finished. For this reason, quantitative analysis should never be performed when scanning.

Scan Summary Data Screen

When the Scan File is loaded, the normal Status Menu no longer appears below the Status Screen. Instead, several new lines that we call the “Scan Summary Data Screen” appear. The Scan Summary Data Screen is useful in setting up the parameters to replay your stored spectra.

An example of the Scan Summary Data screen as it appears after two sample scans.

```
File S:  SCAN
--------------------------------------
Time          λMax     λMaxAU     λMin
10.50          280     1.6668     230
11.66          255     0.7768     220
```

The Scan Summary Data Screen has four fields:

1. /Time/, which is the run time at which the scan was initiated
2. /λ Max/, which is the scan wavelength where the maximum absorbance occurred
3. /λ Max AU/, which is the maximum absorbance
4. / λ Min/, which is the scan wavelength where the minimum absorbance occurred

If no maximum was found, the λMax and λMaxAU fields show zero. The summary information is updated as each sample scan is completed.

NOTE: The ProStar 345 uses a second derivative to find the “local” Max.

In our example above scans were taken at 10.50 and 11.66 minutes into the run. The scan taken at 10.50 minutes has a maximum absorbance of 1.6668 AU at 280 nm. The minimum absorbance occurred at 230 nm. To replay your 10.50-minute scan, you would use a range of 2.0 AUFS to keep the absorbance values on-scale.

Stopping the Scan File

There is no programmed stop in the Scan mode. The run will continue until it reaches 99.99 minutes, or until you press [STOP].

Replaying Your Spectra

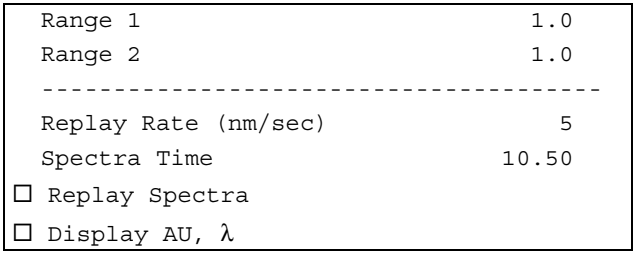
When you’ve completed your run, you can retrieve your stored sample spectra using the Replay Menu.

To access the Replay Menu:

1. Press [MENU]. Select /FILES/.

2. Select /Edit/ to display the Scan File Edit Menu.

Select /Replay/.



Setting Replay Parameters

To set the parameters for replay:

1. Set /Range 1/ and /Range 2/ for Analog Output 1 and Analog Output 2. If you're using only one output, disregard the appropriate range.

2. Enter the Replay Rate (nm/sec). This is the rate at which the detector will read out the spectral data to your chart. You'll use this value and an appropriate chart speed to calculate wavelength increments on your printed sample spectrum.

   For example, if your sample scan were taken between 190 and 340 nm (a span of 150 nm), a replay rate of 5 nm/sec would print the spectrum in 30 seconds. A chart speed of 30 cm/min would give you a scan of 15 centimeters in increments of 10 nm/cm.

3. Select the spectrum you want to replay by selecting its start time in the Spectra Time field. Each spectrum taken during the run is identified individually by the run time at which it was initiated.

When you finish setting your replay parameters, you're ready to send the spectral data to your chart using the Replay Spectra command.

Running Replay

To initiate the Replay Spectra command in the Replay Menu, press [ENTER]. While the replay is occurring, the screen shown below appears on the display.

Replay	λ	AU
10.50	220	0.00001

The screen Replay field displays the start time of the spectrum being replayed. The λ and AU fields display the individual data points being plotted.

The ProStar 345 uses advanced curve-fitting algorithms to present a smooth, continuous plotted spectrum. The spectrum is replayed in 1-nm steps regardless of the wavelength interval selected. To change the appearance of replayed spectra from 1-nm stepped curves to smooth curves (or vice versa), vary the recording device replay rate and response time.

If no spectra are stored in memory when you activate the Replay Spectra command, the message shown below will appear on the display. when the replay in finished, the display returns to the Replay Menu.

```
** No Scans Stored **
```

You may stop a replay at any time by pressing [STOP].

Spectral Data Storage

Spectral data are stored in the ProStar 345 memory until a new file or queue is loaded or the detector is turned off.

Viewing Data

You can display the individual data points of your stored spectra by selecting the Display AU, λ field in the Replay Menu. A screen similar to that shown will appear on the display.

Display	λ	AU
10.50	220	0.00001

NOTE: Only actual data points (separated by the proper wavelength interval) can be displayed.

The Display AU, λ screen shows the time at which the scan was initiated, along with each wavelength and absorbance reading collected. You can move the cursor through the data using [+] and [-]. To return to the Replay Menu, press ▲.

Develop File

The Develop File is unique to the ProStar 345. It allows you to perform sequential sample injections at different wavelengths automatically. This automation makes method development much easier because you can use an automated run to determine the optimum detection wavelength for each component in your sample. You can also use the Develop File to troubleshoot chromatographic problems, or to confirm method transfer from laboratory to laboratory.

Selecting the Develop File

1. Press [MENU]. Select /FILES/.

2. Press [+] to increment the Edit File field until a “D” is displayed. The File Name field will read DEVELOP. (You cannot edit the Develop File name.)

Editing the Develop File

1. Once you’ve selected the Develop File as described above, press either [ENTER] or [▼] to access the Develop File Edit Menu.

Edit File	D
File Name	DEVELOP
Start λ	220
End λ	350
λ Interval	5
Run Time	10.00
Runs per λ	2
Rise Time	1.0
Autozero Time	0.00
Range 1	1.0
Range 2	1.0

2. In /Start λ*I*, enter the wavelength at which the 1st chromatogram is to be monitored.

3. In /End λ*I*, enter the wavelength at which the last chromatogram is to be monitored.

4. In /λ Interval/, enter the wavelength increment that the detector monochromator should use for each wavelength change.

5. In /Run Time/, enter the length of each run.

6. In/Runs per λ/, enter the number of injections to be made at each wavelength setting.

7. Enter Rise Time, Autozero Time, Range 1, and Range 2 as you would for a typical run. Range 1 and Range 2 are the corresponding ranges for Analog Outputs 1 and 2.

As an example, the Develop File shown above is used. The ProStar 345 would make its first two ten-minute runs at 220 nm. The monochromator would then change to 225 nm, and the detector would make two runs at this wavelength. This pattern would continue in five-nanometer increments until the detector has made two runs at the last wavelength, 350 nm.

After setting up your Develop File, you're ready to load it and run.

Running the Develop File

When the Develop File is loaded, you'll notice an additional field in the Status Screen, /#Runs/.

Status	λ	AU	#Runs	
READY	220	+0.0001	1/3	▼

#Runs

The #Runs field in the Status Screen shows the current run number, followed by a forward slash and the total number of injections for the wavelength specified in the l field. The field is updated with each injection. For example, if the file is set up to make three injections per wavelength, and the detector is in the second run for the 250-nm setting, the # Runs field would appear as 2/3.

The Status Menu looks the same for a Develop File as it does for a typical chromatographic file.

```
File D                          DEVELOP
----------------------------------------
Time                          Wavelength
0.00                             250
10.00                            250
                                      ▼
Rise Time                        1.0
Autozero Time                   0.00
Range 1                          1.0
Range 2                          1.0
```

NOTE: You can change any of the parameters in the Status Menu while the detector is running, but the changes will be effective only until the next wavelength is loaded.

Repeating the Develop File

After the last wavelength is run, the detector is reset automatically to the starting wavelength in the Develop File. The file can be run as many additional times as you wish, as long as the detector continues to receive run signals.

Sample Queue

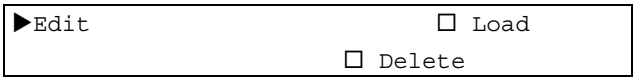
Sometimes it is convenient to group samples together under different detector conditions in an automated run. For these occasions, the Model 205 offers a queuing feature. Using a queue, you can program the detector to load and run a specified file automatically for your first group of samples, then load a second file to run your next group of samples. The queue feature allows you to run as many as ten groups in a singe queue.

Queue Menu

1. Press [MENU].

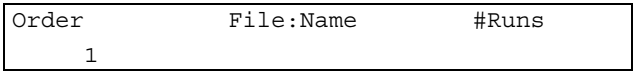
2. Select /QUEUE/.

When no queue is loaded, the Queue Menu appears as shown below.



Setting Up a Queue

To setup a queue, select /Edit/ from the Queue Menu. For an empty queue, the display appears as shown below.



Entering a Line

A “1” is placed automatically in the Order field of the first file to be run. You can’t change that, so the cursor appears under the first editable field, /File:Name/. Scroll through the available files and press [ENTER] when your choice appears.

NOTE: You may only select numbered files. The Scan and Develop files aren’t available in the Queue mode.

Enter the number of injections to be made in the # RUNS field and press [ENTER]. You can have as many as 999 injections per file.

Adding More Lines

After completing the first line, a second line appears automatically. The Order field reads 2, and the rest of the line is blank. Select the proper file and the number of injections to be made for that file. You can have as many as ten groups in the queue.

Deleting a Line

To delete a line, press [-] while in the File:Name field until the field is blank. When you leave the line, it is deleted and the queue is resorted automatically.

Order	File:Name	#Runs
1	2:THEOPHYL	5
2	3:ABCD	25
3	1:BABITUR	10

In our example, we have programmed the detector to run File 2 off the first five injections, File 3 for the next 25 injections, and File 1 for the last 10 injections.

Loading a Queue

To load a queue, select/Load/ in the Queue Menu. When the words “Load Queue” appear, press [ENTER]. The confirmation message in the display below appears for one second.

```
** Queue Loaded **
```

When a queue is loaded, the letter “Q” appears at the extreme left of the Status Screen shown below.

Status	λ	AU
Q READY	250	+0.0001

If you attempt to load a queue when no queue exists, the message shown below appears on the display.

```
** No Queue Available **
```

Running a Queue

When the detector receives its first start signal, it loads and runs the file designated in Order 1. It will continue to run this file each time it receives a start signal until the file has run the number of times specified in the #Runs field. The detector will then load and run the file designated in Order 2 and run it the number of times specified in that line, and so on, until the entire queue has run.

Viewing the Progress of a Queue

1. Press [MENU].

2. Select /QUEUE/. Note that when a queue is loaded, the Queue Menu looks different. The Load field has been

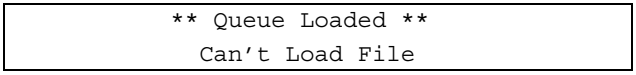
replaced by “Pause.” See below for more information on the Pause selection.

3. Select /Edit/to display the queue.

While the queue is running, the # Runs field decreases by one automatically with each injection. When a last injection of a particular file is made, the queue is resorted automatically. In other words, the information for Order 2 is now moved up to Order 1, the information for Order 3 is moved up to Order 2, and so forth. This process continues until the queue becomes empty, is paused, or is deleted.

Loading Other Files

When a queue is loaded or running, you may not load any other file from the Files Menu without first pausing or deleting the queue. If you forget to pause or delete the queue and attempt to load a different file, you’ll get the message shown below. You are then returned to the Files Menu.



Editing a Queue

To edit an existing queue, follow the procedures outlined in *Setting Up a Queue* on page 60. You’re allowed to edit the Queue while it is running, but if you want to edit anything in Order 1, you’ll have to pause the queue first.

Pausing a Queue

1. Select /Pause/ from the Queue Menu.

2. When the words “Pause Queue” appear, press [ENTER]. If a file is running, the run continues until it is completed, at which point the detector returns to its READY state. The letter Q will then no longer appear in the Status Menu.

When you wish to continue, you must reload the queue. When the detector receives a start signal, the queue will resume operation at the point where it left off.

Deleting/Stopping a Queue

1. Display the Queue Menu.

2. Select/Delete/.

3. When the words “Delete Queue” appear, press [ENTER]. If a file is running, the run continues until it is completed. A confirmation message appears for one second and you’re returned to the Queue Menu.

You may delete or stop a queue at any time, but remember that the queue will be erased from memory. It is good practice to delete an existing queue prior to creating a new one.

K-Factor

The K-factor calculates a factored response that can be used to eliminate, add, or subtract absorbance. This technique is useful for suppressing peaks when there are two coeluting, or poorly resolved, peaks in your chromatogram. It is also useful in applications where you want to add or subtract absorbances at two different wavelengths in real-time.

For example, if you want to quantitate a peak without interference from another peak, you would use the K-factor to calculate a response of zero.

More specifically, let us say you want to analyze for Compound A in the presence of Compound B. If both absorb at the monitoring wavelength, $\lambda 1$, but only Compound B absorbs at a second wavelength, $\lambda 2$, you can calculate a K-factor for Compound B using its absorbances at $\lambda 1$ and $\lambda 2$. You can then use the K-factor to calculate the absorbance due to only Compound A at the monitoring wavelength ($\lambda 1$), by subtracting the Compound B contribution from the total absorbance. The ProStar 345 uses the algorithm:

Absorbance due to A at λ1 = TAbs(λ1) - K x TAbs(λ2)

where TAbs(λ1) is the sum of the absorbances of A and B at the monitoring wavelength, K is the K-factor, and TAbs(λ2) is the total absorbance obtained at λ2.

Figure 9 shows a chromatogram of a mixture of toluene and butyl paraben where the two compound peaks overlap. Toluene (Peak A) is the compound of interest. Butyl paraben (Peak B) is the peak we want to suppress.

We will use this example throughout the following steps for determining and using the K-factor.

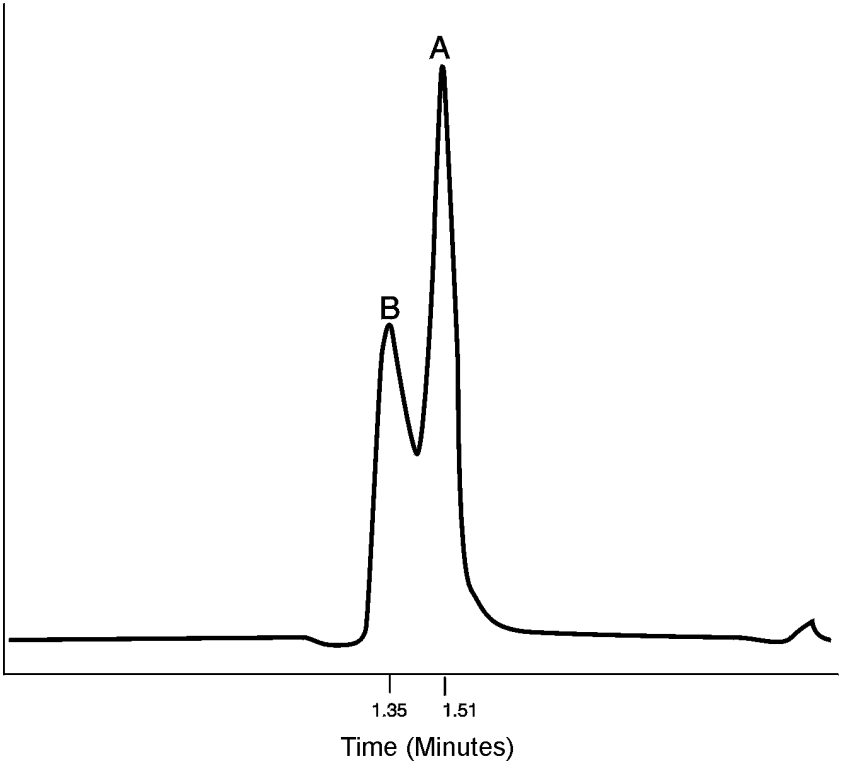


Figure 9 A Chromatogram of Two Unresolved Peaks: toluene (A) and butyl paraben (B)

Choosing a Pair of Wavelengths

The first step in determining the K-factor is to choose a pair of wavelengths for your analysis.

1. Take an absorbance spectrum of each compound. You can do this by injecting samples of compound A and compound B alone, separately, under the same chromatographic conditions as your analysis, and using the ProStar 345 scanning feature. (See *Scanning* on page 48).

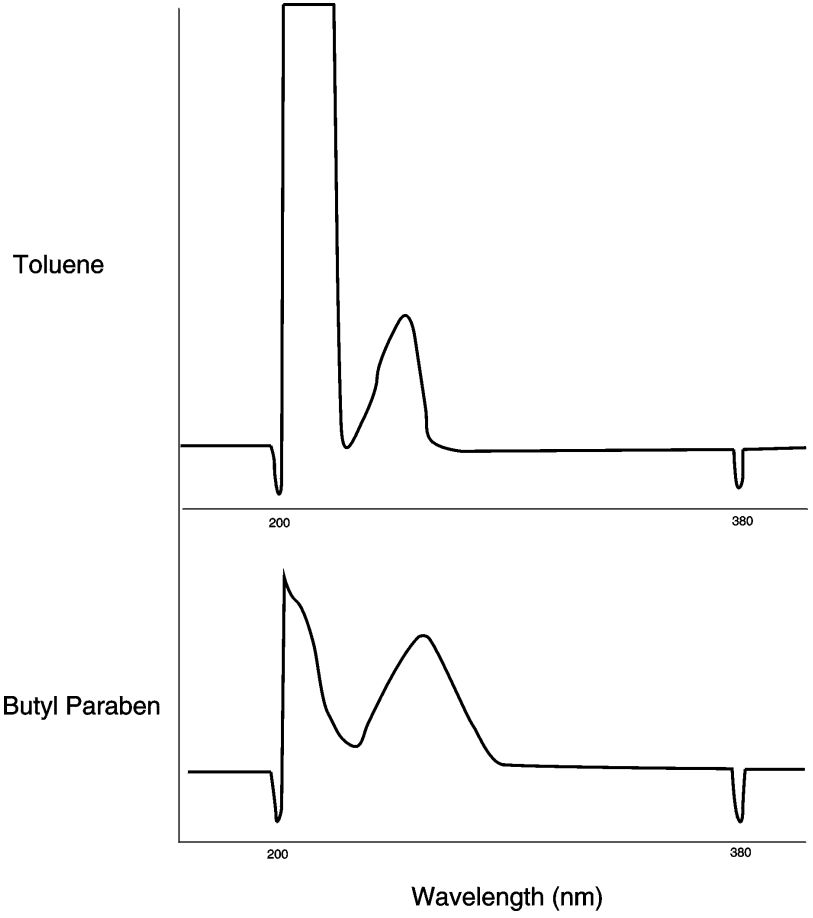


Figure 10 Spectra of Individual Compounds

2. Label the wavelength maximum for your peak of interest as λ1.

3. From the spectra, pick a wavelength for which compound B absorbs and compound A doesn't. This wavelength is labeled λ2. For our example, we have chosen 254 nm as λ1 and 280 nm as λ2.

Calculating the K-Factor

Use the ProStar 345 Display AU, λ screen to obtain the individual absorbance value data from your scan of compound B.

Calculate the K-factor using the following equation:

K = AU1/AU2

where AU1 and AU2 are the absorbance values for compound B at λ1 and λ2, respectively.

For our example, the absorbance values are 0.0144 and 0.0032 (for 254 and 280 nm respectively), so our K-factor is 4.5 calculated as follows:

K= 0.0144/0.0032 = 4.5

Using the K-Factor

To use the K-factor, set the parameters in the Analog Outputs Menu, inject your sample, and monitor the results as follows:

1. The menu below will appear. Press [MENU]
2. Select /OPTIONS/.
3. Select /Analog Outputs/.

```
Analog 1 Offset (%)                    0
Analog 2 Offset (%)                    0
----------------------------------------
Analog 2                              AU
K Factor                           1.000
```

4. Scroll down to Analog 2 and select AU1-K*AU2.
5. Scroll down to K-factor and enter your calculated value (4.5, for our example).
6. Inject your sample.

NOTE: Make sure your file was set to dual-wavelength mode as described in *Basic Operations*. Also remember that in this example, AU1 (λ1) is 254 nm and AU2 (λ2) is 280 nm.

7. Use Analog Output 2 (CH 2 on the detector rear panel) to monitor the chromatograms for your peak of interest.

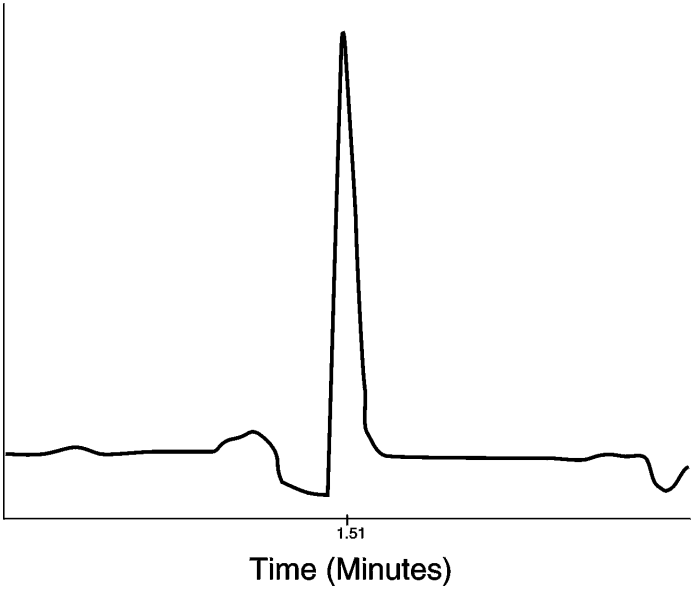


Figure 11 Chromatogram of Toluene with Butyl Paraben Suppressed

Our example chromatogram would now appear, as shown in the figure above, with a slightly lowered response for toluene and no absorbance contribution from butyl paraben. Using the K-factor in this way, we can quantitate toluene in the presence of butyl paraben without altering the chromatography.

Absorbance Ratios

Ratioing the detector outputs from two different wavelengths can be a useful way of confirming peak purity. When a peak is pure, the ratio of the absorbances should remain constant. Thus the ratio for a pure compound produces a relatively square wave, while the ratio for an impure compound produces a distorted wave (see the plots at 1.57 and 0.97 minutes, respectively, in the figure below).

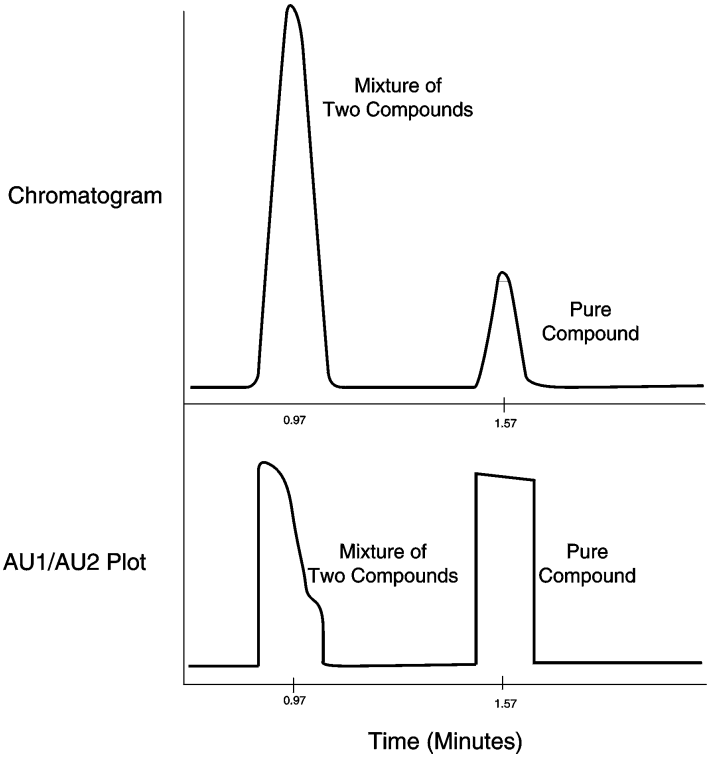


Figure 12 Using Absorbance Ratios to Determine the Purity of Two Peaks in a chromatogram

To use absorbance ratioing, you need to select AU1/AU2 for the Analog 2 Output field in the Analog Outputs Menu. You also need to select the two wavelengths you want to ratio.

To select the most appropriate wavelengths, use the ProStar 345 Scan File to collect a spectrum across a range of wavelengths. Then select/Display AU, λ/from the Replay Menu and examine the collected data.

Display	λ	AU
1.50	250	0.00001
1.50	250	1.66681
1.50	280	0.28831

Ratioing only occurs when the absorbance value for each wavelength exceeds 12.5% of the corresponding range value. So, in our example, if Ranges 1 and 2 were set to 1.0 in the /FILES/, /Edit/, Options Menu, the 250 and 280 nm wavelengths could be rationed. Twelve-and-a-half percent of 1.0 (the range) is 0.125. Absorbance values less than 0.125 are too low for ratioing. No ratio output is produced when the absorbance values fall below 7.5% of the range values.

Generally, good wavelengths to choose are:

- the lambda max of the main peak (AU1)
- a wavelength with an absorbance value less than the lambda max but greater than 12.5% of the corresponding range (AU2)

NOTE: A good rule of thumb is to select a second wavelength that is either half the height of the lambda max or more than ten nanometers removed from the lambda max.

Whichever wavelengths you choose, do not select a wavelength that has a low absorbance value. Low absorbance values decrease the signal-to-noise ratio, thus making the absorbance ratios less meaningful. Similarly, a small fluctuation in AU2 results in a big difference in the absorbance ratio if AU2 is very small. Fortunately, by relying on the preset range values, the ProStar 345 has a built-in safeguard that prevents the ratioing of low absorbance values.

Maintenance and Troubleshooting

Routine maintenance is necessary to ensure peak performance, performance can only be guaranteed if you follow proper care and maintenance procedures.

This section explains how to clean and replace your detector flowcell and lamps.

Flowcells

This section describes the changing and general cleaning of your detector flowcell For other flowcell problems, such as a cracked window or leaks that occur in locations other than at the inlet/outlet fittings, contact LC Technical Services at 1-800-FOR-HPLC or your local Varian Office.

NOTE:	Flowcells are factory-assembled units that should not be disassembled by a novice under any circumstances.

Changing the Flowcell

The flowcell must be removed whenever you need to replace a broken cell, change between specialized applications, or clean the cell with nitric acid. For a list of available flowcells, see Parts and Accessories, page 102. All flowcells are shipped pre-mounted in a holder for easier installation and alignment.

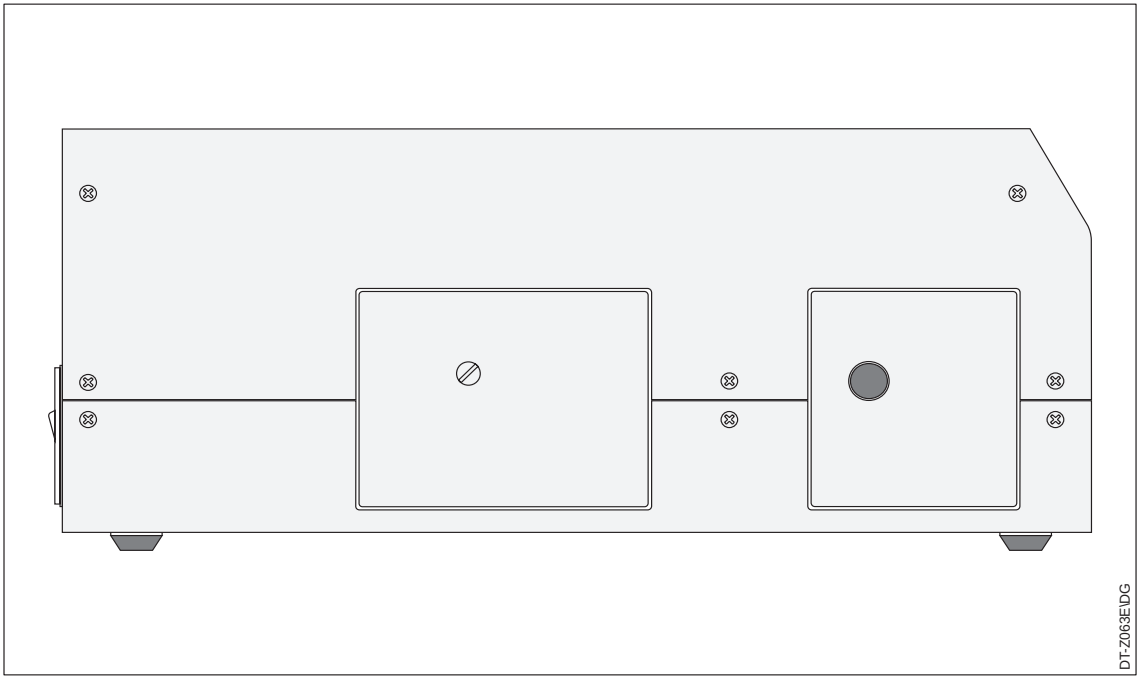


Figure 13 Left-side View of Detector Chassis. Front housing contains flowcell; rear housing contains lamps

Flowcell Removal

To access the flowcell, remove the front enclosure of the two enclosures on the detector left side (as you face the detector from the front). The flowcell assembly is located inside the enclosure (Figure 13). Once the enclosure is removed, the flowcell is easily identified by the tubing that extends from the fittings at its top and bottom,

1. Disconnect the power cord from the detector rear panel and turn the power switch off.

2. Loosen the knurled thumbscrew that holds the flowcell enclosure in place, and remove and set aside both the thumbscrew and the housing.

3. Disconnect the flowcell inlet tube from the chromatograph and free the flowcell outlet tubing from the waste reservoir.

4. Remove the two thumbscrews from the photodiode mount and carefully put the mount straight back. The cable that connects the photodiode mount to the detector is sufficiently long to allow the mount to be positioned out of the way (Figure 14).

CAUTION

Wear powder-free latex gloves during disassembly of flowcell-housing components to avoid putting fingerprints or scratches on the flowcell windows, photodiode surface, or monochromator lens, all of which are exposed during these procedures. If dirty, clean the surfaces with spectroscopic-grade methanol (or isopropanol) and lint-free lens paper only.

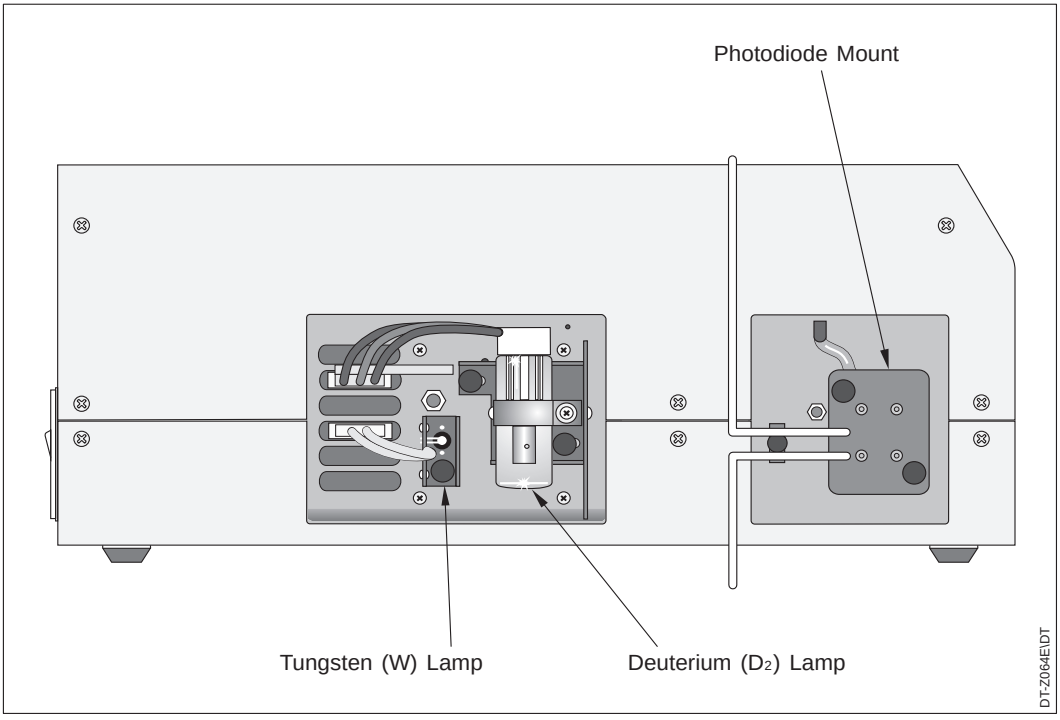


Figure 14 Removing the Lamp and Flowcell Housings to Expose the Lamp, the Flowcell, and the Photodiode Mount

5. Loosen the thumbscrew that holds the tubing clamp in place. Gently pull the clamp toward you just far enough to disengage the tubing. Reorient the tubing so that it is clear of the tubing clamp.

6. Loosen the two thumbscrews that hold the flowcell assembly. Carefully pull the assembly toward you to remove it from the detector.

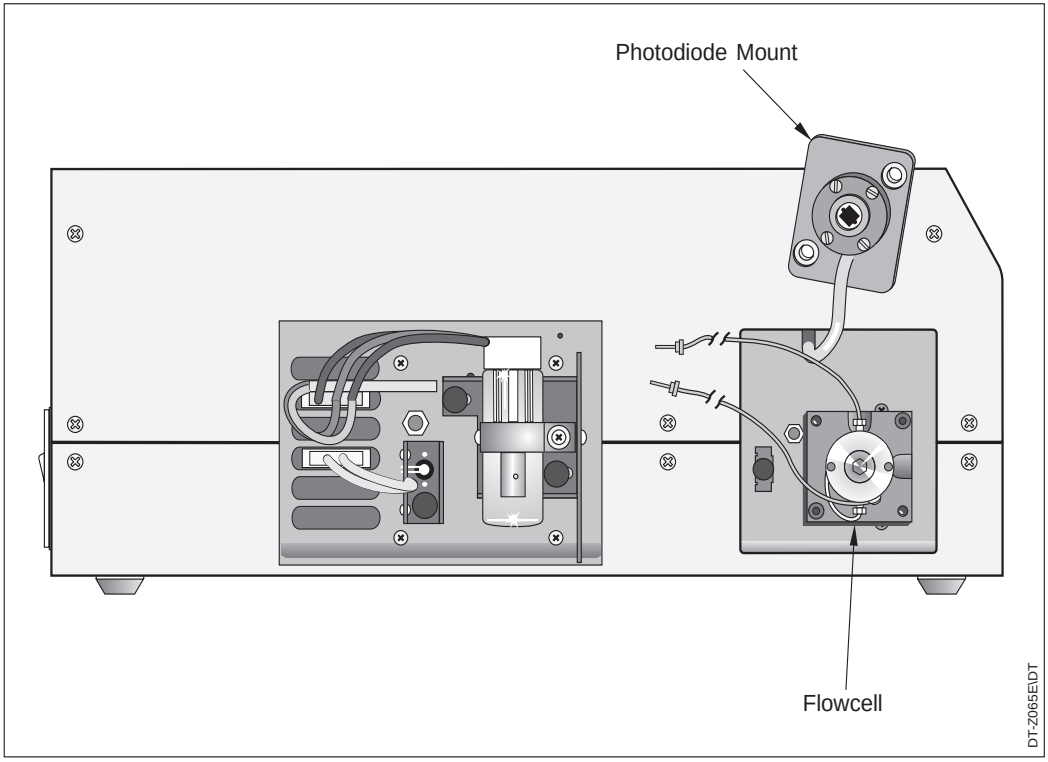


Figure 15 Repositioning the Photodiode Mount to Expose the Flowcell

Flowcell Installation

To install a flowcell, follow these steps:

1. With the inlet tube on the bottom, slide the flowcell assembly onto the alignment pins and securely fasten it in place with the two thumbscrews.

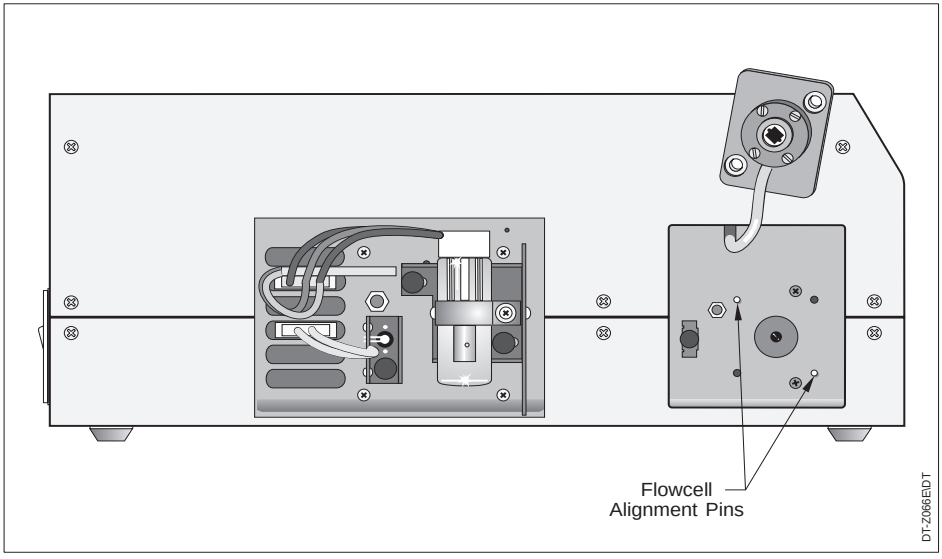


Figure 16 Location of the Flowcell Alignment Pins

2. Slip the flowcell inlet and outlet tubes into the slots of the tubing clamp and tighten the thumbscrew that holds the clamp in place.

3. Replace the photodiode mount and fasten it securely with the two thumbscrews.

4. Connect the inlet tubing to the chromatographic column and the outlet tubing to the waste reservoir.

5. Taking care not to pinch the cable or tubing, replace the flowcell enclosure and secure it with the knurled thumbscrew.

6. Connect the power cord to the rear detector panel.

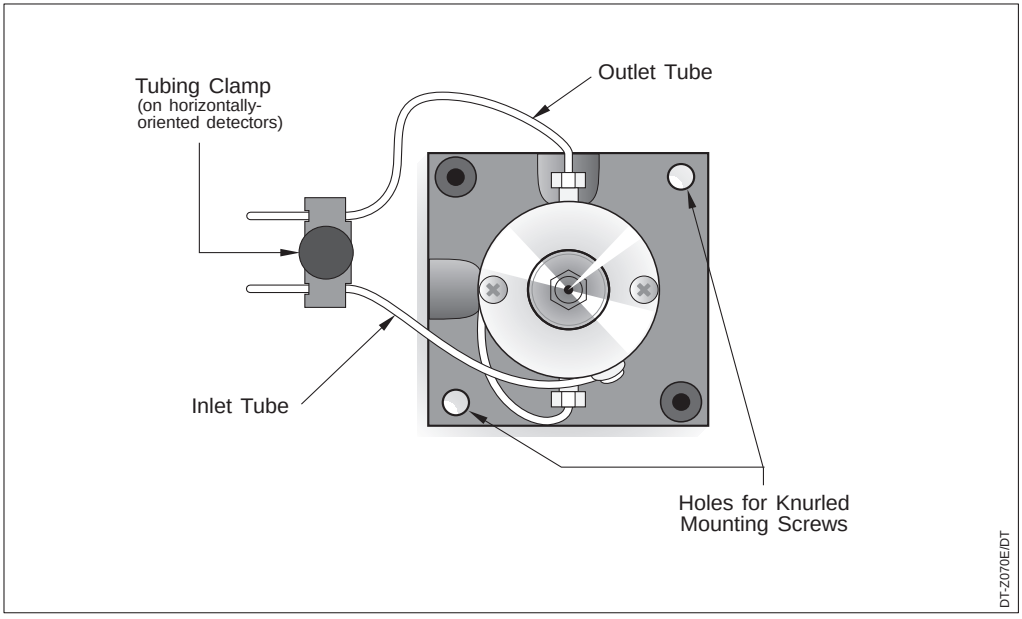


Figure 17 Proper flowcell installation

Cleaning the Flowcell

The exterior and/or interior surfaces of the flowcell can become contaminated. When flowcell contamination occurs, it is usually caused by precipitation or solubility problems, such as when the quality of your mobile-phase solvent components and the cleanliness of your samples are variable. Signs of a contaminated flowcell are increased baseline noise, signal spiking, erratic or drifting baselines, and, in the case of severe contamination, increased back-pressure.

Cleaning with Organic Solvents

If you suspect that your flowcell requires cleaning, start by using the following procedure with organic solvents.

NOTE: Flowcells are factory-assembled units that shouldn't be disassembled under any circumstance. If you encounter contamination problems that not remedied by this cleaning procedure, contact LC Technical Services at 1-800-FOR-HPLC or your local Varian office to arrange for repair or replacement.

1. Ensure that the first cleaning solvent you plan to use is miscible with the solvent already present in the flowcell and pump. Isopropanol is a good choice for most applications.

CAUTION

If the last solvent in the pump was an aqueous buffer solution, be sure to pump 25-40 mL of HPLC-grade water (or equivalent) through the system to remove any salts before flushing with the cleaning solvent(s).

2. Flush the flowcell with 40-50 milliliters of solvent (HPLC-grade water, methanol, or isopropanol). You can either pump the solvent through the flowcell with chromatographic pump, or you can draw the solvent through the flowcell using a large-volume syringe.

   If you use an LC pump to flush the flowcell, first remove the column from your chromatographic system to avoid column degradation. Replace the column with an appropriate length of tubing, ensuring that all connections are snug and leak-free. If you use a syringe, always draw the solution through the flowcell.

WARNING:
EYE HAZARD

Never use a syringe to force solvent through a flowcell. Pressurizing the syringe could cause a leak or rupture that would result in an extremely dangerous, uncontrolled spray of solvent.

Cleaning with Nitric Acid

Methanol or isopropanol is generally sufficient for cleaning a flowcell. However, if the flowcell is still contaminated after flushing with organic solvents, follow this nitric acid procedure.

WARNING:
EYE HAZARD

Nitric acid is extremely corrosive and can react explosively with alcohols (especially methanol). Be sure to adhere to your company's safety procedures for handling and disposal of corrosive acids. Flush the flowcell with water to remove all traces of alcohol prior to flushing with nitric acid!

1. Remove the flowcell assembly from the detector housing (following the procedure on page 72) before cleaning with a nitric acid solution. This will prevent possible leaks from harming the mechanical or electronic components of the detector.

2. Flush the flowcell with water before proceeding following safety procedures as explained in the Eye Hazard Warning preceding. This step is critical for operator safety.

3. Prepare a 20% (v/v) solution of nitric acid in HPLC-grade water.

4. Pump the nitric acid solution through the flowcell with the chromatographic pump or draw it through with a large-volume syringe.

   If you use an LC pump, replace your column with tubing and make sure water was the last solvent in the pump and solvent reservoir. If you use a syringe, always draw the solution through the flowcell.

WARNING:
EYE HAZARD

Never use a syringe to force nitric acid through a flowcell. Pressurizing the syringe could cause a leak or rupture that would result in an extremely dangerous, uncontrolled spray of acid.

5. After you've finished the cleaning procedure and before returning to the buffer solution, pump another 25-40 mL of water through the flowcell to remove all traces of nitric acid before returning to your chromatographic solvents. Reinstall the flowcell assembly.

CAUTION

Flush the pump with water immediately after the nitric acid flush. Leaving nitric acid solution in the pump for prolonged periods can damage pump seals.

If you encounter contamination problems that are not remedied by either cleaning procedure, contact LC Technical Services at 1-800-FOR-HPLC or your local Varian office.

Flow Cell Maintenance

Cell Cleaning

If at all possible, we discourage the disassembly of flow cells for routine cleaning purposes. Most cells can be adequately cleaned by flushing with several milliliters of appropriate solvent. We recommend the following solvents for this purpose:

1. Methanol
2. Tetrahydrofuran
3. Methylene chloride
4. HPLC Grade Water
5. 6 N Nitric Acid following by flushing with HPLC Grade Water

Cell Disassembly

If flushing proves inadequate for cleaning purposes or if the flow cell becomes leaky, requiring gasket replacement, the following procedure should be followed for flow cell disassembly, see Figure 18.

1. Remove the flow cell assembly from the detector as described in the installation section of this manual.

2. Remove the two screws which secure the flow cell body to the flow cell mount and free the flow cell from its mount.

3. Using a wide, flat-blade screwdriver, remove the window retaining nut (11).

4. Remove the retaining washer (10). Note that it is installed concave-side up.

5. With a fine pair of forceps, gently lift out the flow cell window (9). Be careful not to scratch these windows. Clean the window using spectroscopic grade methanol and lint-free lens paper.

6. Note the orientation of the tear drop of the flow cell gasket (8.). It should be installed so that both the optical bore (the large hole) and fluid bore (the small hole) are not covered. Remove the cell gasket with a pair of fine forceps.

7. Repeat steps 3 through 6 above for the other side of the cell.

8. If the inlet or outlet tubes are clogged, remove them as follows:

    - Remove the exit tubing (7) by unscrewing its fitting (2) and pulling the tube straight forward.
    - Unscrew the heat exchanger restraint screw (5) and remove the screw and washer (4).
    - Unwind the inlet tubing (1) from around the cell body (6).
    - Remove the inlet tubing (1) by unscrewing its fitting and pulling the tube straight out.
    - Remove the remaining heat conductive epoxy out of the heat exchanger groove which circumscribes the cell body.

The flow cell body may be cleaned by soaking it in spectroscopic grade methanol. For best results, an ultrasonic bath should be used.

Flow Cell Reassembly

NOTE:	For best results, the flow cell gaskets should be replaced each time the cell is disassembled.

1. With a pair of fine forceps, replace the cell gasket (8) in its proper orientation so that both the optical bore (large hole) and fluid bore (small hole) are exposed by the tear drop.

2. Carefully replace the cell window (9).

3. Install the retaining washer (10) so that its concave surface faces away from the cell body.

4. Replace the window retaining nut (11). Tighten to 14 inch-pounds. To avoid possible damage to the windows, do not exceed 14 inch-pounds of torque.

5. Repeat steps 1 through 4 for the other side of the flow cell.

6. If the cell tubing was removed, re-install as follows:

   - Replace the cell inlet tubing by replacing its fitting into the inlet hole (the one next to the hole for the heat exchanger restraint).
   - Bend the tubing around the cell so that it circumscribes the cell body in the heat exchanger groove before it approaches the hole for the heat exchanger restraint.
   - To improve heat exchange between the inlet tubing and flow cell body, a heat conductive epoxy should be applied into the groove before the tubing is installed.
   - After the epoxy has been applied, secure the tubing into the heat exchanger groove by replacing the heat exchanger restraining screw (5) and washer (4).
   - Replace the cell outlet tubing by placing its fitting into the outlet tubing hole.

7. Reinstall the flow cell body on the flow cell holder using the two mounting screws. Insure that the protruding nose piece of the flow cell is inserted into the cell mount.

8. Reinstall the flow cell onto the detector as outlined in the installation section of this manual.

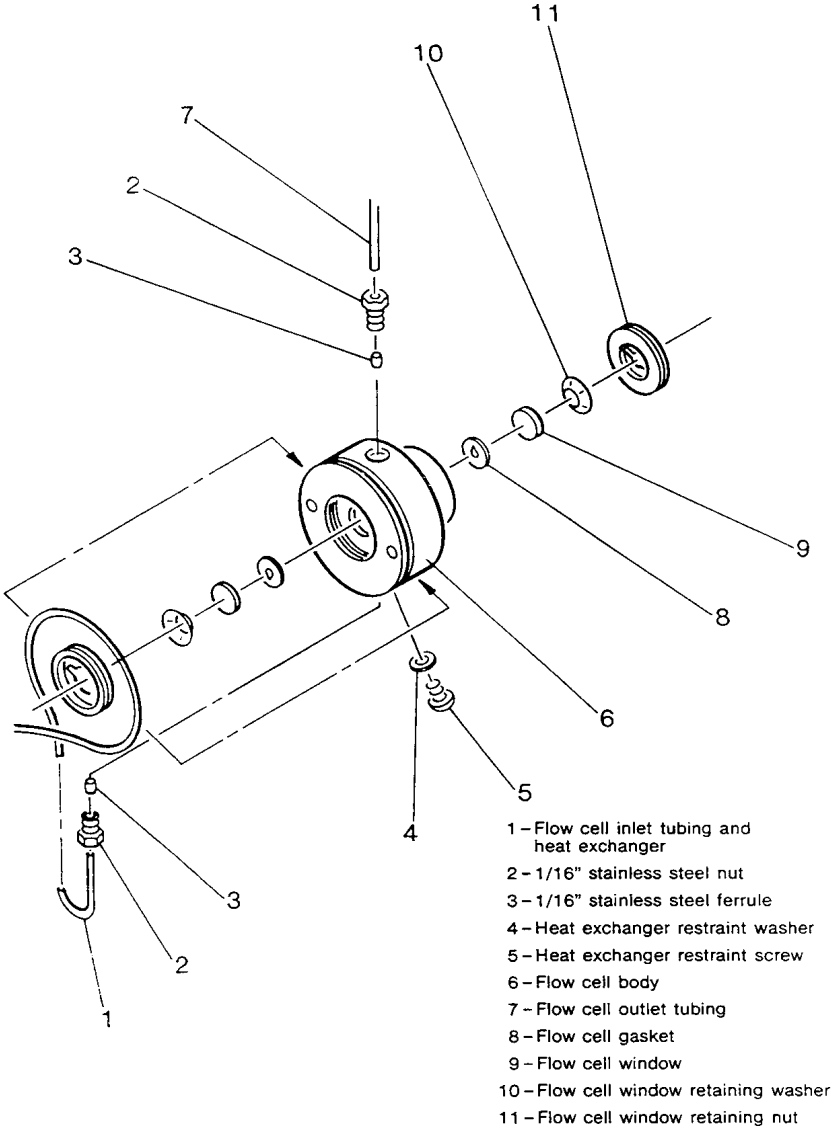


Figure 18 Flow Cell Assembly

Lamps

As lamps age, there is a reduction in light output that results in increased baseline noise. If the noise level on your detector output signal in increasing and cleaning the flowcell doesn't help, you should change the appropriate lamp, using the procedures in this section.

Remove the lamp housing (the housing shown on the left below). Both lamps are supplied prealigned in their individual assemblies to make them easy to install.

CAUTION

Never loosen the screws that hold the lamp to its assembly or attempt to rotate or move the lamp up or down in the assembly. Either of these actions can cause a loss of alignment and degrade the detector performance.

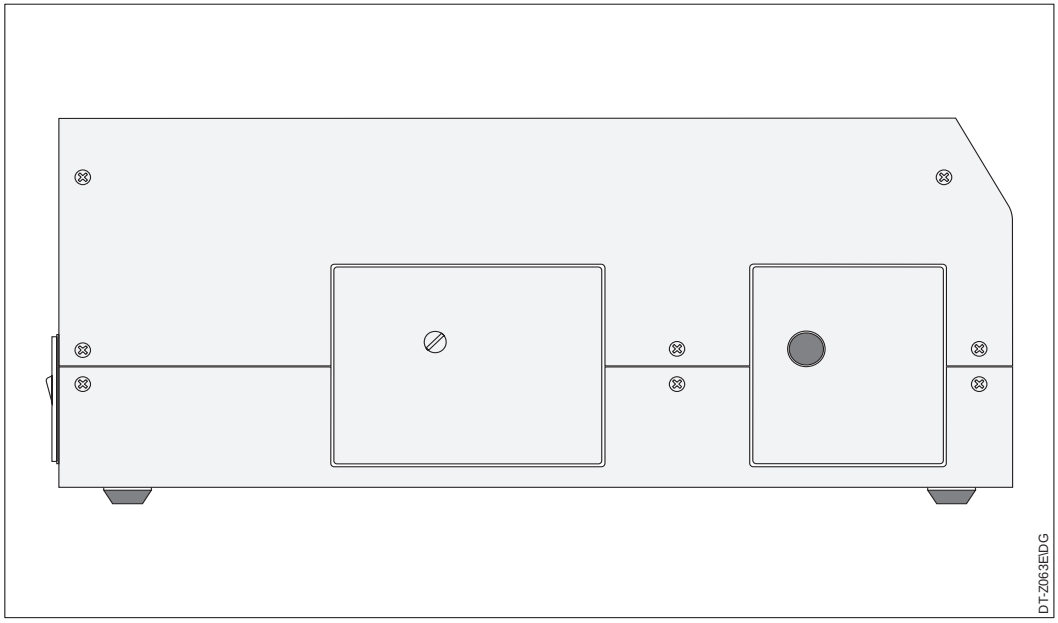


Figure 19 Left side of the detector showing location of lamp and flowcell housings

The Deuterium Lamp

The deuterium (D2) lamp typically requires a warm-up time of 20 to 30 minutes. However, for applications that demand great sensitivity, you may want to allow an extended warm-up period of up to an hour.

The deuterium lamp lifetime is usually at least 1000 hours. Each D2 lamp assembly is equipped with a chronometer that tracks the total hours of lamp operation. To read the chronometer, observe the position of the "gap" in the mercury tube relative to the graduated scale, noting that the center graduation corresponds to 1,000 hours and each of the smallest divisions represents 100 hours. In the example shown in Figure 20, the position of lamp chronometer gap indicates that the lamp has operated for approximately 1,100 hours.

You can also track lamp life automatically. (See *Automatic Lamp Operations* on page 42 for details).

NOTE:	Wear powder-free latex gloves to keep the lamp surface free of fingerprints and smudges. If the surface needs cleaning, use a lint-free lens paper moistened with methanol or isopropanol.

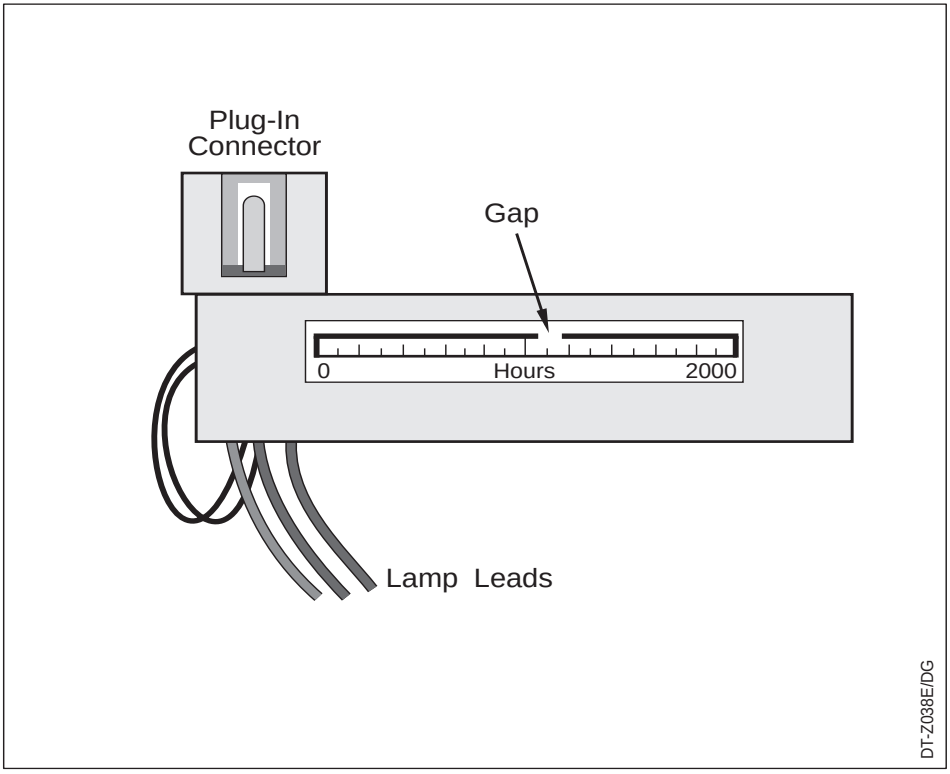


Figure 20 Deuterium Lamp Chronometer, Top view

D2 Lamp Removal

1. Disconnect the power cord from the detector rear panel and make sure that the instrument is turned off.

WARNING:
EYE HAZARD

Intense UV light can injure your eyes. Wear UV-blocking safety glasses. Always disconnect the power cord before exposing the lamp and always allow sufficient time for the lamp to cool before removing it, as it gets very hot when lit.

2. Remove the lamp housing by removing the mounting screw and pulling off the cover. The lamp assemblies will then be exposed.

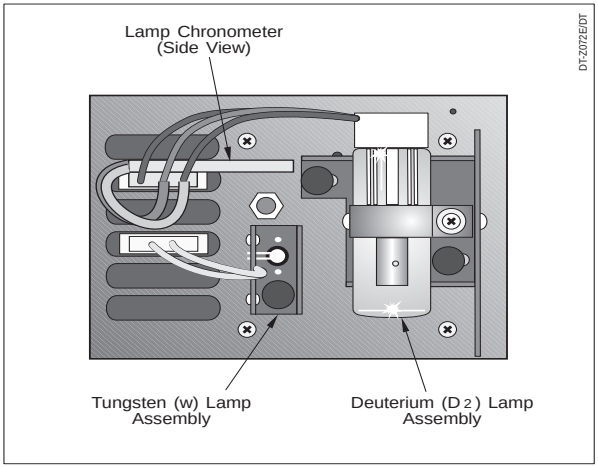


Figure 21 Deuterium (D2) Lamp Chronometer, D2 and Tungsten (W) Lamp Assemblies

3. Unplug the deuterium lamp lead from the detector, taking care not to twist the connector as you pull it out gently.

4. Loosen the two thumbscrews that hold the lamp assembly in place and pull the assembly straight out.

D2 Lamp Installation

1. Hold the deuterium lamp assembly so that the leads are at the top. Slide the assembly onto the alignment pin shown in the figure below. (The alignment pin is located to the right of the detector monochromator aperture.)

2. Fasten the assembly securely in place using the two thumbscrews and aluminum standoffs.

3. Insert the lamp white-nylon electrical connector into the upper bulkhead connector in the lamp compartment.

4. Replace the lamp enclosure and secure it with the knurled thumbscrew.

5. Connect the power cord to the rear detector panel.

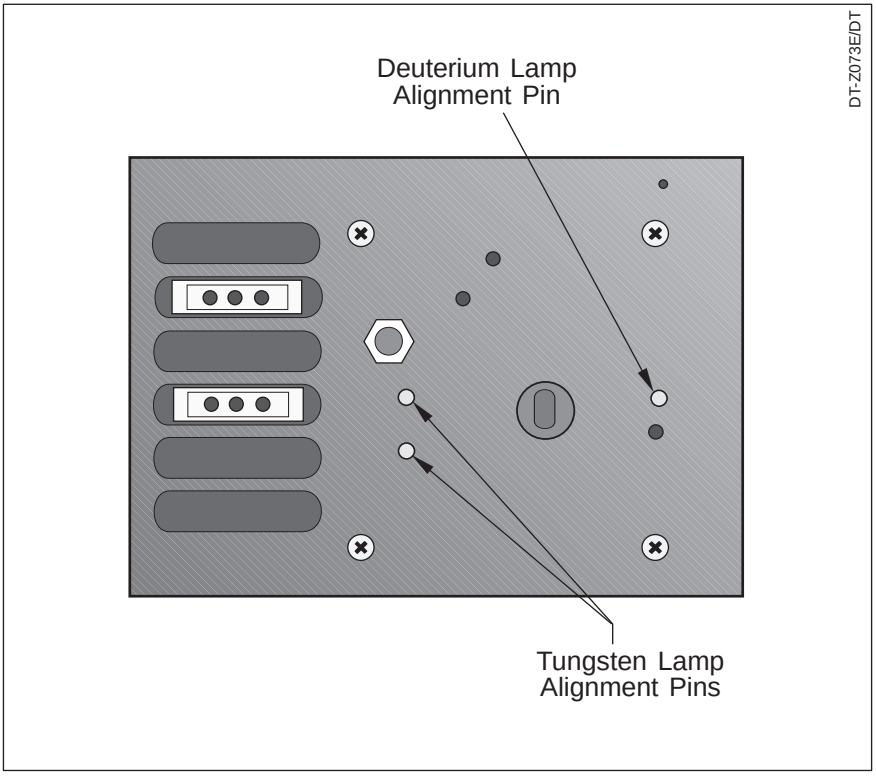


Figure 22 Deuterium and Tungsten Lamp Assemblies Removed to Show Lamp-Alignment Pins

The Tungsten Lamp

The tungsten (W) lamp requires only 15 minutes of warm-up time, typically. Its lifetime is approximately 2500 hours. You can track lamp life automatically. (See *Automatic Lamp Operations* on page 42 for details.)

W Lamp Removal

1. Disconnect the power cord from the detector rear panel and make sure that the instrument is turned off.

WARNING:
BURN HAZARD

To avoid burns, always allow sufficient time for the lamp to cool before removing it.

2. Remove the lamp enclosure by loosening the thumbscrew and pulling the cover away to expose the lamp, see Figure 21).

3. Unplug the tungsten lamp lead (the lower white-nylon connector) from the detector lamp compartment, taking care not to twist the connector as you pull it out gently.

4. Loosen the thumbscrew and the aluminum standoff that hold the lamp assembly in place and pull the assembly straight out.

W Lamp Installation

These five steps explain how to replace the tungsten lamp.

1. Hold the lamp assembly so that the leads are at the top. Slice the assembly onto the two alignment pins shown. (The alignment pins are located on either side of the detector monochromator aperture.)

2. Fasten the assembly in place securely with the thumbscrew and aluminum, standoff.

3. Connect the lamp white-nylon electrical connector to the lower bulkhead electrical connector in the lamp compartment.

4. Replace the lamp enclosure and fasten it securely with the thumbscrew.

5. Connect the power cord to the rear detector panel.

CAUTION

Exercise care when installing the tungsten lamp assembly to ensure that the alignment pins enter the correct openings in the assembly. If an alignment pin inadvertently and forcefully presses against the W lamp, the pin may knock the lamp out of alignment.

This section provides you with helpful information for troubleshooting possible detector and chromatographic system problems.

- a brief theory of operation
- a troubleshooting guide that lists symptoms, possible problems, remedies
- possible error messages
- a description of the detector diagnostic tests

Theory of Operation

This brief Theory of Operation is included to aid you in troubleshooting problems and performing maintenance for your detector.

Figure 23 shows the optical system used. The detector operates in a double-beam mode using a fiber-optic beam-splitter that creates sample and reference beams. The reference beam is directed to a reference photodiode. The sample beam is lens-focused prior to passing through the flowcell to a sample photodiode.

An analog PCB processes the signals from the photodiodes and provides analog output signals through an 8-pin external connector. The digital PCB contains the EPROM (the built-in software), provides digital processing circuitry, and interfaces with the keyboard/display and the remote communications devices. (Additional software is held on an EPROM PCB.) The Motherboard provides all the necessary interconnections and power supplies.

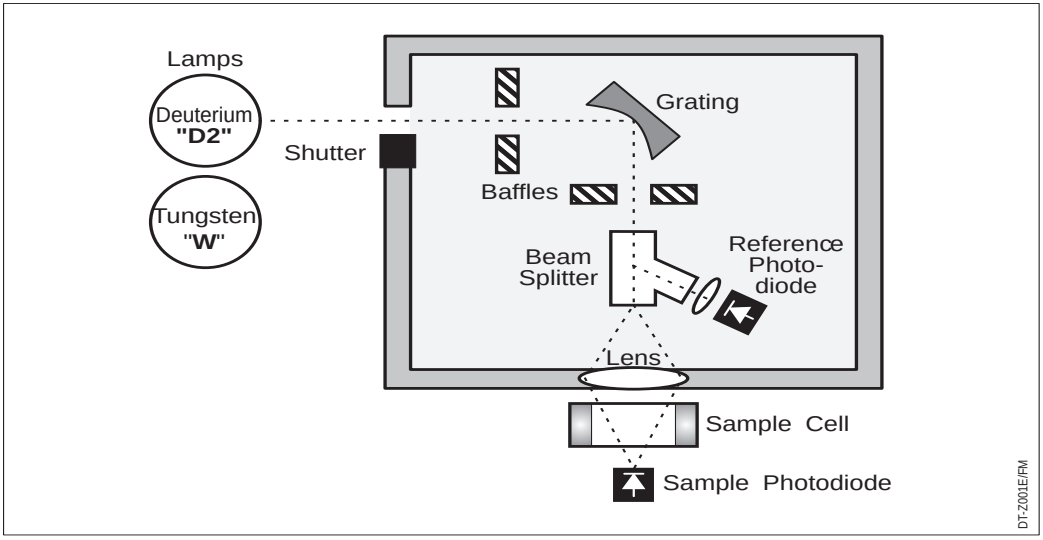


Figure 23 ProStar 345 Optical System

The deuterium and tungsten lamps are continuum light sources that provide high light intensity over the UV and visible wavelength ranges. Two sets of baffles minimize stray light. A concave holographic grating actuated by a microprocessor-controlled stepper motor provides wavelength selection.

Troubleshooting Table

This section contains a table of symptoms, possible causes, and remedies for some common problems. Many problems attributed to the detector may actually be due to other components in the HPLC system, so references to these types of problems and solutions are included. If the problem persists after you have tried the suggested remedy, please call LC Technical Services at 1-800-FOR-HPLC or your local Varian Office for further assistance.

Symptom	***Possible Cause***	***Suggested Remedy***
Spikes on baseline	Bubbles in the flow cell.	Degas mobile phase. Supply backpressure device to flowcell (check backpressure rating). Check for leaks at high-pressure fittings.
	Immiscible solvent bubbles following mobile phase changeover.	Flush flowcell with 2-propanol, then with mobile phase.
	Electrical interference.	Check electrical connections for good continuity. Check for RFI (Radio Frequency Interference) from nearby sources such as computers, monitors, printers, etc. Verify that detector GND input is not connected to the recorder's earth-ground terminal, creating a ground loop.
	Large AC-line voltage fluctuations.	Connect detector to a power outlet not shared with heavy-current-draw devices (refrigerators, large electric motors, etc.).
Random noise on integrator/ recorder baseline	Flowcell contamination.	Clean flowcell with solvents.
	Leaking sample-inlet line.	Check all fittings from the column outlet and to the flowcell inlet for leaks. Tighten or replace fittings.
	Bubble trapped in flowcell.	Increase flowrate to dislodge bubble. Supply back-pressure device to flowcell (max. 500 psi).
	Flowcell leaking.	Replace flowcell.

Symptom	*Possible Cause*	*Suggested Remedy*
	Ground-loop between detector and integrator/ recorder.	Verify that detector GND input is not connected to the recorder's earth-ground terminal, creating a ground loop. Ensure that both devices are connected to the same AC outlet. Do not ground both ends of cable.
	Dirty optics (flowcell, lamp, or lenses).	Clean appropriate system optics.
	Integrator/recorder input voltage mismatched with detector output voltage.	Reconnect positive lead of integrator's or recorder's connecting-cable to correct terminal on detector. Verify correct integrator attenuation.
	Mobile phase contaminated.	Replace with fresh mobile phase made with high-purity solvents.
	Lamp aging or defective.	Replace lamp.
Excessive baseline drift	Flowcell contaminated.	Flush flowcell with cleaning solvent.
	Mobile phase contamination.	Replace with fresh mobile phase made with high-purity solvents.
	Material bleeding from column.	Clean or replace column.
	Leaks in system, or flowcell.	Check all fittings for leaks. Replace flowcell.
	Tiny bubble trapped in flowcell.	Increase flow rate until bubble is removed. Connect back-pressure device to flowcell outlet (check back-pressure rating to avoid rupturing flowcell).
	Large temperature fluctuations.	Remove system from drafts. Thermostatically control column temperature.
No peaks, or peaks smaller than expected	Incorrect wavelength setting.	Check wavelength setting. Make sure the correct file is selected.
	Lamp not on or defective.	Make sure lamp is lit. Run diagnostic test to check lamp. Replace lamp if necessary.

Symptom	***Possible Cause***	***Suggested Remedy***
	Integrator output voltage does not match detector output voltage.	Connect integrator to appropriate output connectors on detector, see *Installation* section. Check attenuation setting on integrator.
	Insufficient sample reaching detector.	Check HPLC system for leaks. Verify sample injection volume.
Broad, tailing peaks	Rise time too slow.	Reduce rise time.
	Flowcell volume too large.	Change to smaller volume flowcell.
Clicking sound in dual-wavelength mode		Noise from grating motor is normal. No action required.
Detector will not power up	Tripped circuit breaker at AC wall outlet.	Resolve problem and reset breaker.
	Blown fuse.	Resolvent problem, reset fuse.
	Incorrect voltage selected.	Reset detector for correct line voltage.
	Power cord not connected.	Connect power cord.

Error Messages

Three types of errors may appear on your detector display. Each is explained below in further detail.

System Real-time Input

System Errors

System errors are indicated on the display by exclamation points (!! !!), and occur whenever an undesirable condition exists that prevents the detector from operating properly. If one of these messages appears, first try turning the detector power switch off and on. If the message is displayed again, contact LC Technical Services at 1-800-FOR-HPLC or your local Varian office.

!! SYSTEM RESET !!

!! RAM ERROR !!

!! ADDRESS ERROR !!

!! BUS ERROR !!

!! DIVIDE BY ZERO !!

!! LOW L0 ERROR !!

!! LOW L1 ERROR !!

!! DISTANT QUEUE ERROR !!

Real-Time Errors

The following real-time error messages may appear on the display of your detector.

LOW LIGHT DETECTED FROM DEUTERIUM LAMP

This message indicates that the deuterium lamp may not be on, may be improperly installed, or needs to be replaced due to low light energy. It can also appear if the lamp cover is replaced while the lamp is on.

Using the Lamps Menu (see *Automatic Lamp Operations* on page 42), turn the lamp state to Off, wait five seconds, and then switch the lamp to On. If the lamp installed correctly, its surface clean, and the message still appears, replace the lamp.

`LOW LIGHT DETECTED FROM TUNGSTEN LAMP`

This message indicates that the tungsten lamp may not be on, may be improperly installed, or needs to be replaced due to low light-output.

Using the Lamps Menu (see *Automatic Lamp Operations*, page 42), turn the lamp state of off, wait five seconds, and then switch the lamp to On. If the lamp is installed correctly, its surface is clean, and the message still appears, replace the lamp.

Input Errors

The following error messages indicate improper use of the detector menu system.

Error Message	***Description***
A File Is Already Running	You cannot start a file while a different file is already running.
Invalid Parameters, Spectrum Not Allowed	Invalid scanning setup parameters have been entered, so the detector cannot perform a spectral scan.
No More Available Memory	All available system memory is full.
No Queue Available	You cannot load a queue if none has been set up first.
No Spectra Available	You cannot run the replay spectra command when no spectra are available in memory.
Protected File, Cannot Be Copied To	You cannot copy to a protected file.

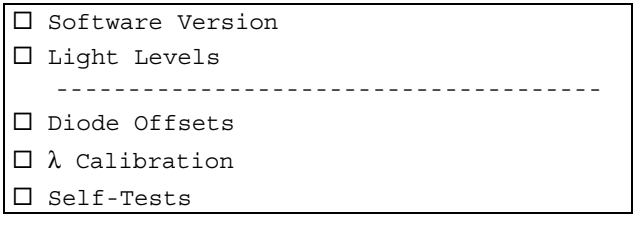
Error Message	*Description*
Protected File, Cannot Be Deleted	You cannot delete a protected file.
Protected File, No Editing Allowed	You cannot modify a protected file.
Queue Loaded, Cannot Load File	When a queue is loaded, you cannot load any other file.
Run In Progress, No Testing Allowed	You cannot run the detector built-in diagnostics while a run is in progress.
Run Not In Progress, No Scanning Allowed	A spectral scan can only be performed when a run is in progress.
Detector Shutdown	This message occurs when you use the Shutdown Detector field to turn off the detector. (See Shutdown Detector on page 48). Press any key on the keypad to turn on the detector.
Scan Memory Full	This message occurs when the Scan File is loaded and the scan data memory storage is full.
Run Not In Progress, No Replay Allowed	You can only replay stored spectral scans when a run is in progress.

Diagnostic Tests

This section describes diagnostic tests you can use if you suspect that your detector isn't working properly. All are built into your detector. To access these diagnostic tests:

1. Press [MENU].
2. Select /TESTS/.

The Tests Menu appears as shown below.



Software Version

Select this field to display the EPROM version of your detector software. Note that this is the only selection in the Tests Menu that should be made while an analysis is in progress.

```
Varian
Version x.xx
```

Light Levels

The Light Levels test displays numbers related to the level of light intensity seen by the sample and reference photodiodes. When you select/Light Levels/, this screen appears.

```
S1:  nnnnn.n      R1:  nnnnn.n
S2:  nnnnn.n      R2:  nnnnn.n
```

The sample (S1, S2) and reference (R1, R2) numbers may differ considerably between instruments. A five-or six- digit number is typical. If you get an unusual reading, check the photodiodes. These components are the ones that are the most likely to affect light intensity. If any of the numbers is zero, call LC Technical Services at 1-800-FOR-HPLC.

Diode Offsets

The Diode Offsets test presents numbers related to the level of background signal (dark current) received from the sample and reference photodiodes when the lamps are off. Access this test by pressing [MENU] and selecting /Tests/, /Diode Offsets/. The display shown below appears.

```
C        S1:  nnnn.n      R1:  nnnn.n
         S2:  nnnn.n      R2:  nnnn.n
```

The sample (S1, S2) and reference (R1, R2) numbers may differ considerably between instruments. A three-or four- digit number is typical. If you get an unusual reading, check the photodiodes. These components are the ones that are the most likely to affect light intensity. If any of the numbers is zero, call your local Varian Service Representative.

To recalculate the diode offsets, select C. The offsets may need to be recalculated if the light levels are less than the diode offsets. This situation normally occurs after slight diode offset drift or while working with extremely low light.

λ Calibration

Selecting /λ Calibration/ brings up the screen shown below. You can use this screen (in combination with the optional Cuvette Holder Accessory) to calibrate or recalibrate the detector to a different calibration standard (FDA, industry, or in-house) than that used during its manufacture.

```
λ Offset  (steps)                    0
```

NOTE: The detector is calibrated using a mercury lamp fixture. This provides a very narrow emission line at 254 nm. Broad-band calibration standards, such as holmium oxide and didymium filters, make calibration more difficult and less accurate.

To offset the factory-calibrated wavelength, select the number of "steps" by which you want the wavelength to be offset. Each step represents approximately 0.25 nm, so if you choose "2" for the number of steps, you'll have offset the wavelength by + 0.5 nm. You can offset the wavelength by as much as ± 2.5 nm.

NOTE: The offset value isn't cleared upon resetting the RAM memory. It can only be changed from the λ offset screen.

Self-Tests

The detector runs eight internal diagnostic tests automatically when it is powered up. To run the tests at any other time, simply select /Self-Tests/.

If any test (other than the two lamp test) fails, you'll see a message to that effect on the display. Clear the message and run the remainder of the self-tests by pressing [ENTER]. Repeat this process as many times as necessary until all self-tests are completed and the Status Screen appears. If any test has failed, the Status Screen will read "NRDY" (Not Ready).

Although you can frequently get back to the ready state on your own (e.g., you can turn on the lamps manually from the Options Menu), the detector may not function properly and your results may be affected. For this reason, and to help you troubleshoot the detector on your own, we have listed the most likely failure for each test. The eight self-tests are:

Test	***Description***	***Most Likely Failure***
RAM	This test checks both non-volatile and volatile RAM with a read/write test. The "Testing RAM" message only appears during self-initiated testing. On power-up, the test occurs without any special message. Instead, you'll see words like "Version No." on the screen. A failure during either type of testing is indicated by the messages "Bad DRAM" or "Bad NVRAM."	Digital PCB
Voltages	This test checks the circuitry-supply voltages.	Motherboard
Analog Outputs	This test checks the scale and linearity of the output signal (recorder/integrator). Failure is indicated by a "Fail" or a "Bad Analog Linearity" message.	Analog PCB
Diode Offsets	This test checks the photodiodes with the lamp(s) off (dark current). Failure is indicated by either a "Bad Sample Diode" or "Intense Light Detected" message. You should verify that the sample photodiode is fastened securely to the flowcell and that light is actually passing through the flowcell.	Photodiode or Analog PCB
Motor	The Motor Test checks the monochromator motor and its voltages.	Motor
Deuterium Lamp	This test checks the D2 lamp and its voltages when the lamp is on and when it is off. If the message "D2 Not Detected" appears, the lamp voltages are good, but the lamp is either not present or not functioning properly. Try replacing the deuterium lamp and repeating the test. If the word "Fail" appears, call LC Technical Services at 1-800-FOR-HPLC.	Lamp or Motherboard

Test	*Description*	*Most Likely Failure*
Tungsten Lamp	This test checks the W lamp and its voltages when the lamp is on and when it is off. If the message “W Not Detected” appears, the lamp voltages are good, but the lamp is not present or is not functioning properly. Try replacing the tungsten lamp and repeating the test.	Lamp or Motherboard
Lamp and Shutter	This test has several parts, each of which checks a different part of the lamp and shutter operation. If either of the lamps fail, an appropriate message will display. Replace the lamp and reconduct the test.	Part listed on display

Appendix

Specifications

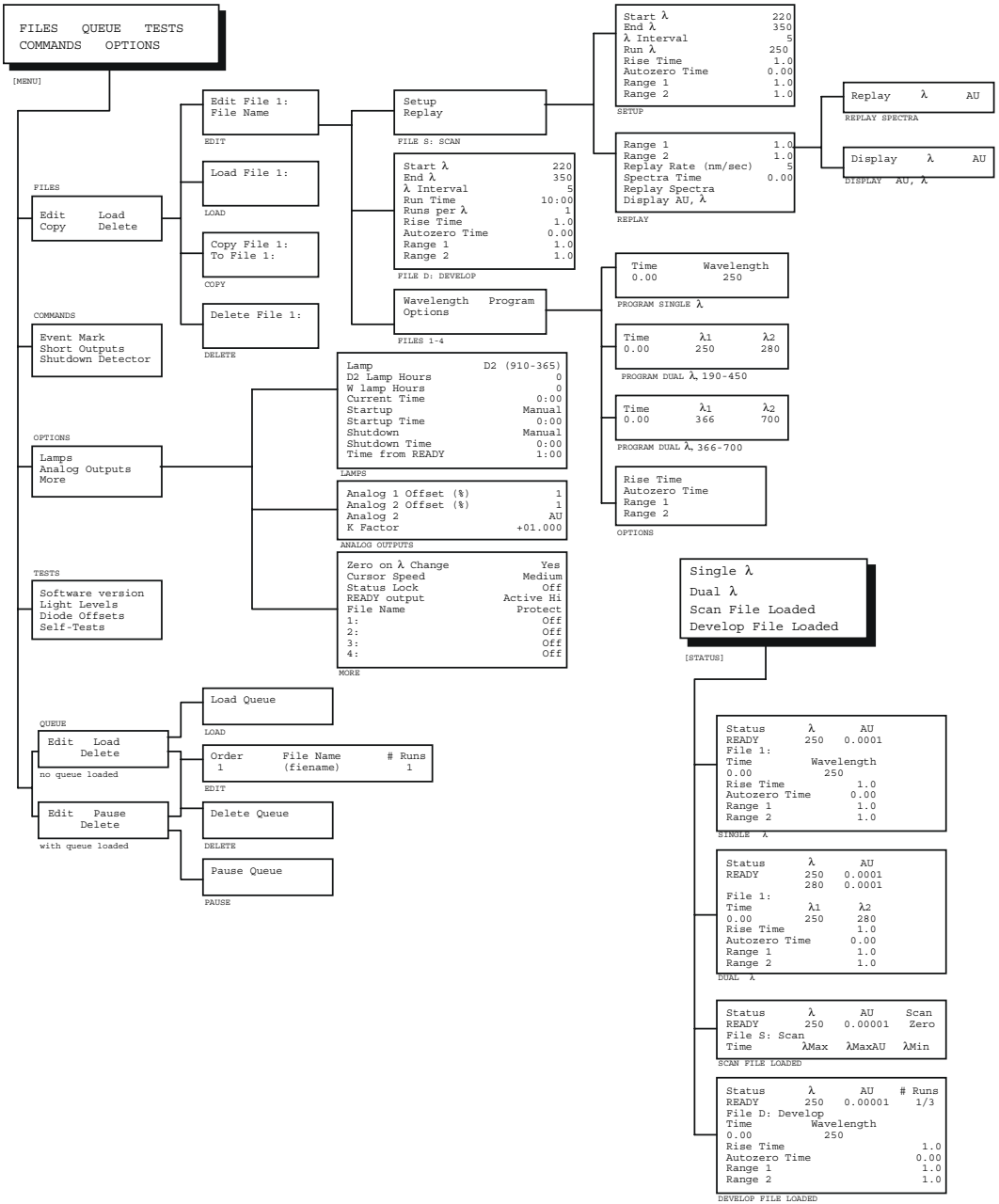
Wavelength	
D_2 lamp	190 to 365 nm
W lamp	135-800 nm
Lamps	D2 and W standard
Bandwidth	6 nm
Wavelength Accuracy	± 1.0 nm
Wavelength Precision	± 0.1 nm
Range Selections	3.0, 2.0, 1.0, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 0.0005 AUFS
Absorbance Range	0.0005 to 3.0 AUFS
Absorbance Linearity @ 254 nm	Better than 1% to 2.0 AU
Analog Outputs CH 1 & CH 2	Range-selectable over entire absorbance range
Communications	
Remote Inputs	Run/Start, Stop, and Zero
Remote Outputs	Not Ready
Noise Single-wavelength Mode @ 254 nm, 1.0-sec rise time	< ± 1.0 x 10^{-5} AU
Dual-wavelength Mode @ 254 nm and 280 nm, 1.0-sec rise time	< ± 2.5 x 10^{-5} AU
Drift (after warm-up @ 254 nm)	< 2 x 10^{-4} AU/hour
Display	2 x 24 character, high-contrast LCD
Dimensions	37 cm x 15 cm x 47 cm (H x W x D)
Weight	18 kg
Power Requirements	100/120/220/240 Vac nominal; 200 VA; 50/60 Hz

Parts and Accessories

These parts and accessories for the ProStar 345 detector are available from Varian.

Part Number	***Description***
R0-000885-06	Flowcell, analytical, 6 mm
R0-000885-11	Flowcell, analytical, 10 mm
R0-000885-09	Flowcell, biocompatible, 6 mm
R0-000885-07	Flowcell, microbore, 3 mm
R0-000885-14*****	Flowcell, high pressure microbore (SFC, LC-Mass Spec), 2 mm
R0-000885-12*	Flowcell, capillary HPLSFC, 240 µm
R0-000885-08	Flowcell, semi-preparative, and glass column, 3 mm
R0-00IZRZ-IL*****	Reducer, 1/8" to 1/16" for preparative flowcell
R0-000885-10*****	Flowcell, preparative, 0-3 mm, SS
R0-000885-13*****	Flowcell, bio-preparative, 0-3 mm, titanium
R0-000885-22	Cover, standard flowcell *
R0-000885-16	Lamp, tungsten, pre-aligned
R0-000885-15	Lamp, deuterium, pre-aligned
*Flowcells marked with * are shipped with the flowcell cover necessary for operation. The other flowcells do not include a cover. If your detector was shipped with one of the * marked flowcells installed, and you wish to order a standard flowcell, you will need the standard flowcell cover for operation.	

Menu Tree


FILES QUEUE TESTS
COMMANDS OPTIONS
[MENU]
FILES
Edit Load
Copy Delete
COMMANDS
Event Mark
Short Outputs
Shutdown Detector
OPTIONS
Lamps
Analog Outputs
More
TESTS
Software version
Light Levels
Diode Offsets
Self-Tests
QUEUE
Edit Load
Delete
no queue loaded
Edit Pause
Delete
with queue loaded
Edit File 1:
File Name
EDIT
Load File 1:
LOAD
Copy File 1:
To File 1:
COPY
Delete File 1:
DELETE
Load Queue
LOAD
Order File Name # Runs
1 (fiename) 1
EDIT
Delete Queue
DELETE
Pause Queue
PAUSE
Setup
Replay
FILE S: SCAN
Start λ 220
End λ 350
λ Interval 5
Run Time 10:00
Runs per λ 1
Rise Time 1.0
Autozero Time 0.00
Range 1 1.0
Range 2 1.0
FILE D: DEVELOP
Wavelength Program
Options
FILES 1-4
Lamp D2 (910-365)
D2 Lamp Hours 0
W lamp Hours 0
Current Time 0:00
Startup Manual
Startup Time 0:00
Shutdown Manual
Shutdown Time 0:00
Time from READY 1:00
LAMPS
Analog 1 Offset (%) 1
Analog 2 Offset (%) 1
Analog 2 AU
K Factor +01.000
ANALOG OUTPUTS
Zero on λ Change Yes
Cursor Speed Medium
Status Lock Off
READY output Active Hi
File Name Protect
1: Off
2: Off
3: Off
4: Off
MORE
Start λ 220
End λ 350
λ Interval 5
Run λ 250
Rise Time 1.0
Autozero Time 0.00
Range 1 1.0
Range 2 1.0
SETUP
Range 1 1.0
Range 2 1.0
Replay Rate (nm/sec) 5
Spectra Time 0.00
Replay Spectra
Display AU, λ
REPLAY
Replay λ AU
REPLAY SPECTRA
Display λ AU
DISPLAY AU, λ
Time Wavelength
0.00 250
PROGRAM SINGLE λ
Time λ1 λ2
0.00 250 280
PROGRAM DUAL λ, 190-450
Time λ1 λ2
0.00 366 700
PROGRAM DUAL λ, 366-700
Rise Time
Autozero Time
Range 1
Range 2
OPTIONS
Single λ
Dual λ
Scan File Loaded
Develop File Loaded
[STATUS]
Status λ AU
READY 250 0.0001
File 1:
Time Wavelength
0.00 250
Rise Time 1.0
Autozero Time 0.00
Range 1 1.0
Range 2 1.0
SINGLE λ
Status λ AU
READY 250 0.0001
280 0.0001
File 1:
Time λ1 λ2
0.00 250 280
Rise Time 1.0
Autozero Time 0.00
Range 1 1.0
Range 2 1.0
DUAL λ
Status λ AU Scan
READY 250 0.00001 Zero
File S: Scan
Time λMax λMaxAU λMin
SCAN FILE LOADED
Status λ AU # Runs
READY 250 0.00001 1/3
File D: Develop
Time Wavelength
0.00 250
Rise Time 1.0
Autozero Time 0.00
Range 1 1.0
Range 2 1.0
DEVELOP FILE LOADED

Menu List

Following is an alphabetical listing of each menu field and command. Included in each listing is the field definition and, where appropriate, all allowable and default values for the field.

Menu Field	*Description*
Analog 1 Offset (%)	This field offsets the Analog 1 output signal by a positive or negative 50, 20, 10, 5, 2, 1, or 0 percent of the full-scale range. Default is 0%.
Analog 2	This field allows you to select the output signal from the Analog Output 2 terminal. The selections are AU (the absorbance signal for wavelength one in single-wavelength operation or from wavelength two in dual-wavelength operation), AU1-K x AU2 (a calculated peak response using the K-Factor technique), and AU1/AU2 (the absorbance ratio of wavelength 1 to wavelength 2). Default is AU.
Analog 2 Offset %	This field offsets the Analog 2 output signal by a positive or negative 50, 20, 10, 5, 2, 1, or 0 percent of the full-scale range. Default is 0%.
Analog Outputs	This menu allows you to offset the analog output terminals located on the back panel of the instrument. You can also select the output signal for Analog Output 2 and input a K-Factor.
AU	This field, located in the Status Screen, shows the detector current absorbance reading. It is a six-digit number, ranging from -3.00000 to +3.00000 AUFS.
Autozero Time	This field tells the detector when to perform an automatic zero. Allowable values are 0.00 to 99.99 minutes. Default is 0.00 minutes.
COMMANDS	The Commands Menu lets you put an event mark into your chromatogram, short detector outputs, and shut down the ProStar 345.
Copy	This menu choice accesses the Copy File field.
Copy File	This field, along with the To File field, allows you to copy from the specified file to another file designation.
Current Time	This field displays local time in a 24-hour format, from 0:00 to 23:59.
Cursor Speed	The field regulates the cursor speed on the display. It can be set to Slow, Medium, or Fast. Default is Medium.
Delete	Under the top-level menu FILES, this field accesses the Delete File command. Under the top-level menu QUEUE, this field accesses the Delete Queue command.
Delete File	This field deletes the designated file, setting all fields to their default values. After pressing [ENTER], the message **File Deleted** appears for one second.

Menu Field	*Description*
Delete Queue	This field deletes the queue. After pressing [ENTER], the message **Queue Deleted** appears for one second.
D2 Lamp Hours	This field tracks the total number of hours the detector deuterium lamp has been in operation (up to 9999). When a new lamp is installed, you must reset this parameter to zero.
Diode Offsets	This field displays the analog-to-digital (A/D) conversion frequencies of the sample and reference diodes when both lamps are turned off. These values are used to measure the detector digital noise level.
Display AU, λ	This command calls up the Display AU, λ screen, a screen that shows the incremental wavelength versus absorbance data for the selected spectral scan.
Edit	Under the top-level FILES Menu, the Edit Menu allows you to set up or edit files. The edits do not change the current settings of the detector until the file is loaded. Under the top-level QUEUE Menu, the Edit Menu allows you to set up or edit a queue. Edits may not be made to Order 1 while a queue is loaded or running unless you pause the queue first.
Edit File	This field allows you to identify the file you wish to edit. Allowable designations are 1 to 4, S for the Scan file, and D for the Develop file. Default is 1.
End λ	In the Scan File Setup, this field defines the wavelength at which the detector should finish the scan. Allowable values are 191 to 800 nm. Default is 350 nm. In the Develop File Setup, this field defines the wavelength at which the detector should run its last set of injections. Allowable values are 191 to 800 nm. Default is 350 nm.
Event Mark	The Event Mark field applies a 15% of full-scale spike on the detector output signals.
FILES	The Files Menu allows you to edit, load, copy, or delete files.
File Name	This field allows you to enter a file name for a designated file (numbered 1 to 4). The name can contain up to eight characters from the following list: A to Z, 0 to 9, /, -, and blank. Default is blank. For files S and D, the files names are designated SCAN and DEVELOP; no editing is allowed for these names.
K Factor	This field is used in the K-Factor technique. Allowable values are -99.999 to +99.999. Default is 1.000.
λ1, λ2	The wavelength field is located in the Status Screen and shows the current detector wavelength setting(s).
λ Calibration	The wavelength calibration screen located in the Tests Menu shows the current detector wavelength setting(s).

Menu Field	*Description*
λ Interval	In the Scan File Setup, this field defines the wavelength interval at which the detector should perform the scan. Allowable values are 1, 2, 3, 4, 5, and 10 nm. Default is 5 nm. In the Develop File Setup, this field defines the wavelength increment the detector monochromator should use for wavelength changes between each set of injections. Allowable values are 1, 2, 3, 4, 5, 10, and 20 nm. Default is 5 nm.
λ Max	This field is the wavelength maximum in a spectral scan.
λ Min	This field is the wavelength minimum a spectral scan.
λ Offset	The lambda offset screen lets you choose a number of steps, each representing 0.25 nm, by which you want to offset the wavelength. This field is used to check the detector wavelength accuracy. Allowable entries are: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, -1, -2, -3, -4, -5, -6, -7, -8, -9 and -10. The default is 0.
Lamp	The lamp field allows you to choose from several selections: D2 (190-365) for the deuterium lamp; W (366-800) for the tungsten lamp; D2 + W (190-800) for dual-lamp operation; or Off to shut the lamp(s) off. Default is D2 (190-365).
Lamps	The lamps Menu allows you to control the detector lamp operations.
Light Levels	This field displays the analog-to-digital (A/D) conversion frequencies of the light detected by the sample and reference diodes when the D2 lamp is on.
Load	Under the top-level menu FILES, the Load selection accesses the Load File command. Under the top-level menu QUEUE, the Load selection accesses the Load Queue command.
Load File	The Load File command loads the designated file settings into the active run file. After pressing [ENTER], the message **File Loaded** appears for one second.
Load Queue	The Load Queue command loads the designated queue. After pressing [ENTER], the message **Queue Loaded** appears for one second.
More	The More Menu allows you to access the Zero on λ Change, Cursor Speed, Status Lock and READYOutput fields, and the file protection feature.
OPTIONS (Main Menu)	Found in the Main Menu, the Options Menu allows you to perform lamp and analog output operations.
Options (Edit Menu)	The Options selection in the Edit Menu of FILE(S) allows you to edit Rise Time, Autozero Time, and Range.

Menu Field	*Description*
Order	This field designates the order in which the detector is to run the selected files in a queue.
Pause	This field accesses the Pause Queue command.
Pause Queue	This command pauses an active queue. If a file is running, the file continues until it is completed, and the detector returns to a READY state.
Program	This field allows you to select single-or dual-wavelength operation. The selection toggles between Single λ, Dual λ (190-450), and Dual λ (366-700). Default is Single λ.
Protect	This field, in conjunction with the File Name field, protects a specified file from being edited, copied to (overwritten), or deleted. The field toggles between On, allowing no changes to the file, and Off, where changes may be made. Default is Off.
QUEUE	The Queue Menu allows you to edit, load, delete, or pause a queue. A queue is a series of files which are run in a specific order, and is typically used for automated runs.
Range 1, Range 2	The Range 1 and Range 2 fields control the full-scale output ranges for the CH 1 and CH 2 terminals located on the back panel. Allowable full-scale ranges are 3.0, 2.0, 1.0, 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, and 0.0005 AUFS. Default is 1.0 AUFS.
READY Output	This field is used to communicate with other devices through the detector NOT READY terminal. This TTL terminal switches the transistor between high and low states whenever the detector starts a run. Select “Active Hi” or “Active Lo,” for the high or low state, respectively. Default is Active Lo.
Replay	The Replay command sends you to the Replay Menu, from which you can set up the parameters for replaying stored spectra.
Replay Spectra	This command initiates replay of the designated spectrum.
Replay Rate	This field designates the rate at which you wish to replay a stored spectrum. Allowable values are 1, 2, 5, 10, and 20 nm/sec. Default is 5 nm/sec.
Rise Time	This field controls the detector response time. Rise time is inversely proportional to the amount for baseline noise. Allowable values are 0.0, 0.1, 0.2, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0 seconds. Default is 1.0 second.
#Runs	When this field appears in the Status Screen, the current run and the total number of injections to be made at the displayed wavelength appear directly below it. The field is updated at the beginning of each injection. When this field appears in a Queue setup, it displays the number of times each file runs in a queue.

Menu Field	*Description*
Run λ	This field designates the monitoring wavelength used when running the Scan file. Allowable values are 190-800 nm. Default is 250 nm.
Run Time	Located in the Develop file, this field is the amount of time designated for each chromatographic run. Allowable values are 0.01 to 999.99 minutes. Default is 10.00 minutes.
Runs per λ	Located in the Develop file, this field designates the number of injections to be performed at each wavelength increment. Allowable values are 1 to 9. Default is 1.
Scan	This field appears in the Status Screen when the Scan file is loaded. To initiate a scan, move the cursor to this field and press [ENTER].
Scan Zero Time	This field allows you to set the time at which the detector should perform a baseline scan automatically. Allowable values are 0.00 to 99.99 minutes. Default is 0.00 minutes.
Self-Tests	This command tells the detector to run through its internal diagnostic tests.
Setup	The Setup Menu allows you to set up parameters in the Scan file.
Short output	This field is used to short the detector analog outputs together (zero volts). When the outputs are shorted, the field changes to Unshort Outputs. To remove the short and return the outputs to their normal operating state, select Unshort Outputs, and the field changes back to Short Outputs. When you leave this screen, the field returns automatically to Short Outputs.
Shutdown	This field toggles between Manual (you turn off the lamp manually), Time (the lamp turns off automatically at a preset time), Time from READY (see Time from READY field), and End of Queue (the lamp turns off when the queue is finished). Default is Manual.
Shutdown Detector	This field shuts down the lamps and motors, leaving the electronics on to preserve memory. Press any key to return the detector to the same settings as when this field was activated.
Shutdown Time	This field displays local time, from 0:00 to 23:59, at which you've programmed the lamp to turn off automatically. Default is 0:00.
Software Version	This field displays the E-PROM version of your detector software.
Spectra Time	This field contains a list of the scans that are currently stored in memory. Each scan is identified by the runtime when initiated.
Start λ	In the Scan File Setup, this field defines the wavelength at which the detector should begin the scan. Allowable values are 190-799 nm. Default is 220 nm. In the Develop File Setup, this field defines the wavelength at which the detector should run its first set of injections. Allowable values are 190 to 799 nm. Default is 220 nm.

Menu Field	*Description*
Startup	The Startup field toggles between Manual, where you turn on the lamp manually, and Time, where the lamp powers up automatically at a preset time. Default is Manual.
Startup Time	This field displays the local time, from 0:00 to 23:59, at which you've programmed the lamp to start up automatically. Default is 0:00.
Status	This field in the Status Screen shows the current condition of the detector. The possible conditions are: READY (the detector is stabilized and waiting for initiation of a run), NRDY (The detector isn't stabilized, is set to the wrong lamp for the run requested, is performing internal tests, or has a possible internal problem), or UVW (the deuterium lamp is warming up). The run time is displayed when the running file has a programmed stop-time. The letter Q appears at the beginning of this field when a queue is loaded.
Status Lock	The Status Lock field limits accessibility to the Status Menu (the programming area below the Status Screen). When set to On, only the Status Screen is shown on the display and the down-arrow icon is not seen. Default is Off.
TESTS	The Tests Menu allows you to perform the detector internal diagnostic, light level, and diode offset tests. Note that these tests (except for the EPROM version number display) should not be conducted while a chromatographic analysis is in progress. Involving selections from the Tests Menu while a sample is being analyzed will result in baseline shifting.
Time, Wavelength	The wavelength Program contains the Time and Wavelength fields. It allows you to program changes in the detector wavelength as a function of time. Time refers to the run time, in minutes, when a timed event (wavelength change, autozero, or run stop) is to occur. Allowable values range from 0.00 to 999.99 minutes. Default is 0.00 minutes. Wavelength refers to the wavelength that will set at a specified time. Allowable values are: 190-365 nm with the deuterium lamp, and either 366 to 700 nm or 366 to 800 nm with the tungsten lamp (depending on whether the detector is operating in the dual wavelength or the single-wavelength mode, respectively). Default is 250 nm.
Time from READY	A preset time interval from the Ready state of the detector, after which the detector lamp will turn off if a start signal has not been received from the keypad or external RUN/START terminal. Allowable values range from 0:30 to 9:59 hours. Default is 1:00.
To File	This field, along with the Copy File field, allows you to copy a file to the specified file number.

Menu Field	*Description*
W Lamp Hours	This field tracks the total number of hours the detector tungsten lamp has been in operation (up to 9999). When a new lamp is installed, you must set this parameter to zero.
Wavelength Program	This command allows you to access the Wavelength Program. See the “Time, Wavelength” description above for details.
Zero	This field appears in the Status Screen when the Scan file is loaded. To initiate a background scan, move the cursor to this selection and press [ENTER].
Zero on λ Change	This field toggles between Yes, where the detector baseline automatically zeroes each time the wavelength changes during a programmed run, and No. Default is Yes.

Glossary

This Glossary defines certain technical terms used throughout the manual text. These terms should be consistent with standard definitions used throughout the analytical industry, and are added here as a quick reference only.

A/D	Analog-to-digital. Converts a detector analog signal to a digital (binary-coded) signal.
AUFS	Absorbance units full scale, a measure of sensitivity.
absorbance	A process where the intensity of light shining through a sample is decreased; the transmittal light is measured in absorbance units, which are directly proportional to the concentration of the absorbing sample.
analog offset	A voltage applied to the output signal in order to keep the signal “on-scale” throughout a run.
background scan	The reference spectrum of the mobile phase. It is subtracted from the sample spectral scans to correct for baseline absorbances.
baseline	The reference line at the bottom of a chromatogram from which measurements are made. A baseline represents the chromatogram that would be drawn if only the mobile phase (with no sample) were run through the column.
chronometer	A gauge for measuring the total amount of time something has been in operation.
defaults	The values or choices built into a system. If no specific choice is made, the detector will run using the default settings.
develop file	A feature that allows you to make multiple injections of a sample at different wavelengths, automatically.
degassing	The practice of removing air from the mobile phase, usually by helium sparging or applying a vacuum.
diagnostics	Ways of detecting and isolating instrument of software problems.
display	The two-line liquid-crystal screen.
edit file	A copy of the file used for editing. Once loaded, parameters set in the edit file are transferred to the run file.
error message	A displayed message that notifies you of a problem.
fields	The area in a display, screen, or menu where an entry is required or a choice must be made.

files	A list of detector parameters that contains the desired settings for an analysis.
gradient elution	A liquid chromatographic technique where the mobile phase composition changes over time; changes may be continuous or in steps. Also called solvent programming.
ground terminal	A terminal used to connect the ground or earth lead of a signal or contact closure cable.
K-Factor	A factor used to calculate a response for zero for one of two coeluting or poorly resolved peaks; also known as peak suppression.
keypad	All of the keys which you use to communicate with your instrument or computer.
menus	A list of choices.
miscible	Two solvents are miscible if they combine with each other to form a single phase.
parameters	A value or set of values used to define the characteristics of behavior of an instrument or system.
peak broadening	The dilution of a peak as it moves through the chromatographic system.
peak suppression	A technique that uses a factor (the K-factor) to calculate a response of zero for one of two coeluting or poorly resolved peaks.
photodiode	The detector component that measures light intensity.
queue	A set of items (i.e., samples, files) in a prearranged order.
RAM	Random Access Memory.
range	A detector parameter that controls the full-scale range for the output signal.
replay	Retrieving a stored spectrum, which can be played back as either individual data points or a smoothed spectrum.
rise time	A detector parameter that controls the detector response time. Rise time is inversely proportional to the amount of baseline noise.
run file	The run file is the file that contains the current detector parameter settings.
run time	The duration of a sample run from injection to detection.
signal-to-noise	A measurement of the sensitivity of a detector, the ability to measure a very small sample response over the baseline noise.
spectral scan	A sample spectrum.

status	The current condition.
timed events	An instrument action triggered to occur at a specific, preset time during a run (e.g., autozero, wavelength change, stop-time).
troubleshooting	Refers to locating the cause of problems with equipment or procedures, and solving these problems.
wavelength programming	Programming the detector to change the monitoring wavelength as a function of time during a run.