030-38148

smiths detection

bringing technology to life 30 Technology Drive

Warren, NJ 07059 USA

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September 16, 2009

United States Nuclear Regulatory Commission Materials Safety and Inspection Branch Division of Industrial and Medical Nuclear Safety Two White Flint North 11545 Rockville Pike North Bethesda, MD 20852-2738

RE: Exempt Distribution License and Device Evaluation

Dear Sir or Miss:

Please find the attached application for an Exempt Distribution License. Smiths Detection is applying for their explosives, narcotic, and chemical detection systems to be distributed to end users exempt from regulatory oversight as according to 10 CFR 32.29.

These devices are currently distributed as generally licensed devices under NRC License 29-28620-02G and Maryland License MD-25-044-01.

This application is being filed simultaneously with an application for an NRC device registration to distribute products to users exempt from regulatory requirements.

Thank you for your time and consideration. If you have any questions please let me know.

Sincerely,

Richard Keosian Radiation Safety Officer (908) 222-9100 x3099

Smiths Detection – Warren Inc. A Smiths Group Company

022775

	030-381
NRC FORM 313 U.S. NUCLEAR REGULATORY COMM	ISSION APPROVED BY OMB: NO. 3150-0120 EXPIRES: 3/31/2012
3-2009) O CFR 30, 32, 33, 4, 35, 36, 39, and 40 APPLICATION FOR MATERIALS LICEN	Estimated burden per response to comply with this mandatory collection request: 4.3 hours. Submittal of the application is necessary to determine that the applicant is qualified and that adequate procedures exist to protect the public health and safety. Send comments regarding burden estimate to the Records and FOIA/Privacy Services Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0120), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.
INSTRUCTIONS: SEE THE APPROPRIATE LICENSE APPLICA SEND TWO COPIES OF THE ENTIRE COMPL	TION GUIDE FOR DETAILED INSTRICTIONS FOR COMPLETING APPLICATION. ETED APPLICATION TO THE NRC OFFICE SPECIFIEC BELOW.
APPLICATION FOR DISTRIBUTION OF EXEMPT PRODUCTS FILE APPLICATIONS	WITH: IF YOU ARE LOCATED IN:
OFFICE OF FEDERAL & STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS DIVISION OF MATERIALS SAFETY AND STATE AGREEMENTS U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON, DC 20555-0001	ILLINOIS, INDIANA, IOWA, MICHIGAN, MINNESOTA, MISSOURI, OHIO, OR WISCONSIN, SEND APPLICATIONS TO:
ALL OTHER PERSONS FILE APPLICATIONS AS FOLLOWS: 7863	U.S. NUCLEAR REGULATORY COMMISSION, REGION III 2443 WARRENVILLE ROAD, SUITE 210 LISLE, IL 60532-4352
IF YOU ARE LOCATED IN:	
ALABAMA, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA, FLORIDA, GEC KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, NEW HAMPSHIRE, NEW JER NEW YORK, NORTH CAROLINA, PENNSYLVANIA, PUERTO RICO, RHODE ISLAND CAROLINA, TENNESSEE, VERMONT, VIRGINIA, VIRGIN ISLANDS, OR WEST VIRG SEND APPLICATIONS TO:	ORGIA, RSEY, J. SOUTH DAKOTA, OKLAHOMA, OREGON, ACLIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, LOUISIANA, MISSISSIPPI, MONTANA, NEBRASKA, NEVADA, NEW MEXICO, NORTH DAKOTA, OKLAHOMA, OREGON, PACIFIC TRUST TERRITORIES, SOUTH DAKOTA, TEXAS, UTAH, WASHINGTON, OR WYOMING, SEND APPLICATIONS TO:
LICENSING ASSISTANCE TEAM DIVISION OF NUCLEAR MATERIALS SAFETY U.S. NUCLEAR REGULATORY COMMISSION, REGION I 475 ALLENDALE ROAD KING OF PRUSSIA, PA 19406-1415	NUCLEAR MATERIALS LICENSING BRANCH U.S. NUCLEAR REGULATORY COMMISSION, REGION IV 612 E. LAMAR BOULEVARD, SUITE 400 ARLINGTON, TX 76011-4125
PERSONS LOCATED IN AGREEMENT STATES SEND APPLICATIONS TO THE U.S.	NUCLEAR REGULATORY COMMISSION ONLY IF THEY WISH TO POSSESS AND USE LICENSED
1. THIS IS AN APPLICATION FOR (Check appropriate item)	2. NAME AND MAILING ADDRESS OF APPLICANT (Include ZIP code)
	Smiths Detection. Inc.
	30 Technology Drive
C. RENEWAL OF LICENSE NUMBER	Warren, New Jersey 07059
S. ADDRESS WHERE LICENSED MATCRIAL WILL BE USED OR POSSESSED	4. NAME OF PERSON TO BE CONTACTED ABOUT THIS APPLICATION
30 Tashnalagu Duina	Richard Keosian
Wernen New Jersey 07050	TELEPHONE NUMBER
warren, new Jersey 07059	(908) 222-9100
SUBMIT ITEMS 5 THROUGH 11 ON 8-1/2 X 11" PAPER. THE TYPE AND SCOPE OF	INFORMATION TO BE PROVIDED IS DESCRIBED IN THE LICENSE APPLICATION GUIDE.
 RADIOACTIVE MATERIAL Element and mass number; b. chemical and/or physical form; and c. maiximum an which will be possessed at any one time 	mount 6. PURPOSE(S) FOR WHICH LICENSED MATERIAL WILL BE USED.
7. INDIVIDUAL(S) RESPONSIBLE FOR RADIATION SAFETY PROGRAM AND THEIR TRAINING EXPERIENCE.	8. TRAINING FOR INDIVIDUALS WORKING IN OR FREQUENTING RESTRICTED AREAS.
9. FACILITIES AND EQUIPMENT.	10. RADIATION SAFETY PROGRAM.
11. WASTE MANAGEMENT.	12. LICENSE FEES (See 10 CFR 170 and Section 170.31) FEE CATEGORY 3H
13. CERTIFICATION. (Must be completed by applicant) THE APPLICANT UNDERSTA	ANDS THAT ALL STATEMENTS AND REPRESENTATIONS MADE IN THIS APPLICATION ARE BINDING
THE APPLICANT. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATION ON BE CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PARTS 30, 3 CORRECT TO THE BEST OF THEIR KNOWLEDGE AND BELIEF. WARNING: 18 U.S.C. SECTION 1001 ACT OF JUNE 25, 1948 62, STAT, 749 MAKI	THALF OF THE APPLICANT, NAMED IN ITEM 2, CERTIFY THAT THIS APPLICATION IS PREPARED IN 32, 33, 34, 35, 36, 39, AND 40, AND THAT ALL INFORMATION CONTANED HEREIN IS TRUE AND
ANY DEPARTMENT OR AGENCY OF THE UNITED STATES AS TO ANY MATTER	R WITHIN ITS JURISDICTION.
CERTIFYING OFFICER - TYPED/PRINTED NAME AND TITLE Dana Chandler - Financial Controller	SIGNATURE Official DATE 09/16/2009
EOI	
TYPE OF FEE FEE LOG FEE CATEGORY AMOUNT RECEIVED	
APPROVED BY	DATE

022775

APPLICATION FOR EXEMPT DISTRIBUTION LICENSE

MMTD IONSCAN Series IONSCAN 500DT Sabre Series Sabre Centurion Series Sentinel Series

smiths detection

September 8, 2009

Prepared by:



www.irsc-inc.com

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NRC Form 313, Application for Material License to Distributed Devices to Users Exempt from Regulation

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Responsibility for Amendment:

In the event of change of ownership, Smiths Detection, shall file a written amendment request with the NRC *in advance* to change the name on the distribution license. The transfer shall not be completed until the license amendment has been approved and issued. We commit to filing license amendments in advance for the change of possession limits, radionuclides possessed, location of operation, mailing address, or other conditions of use of material as covered by the license.

Notification Upon Suspension or End of Activities:

We shall inform the NRC in writing within 60 days of the permanent conclusion of distribution activities, or a temporary suspension lasting longer than 24 months.

The applicant will notify the NRC in writing immediately upon the filing of bankruptcy including the location of the court where the filing was made.

The applicant will regularly review changes in the regulations as referenced on the NRC website and as appear in the *Federal Register* and adjust procedures as required.

5. Radioactive Material

Device Distributor:	Smiths Detection, Inc. 30 Technology Dr. Warren, NJ 07059
	Smiths Detection, Inc. 2202 Lakeside Boulevard Edgewood, MD 21040
Device Manufacturer:	Smiths Detection 7030 Century Ave. Mississauga, ON L5N 2V8 CANADA
Products to Be Distributed:	MMTD IONSCAN Series IONSCAN 500DT Sabre Series Sabre Centurion Series Sentinel Series

Sealed Source:

QSA Global, Inc. Model NBC

NR-136-S-185-S

OR

Nuclear Radiation Development (NRD) Model N1001

NY-502-S-101-S

Physical form of material: Plated foil source

Radionuclides used in the Product: Ni-63

Maximum Activity: 30 millicuries-per device (1110 MBq). Source tolerance +/- 10%.

Device Lifetime: 10 Year

Estimated Distribution:

Estimated quantity of radioactive material to be distributed on an annual basis: about 16.5 Curie (610.5GBq). This breaks down as the following models by quantity:

Model	Quantity
Ionscan Series	100
Ionscan 500DT	200
MMTD	100
SABRE Series	500
Centurion Series	50
Sentienl Series	50

Smiths Detection considers this to be proprietary information not for public disclosure.

Copies of our Maryland Radioactive Materials Possession and NRC Distribution License and devices registrations are enclosed. See Attachments A and B.

Proprietary Declaration

Enclosed is our declaration of proprietary information according to NRC requirements.

6. Purposes for Which Licensed Materials Will Be Used

Smiths Detection, is applying to have the above mentioned devices classified as exempt devices, as per 10 CFR 32.26, *Gas and aerosol detectors containing byproduct material: Requirements for license to manufacture, process, produce, or initially transfer.*

Numbers appearing in parenthesis refer to sections of NUREG 1556, Volume 8.

See Attachment J conditions of use table.

Purpose of Device (9.1.1)

The IONSCAN devices use ion mobility spectrometry (IMS) to detect and identify trace quantities of a wide variety of chemical substances. Air containing microscopic particles of various chemical substances are drawn into a sample collector. The sample is heated in order to vaporize the particulate matter. The vapor is drawn into the detector, ionized by the nickel-63 source and passed into a drift region. The ionized particles are focused and accelerated by an electric field along the driftregion towards a collector electrode. Ionized particles in the vapor form are accelerated at different rates and arrive at the collector electrode at different times. The amount of time the particles take to reach the collector electrode can be directly related to the ionized chemical substances present in the vapor. Therefore, specific substances can be detected according to the time required to reach the collector.

Each model fits into one of the following Device Series:

IONSCAN Series IONSCAN 500DT Series Sabre Series Sabre Centurion Series Sentinel Series

<u>Model</u>	<u>IMS Type</u>	<u>Device</u>	<u>Location</u>	<u>Nominal Activity of</u>	Use
		<u>Series</u>		<u>Ni-63 Per</u>	
				<u>Instrument</u>	
IONSCAN	400B	IONSCAN	Desktop,	15 mCi	Explosives,
400B	4000	IUNSCAN	Movable	15 1101	Narcotics
IONSCANTS	400D	IONSCAN	Desktop,	15 mCi	Chemical
	4000	IONSCAN	Movable	15 IICI	Analysis
IONSCAN			Dockton		Evelocivos
Document	400B	IONSCAN	Desktop, Movabla	15 mCi	Explosives,
Scanner			Wiovable		Inarcotics
IONSCAN	400P	IONSCAN	Desktop,	20 mCi	Explosives,
500DT	400D	DT	Movable	JUIICI	Narcotics

Sabre 4000	Sabre	Sabre	Portable	15 mCi	Explosives, CWA, Narcotics, TIC
Sabre 4000FR	Sabre	Sabre	Portable	15 mCi	CWA, TIC
Sabre EXV	Sabre	Sabre	Portable	15 mCi	Explosives
MMTD	Sabre	Sabre	Portable	15 mCi	Explosives, CWA, Narcotics, TIC
Sabre Centurion	Sabre	Sabre Centurion	Fixed	15 mCi	CWA, TIC
Sabre Centurion II	Sabre	Sabre Centurion	Fixed	15 mCi	CWA, TIC
Sentinel II	400B	Sentinel	Fixed	15 mCi	Explosives, Narcotics

See attachment K for device flyers.

Sealed Source and Device Evaluations (9.1.2)

This device is currently distributed in the U.S. as a generally licensed device, registration number NR-0163-D-101-G and MD-0163-101-G. Please refer to Attachment B. A separate Exempt Device Evaluation Application has been submitted along with this Exempt Distribution License Application.

Quality Assurance/Quality Control Programs (9.1.3)

The above mentioned devices are manufactured at Smiths Detection in Mississauga, Ontario, Canada. This facility uses an ISO-9001:2000 certified quality management system. Replacement of IMS Units including the sealed source for existing devices shall only be performed at the Canadian facility. Because devices are assembled by a foreign manufacturer, Smiths Detection commits to auditing the QA program of the Canadian facility on an annual basis in order to comply with the requirements of NRC Regulatory 6.9. Please refer to Attachment O.

Inspection, Servicing and Disposal of the Device:

(the follwing statements are relevant excerpts form QA Documents)

Receipt of Sealed Sources

Radioactive sources are inspected upon receipt. Below is the procedure:

1. Visually inspect the package to ensure that there has been no damage or tampering during transport. Notify the Source Room Technician if the package

has been damaged or tampered with in any way. Do not proceed further with the sources in this case. The Source Room Technician will notify the RSO.

2. If damage, tampering, leakage is verified, or if the source integrity has been compromised, the Source Room Technician will follow the radiological incident procedure while proceeding carefully to open the package. If necessary the RSO will submit a written report of the discovery to the Canadian Nuclear Safety Commission (CNSC).

In normal situations, the sealed source is taken from receiving to the Source Room by the Source Room Technician. The Source Room Technician opening the package must:

- a) Wear a lab coat and gloves, move the package to an area prepared for the handling of radioactive material.
- b) Have a functioning and appropriate contamination monitor and/or wipes available for use.
- c) If applicable, remove the packing slip and dangerous goods documentation. The dangerous goods documentation must be filed and cross-referenced to the Source QC log book (as indicated below).
- d) If the material is the same as requested, record the receipt in the Purchase Registry Log.
- e) If the material delivered does not correspond with that ordered, contact the RSO immediately. The RSO will contact the supplier of the radioactive material, and if appropriate the CNSC.
- f) Place the sealed sources in a storage container (labeled with radiation warning sign and source details) to avoid unnecessary direct contact and place the radioisotope in a dedicated, labeled storage area until it is to be checked for quality and transferred to production.
- g) Prior to disposing the packaging, remove all radiation warnings.
- h) The dangerous goods documentation in step c) must be retained for at least three years.

Servicing:

Since Smiths is requesting to have its devices approved as exempt, end users will only be allowed to perform certain maintenance tasks, such as changing filters, cleaning sampling areas, etc., which are not in proximity to the source. All other servicing will be performed by Smiths at its Warren, NJ or at its Mississauga, ON facility, and at Smith's contractor Medgraphix facility located in Pinebrook, NJ. Source exchanges which will only be performed at its Mississauga, ON facility. For reference, Smiths' Edgewood, MD site will not provide service to any devices. Maintenance tasks that end users are allowed to perform are listed in each device's operators manual (see device application for manuals).

Useful Life and End of Life

All devices have an expected useful working life of 10 years. When products are determined to be beyond their useful life, Smiths Detection offers to take back the

products at that time as an effort to demonstrate environmental consideration. However, Smiths Detection does recognize that if devices are granted "exempt" status, the devices may be discarded as normal refuse according to US NRC regulations.

Installation of New Devices

See attachment Q for Installation Instructions

HANDLING, STORAGE, REMOVAL AND CLEANING OF RADIOACTIVE SOURCES

POLICY

Radioactive sealed sources are delivered to Smiths Detection Canada as described in Radiation Safety Procedure. Also, the IMS detector may be returned to for repair and/or cleaning. It is essential to take adequate measures to ensure that personal or area contamination does not result from the handling of these sealed sources and radiation devices. Handling, storage, removal and cleaning of sources and radiation devices are to be conducted as per this procedure.

PROCEDURE

Cleaning is necessary due to chemical residue build-up within the detection device. Removal may also be necessary due to a leaking sealed source.

Only authorized personnel, normally Service Technicians, are permitted to remove IMS detectors. The Source Room Technician is the only person authorized to remove sources from within these detectors.

The removal procedure is the reverse of the installation as detailed in the document IMS Source Installation and QC Procedure, PS 100138.

All unsealed sources, i.e., those sources that are not yet installed in the "Drift Tube" assembly, are to be stored in the Source Room. The sources are to be kept in a locked cabinet as a security measure.

Handling of the sources should only be preformed by a source technician who has been trained in the safe use of the sources.

Handling Precautions and General Data:

⁶³Ni halflife: 100.1 yrs

Decay Energy: 66 keV

Physical Data

Maximum Beta Energy: $0.066 \text{ MeV} (100\%)_{(1)}$ Maximum Range of Beta in Air: 5 cm (2 in.)₍₂₎

Occupational Limits(3)

Annual Limit on Intake: 9 mCi (330 MBq) for oral ingestion and 800 [Ci (30 MBq) for inhalation.

Derived Air Concentration: 3 x 10-7 (Ci/ml (11 kBq/m3).

Dosimetry

Millicurie (37 MBq) quantities of 63 Ni do not represent a significant external exposure hazard since the low energy betas emitted cannot penetrate the outer dead layer of skin. It may be assumed that 2% of $_{63}$ Ni uptake transfers to the kidney where it is retained with a biological half-life of 2 days; 68% is directly excreted; and 30% is uniformly distributed throughout all organs and tissues of the body including the kidneys, and retained there with a biological half-life of 1200 days₍₄₎.

General Handling Precautions for Nickel-63

- 1. Designate area for handling ₆₃Ni and clearly label all containers.
- 2. Prohibit eating, drinking, and smoking in room where ₆₃Ni is handled.
- 3. Use transfer pipets, spill trays and absorbent coverings to confine contamination.

- 4. Handle ₆₃Ni compounds which are potentially volatile or in powder form in ventilated enclosures. (Note: At Smiths Detection, source material is not in a volatile or powder form)
- 5. Sample exhausted effluent and room air by continuously drawing a known volume through membrane filters. (Not needed, see #4.)
- 6. Wear lab coat, and gloves for secondary protection.
- 7. Select gloves appropriate for chemicals handled.
- 8. Maintain contamination control by regularly monitoring and promptly decontaminating gloves and surfaces.
- 9. Use open-window Geiger-Mueller detector, NaI(Tl) detector or liquid scintillation counter to detect ⁶³Ni.
- 10. Isolate waste in sealed, clearly labeled containers and dispose according to approved guidelines.
- 11. Establish surface contamination, air concentration and bioassay action levels below regulatory limits. Investigate and correct any conditions that may cause these levels to be exceeded.
- 12. On completing an operation, secure all ₆₃Ni; remove protective clothing; dispose of protective coverings; monitor and decontaminate self and surfaces; wash hands and monitor them again.

References:

- 1. Kocher, David C., Radioactive Decay Data Tables, Springfield: National Technical Information Service, 1981 DOE/TIC-11026.
- 2. Kaplan, Irving, Nuclear Physics, New York: Addison-Wesley, 1964.
- 3. U.S. Nuclear Regulatory Commission. 10CFR 20 Appendix B Standards for Protection Against Radiation, 1994.
- 4. ICRP Publication 30, Part 3, Limits for Intakes of Radionuclides by Workers. Pergamon Press, Oxford, 1981.

See Attachment O QA Program

Retention of Records

Records related to the distribution of devices including customer names and addresses shall be retained of a period of at least five years.

Training Records

All radiation safety-training records are maintained in the HR Department. Records must indicate individuals authorized to work directly or handle radiation sources and/or devices.

Inventory records are maintained in three streams:

- 1. An entry corresponding to each sealed source received is recorded in the Source QC log book and also the Serial Number log book.
- 2. As sealed sources are placed in drift tubes an entry is recorded in the Serial Number log book and the IMS Assembly log book for the model.
- 3. Drift tubes removed from devices are recorded in the Service QC log book

Also see Contamination Monitoring Records: Radioactive Source Transfer Record*

Reporting of Defects

Potential defects shall be reported to the manufacturing facility. A root cause investigation shall be performed, after which an engineering change action shall be authorized to correct the problem. If a product defect is discovered which affected the radioactive source it is highly unlike that it would result in a radiation dose to the end user in excess of 10% of the limits of 10 CFR 20.1201(a). It is unlikely that any defect would meet regulatory reporting criteria.

Distribution of Device

The above mentioned devices are distributed from Smiths Detection headquarters in Warren, NJ or Edgewood, MD. The Quality Management System for this facility is ISO 9001:2000 certified. Repair and maintenance of devices are the only other activities performed. See Attachment P for copies of ISO Certificates.

End of Useful Life of Devices

Devices which can no longer be repaired shall be either returned to the Canadian facility for further service or shall be disposed of as ordinary refuse.

Product Transfer Reports (9.1.4)

Smiths Detection commits to filing annual transfer reports to the NRC. Reports shall be filed within 30 days of the end of every year (or upon license renewal) and contain a description or identification of the type of each product, the total quantity of radionuclides shipped, and the number of units shipped of each type, as described in 10 CFR 32.29 (4)(c). Copies of all reports filed shall be retained and available for review upon inspection.

10 CFR 32.26 Gas and Aerosol Detectors Containing Byproduct Material (9.8)

All devices included in this application incorporate an ion mobility spectrometer (IMS) to determine the chemical makeup of substances being analyzed by the device. There are two basic IMS designs: the IONSCAN 400B, and Sabre 4000. The IMS's in all devices are nearly identical to either of these IMS designs. Each IMS is similar in design and is identical in function. A product tree is included as Attachment D to demonstrate the relationship of the subassemblies to the device.

Model Numbers:

	,			
<u>Model</u>	<u>Height</u>	<u>Width</u>	<u>Length</u>	<u>Weight</u>
	<u>(in)</u>	<u>(in)</u>	<u>(in)</u>	<u>(lbs)</u>
IONSCAN 400B	13.7	13.06	16.0	49.6
IONSCAN LS	32.9	16.7	25	112.4
IONSCAN				
Document	13.7	16.7	16.0	50.7
Scanner				
IONSCAN	10.5 (corresponding)	174	16.1	16.2
500DT	19.5 (screen up)	17.4	10.1	40.5
Sabre 4000	6.3	4.5	16.0	7.7
Sabre 4000FR	6.3	4.5	16.0	7.7
Sabre EXV	6.3	4.5	16.0	6.6
MMTD	8.8	8.1	19.2	16.1
Sabre Centurion	16.9	10.6	19.5	28.7
Sabre Centurion II	16.9	10.6	19.5	28.7
Sentinel II	90.0	42.9	74.0	2661

Device Design and Construction

Device Construction

The radioactive source consists of a Ni foil, coated with Ni-63 on the inner side. Under normal operational conditions there is no possibility to get in direct contact with the surface of the radioactive source.

Each device, except the Sabre 4000, Sabre 4000FR, Sabre EXV, Sabre Centurion I, and Sabre Centurion II, contains a detector assembly, which contains an IMS drift tube assembly, which, in turn, contains the Ni-63 source.

Each source (drawing #2810640) is formed into a cylindrical shape and placed in a source holder made of brass. The brass holder is also gold plated to help with conductivity and has an added benefit of corrosion inhibition. Each IMS tube receives a single source, encapsulated by the IMS tube's components. The tube is stainless steel and the spacers surrounding the source holder are ceramic and will not allow any beta radiation to escape.

Source installation and removal are only performed at Smiths Mississauga, ON facility.

The holder is placed into a ceramic spacer within the IMS tube and capped with a ceramic plate. The plate is held in place with screws.

For all devices except for the Sabre 4000, Sabre 4000FR, and Sabre EXV, the IMS drift tube assembly is then inserted into a detector module, source end first. The IMS drift tube assembly is fastened to the detector module with tamperproof screws. The shell of the detector module is aluminum and it contains insulation to allow the IMS heater to work efficiently.

For the Sabre 4000, Sabre 4000FR, and Sabre EXV, the IMS tube assembly, is mounted directly to the inside of one half of the device housing. The remaining half is then fastened to the first half with tamperproof screws. See Attachment H for details.

For the Sabre Centurion I and Sabre Centurion II, the IMS tube assembly is mounted within the Centurions' outer enclosure with tamperproof screws. The enclosure is steel and is supplied with a lock to prevent unauthorized entry. Assembly drawings for each IMS, detector, and device are included as Attachment G.

The heaters in the IMS systems are regulated to various temperatures depending upon the series/model. Each model is also equipped with hardware and/or software controls to prevent heater runaway. The table below outlines the temperatures for each series.

Products Temperature Conditions				
	IMS Norn	nal Operating		
Product	Tem	perature	Shut-off Runaw	ay Temperature
	Inlet Temp.	Drift tube Temp	Hardware control	Software control
400B	290C	240C	330C	320C
Sabre	190C	130C	None	210C
500DT	Tube1=285C	Tube1=240C	T1-T2-225C	$T_{1}-T_{2}-215C$
500D1	Tube2=245C	Tube2=110C	11-12-3250	11-12-3130
Centurion	145C	105C	None	210C
Sentinel	290C	240C	330C	320C

As demonstrated by this Table, no heater will ever exceed 330°C. Each source is rated for a minimum of 400°C, and therefore is sufficient for the temperature rating of the heaters in each device.

Prototype Testing

Testing of Source:

Both sources which may be used in the device are registered with the US NRC. The source manufactured by QSA Global has received an ANSI classification of 77C4X212,

where the pressure rating 'X' was tested to 5 kPa absolute. The NRD source has been subjected to 400-450°C without degradation. This source has been in production and for almost 40 years.

Testing of Device:

In order to assure that its devices are as safe as reasonably achievable, Smiths has performed testing on the detector modules (and the IMS assembly for the Sabre models). Each module and assembly has been subjected to tests equivalent to those listed in ANSI N.542 or ISO 2919. The results show that these assemblies meet the requirements of these testing standards.

Smiths performed testing on the IMS assembly of its Sabre 4000 device. The IMS system was tested to the ISO 2919:1999 standard, and was determined to meet the requirements of a classification of C.32222. A copy of the test report provided by QSA Global is included as Attachment L.

To summarize the results, the IMS assembly was subjected to the following conditions and leak tests after each segment of testing as outlined in the attached results.

Test	Conditions
Temperature "3"	-40°C to +180°C
Pressure "2"	25 kPa to Atmospheric
Impact "2"	50 g from 1 m
Puncture "2"	1 g from 1 m
Vibration "2"	25 to 500 Hz @ 49 m/s^2

Each leak test showed less than 200 Bq of removable contamination.

The Sabre 4000 IMS assembly is used in the following models:

Sabre 4000 Sabre 4000FR Sabre EXV MMTD Centurion I Centurion II

Except for the MMTD, the IMS is contained within the enclosure or shell of the device. Within the MMTD model, the IMS is contained in an additional enclosure to further reduce the risk of damage to the IMS system.

Initially, Smiths had tested its IONSCAN 400B IMS assembly to ANSI N.43-6 and ISO 2919 with respective classifications of 77C32211 and C32211. Smiths recognized that further testing would assist in proving that the devices meet stricter safety requirements. Smiths performed an engineering analysis to demonstrate that the IONSCAN 400B IMS

assembly is comparable to the Sabre 4000 IMS assembly. Smiths maintains that the classification of the IONSCAN 400B IMS assembly is ISO 2919:1999 C.32222. The engineering analysis provided by QSA Global is included as Attachment L.

The IONSCAN 400B IMS assembly is utilized in the following models:

IONSCAN 400B IONSCAN Document Scanner IONSCAN LS Sentinel II

Note: the IONSCAN 500DT contains 2 IMS systems each identical to the IONSCAN 400B's.

Smiths Detection (formerly Barringer Research, Ltd.) has been producing detection systems since the early 1990's. In that time, Smiths is unaware of any incidents or failures related to the radiation safety of its devices. Additionally there has never been a positive leak test result from the field reported to Smiths.

The Table below outlines the years in which the devices within this application have been produced and the estimated total quantity of each model distributed in that timeframe. This Table has been extracted from a statement from Smiths, which is included as Attachment M.

Model/Series	Years Produced	Est. Qty Distributed
IONSCAN 400B	1999 - Present	>8000
IONSCAN 500DT	2006 – Present	>500
MMTD	2009 – Present	20
Sabre 4000 Series	2004 – Present	>4000
Sabre Centurion Series	2005 – Present	250
Sentinel II	2002 - Present	200

Smiths threat detection systems are utilized by federal, state, and local security agencies, as well as private and public entities to assure the safety and security of the public and private citizens. They are comparable to other devices produced by other manufacturers, which perform identical functions.

Since the sources used in Smiths devices are Ni-63, the average energy of the beta radiation is about 66 keV, and the sources are housed in metal tubes, no radiation is expected to penetrate the surrounding components. Therefore, there is no expected dose from the device, and no other safety features are required.

The sources in Smiths' devices are Ni-63 which is deposited/plated onto a nickel or nickel alloy foil. This foil is placed in a gold-plated, brass housing, which in turn is placed into a ceramic shield. Corrosion is not expected to be significant between any of

these components. In addition, the air entering the IMS system is first drawn through a desiccant to reduce the moisture content of the air. This further reduces the risk of corrosion between components. Shielding is provided by the inherent properties of the materials that surround that source and source holder.

None of the devices referenced in this application employ a shutter or allow direct access of the user to the radioactive source.

System status can typically be told from the user input screen. Some devices also have a user indicator light, usually located at the rear.

Smiths devices do not contain faraday plates.

Ni-63 is relatively insoluble in water. (Source: Brookhaven National Laboratory)

There is no history of positive leak tests for the devices. See attachment M.

Labeling:

Each detector module of each device is labeled with a trefoil and a label stating: CAUTION: RADIOACTIVE MATERIAL. These are durable, self-adhering labels made from vinyl and aluminum, and are present to warn service providers of the device where the radioactive source is housed.

Vinyl and .002" thick aluminum labels are self-adhesive and .032" aluminum labels are riveted to the device.

Each device will also have a label which states that the device is compliant with 10 CFR 32.27 and the end user is not subject to any regulatory requirements. These are also durable, self-adhering aluminum labels, with the exception of the Sabre EXV, MMTD. The label for these devices is 0.032" thick aluminum and is riveted to the device.

Trefoils and cautionary labels are present on the IMS system of each device as well.

Point of sale labels are placed on the packages for initial shipments.

Attachment G contains drawings, locations, and photos of labels for each device and the point of sale label. Actual samples are provided in the device registration application. There is also a spreadsheet which outlines the labels placed on each device and the method of attachment.

Potential Dose Received During Accident Conditions:

In the event of fire or explosion involving the device, due to the quantity of material, activity, moderate radiotoxicity of Ni-63, and construction of the device, it is unlikely

that a person or persons would receive in any one year period a radiation dose greater than 10% of the limits specified in 10 CFR 20.1201(a).

See Attachment N for Accident Dose Calculations

Items 7 through 11 on the application are not required for distribution licenses

Items 12 and 13 are listed on the application

List of Attachments

Letter Name

Page Reference

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А	Mississauga, ON Facility License (CNSC)	4
	Warren, NJ Facility License (NRC)	4
	Edgewood, MD Facility License (NRC)	4
В	Mississauga, ON Device Registration (CNSC)	4
	Warren, NJ Device Registration (NRC)	4
	Edgewood, MD Device Registration (NRC)	4
С	Smiths Source Drawing	4
	NRD Source Registration	4
	QSA Global Source Registration	5
D	Product Tree	5
Е	IMS Schematic	13
F	Outline Drawings	13
G	Assembly Drawings	13
Н	Tamperproof ECO	13
Ι	Labels	16
J	Use condition tables	11
K	Product Brochures	6
L	Prototype Testing Reports and Analyses	14
М	Smiths Leak Test and Incidents Statement	16
Ν	Dose Calculations	11
0	QA Manual and Procedures	8
Р	Mississauga, ON and Warren, NJ ISO 9000	11
	Certificates	
Q	Installation Procedures	16



NUCLEAR SUBSTANCES AND RADIATION DEVICES LICENCE

PERMIS PORTANT SUR LES SUBSTANCES NUCLÉAIRES ET LES APPAREILS À RAYONNEMENT

11013-1-12.3

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I) LICENCE NUMBER: 11013-1-12.3

II) LICENSEE

Pursuant to section 24 of the Nuclear Safety and Control Act, this licence is issued to:

Smiths Detection - Toronto Ltd. 7030 Century Avenue Mississauga, ON L5N 2V8 Canada

This licence replaces licence 11013-1-12.2.

III) LICENCE PERIOD

This licence is valid from: November 17, 2008 to June 30, 2012 unless otherwise suspended, amended, revoked or replaced.

IV)

LICENSED ACTIVITIES

This licence authorizes the licensee to:

(a) possess, transfer, import, export, use, service and store the nuclear substances and the prescribed equipment listed in the Appendix: Nuclear Substances and Radiation Devices of this licence.

(b) conduct licensed activities in the location(s) specified in the Appendix: Locations of Licensed Activities of this licence.

This licence is issued for: device manufacturing (864).

V) CONDITIONS

The contents of the appendices attached to this licence form part of the licence.

1. Records Requirements - Portable Devices

The licensee shall ensure that a copy of the prescribed records and operating procedures specific to the site where licensed activities are conducted for more than 90 consecutive days is maintained at that site. The continuity of consecutive days is not broken during off site use or off site temporary storage. (2350-4)

2. Location Notification

The licensee shall, for any site where licensed activities are to be conducted for more than 90 consecutive days, notify the Commission in writing of the site within 7 days of starting to conduct the activities at the site. The licensee shall notify the Commission in writing within 7 days of the discontinuance of licensed activities at any

Canadian Nuclear Safety Commission

NUCLEAR SUBSTANCES AND RADIATION DEVICES LICENCE

PERMIS PORTANT SUR LES SUBSTANCES NUCLÉAIRES ET LES APPAREILS À RAYONNEMENT

11013-1-12.3

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site. The continuity of consecutive days is not broken during off site use or off site temporary storage. (2300-2)

3. Export Restrictions

This licence does not authorize the licensee to export for the valid period of this licence:

- (a) any quantity in any form of:
 - (i) Deuterium;
 - (ii) Plutonium;
 - (iii) Thorium;
 - (iv) Tritium;
 - (v) Uranium; or

(b) any quantity of the elemental form, or any quantity of a compound or mixture greater than or equal to 37 GBq/kg, or any sealed source or device greater than or equal to 3.7 GBq of:

- (i) Actinium 225, 227;
- (ii) Californium 248, 250, 252, 253, 254;
- (iii) Curium 240, 241, 242, 243, 244;
- (iv) Einsteinium 252, 253, 254, 255;
- (v) Fermium 257;
- (vi) Gadolinium 148;
- (vii) Mendelevium 258;
- (viii) Neptunium 235;
- (ix) Polonium 208, 209, 210; or
- (x) Radium 223;

(c) any quantity of Americium 241 or 243, except in a compound or mixture, or any sealed source or device;

- (d) any quantity of Neptunium 237, except in a compound or mixture, or any sealed source or device;
- (e) any quantity of Radium 226, or any quantity of a compound or mixture of Radium 226;

(f) any product or device, except for medical applicators, containing more than 0.37 GBq of Radium 226 in any form; and

(g) any neutron generator system (including tubes) designed for operation without an external vacuum system and utilizing electrostatic acceleration to induce a Tritium-Deuterium nuclear reaction. (2403-7)

4. Laboratory Lists

The licensee shall maintain a list of all areas, rooms and enclosures in which more than one exemption quantity of a nuclear substance is used or stored.

(2569-1)

5. Inaccuracies Notification

The licensee shall report to the Commission or a person authorized by the Commission, as soon as is practicable, the discovery of any inaccuracy or incompleteness in the documents referred to in the Appendix: Licence Document(s). (2920-6)

6. Storage

The licensee shall:

(a) ensure that when in storage radioactive nuclear substances or radiation devices are accessible only to persons authorized by the licensee;

Licensee's Copy - Original

Page 2 of 10



PERMIS PORTANT SUR LES SUBSTANCES NUCLÉAIRES ET LES APPAREILS À RAYONNEMENT

11013-1-12.3

(b) ensure that the dose rate at any occupied location outside the storage area, room or enclosure resulting from the substances or devices in storage does not exceed 2.5 microSv/h; and

(c) have measures in place to ensure that the dose limits in the Radiation Protection Regulations are not exceeded as a result of the substances or devices in storage.
 (2575-1)

7. Storage Notification

Upon request from the Commission or a person authorized by the Commission the licensee shall notify the Commission in writing of the storage site(s) of each nuclear substance. (2298-1)

8. Annual Compliance Report

The licensee shall, by April 30 of each year, submit to the Commission a written annual compliance report in the form specified in the Appendix: Annual Compliance Reporting Form to this licence. (2916-10)

9. Operation Limitations

Subject to any other condition of this licence and unless otherwise permitted by the prior written approval of the Commission or a person authorized by the Commission, the licensee shall carry out the licensed activities in accordance with the documents or parts thereof referred to in the Appendix: Licence Document(s). (2917-7)

Designated Officer pursuant to paragraph 37(2)(c) of the Nuclear Safety and Control Act





NUCLEAR SUBSTANCES AND RADIATION DEVICES LICENCE

PERMIS PORTANT SUR LES SUBSTANCES NUCLÉAIRES ET LES APPAREILS À RAYONNEMENT

11013-1-12.3

Appendix: **Nuclear Substances and Radiation Devices**

Smiths Detection - Toronto Ltd.

Sealed Nuclear Substances			
Nuclear Substance	Maximum Quantity Per Sealed Source		
Americium 241	15 MBq		
Barium 133	370 kBq		
Californium 252	174 kBq		
Cesium 137	370 kBq		
Cobalt 60	37 kBq		
Europium 152	37 kBq		
Nickel 63	700 MBq.		
Radiation Devices			
Equipment Make and Model	Sealed Source Assembly	Nuclear Substance	Maximum Quantity Per Sealed Source
Barringer Ion Mobility Spectometer (IMS) IONSCAN - Models 100, 200 250, 350, 400A, 400B and Sentine	n/a D,	Nickel 63	700 MBq
Barringer Ion Mobility Spectometer (IMS) IONSCAN - Sabre 2000 and Centurion	n/a	Nickel 63	700 MBq
Smiths Detection Ion Mobility Spectrometer	n/a	Nickel 63	700 MBq
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NUCLEAR SUBSTANCES AND RADIATION DEVICES LICENCE

PERMIS PORTANT SUR LES SUBSTANCES NUCLÉAIRES ET LES APPAREILS À RAYONNEMENT

11013-1-12.3

 Appendix:
 Location(s) of Licensed Activities

 Smiths Detection - Toronto Ltd.

 1.
 7030 Century Avenue Mississauga, ON

 2.
 3225 Francis-Hughes Laval, QC

Suite 100

end of appendix



Licensee's Copy - Original Page 5 of 10 NRC FORM 374

U.S. NUCLEAR REGULATORY COMMISSION

PAGE <u>1</u> OF <u>4</u> PAGES Amendment No. 14

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40, and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee		In accordance with	h the application dated	
1. Smiths Detection Inc. 3. License its entirety		3. License numbe	arch 6, 2009, License number 29-28620-01 is amended in s entirety to read as follows:	
2. 30 Technology Drive		4. Expiration date	April 30, 2012	
Warren, New Jersey 07059		5. Docket No. 030)-32123	
		Reference No.		
6. Byproduct, source, and/or special nuclear material	7. Chemical and/or	physical form	 Maximum amount that licensee may possess at any one time under this license 	
A. Nickel 63	A. Sealed Source Products Labo NER-004)	e (Isotope // pratories Model	 A. 5 millicuries per source and 15 millicuries total 	
B. Nickel 63	B. Sealed Source (Amersham M NRD Model N	es i odel NBC and 1001)	 B. 15 millicuries per source and 7.5 curies total 	
C. Californium 252	C. Sealed Source (QSA Global M Series)	es Iodel CVN.CYn	 C. 6 microcuries per source and 20 microcuries total 	

9. Authorized use:

A. Research and development as defined in 10 CFR 30.4.

B. Installation of ion mobility spectrometry (IMS) assemblies in the manufacture of IONSCAN, Sabre, Sabre EXV, Sabre Centurian, Sabre Centurian II, Sentinel II, APD 2000 and MMTD devices; instruction and training of individuals in the use of the devices; and for demonstration at customer facilities in the devices.

B. and C. Repair and servicing of the IONSCAN, Sabre, Sabre EXV, Sabre Centurian, Sabre Centurian II, Sentinel II, APD 2000 and MMTD devices that does not involve the IMS assemblies.

NRC	FORM :	374A		PAGE	2	OF	4	PAGES
,			License Number 29-28620-01					
		MATERIALS LICENSE SUPPLEMENTARY SHEET	Docket or Reference N 030-32123	lumber				
			Amendment No.	14				
		CONDIT	TIONS	-				
10.	Lice Pine sites mair juris	nsed material may be used or stored at the lice Brook, New Jersey; 30 Technology Drive, Wa s of the licensee anywhere in the United States ntains jurisdiction for regulating the use of licen diction within Agreement States.	ensee's facilities located irren, New Jersey; and r where the U.S. Nuclea ised material, including	i at 30 Ho nay be us r Regulato areas of e	ok M ied a ory C exclu	lounta it tem comm sive f	ain R pora issio ⁻ ede	load, ry job n ral
	lf the cont is ar Agre regu	e jurisdiction status of a Federal facility within a tact the Federal agency controlling the job site in area of exclusive Federal jurisdiction. Author eement States not under exclusive Federal juris ilatory agency.	in Agreement State is un in question to determine ization for use of radioa sdiction shall be obtaine	nknown, t whether ctive mate d from the	he lic the p erials e app	cense propo at jo propri	e sh sed j b site ate s	ould job site es in state
1 1.	Licensed material shall be used by, or under the supervision of, Richard Keosian.							
12.	The	Radiation Safety Officer for this license is Rich	ard Keosian.					
13.	This purs 30.2	license does not authorize commercial distribution to 10 CFR Part 31 or to persons exempt f 1, inclusive, or equivalent regulations of any Ag	ution of licensed materia from licensing pursuant greement State.	Il to perso to 10 CFF	ns g R 30.	enera 14 th	ally lie roug	c ensed h
14.	Α.	Sealed sources shall be tested for leakage a months or at the intervals specified in the cer Regulatory Commission under 10 CFR 32.21 State.	nd/or contamination at i rtificate of registration is 10 or under equivalent r	ntervals r sued by t egulations	not to he U s of a	exce .S. Ni an Ag	ed s uclea reem	ix ar ient
	В.	Notwithstanding Paragraph A of this Condition particles shall be tested for leakage and/or content of the state of the sta	on, sealed sources desig ontamination at interval	gned to pr s not to ex	rimar kceek	ily en d 3 m	nit alı onth	pha s.
	C.	In the absence of a certificate from a transfer intervals specified in the certificate of registra Commission under 10 CFR 32.210 or under the transfer, a sealed source received from a and the test results received.	ror indicating that a leak ation issued by the U.S. equivalent regulations o another person shall not	test has Nuclear f of an Agre be put int	been Regu e me to us	i mad latory nt Sta e unt	e wit / ate, p il tes	thin the prior to ted
	D.	Sealed sources need not be tested if they co radioactive gas; or the half-life of the isotope 100 microcuries of beta- and/or gamma-emit	ntain only hydrogen-3; o is 30 days or less; or th ting material or not more	or they co ey contai e than 10	ntain n not micn	only more ocurie	a e tha es of	n

FORM	374A	PAGE 3 OF 4 PAG
		License Number 29-28620-01
	MATERIALS LICENSE SUPPLEMENTARY SHEET	Docket or Reference Number 030-32123
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<u> </u>	Sealed sources need not be tested if they are i	in storage and are not being used; however, when
	they are removed from storage for use or trans within the required leak test interval, they shall shall be stored for a period of more than 10 year contamination.	sferred to another person and have not been tester be tested before use or transfer. No sealed source ars without being tested for leakage and/or
F		
	The leak test shall be capable of detecting the radioactive material on the test sample. If the (185 becquerels) or more of removable contan Regulatory Commission in accordance with 10 immediately from service and decontaminated, Commission regulations.	presence of 0.005 microcurie (185 becquerels) of test reveals the presence of 0.005 microcurie nination, a report shall be filed with the U.S. Nuclea CFR 30.50(c)(2), and the source shall be remove repaired, or disposed of in accordance with
G.	The leak test shall be capable of detecting the radioactive material on the test sample. If the (185 becquerels) or more of removable contant Regulatory Commission in accordance with 10 immediately from service and decontaminated, Commission regulations. Tests for leakage and/or contamination, limited by the licensee or by other persons specifically Commission or an Agreement State to perform perform the analysis; analysis of leak test samp licensed by U.S. Nuclear Regulatory Commissi	presence of 0.005 microcurie (185 becquerels) of test reveals the presence of 0.005 microcurie nination, a report shall be filed with the U.S. Nuclea CFR 30.50(c)(2), and the source shall be remove repaired, or disposed of in accordance with to leak test sample collection, shall be performed licensed by the U.S. Nuclear Regulatory is such services. The licensee is not authorized to ples must be performed by persons specifically ion or an Agreement State to perform such service

- 15. The licensee shall conduct a physical inventory every six months, or at other intervals approved by the U.S. Nuclear Regulatory Commission, to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 5 years from the date of each inventory and shall include the radionuclides, quantities, manufacturer's name and model numbers, and the date of the inventory.
- 16. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.
- 17. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

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	MATERIALS LICENSE SUPPLEMENTARY SHEET	License Number 29-28620-01				
		Docket or Reference Number 030-32123				
		Amendment No. 14				
8. Exc	cept as specifically provided otherwise in this lice	ense, the licensee shall conduct its program in				

For the U.S. Nuclear Regulatory Commission

Date _____March 27, 2009

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RTaury

Dennis R. Lawyer Commercial and R&D Branch Division of Nuclear Materials Safety Region I King of Prussia, Pennsylvania 19406 Friday, March 27, 2009 06:23:40



RADIOLOGICAL HEALTH PROGRAM RADIOACTIVE MATERIAL LICENSE

Page 1 of 5

Pursuant to the Maryland Radiation Act, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. The license is subject to all applicable rules, regulations and orders of the Maryland State Department of the Environment, now or hereinafter in effect and to any conditions specified below.

 Name: Smith Detection-Edgewood Address: 2202 Lakeside Blvd. Edgewood, Maryland 210 	Inc. 3 40	3. License No.: MD-25-044-01 4. Amendment No.: 34 Code (03240) 5. Expiration Date: July 31, 2014			
6. Radioactive material (element and mass number)	7. Chemical and/or p	bhysical form	8. Maximum amount of activity which licensee may possess at any one time		
A. Nickel-63	A. Foils (#NBC.13, N NBC.11, IPL NEN and electroplated of NEN or Amershar Part #5-15-11143)	NBC.14, N NER 004) devices IPL n per ETG	 A. No source to exceed 25 millicuries. Total possession 3 Curies. 		
B. Nickel-63	B. Beta ionizing ring U.S. Army Drawin 416 NEN NER-00 Amersham #NBC	source per 1g #4D/442- 4R, D)	 B. No source to exceed 15 millicuries. Total possession 45 Curies. 		
C. Nickel-63	C. Sealed sources: IP Amersham NBC, I Nuclear Radiation Development, Inc. N1001	L NER 004R, NBCQ8681, (NRD) model	C. No source to exceed 15 millicuries. Total possession 60 Curies.		
D. Nickel-63	D. Sealed sources: IP Amersham NBC, I Nuclear Radiation Development, Inc. N1001	L NER 004R, NBCQ8681, (NRD) model	D. No source to exceed 15 millicuries. Total possession 15 Curies.		



RADIOLOGICAL HEALTH PROGRAM RADIOACTIVE MATERIAL LICENSE

Page 2 of 5 License Number: MD-25-044-01 **Amendment Number:** 34 E. Americium-241 Sealed Sources: NRD, Inc. Foil E. Total possession 3 E. source model A-001 millicuries, no source to exceed 300 microcuries. F. 40 millicuries F. Phosphorus-32 F. Labeled Compounds G. Phosphorus-33 G. Labeled Compounds G. 40 millicuries

9. Authorized Use(s):

A. For use in development of analytic instruments for atmospheric contamination monitoring.

B. For use in manufacturing and distribution of analytical instruments to specifically licensed recipients.

C. For use in manufacturing and distribution of Smiths Detection Models CAM (2429200), ICAM (2429201), CAM2 (0482-0301R), ICAM -APD (2427601), Fixed site CW detector (2429131), APD 2000 (2428800-10, -20 and -30), M43-APD (2428980), CAM 1.5, OTTO-2 (0603-0001), GID-2A (0482-0301R), GID- 3/M22/ACADA (P0614-2000A), GID-3 24/7 (10505), ECAM (1035-5725), Sabre 2000 (4811500), Ionscan 400B, Sentinel II (4814000), Centurion (4813700), and MCAD (P05284) chemical warfare agent detector systems, under COMAR 26.12.01.01 Section C.28(d) to generally licensed recipients under C.22(d).

D. For distribution of Ionscan 500 DT (6817800), MMTD and Sabre 4000 (4816600) to generally-licensed recipients under COMAR 26.12.01.01, Section C.22.

E. For distribution of M43A1 to specifically-licensed recipients. For development and testing of systems that have the M43A1 as a component of the system.

F. & G. For biotechnology research and development at the address in item 2 only. No human or animal use is authorized.

LICENSE CONDITIONS

- 10. The authorized place of use is the licensee's address stated in Item 2 with use, demonstration, and repair at temporary job sites throughout the State of Maryland. The licensee must notify the Radiological Health Program 30 days prior to vacating a permanent use address as is required by Section D.1301 of COMAR 26.12.01.01.
- 11A. The radiation protection program shall be under the supervision of John Volz assisted by Amy Sadera.
 11B. Radioactive material shall be used by, or under the supervision of John Volz, Ali Kerem, or Amy Sadera.



RADIOLOGICAL HEALTH PROGRAM RADIOACTIVE MATERIAL LICENSE

Page 3 of 5

License Number: MD-25-044-01

Amendment Number: 34

LICENSE CONDITIONS, CONTINUED

- 12. The licensee shall comply with all appropriate provisions of COMAR 26.12.01.01 "Regulations for Control of Ionizing Radiation."
- 13A. Each sealed source containing radioactive material, other than Hydrogen-3 with a half-life greater than thirty (30) days and in any form other than gas shall be tested for leakage and/or contamination at intervals not to exceed six (6) months. In the absence of a certificate from a transferor indicating that a test has been made within six (6) months prior to the transfer, the sealed source shall not be put into use until tested. If there is reason to suspect that a sealed source might have been damaged, or might be leaking, it shall be tested for leakage before further use.
- 13B. The test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. The test sample shall be taken from the sealed source or from the surfaces of a device in which the sealed source is permanently mounted or stored on which one might expect contamination to accumulate.
- 13C. Records of leak tests shall be kept in units of microcuries and maintained for inspection by the Department.
- 13D. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Department regulations. A report shall be filed within five (5) days of the test with the Administrator, Radiological Health Program, 1800 Washington Blvd, Baltimore, Maryland 21230, describing the equipment involved, the test results, and the corrective action taken.
- 13E. Test for leakage and/or contamination shall be performed by the licensee or by other persons specifically authorized by the Department, the U.S. Nuclear Regulatory Commission or another Agreement State to perform such services.
- 14. The licensee shall conduct a physical inventory every six (6) months to account for all sealed sources received and possessed under the license. The records of the inventories shall be maintained for two (2) years from the date of the inventory for inspection by the Department, and shall include the quantities and kinds of radioactive material, location of sealed sources, and the date of the inventory.



RADIOLOGICAL HEALTH PROGRAM RADIOACTIVE MATERIAL LICENSE

License Number: MD-25-044-01

Amendment Number: 34

LICENSE CONDITIONS, CONTINUED

- 15. The licensee shall report to the Department all transfers of the devices distributed under this license to persons generally licensed under Section C.22(d) in accordance with Section C.28(d)(4). Such reports shall identify each general licensee by name and address, the type of device transferred, the quantity and type of radioactive material contained in the device, and specific location where each device is installed. The report shall be submitted within 30 days after the end of each calendar quarter in which any such device is transferred to a generally licensed person.
- 16. The licensee shall test each device distributed under this license for leakage or contamination of radioactive material and proper operation of the "on-off" mechanism and indicator, if any, at the time of installation of the device.
- 17A. The licensee shall not make any false statement, representation, or certification in any application, record, report, plan, or other document regarding radiation levels, tests performed or radiation safety conditions or practices. Additionally, the licensee shall not falsify, tamper with, or render inaccurate any monitoring device or method.
- 17B. Violation of any term, condition, or regulation could subject the licensee to administrative or civil penalty or criminal prosecution, as specified in Title 8, Radiation, of the Article Environment of the Annotated Code of Maryland.
- 18. Conditions for working at temporary job sites are:
 - A. The work area is to be controlled by limiting access only to authorized personnel and Radioactive Materials signs are to be posted in the work area.
 - B. Work will be done only by trained Smiths Detection personnel.
 - C. The work will consist of refurbish, replace, or repair of component items, assemblies, subassemblies, modules and pieces, not to include opening the IMS Cell containing the radioactive source.
 - D. A leak test will be conducted and approved before final release of the equipment to the user.
 - E. When the work is performed at temporary job sites, all devices will remain in the user's possession at all times.
- 19. The licensee shall not transfer ownership and/or control of this license to any person or entity without providing required information regarding the transfer for the agency's review and without receiving written authorization for the transfer by the agency.

Page 4 of 5



RADIOLOGICAL HEALTH PROGRAM RADIOACTIVE MATERIAL LICENSE

License Number: MD-25-044-01

Amendment Number: 34

Page 5 of 5

LICENSE CONDITIONS, CONTINUED

- 20. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material authorized by this license in accordance with statements representations, and procedures contained in:
 - Renewal application dated October 9, 2006.
 - ▶ Letter with attachments dated April 25, 2007.
 - Letter dated December 13, 2007, with attached SSD registration adding distribution of the Sabre 4000 and the Ionscan 500DT.
 - > Letter dated February 18, 2008, with sealed source models and possession limits.
 - Letter dated August 20, 2008, with attached SSD registration adding the M43A1 for testing systems and for distribution to specifically-licensed recipients.
 - Letter dated August 20, 2008, adding the distribution of the generally-licensed MMTD.
 - Amendment application with attachments, dated January 9, 2009, adding P-32 and P-33.

COMAR 26.12.01.01 "Regulations for Control of Ionizing Radiation" shall govern the licensee's statements in applications or letters, unless the statements are more restrictive than the regulations.

FOR THE MARYLAND DEPARTMENT OF THE ENVIRONMENT

February 9, 2009

Roland G. Fletcher, Manager III Radiological Health Program

BJ



1800 Washington Boulevard • Baltimore MD 21230 410-537-3000 • 1-800-633-6101

Martin O' Malley Governor

MAR 1 6 2009

Shari T. Wilson Secretary

Deputy Secretary

Robert M. Summers, Ph.D

Anthony G. Brown Lieutenant Governor

> John Volz, Radiation Safety Officer Smith Detection-Edgewood, Inc. 2202 Lakeside Boulevard Edgewood, MD 21040

RE: Radioactive Material License #MD-25-044-01

Dear Mr. Volz:

Your requested amendment to radioactive materials license number MD-25-044-01 is enclosed. Please review it carefully to ensure that it reflects all modifications included in your letter received in this office on January 15, 2009.

Should you require further assistance, please contact Mr. Raymond E. Manley at 410-537-3301. You may also reach our office toll-free by dialing 1-800-633-6101 and requesting extension 3301. Also, you may contact this office via facsimile at 410-537-3198.

Sincerely.

Roland G. Fletcher, Manager Radiological Health Program Air and Radiation Management Administration

 犬 気 RGF/REM/BJP/cc

Enclosures: License amendment (34) Code (03240)

Certificate

for Radiation Device

Certificate Number	Date of Issue	Date of Expiry
R-158-0004-3-2017	May 23, 2008	March 31, 2017

The radiation device identified below is certified by the Canadian Nuclear Safety Commission pursuant to paragraph 21(1)(h) of the *Nuclear Safety and Control Act* and section 12 of the *Nuclear Substances and Radiation Devices Regulations*.

Manufacturer: Barringer Research Ltd.

Make and Model: Barringer Ion Mobility Spectometer (IMS) IONSCAN - Models 100, 200, 250, -350, 400A, 400B and Sentinel II.

Device Type: ELECTRON CAPTURE DETECTOR

Description: Reference CNSC Application No. 33428.

The certified equipment is used as a chromatograph for detecting various chemical compounds including drugs or explosives. The device may be contained in a table-top or portal configuration.

The device is authorized to contain a beta source in the form of solid Ni-63 plated onto gold foil which is housed in a ceramic insulator. There is no shutter as the foil is completely enclosed. The following source models are authorized for use in the device: NRD Model N1001, AEA Theorology Model NBC, Isotope Products Laboratories Model NER-004.

The radiation device may contain any of the following nuclear substances in a quantity not exceeding the corresponding quantity indicated:

Nuclear Substance	Maximum Quantity
Nickel 63	700 MBq
Autoin Sill	

Designated Officer pursuant to paragraph 37(2)(a) of the Nuclear Safety and Control Act




Canadian Nuclear Safety Commission

Commission canadienne de sûreté nucléaire

Certificate

for Radiation Device

Certificate Number	Date of Issue	Date of Expiry
158-0015-1-2017	2002-08-14	2017-03-31

The radiation device named in this certificate is certified pursuant to paragraph 21(1)(h) of the Nuclear Safety and Control Act and section 12 of the Nuclear Substances and Radiation Devices Regulations.

The certified equipment is a **BARRINGER ION MOBILITY SPECTROMETER (IMS) IONSCAN** – **SABRE 2000 and Centurion** used as a **CHROMATOGRAPH**. The equipment has been approved based on the information submitted to the Canadian Nuclear Safety Commission under application # # 32350, dated **April 29, 2002**, which includes instructions for dealing with accidents, including fires and spills. The equipment is certified to be used with the following nuclear substances and quantity of those substances:



Nuclear Substance

Maximum Quantity

Ni 63

700 MBq

Subject to the procedures set out in Section 15 of the *Nuclear Substances and Radiation Devices Regulations*, this radiation device may be decertified if errors, inaccuracies, or misrepresentations are discovered in the application or supporting documents or if the equipment deviates from the design submitted in those supporting documents or if there are other grounds for decertification.

Designated Officer pursuant to paragraph 37(2)(a) of the Nuclear Safety and Control Act

Canada

*

Canadian Nuclear Commission canadienne Safety Commission de sûreté nucléaire

P.O. Box 1046, Station B Ottawa, Ontario K1P 5S9 C.P. 1046; Succursale B Ottawa (Ontario) K1P 5S9

Fax: (613) 995-5086

Télécopleur : (613) 995-5086

Directorate of Nuclear Substance Regulation

Telephone: (613) 995-0052

July 19, 2004

Dr. Georgia Ranger Smiths Detection – Toronto Ltd. 1730 Aimco Boulevard Mississauga, ON L4W 1V1

Dear Dr. Ranger:

With regards to Smiths Detection's request to obtain CNSC certification for the Ionscan 500DT and Sabre 4000, as per your letter dated February 27, 2004, please note the following decision. These models were added to the existing device certificate 147-0001-0-2017 (Smiths Detection Ion Mobility Spectrometer) issued on September 9, 2002. An amendment to this certificate was determined to be not required.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Christia Dodiin, C.E.T.

Christina Dodkin, C.E.T. Licensing Specialist Nuclear Substances and Radiation Devices Licensing Division . Your lite Votre rétérence

Our lile Notre rélérence

Canada

28-147-0001

.04-1167cd.doc

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 1 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

MODEL: IONSCAN Models 100, 200, 250, 350, 400, 500DT, 500HDT, LS, Sabre 2000, Sabre 4000, Sabre Centurion, Sabre Centurion II, Sabre EXV, Sentinel II, MMTD

- MANUFACTURER: Smiths Detection, Inc. (Formerly Barringer Research Ltd.) 7030 Century Drive Mississauga, ON L5N 2V8 Canada
- DISTRIBUTOR: Smiths Detection, Inc. (Formerly Barringer Instruments, Inc.) 30 Technology Drive Warren, NJ 07059

Smiths Detection, Inc. 2202 Lakeside Boulevard Edgewood, MD 21040

SEALED SOURCE MODEL DESIGNATION:

Amersham Corp. Model NBC Nuclear Radiation Development (NRD) Source Model, N1001

ISOTOPE:

MAXIMUM ACTIVITY:

Nickel-63

30 mCi (1.11 GBq)

LEAK TEST FREQUENCY: 6 Months

PRINCIPAL USE: (N) Ion Generators, Chromatography

CUSTOM DEVICE: YES X NO

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 2 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION:

The IONSCAN devices use ion mobility spectrometry (IMS) to detect and identify trace quantities of a wide variety of chemical substances. Airs containing microscopic particles of various chemical substances are drawn into a sample collector. The sample is heated in order to vaporize the particulate matter. The vapor is drawn into the detector, ionized by the nickel-63 source and passed into a drift region. The ionized particles are focused and accelerated by an electric field along the drift-region towards a collector electrode. Ionized particles in the vapor form are accelerated at different rates and arrive at the collector electrode at different times. The amount of time the particles take to reach the collector electrode can be directly related to the ionized chemical substances present in the vapor. Therefore, specific substances can be detected according to the time required to reach the collector.

The Ni-63 source is encapsulated in a hollow brass cylinder. which is, in turn, sealed in a ceramic shield. The ceramic shield is connected to the drift region which consists of a brass tube surrounded by brass discs equally spaced along its length. These discs create the electric field which focuses and accelerates the ionized particles. The entire assembly (the drift tube assembly) is contained in a brass source housing assembly. Graphite gaskets are used to provide a seal between the flanges of the housing assembly. A Pyrex glass inlet tube is connected to the drift tube assembly. Samples are drawn into the ion chamber through this inlet. The source housing assembly, with drift tube assembly and inlet tube installed, is contained within a stainless steel housing. Void spaces between the stainless steel housing and drift tube assembly are filled with insulation in order to protect and immobilize the drift tube assembly. The entire assembly (detector cell) is mounted inside the IONSCAN device. All brass components are plated with a 1.31 X 10E-3 inch (400 microns) layer of nickel, and all internal surfaces are also plated with a 0.66 x 10E-3 inch (200 microns) layer of gold.

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 3 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION (Cont.):

The Model 250 devices are identical to the Model 200 except that Model 250 devices contain a Model 100 style keypads. The Models 350 and 400 are identical to the Model 250 except that the Model 350 contains an alternate power/pump unit, adding a thermoelectric cooler to remove moisture from the air flow and an optional DC battery pack, and the Model 400 uses a modified keypad and an alternate, a smaller power/pump unit without mass flow controllers. The IONSCAN-LS utilizes the IONSCAN-400B as a subassembly with additional external components, such as an autosampler and an injection port.

The Ionscan Sabre 2000, Sabre 4000, Sabre EXV, and MMTD are hand-held portable chemical detection devices which can identify trace residues of, and vapors emitted from, a wide variety of chemicals and, therefore, will be in contact with the operator. The metals used in the construction of the detector are gold and gold plated metals, stainless steel, nickel, Hastelloy. The manufacturer has stated that these metals will not be oxidized by air under anticipated operating and storage conditions. The source is contained in a source holder constructed from gold plated Naval Brass Rod. The difference between the Sabre 2000, Sabre 4000, and MMTD are as follows:

Sabre 2000	Sabre 4000	MMTD
Grey painted cover	Black painted cover	Beige Cover, black handle and bumpers
Blue push buttons	Yellow push buttons	Black buttons
Standard LCD Screen	Color LCD Screen	Same as Sabre 4000
2 hour battery	4 hour battery	2.5 hour HOT SWAP
Standard air purification unit	Long life air purification unit	Same as Sabre 4000
Explosives/Narcotic s/CWA Detection	Addition of Toxic Industrial Chemicals	Same as Sabre 4000
Raw data saved to instrument only	Spectra recorded & able to upload to a PC	Same as Sabre 4000

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 4 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION (Cont.):

The Sabre EXV differs from the Sabre 4000 in its simplified sampling inlet, simplified internal air-flow control, a firmware, which allows the Sabre EXV to switch polarities during sampling, and in its ability to rotate the display screen 180 degree. The Sabre EXV has been optimized to be used for explosive detection only.

Smith's Detection states that the model MMTD device is a hardened version of the model Sabre 4000, with identical design of the internal modules, except that the MMTD has a new exterior design to protect against impact and shock, and will allow 'hard' use under sever environmental conditions. Also, the MMTD may have either an Aluminum or Magnesium enclosure. The Ion Mobility Spectrometer detector fitted in the MMTD has the same drift tube assembly, and identical Ni-63 source holder as the Sabre 4000 model.

The IONSCAN 500DT has a dual IMS system, each IMS device has a 15 mCi (0.56 GBq) to give the device a maximum activity level of 30 mCi (1.11 GBq). The device will be used for detecting trace particles of chemical compounds, specifically explosives and narcotics. The 500DT is specified for operation either in a fixed location where AC power is available or from a dry cell battery. The IMS device fitted in the IONSCAN 500DT has the identical drift tube assembly (which contains the nickel-63 source and its holder) as the previous IONSCAN models. The outer casing for the drift tube assembly (the outer casing and drift tube assembly together comprise the IMS assembly) is of a different construction to those in previous models. The IMS assembly used in the IONSCAN 500DT is identified as the IMS-2 in the engineering drawings provided by Smiths Detection. The Model 500HDT device is a hardened version of the model 500DT, with identical design of the internal modules. Its outer case is made from Aluminum, with integral impact, shock, and vibration protection. The IMS detector fitted in the IONSCAN 500HDT has the same drift tube assembly and identical nickel-63 source and holder as the IONSCAN 500DT model.

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DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION (Cont.):

The difference between the IONSCAN 400B, IONSCAN 500DT, and IONSCAN 500HDT IMS assemblies are as follows:

	IONSCAN 400B	IONSCAN 500DT	IONSCAN 500HDT
Drift Tube Assembly	As Per Drawing	No Change	No Change
Drift Tube Casing	St. Steel Casing	St. Steel Casing	Aluminum
Insulation	Ceramic Fiber	1. Micro Fiber Felt 2. Flex Aerogel	Micro Fiber
Outer Casing	Aluminum Casing	St. Steel Casing	St. Steel Casing
Heater	Band Heater	Thermofoil Mica Heater	Thermofoil Mica Heater

The ion mobility spectrometer device installed in the IONSCAN 400 is mounted into the Model Sentinel II. The Sentinel II will be used for detection of trace particles of chemical compounds, specifically explosives and narcotics.

The ion mobility spectrometer device installed in the IONSCAN Sabre 2000, Sabre 4000, Sabre EXV, and MMTD is mounted in the Model Sabre Centurion and Sabre Centurion II. The Sabre Centurion will be used for the detection of trace vapor chemical compounds. The only differences between the Sabre Centurion and Sabre Centurion II are a software modification and the model name designation.

A maximum 15 mCi (0.56 GBq) foil source consisting of nickel metal, electroless, 99.9% pure gold plating on a backing foil of 0.006-0.008 inches (0.152-0.203 mm) in thickness (Registration Certificate No. NY-0502-S-103-U) is inserted into the holder so that it conforms to the interior radius of the brass holder. The source sits against a machined ridge on one side of the holder, and rests against a gold-plated nickel mesh (repelling mesh) on

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 6 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION (Cont.):

the other side of the holder. The source is physically wedged in place. Sabre 2000, Sabre 4000, Sabre EXV, MMTD, IONSCAN 500DT, and IONSCAN 500HDT device mounting of the sealed sources is such that it cannot come loose from the source holder, or be dislodged from the device under normal operating and likely accident conditions. The manufacturer stated that for shipping and transportation no additional mechanism is required for shielding the radioactive source. The source is shielded within the detector. No adhesive is used to hold the source in place.

The repelling mesh contacts the source holder on one side while a ceramic spacer contacts the source holder on the other side. The source holder, as well as other pieces of the drift tube assembly, is held together by a 10 lbs. (44.48 N) force provided by a compressed spring.

Radial ceramic shielding surrounds the source holder, and the drift tube casing surrounds the ceramic shielding. The drift tube shell casing is constructed of 0.032 inches (0.813 mm) thick Hastelloy. All Sabre 4000 IMS units made after January 18, 2007, will have a stainless steel tube instead of the Hastelloy. While the Ionscan Sabre 2000, Sabre 4000, MMTD, and Sabre EXV are connected to an electrical power supply and rests in a cradle on the Base Station, the battery pack, consisting of 10 Metal Hydride batteries, is continuously charged and the system offers full operational capability.

The charger checks the battery pack before charging and does not start charging a faulty pack or if the pack temperature is outside the safety range of 0°C to 40°C, (32°F to 104°F). When the battery is fully charged, the Model Sabre 2000 can operate for one and half hours, the Sabre 4000 and Sabre EXV can operate for four hours, **and the MMTD has a 2.5 hour HOT SWAP**. Model may be connected to a compatible computer for data viewing and programming.

An air flow through the assembly is used to induce chemical particulate and vapor samples through the inlet and into the drift tube. A thermoelectric cooler is connected to the

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE^{*} 7 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION (Cont.):

device to remove moisture from the air flow. The air purification cartridge removes moisture from the airflow. The tube is filled with colored and white beads of molecular sieves. The colored beads are blue when dry and turn pink as they are used.

LABELING:

IONSCAN devices distributed prior to February 17, 1994, were erroneously labeled. Barringer (presently Smiths Detection) has committed that all devices distributed on or after February 17, 1994, will contain a label on the outer surface of the IONSCAN devices which meets the requirements of 10 CFR 32.51. In addition, Barringer has committed to sending additional labels to all users of devices distributed prior to February 17, 1994, with instructions for applying these labels. When properly applied, these past distributed devices will contain labels which meet the requirements of 10 CFR 32.51. All labels are made of Mylar and are secured in place with an adhesive.

There are two labels permanently affixed to the Model Sabre 2000, Sabre 4000, Sabre EXV, IONSCAN 500DT, and IONSCAN 500HDT drift tube assemblies. The labels for the Model Sabre 2000, Sabre 4000, Sabre EXV, and IONSCAN 500 DT are shown in Attachment No. 5. The top label designates the isotope, activity level, wipe test date and has the trefoil symbol included. The bottom label is to alert anyone who has removed the Ionscan cover that disassembly of the IMS detector cell is prohibited. The device outside carries a Trefoil Symbol and a CAUTION-RADIOACTIVE MATERIAL label. This label in Attachment No. 4 advises of the Ni-63 source, the requirements for 6 months leak testing, and the general license regulations. The internal and external labels for the IONSCAN 500HDT are shown in Attachment Nos. 13 and 14 respectively.

The MMTD has an internal labels made of Mylar, and secured in place with an adhesive. It also has two external labels engraved on aluminum plates, secured with rivets. The internal label is fastened to the IMS and indicates "CAUTION-RADIOACTIVE MATERIAL", isotope identification, radioactivity declaration,

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 8 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

LABELING (Cont.):

trefoil symbol, serial number and model of the IMS detector, serial number of the radioactive source, model of unit, date of assay, and name of manufacturer. Smith's Detection states that the an external engraved metal label on the unit is riveted to the outer surface, as per 10 CFR 32.51 requirements, and reads "CAUTION-RADIOACTIVE MATERIAL" and that the label advises of the NI-63 source and general licensing regulations. A second external label indicates the model number, serial number, and other information.(See attachments 17-19)

DIAGRAM:

See Attachments 1 to 19.

CONDITIONS OF NORMAL USE:

IONSCAN devices will be used for detecting various chemical compounds, including drugs and explosives. Typical uses of these devices will be in controlled surroundings or in outdoor ambient conditions. The equipment is specified for operation in temperatures ranging from 0°C to 50°C, (32°F to 122°F). The IONSCAN 500HDT is specified for operation in temperatures ranging from -20°C to 60°C, (-4°F to 140°F). The device is not expected to operate under any significant vibration conditions. The optional DC power pack is intended to make the IONSCAN device portable in a limited scope. It allows for movement of the device to a temporary site where AC power is not available.

Model Sabre 2000, Sabre 4000, and MMTD can be used for the detection of both the trace particles and vapor. The devices can be used for detecting and identifying explosives and narcotics. The armed forces, law enforcement authorities, customs, correctional institutions, local police and fire departments, public and private security surveillance organizations may be the primary users of this device. The **Sabre 2000 and Sabre 4000 devices are** not expected to be used in a wet (rain, snow, under water etc.) or vibration environment.

Both the Sentinel II, Sabre Centurion, and Sabre Centurion II are specified for operation in a fixed location where AC power

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 9 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

CONDITIONS OF NORMAL USE (Cont.):

is available. The devices are not recommended for use in wet conditions or under conditions causing vibration.

However, Smith's Detection states that the MMTD is designed for maritime environments, rain resistant (including incidental exposure to heavy rain), and dust resistant (including winddriven fine dust) for reliable operations outdoors in desert environments.

The expected working life of the devices is anticipated to be 10 years or more. The Ni-63 nor radiological safety aspects limit the expected working life.

PROTOTYPE TESTING:

The manufacturer claims that the IMS detector assembly, with sealed source installed, was tested to **ISO 2919:1999** and satisfied the tests for a classification of **ISO/99/C32222**. Following each test air was flown through the device and the drift tube assembly was tested for removable contamination. No removable contamination above 0.005 microcuries (185 Bq) was noted.

The structural integrity of the Model Sabre 2000 detecting device design was tested under the following expected extreme temperatures, pressure and impact conditions. The Sabre 4000, Sabre EXV, and MMTD are designed and built to the same specifications the following testing conditions would still apply:

- Temperature: -40°C, 20 min to 180°C, 1 hr (104°F 356°F)
- Pressure: test to 25 kPa, (3.63 lbs/in2) to atmospheric
- Impact: 50 g from 1 m (39.37 inches)
- Vibration: 3 times 10 min; 25 to 500 Hz at 49 m/s^2
- Puncture: 1 g from 1 m (39.37 inches)

The structural integrity of the IONSCAN 500DT IMS detector design was tested under the following expected extreme temperatures, pressure and impact conditions:

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE[®] 10 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

PROTOTYPE TESTING (Cont.):

- Pressure test to 25 kPa, (3.63 lbs/in2)
- Drop test from 1.5 m,(59.06 inches) ten times onto a steel plate
- Temperature test -70°C to 400°C, (-94°F to 752°F)
- Impact 50 g, from 1 m, (39.37 inches)

The manufacturer reported that prototype tests were conducted on the sealed source drift tube assembly, with the sealed source installed, in accordance with the requirements of classification of 77C32211 for Ion Generator of Chromatography Type (ECD), per ANSI N542-1977. The source material was not affected by the tests and there was no loss of shielding or containment integrity. No removable contamination above 0.005 microcuries (185 Bg)was noted.

 REVIEWER NOTE: The source-holder sub-assembly for the Model Sabre 2000, Sabre 4000, and Sabre EXV were originally tested to ANSI N542-1977 and received a classification of 77C32211. According to letters from Smith's Detection regarding the application adding the model MMTD to this certificate, the Sabre IMS source-holder sub-assembly was tested for compliance with the ISO 2919:1999 (ISO/99/C32222) standard as of March 2006.

EXTERNAL RADIATION LEVELS:

Due to the shielding of the beta-radiation by the brass, ceramic and stainless steel components of the IMS detector cell, Smiths Detection (formerly Barringer) reports no detectable radiation on any accessible surface of the detector cell or the external surface of the IONSCAN device.

Since the walls of the detectors are far in excess of the range of the maximum energy beta particles emitted from the contained source, surface readings on the Model Sabre 2000, Sabre 4000, Sabre EXV, MMTD, and IONSCAN 500DT did not exceed ambient background levels. Furthermore, any beta radiation emitted is thermalized within a distance of 1 cm. The materials used in the construction of the IONSCAN 500HDT detectors are such that

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 11 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

EXTERNAL RADIATION LEVELS (Cont.):

no detectable radiation is apparent on any accessible surface of either the IMS detector or the IONSCAN unit.

Leak tests are to be performed on each sealed source as a part of factory acceptance testing, and a copy of the leak test results is to be delivered to each customer along with a copy of the General License.

QUALITY ASSURANCE AND CONTROL:

Smiths Detection (formerly Barringer) performs an incoming inspection to ensure that each source assembly received is undamaged, properly labeled, that all radiation protection features are in accordance with drawings and specifications and that leak test results are provided by the manufacturer. Once the IMS is installed in the IONSCAN, an operational test will be performed on the entire unit. Each completed device, prior to installation, is tested for leakage. The quality control program involving the IMS is on file with NRC.

Smiths Detection is a certified ISO 9001 organization. Smiths Detection is committed to design, manufacture and distribute the devices in accordance with the current ISO-9001 approved program.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The devices may be distributed to persons generally licensed pursuant to 10 CFR Part 31.5 and 32.51, and must be initially transferred in accordance with the requirements of 10 CFR Part 32.51 and 32.51a.
- These devices shall be leak tested at intervals not to exceed 6 months by persons specifically or generally licensed by the NRC or an Agreement State, using techniques capable of detecting 0.005 microcuries (185 Bq) of

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 12 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (Cont.):

removable contamination. Allow the units to cool down prior to taking swab samples. For Sabre 2000, Sabre 4000, Sabre EXV, MMTD, IONSCAN 500DT, and IONSCAN 500HDT models two samples, one from IMS inlet and another from the exhaust port, must be taken for leak testing.

- This registration sheet and the information contained within the references shall not be changed without the written consent of the NRC.
- REVIEWER NOTE: Smiths Detection distributors (formerly Barringer Instruments Inc.) understand and confirmed that the final disposal of the devices sources will be performed by Smiths Detection, Inc. located in Ontario, Canada. In case of an emergency, USA Federal, State or Local authorities may isolate and dispose of chemically contaminated devices and sources in accordance with the applicable regulations.
- REVIEWER NOTE: The dimensions provided with the picture of the IONSCAN 500DT (Attachment 9) are intended to give an indication of size for marketing purposes. The engineering drawings on file with the NRC provide the actual dimensions.

SAFETY ANALYSIS SUMMARY:

Barringer Instruments, Inc. (presently Smiths Detection), provided adequate IONSCAN units safety characteristics to ensure that individuals will not receive radiation exposures in excess of applicable regulatory limits. Unauthorized access to the source is discouraged by instructions, labeling and the fact that the source in the drift tube is buried deep within the self contained IMS detector housing providing three levels of protection1 and is itself contained inside the IONSCAN device.

Barringer (presently Smiths Detection) has submitted sufficient information to provide reasonable assurance that:

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 13 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

SAFETY ANALYSIS SUMMARY (Cont.):

- The device can be safely operated by persons not having training in radiological protection.
- Under ordinary conditions of handling, storage, and use of devices, the byproduct material contained in the devices will not be released or inadvertently removed from the source housing, and it is unlikely that any person will receive in any period of one year a dose in excess of 10 percent of the limits specified in 10 CFR 20.1201(a).
- Under accident conditions associated with handling, storage and use, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in the following chart:

PART OF BODY

	rem	· Sv
Whole body; head and trunk;		
active blood-forming organs;		<u> </u>
gonads; or lens of eye	15	0.15
Hands and forearms; feet and ankles; localized areas of skin		
then 1 arrivers continue to a	0.0.0	0 00
than I square centimeter	200	2.00
Other organs	50	0.50

Based on review of the IONSCAN spectrometer design and the information and test data cited below, we continue to conclude that the devices are acceptable for licensing purposes.

Furthermore, we continue to conclude that the devices would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

NO.: NR-0163-D-101-G DATE: March 28, 2008 PAGE 14 OF 15

DEVICE TYPE: Ion Mobility Spectrometer

REFERENCES:

The following supporting documents for the IONSCAN spectrometer devices are hereby incorporated by reference and are made a part of this registry document.

- Barringer's letters dated August 31, 1995, March 30, 1995, February 17, 1994, February 15, 1994, February 2, 1994, September 8, 1993, January 17, 1992, December 3, 1991, and August 20, 1990, July 26, 1999, September 23, 1999,
 December 21, 1999, January 20, 2000, February 28, 2000, February 29, 2000, with enclosures thereto.
- Smiths Detection letters dated November 14, 2002, December 17, 2002, and facsimile dated January 24, 2003, letters dated March 19, June 27 and July 4, 2003, September 27, 2003, May 14, 2004, August 18, 2004, and package received on February 15, 2004 with enclosures thereto.
- Smiths Detection e-mails dated August 9, 2004,
 August 18, 2004, August 20, 2004, August 23, 2004,
 August 31, 2004, February 11, 2005, March 1, 2005, and
 letters dated May 20, 2005, September 22, 2005,
 February 9, 2006, and March 30, 2006, with enclosures thereto.
- Smiths Detection letters dated August 24, 2007, October 22, 2007, and e-mail dated November 6, 2007, with enclosures thereto.
- Smiths Detection Letter dated November 7, 2007, and e-mail dated January 25, 2008, with enclosures thereto.
- Smiths Detection Letters dated September 17, 2007, February 25, 2008, March 14, 2008, March 28, 2008, and an e-mail dated March 24, 2008, with enclosures thereto.

<u>NO.:</u> NR-0163-D-101-G <u>DATE:</u> March 28, 2008 <u>PAGE= 15 OF 15</u>

DEVICE TYPE: Ion Mobility Spectrometer

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date:	March 28, 2008	Reviewer: _	Ujagar Bhachu
Date:	March 28, 2008	Concurrence:	John P. (Jankovich

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 1 OF 19







NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 2 OF 19



STITUMAL INS BOOSING



INS BOUSING INSTALLED IN IONSCAN

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 3 OF 19



SABRE 2000 and Base Station Key Components

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 4 OF 19



This label is located on the outside of the device

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 5 OF 19



The above labels are located on the inside of the device, on the drift tube assemblies

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 6 OF 19





<u>NO.:</u> NR-0163-D-101-G <u>DATE:</u> March 28, 2008 <u>ATTACHMENT</u> 7 OF 19



NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 8 OF 19



Sabre 4000

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 9 OF 19



IONSCAN 500DT

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 10 OF 19



IMS-2 Detector Cell Assembly for the IONSCAN 500DT

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 11 OF 19



<u>NO.:</u> NR-0163-D-101-G <u>DATE:</u> March 28, 2008 <u>ATTACHMENT</u> 12 OF 19



IONSCAN 500HDT



NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 13 OF 19



Internal labels for the IONSCAN 500HDT

DATE:

The labels will be placed on each drift tube assembly.

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 14 OF 19



External labels for the IONSCAN 500HDT

- C

4 FI 063 TV F

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 15 OF 19





<u>NO.:</u> NR-0163-D-101-G <u>DATE</u>: March 28, 2008 ATTACHMENŤ 16 OF 19



IONSCAN MMTD

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 17 OF 19



MMTD Internal Labeling

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 18 OF 19





MMTD External Labeling

NO.: NR-0163-D-101-G DATE: March 28, 2008 ATTACHMENT 19 OF 19



MMTD Position of External Labels
NO: MD-0263-D-102-G DATE: April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

MODEL(S): CAM (2429200) ICAM (2429201) CAM2 (0482-0301R), ICAM -APD (2427601), Fixed site CW detector (2429131), APD 2000 (2428800-10, -20 and -30), M43-APD (2428980), CAM 1.5, OTTO-2 (0603-0001), GID-2A (0482-0301R), GID-3/M22/ACADA (P0614-2000A), GID-3 24/7 (10505), ECAM (1035-5725), Sabre 2000 (4811500), Ionscan 400B, Sentinel II (4814000), Centurion (4813700), MCAD (P05284)

MANUFACTURER/DISTRIBUTOR:

Smiths Detection (Formerly Environmental Technologies Group, Inc.)2202 Lakeside Blvd.Edgewood, Maryland 21040

SEALED SOURCE MODEL DESIGNATION: Sources: Model N

Model NER-004R (Ring) Isotope Products Laboratories (IPL)

Models NBCQ8681 (Ring), NBC (Foil) AEA Technology USA, Inc. (AEA) Model N1001 (Foil) Nuclear Radiation Development, Inc. (NRD)

ISOTOPE: Nickel-63

<u>MAXIMUM ACT</u>IVITY: 15 millicuries (0.56 GBq)

LEAK TEST FREQUENCY Six (6) Months

PRINCIPAL USE.: (N) Ion Generators

CUSTOM DEVICE: _YES _X_NO

,

NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION:

Smiths Detection is manufacturing and distributing device models CAM (2429200), ICAM (2429201), CAM2 (0482-0301R), ICAM -APD (2427601), Fixed site CW detector (2429131), APD 2000 (2428800-10, -20, and -30), M43-APD (2428980), CAM 1.5, OTTO-2 (0603-0001), GID-2A (0482-0301R), GID-3/M22/ACADA (P0614-2000A), GID-3 24/7 (10505), ECAM (1035-5725), Sabre 2000 (4811500), Ionscan 400B, Sentinel II (4814000), Centurion (4813700), MCAD (PO5284), which are portable and stationary monitors used to detect hazardous gas and vapors in laboratory and field environments.

The units use ion mobility spectroscopy (IMS) technology to selectively monitor chemical agent vapors. Air is drawn into the inlet nozzle by a pump and past a membrane. Air molecules permeate the membrane into the detector cell where they are ionized by the Ni-63 source. Detection of specific agents is based on the molecular ion drift within the detector cell assembly and at the collector electrode. External characteristics of each device vary with intended use: hand-held portable, fixed site, console and walk-through. Device photos and dimensions are found on pages 10-13.

The IPL model NER-004R source and the AEA model NBCQ8681 source are identical and are used interchangeably in the Edgewood and Watford cells. The AEA model NBC source and the NRD model N1001 source are foils which are rolled into a ring and can be used interchangeably, but only in the Toronto cell. Within the devices there are three different IMS cells used, designated by place of manufacture as either Edgewood, Toronto, or Watford. Devices and cell used are listed in the table below:

Cell identification by device				
Part Number	Model Name	Description	Cell Type	
2429200	CAM	Chemical Agent Monitor	Watford	
2429201	ICAM	Improved Chemical Agent Monitor	Watford	
0482-0301R	CAM 2	Chemical Agent Monitor	Watford	
2427601	ICAM-APD	Chemical Agent Detector	Watford	

NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION, continued

Part Number	Model Number	Description	Cell Type
2429131	None	Fixed site CW Detector	Edgewood
2428800	APD 2000	Hand Held CW Detector	Edgewood
<u> </u>			
2428980	M43-APD	Chemical Agent Detector	Watford
None	CAM 1.5	Chemical Agent Monitor	Watford
0603-0001	OTTO-2	Fuel Monitor(OFM)	Watford
, 			
0482-0301R	GID-2A	Fixed-Point Chemical Agent Detector	Watford
P0614-2000A	GID-3(M22)(ACADA)	Automatic Chemical Agent Detection	2 each Watford
	010 0(047)		
10505	GID-3(24/7)	Fixed Chemical Agent Detector	2 each Watford
4005 5705	FOALA		in the state of th
1030-0720	ECAM		vvatioro
4811500	Sabre 2000	Hand held explosive & CW detector	Toronto
4011000	<u>Sabie 2000</u>		
None	lonscan 400B	Explosive detector	Toronto
4814000	Sentinel II	Ionscan Sentinel II Contraband Detection Portal	Toronto
4813700	Centurion	Chemical Warfare fixed site building monitor	Toronto
· · · · · · · · · · · · · · · · · · ·			
P05284	MCAD	Man Portable Chemical Agent Detector	2 each Watford

In the Edgewood and Watford cells, air is drawn into the inlet nozzle by a pump and past a membrane. Air molecules permeate the membrane into the detector cell where they are ionized by the Ni-63 source. In the Toronto cells, vapors from the combustion of a sample are taken directly into the detector cell and the vapor molecules ionized by the Ni-63 source.

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DEVICE TYPE: Ion Mobility Spectrometer

DESCRIPTION: Continued

Characteristics of the three types of cells are listed below:

IMS Cell Name	Radioactive Source Ni-63	Cell Operating Temperature	Mem- brane used	Cell Materials	Application	Dimensions
Watford	IPL NER- 004R or AEA NBCQ8681, 10 mCi on brass ring	Varies from ambient to 0° C	Yes	Machined aluminum with conductive metal surfaces	Chemical warfare agent detection	Diameter: 3.18 cm, (1.25 in) Length: 6.98cm, (2.75 in.)
Edgewood	IPL NER- 004R or AEA NBCQ8681, 10 mCi on brass ring	Varies from ambient to 0° C	Yes	Ceramic with conductive ink	Chemical warfare agent detection	Diameter: 3.18cm, (1.25 in.) Length: 8.89cm, (3.25 in)
Toronto	15 mCi plated onto gold foil rolled into a ring	Maintained at 100°C	No	Machined aluminum with conductive metal surfaces	Explosives, narcotics and chemical warfare agents	Diameter: 3.27cm (1.29 in) Length 11.94 com (4.7 in)

The IMS cell length varies among the above models in accordance with the specific designs of the drift tube and sieve assembly. The IMS cells are mounted inside metal and plastic instrument cases which contain the collector electrode, a pump, sieve pack, and electronics for the interpretation of data. In the 2429200 CAM model, the IMS cell, sieve pack and pump assemblies are combined. There are no moving parts within the IMS cell.

The sources used in the IMS cells are: IPL Model NER-004R beta ionization ring source, AEA Technologies NBCQ and NBC, and Nuclear Radiation Development, Inc. model N1001 The sources are Ni-63 electroplated onto a substrate over the entire surface of a brass cylindrical ring, except for the Toronto cell, which uses gold foil rolled into a ring. The source length is 7.70 millimeters (0.3 inches) and the diameter is 7.0 millimeters (0.27 inches). The ring wall thickness is 0.15 millimeters (0.005 inches.)

NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

LABELING:

All devices will be affixed with a label containing: "Caution Radioactive Material," the source radionuclide, activity, model and serial number, radiation symbol, leak test frequency and licensing conditions.

When distributed to persons generally licensed, the device is additionally labeled in accordance with COMAR 26.12.01.01, Section C.22.

The rectangular label (example below) will be made of flexible **metallized matte silver polyester film with permanent acrylic PSA Backing**, with minimum dimensions of **2.25 inches (5.7 centimeters)** in width and 1.25 inches (3.18 centimeters) in height. The colors will be black type on yellow background. The Edgewood and Watford cell will have 10 millicuries nominal activity, and the Toronto cell will be designated as 15 millicuries nominal activity.

	CAUTION RADIOACTIVE MATERIAL DO NOT OPEN CELL HOUSING Nickel-63 10 millicuries LEAK TEST EVERY 6 MONTHS
ļ	The receipt, possession, use and transfer of this device,
	Model No
	are subject to a general license or equivalent and the regulations of the U.S. Nuclear Regulatory Commission or a state with which the U.S. Nuclear Regulatory Commission has entered into an agreement for the exercise of regulatory authority. This label shall be maintained on the device in legible condition. Removal of this label is prohibited.

The above label will not only be affixed, with glue, to the IMS cell housing inside the detector, but will also be placed on the outside of each instrument so that the label will be readily visible to anyone operating the equipment.

Diagrams/photos: See pages 10-13

NO: MD-0263-D-102-G **DATE:** April 16, 2003

Page 6 of 13

DEVICE TYPE: Ion Mobility Spectrometer

CONDITIONS OF NORMAL USE:

These devices are gas and vapor monitoring instruments, used to detect and quantify concentrations of hazardous elements and are expected to be subjected to all types of environments. Some devices are portable and some are stationary, and are designed for use indoors or out, depending on the casing in which the detectors are housed. Hand-held portable devices are encased to be water resistant. The devices using the Edgewood and Watford cells are designed to operate in and be stored in temperatures between -55 and 70 degrees centigrade. (-27.5 and 131 degrees F.) In the Toronto cell, a heater in the cell activates at ambient temperatures below -5 degrees centigrade to raise the cell temperature to 100 degrees C (212 degrees F) to allow for detection capabilities.

PROTOTYPE TESTING:

The manufacturer reports that the devices were extensively field tested by the Department of Defense. In July 1992, First Article Testing was conducted which satisfactorily tested the 2429200 (CAM) in the areas of environmental extremes, transportation vibration, and reliability. The tests were conducted in accordance with Chemical Agent Monitor First Test Procedure EIR 2040C, Chemical Agent Monitor Reliability Test Plan EIR 1870E and Chemical Agent Reliability Test Procedures EIR 1879C.

EXTERNAL RADIATION LEVELS:

The manufacturer reports that there is no detectable radiation at any accessible surface of the devices.

QUALITY ASSURANCE AND CONTROL:

Complete information on the manufacturer's quality assurance program, dated August 7, 1997, has been submitted and deemed acceptable by the State of Maryland. The Manufacturer's quality assurance and control program, applicable to the above devices, was approved in September 1997 by Intertek Services Corporation against the quality assurance standards of ISO 9001, BS EN 9001 and ANSI/ASQC Q9001-2000.

NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The device models listed on this sheet shall be distributed to persons generally licensed by the NRC or an Agreement State.
- The general licensee may only transfer these devices to Smiths Detection, a specific licensee authorized to possess the device, or to a commercial radioactive waste disposal unit.
- Cells shall be leak tested at intervals not to exceed six months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- Servicing of device components in these devices must be conducted by the manufacturer or by persons specifically licensed to do so by the NRC or Agreement States.
- This registration sheet and the information contained with the references shall not be changed or transferred without written consent of the Maryland Department of the Environment Radiological Health Program.

SAFETY ANALYSIS SUMMARY:

The manufacturer had submitted sufficient information to provide reasonable assurance that:

- The device can be safely operated by persons not having training in radiological protection.
- Under ordinary conditions of handling, storage and use of the device, the byproduct material contained in the device will not be released or inadvertently removed from the source housing, and it is unlikely that any person will receive in any period of one year a dose in excess of 10 percent of the limits specified in Section 20.1201 (a), 10 CFR Part 20.
- Based on our review of the information and test data cited in the references, we conclude that the hazardous gas and vapor monitors are acceptable for general licensing.



NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

SAFETY ANALYSIS SUMMARY: Continued

• Furthermore we continue to conclude that the device would be expected to maintain its containment integrity for normal conditions of use and accidental conditions that might occur during uses specified in the certificate. Police, fire and other state, federal and local governments that require portable chemical agent monitors to combat terrorism will use these instruments.

REFERENCES:

The following supporting documents for the CAM (2429200), ICAM (2429201), CAM2 (0482-0301R), ICAM -APD (2427601), Fixed site CW detector (2429131), APD 2000 (2428800-10, - 20 or -30), M43-APD (2428980), CAM 1.5, OTTO-2 (0603-0001), GID-2A (0482-0301R), GID-3/M22/ACADA (P0614-2000A), GID-3 24/7 (10505), ECAM (1035-5725), Sabre 2000 (4811500), Ionscan 400B, Sentinel II (4814000), Centurion (4813700), MCAD (PO5284)s are hereby made part of this registry document:

- 1. Environmental Technologies Group, Inc.'s application dated October 9, 1997.
- 2. Environmental Technologies Group, Inc.'s letters, attachments, drawings and Quality Assurance Program submitted December 9, 1997, January 14, and 20, 1998.
- 3. Sealed Source and Device Sheet NR-476-S-151-S
- 4. Smiths Detection-Edgewood's letters, attachments, drawings, and electronic mail, dated July 11, 2000, September 26, 2001, July 31, 2002, July 11, 2002, September 20, 2002, November 11, 2002, February 12, 2003, February 17, 2003, February 27, 2003, March 3, 2003, April 7, April 8, April 9, April 10, and April 11, 2003.

DATE: April 16, 2013 REVIEWED BY: And and for The And DATE: April 16, 2013 CONCURRENCE: Les port History

ISSUING AGENCY: Maryland Department of the Environment Radiological Health Program 1800 Washington Boulevard, Suite 750 Baltimore, Maryland 21230

NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer



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NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer



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DEVICE TYPE: Ion Mobility Spectrometer

The Watford Cell and device models containing it:



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DEVICE TYPE: Ion Mobility Spectrometer

Device models that contain the Watford cell, continued:



NO: MD-0263-D-102-G **DATE:** April 16, 2003

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DEVICE TYPE: Ion Mobility Spectrometer

The Toronto cell and device models containing it:



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	01/00 A 5CN 12741 (M 51
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	12/06 C ECN 13032 14 -C
 1. BASE MATERIAL: 0.007±0.001 THICK: ALLOY TO BE APPROVED BY SMITHS DETECTION 2. DIMENSIONAL / SOURCHENESS AS PER DRAWING. 3. PARTS TO BE SUPPLIED FLAT WITH NO WRINKLES, CREASES OR SIMILAR PHYSICAL DAMAGE. 5. COATING TO BE ON ONE SIDE WITH NICKER 63, NOMINAL STRENGTH 15 MILLICURRIES (555MBq) VARIANCE 16.5±10% MILLIN NO CORROSION, BLEMISHES OR FLAKING ON ANY SURFACE. 6. SERIAL NUMBER TO BE SCRIEDE ON INACIVE SURFACE IN SUCH A MANNER AS TO BE VISIBLE TO THE UNAIDED EYE BUT MINIMAL DISTORTION OF ACTIVE SURFACE. SERIAL NUMBERS ARE TO BE MAINTAINED BY THE VENDOR. 7. PACKAGING OF INDIVIDUAL SOURCES MUST INCLUDE A LABEE CONTAINING THE SERIAL NUMBERS), MATERIAL TYPE, VENDOR PART NUMBER AND SOURCE ACTIVITY, AS WELL AS VENDOR MEDITIFICATION AND THE INTERNATIONAL "RADIOACTIVE SURFACE. 8. THE FINAL SHIPPING. CONTAINER MUST INCLUDE THE CORRESPONDING RADIDACTIVE SOURCE CERTIFICATES. 	CURRIES, T WITH /E MATERIAL SYMBOL,
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NO.:NY502S103UDATE:January 09, 1970PAGE 1 OF 2SEALED SOURCE TYPE:Foil Beta Source

MODEL: N-1001

MANUFACTURER/DISTRIBUTOR: Nuclear

Nuclear Radiation Developments, Inc 2937 Alt Blvd. Grand Island, NY 14072

MANUFACTURER/DISTRIBUTOR:

ISOTOPE: Nickel-63

MAXIMUM ACTIVITY: 15 millicuries

LEAK TEST FREQUENCY:

PRINCIPAL USE: Foil Sources

CUSTOM SOURCE: YES X NO

NO.: NY502S103U

DATE: January 09, 1970

PAGE 2 OF 2

SEALED SOURCE TYPE: Foil Beta Source

DESCRIPTION:

The foil consists of nickel metal, electroless plating on a backing foil of 0.006-0.008 inch in thickness of gold and other metals (platinum, stainless steel, etc.).

The foils according to the manufacturer are suited for such applications as ionization sources for high temperature gas chromatography cells; high output, low-energy beta or ionization sources; and low-energy bremsstrahlung sources.

NRC has classified the foil as Encapsulation Code Series I-100, the nickel-63 content of which ranges from 10 millicuries for the model Part No. N1001-1 to 15 millicuries (maximum) for the model Part No. N1001-6.

LABELING:

None

PROTOTYPE TESTING:

Typical foils have been prototype tested to demonstrate integrity. They have been subjected to high temperature tests and can withstand temperatures of 400-450 degrees C for prolonged periods with no detectable loss of nickel-63 and with no loss in ionization efficiency.

REFERENCE:

Formerly U.S. Radium Corporation Model Lab-784 foil. NRD purchased a major part of U.S. Radium Corporation radioisotope operations.

ISSUING AGENCY:

State of New York Department of Labor

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 1 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

MODEL: NBC; NBCD

DISTRIBUTOR: QSA Global, Inc. 40 North Avenue Burlington, MA 01803

MANUFACTURER: QSA Global GmbH Gieselweg I 38110 Braunschweig Germany

ISOTOPE: Nickel-63

MAXIMUM ACTIVITY:

1,110 megabequerels (30 mCi)

LEAK TEST FREQUENCY:

6 months

<u>PRINCIPAL USE</u>: (N) Ion Generators, Chromatography (S) Foil Sources

CUSTOM SOURCE:

YES ____ NO __X__

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 2 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

DESCRIPTION:

The Model NBC source consists of nickel-63 electroplated on the base of a thin nickel or nickel alloy foil. The active, electroplated Ni-63 is covered by an inactive electroplated nickel coating at a nominal thickness of 0.1 microns. The source foil is 0.05 millimeters (0.002 in.) thick. The source foil size ranges from a minimum 3 millimeters (0.12 in.) x 10 millimeters (0.39 in.) to a maximum of 30 millimeters (1.18 in.) x 50 millimeters (1.97 in.). The active Ni-63 is loaded to a maximum concentration of 10 millicuries per square centimeter (370 MBq / cm²).

The Model NBCD consists of Ni-63 electroplated on a base of thin inactive nickel coating onto the inside surface of a detector housing. The detector housing is fabricated from stainless steel. The active, electroplated Ni-63 surface is covered by an inactive nickel coating. The maximum concentration of active Ni-63 is 10 millicuries per square centimeter (370 MBq / cm^2).

LABELING:

The non-active side of the NBC foil is engraved with a unique serial number. When space permits, the non-active area of the NBCD source is engraved with a unique serial number, Ni-63, a trefoil symbol or the word "Radioactive", and the manufacturer's logo.

The following information is provided on a label affixed to the primary container for the NBC and NBCD sources: 'Ni-63, a trefoil symbol or the word "Radioactive", and the manufacturer's logo'.

Each source shipment is accompanied with a Test Report listing the model number, nuclide, activity assay results, a reference date, serial number, leak test results, and other pertinent information. The sources are distributed with 'Handling Instructions for Radiation Sources'.

DIAGRAM: No diagrams are attached.

CONDITIONS OF NORMAL USE:

These sources are typically used as beta ionizing sources and are routinely used in gas chromatography (GC) or ion mobility spectrometry (IMS) devices where the nickel-63 source is further encapsulated within a detector cell / module that is installed into a GC or IMS instrument. The nickel-63 source should be rolled on its length and inserted into the detector cell / module having a minimum inside diameter of 4 millimeters (0.16 in).

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 3 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

CONDITIONS OF NORMAL USE (Cont'd.):

These sources should not be subjected to temperatures which exceed 400° C (752° F).

The recommended working life of the NBC and NBCD sources is 15 years, after which the user should arrange for the source to be inspected and assessed by a qualified authority (eg. The manufacturer or other persons specifically licensed to perform such service) to extend its working life, or dispose of the product through a suitable disposal route.

PROTOTYPE TESTING:

ANSI classifications are based on test data and the source achieved an ANSI rating of 77C4X212. (Pressure test for classification X was performed at 5 kPa absolute). In addition, prototype sources were subjected to 400° C (752° F) in air for one hour followed by a thermal shock down to 20° C (68° F). Wipes of the inactive side of the sources after the test revealed no removable contamination above 0.005 microcuries (185 Bq).

Performance of the nickel foil sources as related to loss of emission (ionization current) with time when used in a 500° C (932° F) environment was shown in Amersham Corporation Technical Bulletin 79/2. Based on information originally provided by Amersham, loss of emission was due to diffusion of Ni-63 into the substrate and not leakage of the Ni-63.

The distributor states that no specific bending tests have been performed on these sources, however, QSA Global GmbH has provided these sources rolled to a minimum diameter of 4 millimeters since 2001 with no problems or customer complaints related to foil damage due to the rolling / bending process.

EXTERNAL RADIATION LEVELS:

The following dose rates were measured from a Model NBC source using a MAB 500 instrument with a SZS 0500 detector. This instrument is manufactured by Munchener Apparatebau GmbH, has a dose rate measurement range of 50 nSv / hr (0.005 mrem / hr) to 100 mSv / hr (10 mrem / hr) and is sensitive over the energy range of 33 keV to 7.5 MeV. Survey results were based on measurements taken from a 600 MBq (16 mCi) source measuring 24 millimeters (0.94 in.) long x 7 millimeters (0.28 in.) wide. Dose rate results shown below are extrapolated to the maximum source activity of 1,110 MBq (30 mCi).

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 4 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

EXTERNAL RADIATION LEVELS (Cont'd.):

Distance from Source	Nearly on Contact (< 5 mm) with Active Side	Contact with Non-active Side
Dose Rate	< 11 µSv / hr (< 1.1 mrem / hr)	< 0.25 µSv / hr (< 0.025 mrem / hr)

QUALITY ASSURANCE AND CONTROL:

Sources are manufactured and distributed in accordance with the Quality Assurance program of QSA Global, Inc. which is in compliance with the requirements of ISO9001:2000. In addition, the Quality Assurance program of QSA Global, Inc. is compliant with Subpart H of 10 CFR Part 71 (Quality Assurance Program Approval for Radioactive Material Packages, certificate number 0040). For operations performed by vendors, these actions are controlled to QSA Global, Inc. specifications through the Quality Assurance program. The program has been deemed acceptable for licensing purposes by the Agency and a copy of the program is on file with the Agency.

The following tests are performed on all sources:

- Leak Test in accordance with ISO9978:1992(E) (or more recent editions). The removable contamination from the inactive side of the source shall not exceed 0.005 microcuries (185 Bq) and removable contamination from the active side shall not exceed 0.5 microcuries (18.5 kBq).
- Source activity is determined by Liquid Scintillation Counting assay technique. The nominal activity tolerances are \pm 30 % at time of manufacture.
- Sources are visually inspected, under a minimum of 4X magnification, for defects such as cracking peeling, or flaking of the Ni-63 plate and any physical damage after manufacture.

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 5 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The sources shall only be distributed to persons specifically licensed by the Agency, the U.S. Nuclear Regulatory Commission, or an Agreement State and is limited to manufacturers of gas chromatography (GC) or ion mobility spectrometry (IMS) devices where the nickel-63 source is further encapsulated within a detector cell / module that is installed into a GC or IMS instrument.
- These sources, once installed into a detector cell / module, shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 185 Bequerels (0.005 μ Ci) of removable contamination. Removable contamination from the detector cell / module shall not exceed 0.005 microcuries (185 Bq).
- *REVIEWER NOTE:* Sources contained in a detector cell / module device may have longer leak test intervals. Consult the appropriate registration sheet for leak test intervals of a specific detector cell / module device.
- Handling, storage, use, transfer, and disposal: to be determined by the licensing authority. In view of active surface contamination levels of up to 0.5 μ Ci, source foils should not be handled with the bare hand.
- The sources shall not be exposed to environments which exceed their ANSI classification nor to temperatures which exceed 400° C (752° F).
- This registration certificate and the information contained within the references shall not be changed without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY:

Based on our review of the Models NBC and NBCD sources, their ANSI classification, and the information and test data cited below, we conclude that the electron capture detector sources are acceptable for licensing purposes.

Furthermore, we conclude that these sealed sources would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

<u>NO:</u> MA-1059-S-185-S <u>DATE:</u> December 26, 2007 <u>PAGE 6 OF 6</u> (Supersedes NR-136-S-185-S)

<u>SOURCE TYPE</u>: Electron Capture Detector Source

<u>REFERENCES:</u>

The following supporting documents for the models NBC and NBCD sealed sources are hereby incorporated by reference and are made part of this registry document.

QSA Global, Inc. letters dated February 21, 2006, January 17, 2007, October 29, 2007, November 2, 2007, and December 11, 2007 with enclosures thereto.

ISSUING AGENCY: Massachusetts Department of Public Health Radiation Control Program

Date

12/26/07

Reviewer John Sumares

Date

12/26/07

Concurrence Joshua E. Daehler











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Bill of Materials - Assembly #:4810768-A Sorted by Item Number

4810768-AZ	DETECTOR MC	DDULE, 400B, BASIC Dra	wing: 4810768		Rev: 1	
Material	Item#	Description		Qty Per	UOM	Manufacturer
9811054-G	0000	FIRMWARE, V5.011.1, 400B	<u></u>	1.000	EA	BRL
4810728-L	0001	CHASSIS WELDMENT 400B		1.000	EA	BRL
3810742-M	0002	CARD CAGE ASSEMBLY * 400B		1.000	EA	BRL
2810878-J	0003	DRIERITE TUBE DETACHMENT ASSEMBLY		2.000	EA	BRL
3810684-т	0004	PUMP MODULE ASSEMBLY		1.000	EA	BRL
3816130-A	0005	NAFION TUBE ASSEMBLY, IONSCAN 400B	· · · ·	1.000	EA	SD
1810918-A	0007	SURGE TANK TECFA		1.000	EA	BRL
1810865-A	0008	WATER RESERVOIR 400B		1.000	EA	BRL
1810866-B	0009	FITTING PLATE 400B JM		1.000	EA	BRL
3815350-A	0010	SLIDE ASSY, CLIP HINGE TRAY, 400B		1.000	EA	SD
IMS 4810769-lat	0011 cest Rev at top	level		1.000	EA	······································
4813679-в	0012	HVPS MODULE ASSEMBLY* DETECTOR MOD	ULE 40	1.000	EA	BRL
4810694~V	0013	FLOW MODULE ASSEMBLY * 400B	<u> </u>	1.000	EA	BRL
3810770-K	0014	CONTROL PANEL ASSEMBLY* 400B		1.000	EA	BRL
3815209-A	0015	VERTICAL ACTUATOR ASSY 2 DETECTOR,	400	1.000	EA	SD

2814999-D	0016	DESORBER ASSY 400B	1.000	EA	SD
15339-в	0020	INSULATOR, IMS JM	1.000	EA	BRL
1810784-B	0024	COVER, SLIDE ASSEMBLY DETECTOR MODULE	1.000	EA	BRL
1810706-в	0025	BRACKET, SUPPORT, AIR PUR ASSY, 400B	2.000	EA	BRL
1813213-A	0026	FILTER BLOCK, 400B	2.000	EA	BRL
7043705	0027	CLIP, COMPONENT, 1.0" DIA , PVC BLK	1.000	EA	RICHCO
1810705-B	0028	HOLDER, TUBING, NAFION ASSEMBLY, M400B	3.000	EA	BRL
15238-в	0030	BRACKET, MOUNTING, BOTTOM	1.000	EA	BRL
15239-C	0031	BRACKET, MOUNTING, SIDE	1.000	EA	BRL
2810756-E	0032	FRONT PANEL STIFFENER DETECTOR MODULE M4	1.000	EA	BRL

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4810768-AZ	DETECTOR MODULE, 400B, BASIC		Drawing: 4810768		Rev: 1	
Material	Item#	Description		Qty Per	UOM	Manufacturer
3810750-C	0033	COIL, WATER CONDENSATION		1.000	EA	BRL
1810759-A	0034	COIL CLAMP, AIR COOLING M40	0B	1.000	EA	BRL
1810685-C	0035	SUPPORT, SHAFT HOLDER 400B		2.000	EA	BRL



	1810864-B	0036	ORIENTATION BLOCK, D/C 400B	1.000	EA	BRL
	2810846-C	0037	VELSTRAP MODIFIED IONSCAN 400B	2.000	EA	BRL
	15396-A	0038	STRIKE, CATCH, MAGNETIC, MODIFIED	2.000	EA	BRL
		0040	GASKET	1.000	EA	BRL
	2810747-C	0042	CABLE ASSY, FLOW CONTROL 400B	1.000	EA	
	2810749-F	0043	IMS PREAMP, CABLE ASSY 400B	1.000	EA	
	3810762-E	0044	IMS HEATER CABLE ASSY, M400B	1.000	EA	BRL
	2810785-E	0045	IMS TEMPERATURE CONTROL 400B	1.000	EA	BRL
	2810774-D	0046	CABLE ASSEMBLY, VERTICAL ACTUATOR, 400	1.000	EA	
	2810776-E	0047	HVPS CABLE ASSEMBLY 400B	1.000	EA	
	1810793-C	0048	CABLE ASSEMBLY, DESORBER 400B	1.000	EA	BRL
	3810794-J	0049	CABLE ASSEMBLY, DISPLAY 400B	1.000	EA	BRL
	1810792-в	0050	SLIDE SENSOR, CABLE ASSEMBLY, 400B	1.000	EA	BRL
	1810773-B	0051	PUMP CABLE ASSEMBLY, 400B	1.000	EA	BRL
	1810744-E	0052	CONNECTOR, POWER OUT 24V, 400B	1.000	EA	BRL
	3815012-A	0055	ANALOG APT PCB ASSY, 2	1.000	EA	SD
	3814677-в	0056	PROCESSOR /GRAPHICS * PCB ASSY 400B	1.000	EA	BRL
,	2811085-C	0057	IDENTIFICATION PLATE	1.000	EA	BRL
	1810880-A	0058	SPONGE, HOLDING ROD	1.000	EA	BRL
	1810863-D	0059	MUFFLER	1.000	EA	BRL
	7040275	0061	SOLENOID VALVE	1.000	EA	SEMPRESS

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7040274	0062	QUICK DISCONNECT INTERNAL	2.000	EA	BESWICK
7040088	0063	FITTING, ELBOW, ADJUST- ABLE, POSITION	2.000	EA	BESWICK ENGN

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4810768-AZ	DETECTOR MC	DDULE, 400B, BASIC Drawing: 4810	768	Rev: 1	-
Material	Item#	Description	Qty Per	UOM	Manufacturer
13911	0064	CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3	10.000	EA	CLIPPARD
7040276	0065	FILTER, INLINE, 7 MICRONS	1.000	EA	LET-LOK NUPRO
15539	0066	UNION, BULKHEAD. 1/8"	1.000	EA	HAM-LET SWAGELOK
7040090 CAN BE #	SUBSTITUTE FO	DR ITEM 66			DIRGHIOR
15834	0068	UNION, REDUCING, 1/4 TO 1/8 TUBE OD	1.000	EA	HAM-LET SWAGELOK
13725	0069	FILTER, 1/4 NPT	2.000	EA	SCHRADER
7040487	0070	RELIEF VALVE, MINATURE	1.000	EA	AIRTROL
15014	0071	BUMPER, RUBBER	4.000	EA	SPAENAUR
4810907-P	0072	POWER SUPPLY ASSY* MODULE	1.000	EA	BRL
7040279	0073	FILTER EXHAUST FAN	1.000	EA	MCMASTER-CAR



10822	0074	SPRING, S TYPE	3.000	EA	DZUS
20373	0075	SCREW, 2-56 X 1/4 LG, FLAT HD, SST	6.000	EA	PACIFIC
20191	0076	NUT, HEX, 2-56 X STD THK, SST	6.000	EA	SPAENAUR SPAENAUR
20615	0077	WASHER, FLAT, #2, SST	6.000	EA	NA
12435	0078	WASHER, LOCK, SPLIT, #2, SST	9.000	EA	SPAENAUR P.F.
15943	0079	CLIP	3.000	EA	SPAENAUR
11423	0080	CLAMP, CABLE, 5/8 ID NYLON	1.000	EA	SPAENAUR
13746	0081	CLAMP, CABLE, 1/2 ID, NYLON	2.000	EA	SPAENAUR
11006	0082	CLAMP, CABLE, 3/8 ID, NYLON	2.000	EA	SPAENAUR
10897	0084	CLAMP, CABLE, 1/4 ID, NYLON	1.000	EA	NA
20659	0085	SCREW, 10-32 X 5/8 LG, PAN HD, SST	4.000	EA	PACIFIC
20682	0086	SCREW, 8-32 X 5/8 LG, FLAT HD, SST	2.000	EA	PACIFIC
12552	0087	SCREW, 6-32 X 1.25 LG, FL FLAT HD	1.000	EA	PACIFIC
20384	0088	SCREW, 6-32 X 1 LG, FLAT HD, SST	4.000	EA	PACIFIC

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4810768-AZ	DETECTOR MODULE,	400B, BASIC	Drawing: 4810768	Rev: 1

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Material	Item#	Description	Qty Per	UOM	Manufacture
20391	0089	SCREW, 6-32 X 3/4 LG, FLAT HD, SST	1.000	EA	
20385	0090	SCREW, 6-32 X 1/2 LG, FLAT HD, SST (PH	15.000	EA	P.F. PACIFIC PACIFIC
20392	0091	SCREW, 6-32 X 3/8 LG, FLAT HD, SST	18.000	EA	SPAENAUR
20437	0092	SCREW, 6-32 X 5/8 LG, PAN HD, SST	3.000	EA	PACIFIC
20430	0093	SCREW, 6-32 X 1/2 LG, PAN HD, SST	2.000	EA	P.F.
20436	0094	SCREW, 6-32 X 3/8 LG, PAN HD, SST	11.000	EA	SPAENAUR
20380	0095	SCREW, 4-40 X 1.25 LG, FLAT HD, SST	2.000	EA	PACIFIC
20377	0096	SCREW, 4-40 X 1/2 LG, FLAT HD, SST	10.000	EA	P.F.
20382	0097	SCREW, 4-40 X 3/8 LG, FLAT HD, SST	2.000	EA	SPAENAUR
13859	0098	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	5.000	EA	SPAENAUR
15688	0099	SCREW, 4-40 X 1/4 LG, FLAT HD, NYLON	4.000	EA	SPAENAUR
15102	0100	SCREW, 4-40 X 3/16 LG, FLAT HD, SST	2.000	EA	SPAENAUR
7043706	0101	RIVET, SNAP, 1/8" DIA, NYLON, BLK	3.000	ÉÀ	RICHCO
20420	0102	SCREW, 4-40 X 1/2 LG,	8.000	EA	P.F.
20426	0103	SCREW, 4-40 X 3/8 LG, PAN HD, SST	4.000	EA	P.F.
20424	0104	SCREW, 4-40 X 3/16 LG, PAN HD, SST	2.000	EA	PACIFIC
20421	0105	SCREW, 4-40 X 1/4 LG, PAN HD, SST	1.000	EA	PACIFIC
7040488	0106	SCREW, 4-40 X 1/4 LG SK HD, CUP	2.000	EA	SPAENAUR

15832	0107	SETSCREW, 4-40 X 3/16 LG, HEX-SKT, SST	1.000	EA	SPAENAUR
7040489	0108	SPACER, .312 OD, .115 ID X 1/8 THK	2.000	EA	CORDS
20617	0109	WASHER, FLAT, #6, SST	11.000	EA	NA P.F.
20616	0110	WASHER, FLAT, #4, SST	2.000	EA	SPAENAUR
20625	0111	WASHER, LOCK, SPLIT, #6, SST	19.000	EA	SPAENAUR

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4810768-AZ	DETECTOR M	DULE, 400B, BASIC	Drawing: 4810768		Rev: 1	
Material	Item#	Description		Qty Per	UOM	Manufacturer
20624	0112	WASHER, LOCK, SPLIT, #4	, SST	12.000	EA	SPAENAUR
10812	0113	WASHER, LOCK, #4, FLAT,	EXTERNAL TOOTH	1.000	EA	SPAENAUR
7040032	0114	SCREW, PLUG, VITON-O-RI	NG	1.000	EA	BESWICK ENGI
20435	0115	SCREW, 6-32 X 3/4 LG, P.	AN HD, SST	1.000	EA	PACIFIC
20193	0116	NUT, HEX, 6-32 X STD TH	K, SST	10.000	EA	NA P.F.
20192	0117	NUT, HEX, 4-40 X STD TH	K, SST	2.000	EA	SPAENAUR

15242	0119	BUSHING	4.000	EA	CDN BEARING
15038	0120	DISK, VELCRO, HOOK 80	4.000	EA	VELCRO
10947	0121	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	165.000	IN	WAREHOUSE PL
7040490	0122	GROMME T	4.380	IN	RICHCO
1810842-B	0123	HOLDER, TOP COVER	1.000	EA	BRL
1816910-A	0126	COLD TRAP ASSY Tecfa	1.000	EA	SD
10849	0127	MUFFLER, 10-32 THREAD	1.000	EA	CLIPPARD
4810997-B	0129	WIRING DIAGRAM, DETECTOR	1.000	EA	BRL
20425	0130	SCREW, 4-40 X 3/4 LG, PAN HD, SST	2.000	EA	
11069	0131	WASHER, LOCK, #6, FLAT, EXTERNAL TOOTH	3.000	EA	SPAENAUR
3811001-B	0134	REACTANT CHAMBER ASSY SYSTEM, DM	1.000	ĒA	BRL
7040660	0136	SCREW, 6-32 X 3/8 LG PAN HD, WITH LOC	1.000	EA	SPAENAUR
15669	0137	STRAP, MOUNTING, UNIVERSAL	1.000	EA	RICHCO
20445	0138	SCREW, 8-32 X 3/8 LG, PAN HD, SST	3.000	EA	PACIFIC
20618	0139	WASHER, FLAT, #8, SST	3.000	EA	SPAENAUR
20626	0140	WASHER, LOCK, SPLIT, #8, SST	3.000	EA	SPAENAUR
1811158-B	0142	GASKET, VITON, FITTING CLIPPARD	10.000	EA	BRL
11613-C	0145	RING, SAMPLE CARD	1.000	EA	BRL
 1814906-A	0166	STANDOFF, SHOULDER	3.000	EA	BRL

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4810768-AZ	DETECTOR MODULE, 400B, BASIC Drawing: 4810768			Rev: 1			
Material	Item#	Description	Qty Per	UOM	Manufacturer		
7043256	0167	SPRING, COMPRESSION, .18X .014X.44 ST	3.000	EA	SPEC ASSOCIA		
7040825	0168	SCREW, 2-56 X 3/16, PAN H PHILIPS DR,	3.000	EA	PACIFIC		
7043359	0169	WASHER, FLAT, #2, 0.156 OD X 0.025 TH	3.000	EA	ALL AMERICAN		
7043704	0171	FILTER, SAMPLE, DISPOSABLE CLR NYLON	1.000	EA	U.F. SYSTEMS PARKER DREXAN		
7043940	0172	CLIP, COMPONENT, 0.5" DIA , PVC BLK	1.000	EA	RICHCO		
7043942	0173	FITTING, STRAIGHT 1/8" TO 1/4" OD TU	2.000	EA	SMC		

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4810769-AG	IMS ASSEMBI	LY, 400B * Drawing: 4810769		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
15373-к	0001	TUBE ASSEMBLY, IMS *	1.000	EA	BRL
4810771-R	0002	DRIFT TUBE ASSEMBLY, 400B	1.000	EA	BRL
2810709-N	0003	PREAMP MODULE ASSEMBLY * IMS ASSY, 400	1.000	EA	BRL
15912-G	0004	CONDENSER TUBE ASSEMBLY*	1.000	EA	BRL
1810806-J	0005	CALIBRANT GAS ASSY, NEGAT EXPL, IMS 40	1.000	EA	BRL
1810861-F	0006	CALIBRANT GAS ASSY POS, NARC, IMS, 400	1.000	EA	BRL
15580-F	0007	PCB ASSEMBLY, HEATER* POWER DISTR, RE	1.000	EA	BRL
4810757-D	0008	HOUSING, IMS	1.000	EA	BRL
2810772-C	0011	SUPPORT RING, IMS 400B	1.000	EA	BRL
3810736-В	0012	BACK COVER, IMS, M400B	1.000	EA	BRL
2810854-A	0013	INSULATION 1/2 BACK COVER IMS, 400B	1.000	EA	BRL
2810855-A	0014	INSULATION 3/8 BACK COVER IMS 400B	1.000	EA	BRL
11269-D	0015	CLAMP, SPLIT	1.000	EA	BRL
3810764-D	0016	INSULATOR, 400B	1.000	EA	BRL
15351-н	0017	IMS INLET, PLATED	1.000	EA	BRL
2810476-в	0018	INLET COVER IMS ASSY	1.000	EA	BRL

15931-B	0019	SHIELD, THERMAL	1.000	EA	BRL
2810834-A	0020	TOP COVER, IMS 400B	1.000	EA	BRL 400B
2810730-C	0021	BACKPLATE, TOP, IMS 400B	1.000	EA	BRL
3810731-C	0022	BACKPLATE, BOTTOM IMS, 400B	1.000	EA	BRL
2810856-A	0023	SEAL SCREW, MODIFIED C/WSILICONE RING	1.000	EA	BRL
1818489-A	0024	HOLDER, CONDENSER TUBE, 400B	1.000	EA	SD
15606	0025	SPRING, MODIFIED MADE FROM 10803	1.000	EA	BRL
15562-B	0026	SHIELD, THERMAL RING	1.000	EA	BRL
15924-D	0027	LINER, INLET, SILINIZED	1.000	EA	BRL
1810853-A	0028	WIRE CLAMP, IMS 400B	1.000	EA	BRL

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4810769-AG	IMS ASSEMB	LY, 400B *	Drawing: 4810769	·	Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
6814552-A	0030	KIT, GASKETS		1.000	EA	BRL
15370-D	0031	GASKET, INLET COVER		1.000	EA	BRL
30170	0034	JIG, INLET GASKET		1.000	EA	BRL
3810883-в	0035	WIRING DIAGRAM, IMS 400B		1.000	EA	BRL

HEATER BAND, ASSY IMS DETECTOR MODULE	1.000	EA	BRL
CONNECTOR, PLUG DB 15, CRIMP SNAP-IN	1.000	EA	AMP
			AMP
CONNECTOR, RECEPTACLE, 7 PIN, HV, CPC	1.000	EA	AMP
PIN CONTACT, 20-24AWG, 0.060MAX INSUL	4.000	EA	TYCO
			TICO
CONTACT, PIN, 20-24 AWG, GOLD/NICKEL	4.000	EA	AMP
SCREWLOCK KIT, FEMALE, 4-40 THREAD	2.000	PAA	AMP
INLET THERMOCOUPLE ASSY	1.000	EA	BRL
IMS TUBE RTD	2.000	EA	BRL
HEATER ASSY, INLET	2.000	EA	BRL
o-Ring #012 Viton 5/pk	1.000	EA	ABLE
			ADLE
O-RING, 5mm ID 1mm W, VITON	2.000	EA	ABLE
			ABLE
STUD, MINIATURE, SEALING	2.000	EA	BESWICK
CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3	1.000	EA	CLIPPARD
CLAMP, CABLE, 3/32 DIA, NYLON	4.000	EA	MICRO PLASTI
CLAMP, CABLE 3/8 DIA, NYLON	1.000	EA	MICRO PLASTI
PIN, DOWEL, 1/16 DIA X 7/8 LG, SST	1.000	EA	NORDEX
SPRING, COMPRESSION, 0.240 OD X 1/2 LG	1.000	EA	BERG
	CONNECTOR, PLUG DB 15, CRIMP SNAP-IN CONNECTOR, RECEPTACLE, 7 PIN, HV, CPC PIN CONTACT, 20-24AWG, 0.060MAX INSUL CONTACT, PIN, 20-24 AWG, GOLD/NICKEL SCREWLOCK KIT, FEMALE, 4-40 THREAD INLET THERMOCOUPLE ASSY IMS TUBE RTD HEATER ASSY, INLET o-Ring #012 Viton 5/pk O-RING,5mm ID 1mm W, VITON STUD, MINIATURE, SEALING CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3 CLAMP, CABLE 3/8 DIA, NYLON CLAMP, CABLE 3/8 DIA, NYLON PIN, DOWEL, 1/16 DIA X 7/8 LG, SST SPRING, COMPRESSION, 0.240 OD X 1/2 LG	CONNECTOR, PLUG DB 15, CRIMP SNAP-IN 1.000 CONNECTOR, RECEPTACLE, 7 PIN, HV, CPC 1.000 PIN CONTACT, 20-24AWG, 0.060MAX INSUL 4.000 CONTACT, PIN, 20-24 AWG, GOLD/NICKEL 4.000 CONTACT, PIN, 20-24 AWG, GOLD/NICKEL 4.000 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 INLET THERMOCOUPLE ASSY 1.000 IMS TUBE RTD 2.000 HEATER ASSY, INLET 2.000 o-Ring #012 Viton 5/pk 1.000 O-RING, 5mm ID 1mm W, VITON 2.000 STUD, MINIATURE, SEALING 2.000 CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3 1.000 CLAMP, CABLE, 3/32 DIA, NYLON 4.000 CLAMP, CABLE 3/8 DIA, NYLON 1.000 PIN, DOWEL, 1/16 DIA X 7/8 LG, SST 1.000 SPRING, COMPRESSION, 0.240 OD X 1/2 LG 1.000	CONNECTOR, PLUG DB 15, CRIMP SNAP-IN 1.000 EA CONNECTOR, RECEPTACLE, 7 PIN, HV, CPC 1.000 EA PIN CONTACT, 20-24AWG, 0.060MAX INSUL 4.000 EA CONTACT, PIN, 20-24 AWG, GOLD/NICKEL 4.000 EA CONTACT, PIN, 20-24 AWG, GOLD/NICKEL 4.000 EA SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA INLET THERMCCOUPLE ASSY 1.000 EA IMS TUBE RTD 2.000 EA HEATER ASSY, INLET 2.000 EA o-Ring #012 Viton 5/pk 1.000 EA O-RING, 5mm ID 1mm W, VITON 2.000 EA STUD, MINIATURE, SEALING 2.000 EA CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3 1.000 EA CLAMP, CABLE, 3/32 DIA, NYLON 4.000 EA PIN, DOWEL, 1/16 DIA X 7/8 LG, SST 1.000 EA SPRING, COMPRESSION, 0.240 OD X 1/2 LG 1.000 EA

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10857	0065	CLAMP, HOSE, 1.062 TO 2 ID, SST	1.000	EA	SPAENAUR
17555	0066	GROMMET, RUBBER, 11/16 ID	1.000	EA	NA
7040502	0067	GROMMET, 9/32 ID 9/16 OD	1.000	EA	SAENAUR

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4810769-AG	IMS ASSEMBI	Y, 400B * Drawi	ng: 4810769	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
15398	0068	SPACER, #4, 1/4 OD X 1/2 LG, NOT TAPP	E 2.000	EA	SPAENAUR
15786	0071	SLEEVE, CLEAR	4.000	EA	WEIDMULLER
15787	0072	TAG, MARKING, CUSTOM PRINTED "EXHAUST	1.000	EA	WEIDMULLER
15788	0073	TAG, MARKING, CUSTOM PRINTED "NARCOTI	1.000	EA	WEIDMULLER
15789	0074	TAG, MARKING, CUSTOM PRINTED "EXPLOSI	1.000	EA	WEIDMULLER
15796	0075	TAG, MARKING, CUSTOM PRINTED "DPT	1.000	EA	WEIDMULLER
10947	0080	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLO	N 70.080	IN	WAREHOUSE PL
20517	0081	SLEEVING, 0.053 ID, 0.012 WALL, CLEAR	50.400	IN	ALPHA
20504	0083	SLEEVING, 0.234 ID, 0.020 WALL, BLK P	v 10.200	IN	ALPHA
7040504	0085	SLEEVING, BRAIDED #1 WHITE	19.920	IN	CONNEXUS INC
10946	0086	SLEEVING, BRAIDED, #5, WHITE	6.000	IN	CONNEXUS INC

15552	0087	INSULATION, CERAMIC FIBRE 401bs per bg	8.000	oz	CARBORUNDUM
10987	0088	RELEASE AGENT, HEATER, 4 OZ	0.750	oz	WATLOW
7040499	0089	LACING CORD	10.200	IN	Alpha
20595	0091	WIRE, BUS, 24 AWG, TINNED COPPER (UNCO	6.000	IN	BELDEN
15880	0093	BIT, INSERT, TORX, #6, FOR TAMPER RESI	1.000	EA	SPAENAUR
1811158-B	0095	GASKET, VITON, FITTING CLIPPARD	1.000	EA	BRL
7040566-В	0096	LABEL, CAUTION-RADIOACTIVE MATERIAL	1.000	EA	BETTERWAY PR
7040544	0097	LABEL, RADIOACTIVE MATER- IAL, CAUTION	1.000	EA	BETTERWAY PR
7040723	0098	LABEL, IMS SERIAL NUMBER	1.000	EA	BETTERWAY PR
15406	0102	SETSCREW, 2-56 X 1/8 LG, CUP PT SLOT H	1.000	EA	BERG
11085	0103	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	1.000	EA	SPAENAUR
20418	0104	SCREW, 2-56 X 3/8 LG, PAN HD, SST	4.000	EA	PACIFIC
20421	0106	SCREW, 4-40 X 1/4 LG, PAN HD, SST	20.000	EA	PACIFIC
20426	0107	SCREW, 4-40 X 3/8 LG, PAN HD, SST	9.000	EA	P.F.
7040084	0109	SCREW, 4-40 X 7/8 LG PAN HEAD	2.000	EA	PACIFIC

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4810769-AG	IMS ASSEMBLY, 400B *	Drawing: 4810769	Rev:

Material	Item#	Description	Qty Per	MOU	Manufacturer
20422	0110	SCREW, 4-40 X 1.5 LG, PAN HD, SST	4.000	EA	PC
13760	0111	SCREW, 4-40 X 5/16 LG, FLAT HD, SST	1.000	EA	PACIFIC
20435	0113	SCREW, 6-32 X 3/4 LG, PAN HD, SST	2.000	EA	PACIFIC
15879	0114	SCREW, 6-32 X 1/2 LG, BUTTON HD, SST	2.000	EA	SPAENAUR
15951	0115	SCREW, 6-32 X 3/4 LG, BUTTON HD, SST	2.000	EA	SPAENAUR
15878	0116	SCREW, 6-32 X 1 LG, BUTTON HD, SST	4.000	EA	SPAENAUR
10802	0117	SCREW, CAPTIVE, 6-32 X 21/32 LG	2.000	EA	BERG NORDEX
13859	0118	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	2.000	EA	SPAENAUR
12435	0126	WASHER, LOCK, SPLIT, #2, SST	4.000	EA	P.F. SPAENAUR
20624	0127	WASHER, LOCK, SPLIT, #4, SST	25.000	EA	SPAENAUR
20625	0128	WASHER, LOCK, SPLIT, #6, SST	11.000	EA	SPAENAUR
10811	0129	WASHER, LOCK, #6, INTERNAL TOOTH	1.000	EA	SPAENAUR SPAENAUR
10801	0135	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE	2.000	EA	SPAENAUR BERG
7040505	0136	WASHER, .143 ID .267 OD	6.000	EA	PACIFIC FAST
20616	0137	WASHER, FLAT, #4, SST	11.000	EA	SPAENAUR
20617	0138	WASHER, FLAT, #6, SST	5.000	EA	NA P.F.
20191	0144	NUT, HEX, 2-56 X STD THK, SST	1.000	EA	SPAENAUR

					SPAENAUR
20193	0145	NUT, HEX, 6-32 X STD THK, SST	1.000	EA	P.F. NA
12275	0146	THERMAL COMPOUND ELECTROSONIC	2.000	EA	WAKEFIELD
2812726-A	0147	CAL BLOCK SENSOR IMS	1.000	EA	BRL
20621	0148	WASHER, LOCK, #4, INTERNAL TOOTH	10.000	EA	SPAENAUR NA

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4810769-AG	IMS ASSEMBLY,	400B * Di	awing: 4810769		Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
10975	0149	NUT, HEX, 1/8 TUBE OD, BRASS		7.000	EA	SWAGELOK
10976	0150	FERRULE, FRONT, 1/8 TUBE OD, BRASS	3	7.000	EA	SWAGELOK HAM-LET
15780	0151	FERRULE, BACK, 1/8 TUBE OD, BRASS		7.000	EA	SWAGELOK HAM-LET
10812	0159	WASHER, LOCK, #4, FLAT, EXTERNAL	гоотн	4.000	EA	SPAENAUR
7043058	0160	SCREW 4-40, 1/2 LG HEX HEAD, NYLO	1	4.000	EA	SPAENAUR
7040503	0161	SPACER, 1/4 LG NYLON		4.000	EA	CORDS

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Bill of Materials - Assembly #:4810771-Sorted by Item Number

4810771-R	DRIFT TUBE .	ASSEMBLY, 400B Drawing: 4810771		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
1814557-A	0001	SOURCE SPACER ASSY IMS ASSY	1.000	EA	BRL
11112-В	0002	RING, REPELLING GOLD PLATE FROM # 1408	1.000	EA	BRL
11382-D	0003	MESH, REPELLING RING #11142 EACH SHEE	1.000	EA	BRL
14212-В	0004	SUPPORT, GATING	1.000	EA	BRL
14211-в	0005	HOLDER, SOURCE - GOLD PLATED #14090	1.000	EA	BRL
10640-C	0006	SOURCE, IMS DRIFT TUBE ASSY, M400	1.000	EA	BRL
11342-J	0007	GATING ASSEMBLY	1.000	EA	BRL
11133-в	0008	SPACER, 6.14 LG	2.000	EA	BRL
11611-В	0009	SPACER, 6.52 LG	15.000	EA	BRL
11612-В	0010	SPACER, 6.90 LG	10.000	EA	BRL
3810807-D	0011	INNER CONNECTOR PLATE IMS 400B	1.000	EA	BRL 400B
4810862-A	0012	OUTER CONNECTOR PLATE IMS, 400B	1.000	EA	BRL
2810869-A	0013	INNER TUBE SUPPORT ASSY D.T. ASSY 400B	1.000	EA	BRL
2810870-A	0014	INNER TUBE EXHAUST ASSY DRIFT TUBE, 40	1.000	EA	BRL
2810871-A	0015	INNER TUBE DRIFT ASSY, DRIFT TUBE, 40	1.000	EA	BRL
11325-G	0016	INSULATOR, TUBE, SUPPORT	1.000	EA	BRL

14213-в	0017	INSULATOR, TUBE, EXHAUST	1.000	EA	BRL
11327-G	0018	INSULATOR, TUBE, DRIFT	1.000	EA	BRL
2810817-C	0019	COLLECTOR ASSEMBLY DRIFT TUBE ASSY	1.000	EA	BRL 400B
1810813-в	0020	SEAL, HIGH VOLTAGE WIRE 400B	4.000	EA	BRL 400B
11264-C	0021	WIRE, HV, 1700V - GOLD PLATED	1.000	EA	BRL
11265-C	0022	WIRE, HV, 1407V - GOLD PLATED	1.000	EA	BRL
10761	0023	O-RING, 3/32 ID X 7/32 ** BULK**	4.000	EA	ABLE ABLE
10764	0024	O-RING, 1/4 ID X 3/8 OD X 1/16 W, # 01	1.000	EA	ABLE
RoHS					ABLE
11106-в	0025	RING, DRIFT TUBE - GOLD #11609	8.000	EA	BRL

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4810771-R	DRIFT TUBE	ASSEMBLY, 400B	Drawing: 4810771		Rev:	i]
Material	Item#	Description		Qty Per	UOM	Manufacturer
11356-E	0026	GUARD SUPPORT & GRID -	GOLD PLATED#11625	1.000	EA	BRL
11324-D	0027	INSULATOR, GUARD		1.000	EA	BRL
13969-A	0028	SHIELD, COLLECTOR - GOL	D PLATED #14091	1.000	EA	BRL

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5673-G	. 0029	TUBE, HV, 1700V	1.000	EA	BRL
5674-G	0030	TUBE, HV, 1407V	1.000	EA	BRL
5675-G	0031	TUBE, HV, 1387V	1.000	EA	BRL
5676-G	0032	TUBE, HV, 57V	1.000	EA	BRL
1269-D	0033	CLAMP, SPLIT	3.000	EA	BRL
5028	0034	GASKET	1.000	EA	BRL
.3555-B	0035	RESISTOR GROUP ASSEMBLY	1.000	EA	BRL
.3554-D	0036	WIRE GROUP ASSEMBLY, HV	1.000	EA	BRL
30024	0037	GAUGE, DETAILS, IMS DRIFT TUBE	1.000	EA	BRL
0037	0038	ASSEMBLY JIG, IMS DRIFT TUBE	1.000	EA	BRL
0035	0039	DRILL JIG, IMS DRIFT TUBE	1.000	EA	BRL
0095	0040	PUNCH SET, HARDENED TO 60-63 RC	1.000	EA	BRL
.0803	0041	SPRING, COMPRESSION, 0.180 OD X 1/2 LG	3.000	EA	BERG
15534	0042	INSULATOR, SOURCE HOLDER	2.000	EA	BRL
.3970-В	0043	SUPPORT, GUARD, IMS DRIFT TUBE - GOLD	2.000	EA	BRL
814574-A	0044	SPRING MODIFIED #10951	1.000	EA	BRL
1085	0045	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	3.000	EA	SPAENAUR
1027	0046	SCREW, M1.6 X 5 MM LG, CHEESE HD, SST	2.000	EA	PACIFIC
3908	0047	SCREW, M1.6 X 4 MM LG, FLAT HD, SST	2.000	EA	PACIFIC
11186	0048	SCREW, M2 X 8 MM LG, CHEESE HD, SST	3.000	EA	PACIFIC
20357	0049	SCREW, 4-40 X 5/16 LG, BINDING HD, SST	3.000	EA	PACIFIC
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7040332	0050	SEAL, SCREW	5.000	EA	BERG NORDEX
Date: 05-14-2009 Time: 09:52:15			Page Bill of Materials Sorted b	: 2 of - Assen y Item N	3 nbly #:4810771 Number
4810771-R	DRIFT TUBE	ASSEMBLY, 400B Drawing: 4810	771	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacture
20437	0051	SCREW, 6-32 X 5/8 LG, PAN HD, SST	2.000	EA	PACIFIC
20625	0052	WASHER, LOCK, SPLIT, #6, SST	2.000	EA	SPAENAUR
10801	0053	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE	6.000	EA	SPAENAUR BERG
10801 11291-в	0053	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE WASHER, FLAT, M1.7, MODIFIED	6.000	EA EA	SPAENAUR BERG BRL
10801 11291-в 11042	0053	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE WASHER, FLAT, M1.7, MODIFIED WASHER, FLAT, M2 X 0.3 MM THK, SST	6.000 4.000 3.000	EA EA EA	SPAENAUR BERG BRL SPAENAUR
10801 11291-В 11042 20617	0053 0054 0055 0056	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE WASHER, FLAT, M1.7, MODIFIED WASHER, FLAT, M2 X 0.3 MM THK, SST WASHER, FLAT, #6, SST	6.000 4.000 3.000 2.000	EA EA EA EA	SPAENAUR BERG BRL SPAENAUR P.F. NA
10801 11291-В 11042 20617 20191	0053 0054 0055 0056 0057	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE WASHER, FLAT, M1.7, MODIFIED WASHER, FLAT, M2 X 0.3 MM THK, SST WASHER, FLAT, #6, SST NUT, HEX, 2-56 X STD THK, SST	6.000 4.000 3.000 2.000 3.000	EA EA EA EA	SPAENAUR BERG BRL SPAENAUR P.F. NA SPAENAUR SPAENAUR
10801 11291-В 11042 20617 20191 11028	0053 0054 0055 0056 0057 0058	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE WASHER, FLAT, M1.7, MODIFIED WASHER, FLAT, M2 X 0.3 MM THK, SST WASHER, FLAT, #6, SST NUT, HEX, 2-56 X STD THK, SST NUT, HEX, M1.6 X 1.3 MM THK, SST	6.000 4.000 3.000 2.000 3.000 4.000	EA EA EA EA EA	SPAENAUR BERG BRL SPAENAUR P.F. NA SPAENAUR SPAENAUR SPAENAUR

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Bill of Materials - Assembly #:4815657-Sorted by Item Number

4815657-C	IONSCAN - L	S HPI Draw	ing: 4815657	Rev: 4	
Material	Item#	Description	Qty Pe	er UOM	Manufacturer
6816563	0000	KIT, START-UP,LS/HPI	1.000) EA	SD
4810769-AG	0000	IMS ASSEMBLY, 400B *	1.000) EA	BRL
6817751-D	0000	KIT, SAMPLING, IONSCAN-LS/ AS	1.000) EA	SD
7043966	0000	FOAM, TOP AND BOTTOM END CAP	1.000) EA	REPUBLIC
7043967	0000	CARTON, 30 1/8 X 21 7/8 X 22 1/8	1.000) EA	REPUBLIC
7045250	0000	USB A TO USB B CABLE	1.000) EA	MOUSER ELEC.
9816516-D	0000	FIRMWARE 400B-HPI	1.000) EA	SD
9816903-E	0000	SOFTWARE, CD, IONSCAN LS	1.000) EA	SD
4815656-D	0001	DETECTOR MODULE LS-IONSCAN HPI	1.000) EA	SD
2821870-A	0002	COBRA L/S, HPI	1.000) EA	
2821869-A	0003	INJECTION SYSTEM, OPTIC 3-IMS	1.000) EA)
3815987-В	0004	IMS COVER ASSY	1.000) EA	SD
1815989-A	0005	INLET LINER, SILINIZED	1.000) EA	1 .'
1815687-A	0006	COVER, BACK	1.000) EA	SD
1815688-B	0007	PLATE, EXTENDED	1.000) EA	SD
2815974-В	0008	BASE PLATE	1.000) EA	SD



7043648	0009	ADAPTER, REQ 6FT S/USB SERIAL/USB	1.000	EA	QUATECH
Rohs					
1815975-A	0010	BRACKET, USB BOX	1.000	EA	SD
2815633-A	0012	CABLE, SERIAL USB BOX TO AUTOSAMPLER	1.000	EA	SD
2815632-A	0013	CABLE, SERIAL USB BOX TO OPTIC -3 HPI	1.000	EA	SD
2815631-A	0014	CABLE, SERIAL, USB BOX TO IONSCAN - L	1.000	EA	SD
1815976-B	0015	LOCK BAR 1	1.000	EA	SD
1815977-в	0016	LOCK BAR 2	1.000	EA	SD
1815978-B	0017	LOCK BAR 3	1.000	EA	SD
1815979-В	0018	LOCK BAR 4	1.000	EA	SD

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4815657-C	IONSCAN - 1	LS HPI	Drawing: 4815657		Rev: 4	
Material	Item#	Description		Qty Per	UOM	Manufacturer
1815980-A	0019	LOCK BAR 5		2.000	EA	SD
1815981-A	0020	LOCK BAR 6		2.000	EA	SD
7043644	0021	INTERFACE, OPTIC 3-IMS		1.000	EA	ATLAS GL

7043643	0022	Optic 3-IMS Transfer Line	1.000	EA	ATLAS GL
7043674	0023	SLEEVING, SLIT, 1" ID SOLD 25FT LENGT	27.000	IN	MCMASTER-CAR
15009	0024	CABLE TIE	5.000	EA	PANDUIT
15014	0025	BUMPER, RUBBER	3.000	EA	SPAENAUR
7043080	0026	SPACER, ROUND 1/2 OD X 1/8 THICKNESS	8.000	EA	RAF ELECTRON
20496	0027	SCREW, CAP, 6-32 X 7/8 LG, HEX SOCH, S	8.000	EA	PACIFIC
7043656	0028	RETAINER, # 6-32 SCREW	8.000	EA	MCMASTER-CAR
7043655	0029	SCREW, # 4-20 X 1/2 LG, FOR PLASTIC	4.000	EA	MCMASTER-CAR
20436	0030	SCREW, 6-32 X 3/8 LG, PAN HD, SST	2.000	EA	SPAENAUR
20625	0031	WASHER, LOCK, SPLIT, #6, SST	6.000	EA	SPAENAUR
20617	0032	WASHER, FLAT, #6, SST	6.000	EA	NA P.F.
20420	0033	SCREW, 4-40 X 1/2 LG,	2.000	EA	P.F.
20624	0034	WASHER, LOCK, SPLIT, #4, SST	2.000	EA	SPAENAUR
20616	0035	WASHER, FLAT, #4, SST	2.000	EA	SPAENAUR
20391	0036	SCREW, 6-32 X 3/4 LG, FLAT HD, SST	3.000	EA	r ,
20385	0037	SCREW, 6-32 X 1/2 LG, FLAT HD, SST (PH	1.000	EA	P.F. PACIFIC PACIFIC
20430	0038	SCREW, 6-32 X 1/2 LG, PAN HD, SST	4.000	EA	P.F.
20363	0039	SCREW, 10-32 X 1/2 LG, FLAT HD, SST	4.000	ÊA	PACIFIC

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20435	0040	SCREW, 6-32 X 3/4 LG, PAN HD, SST	7.000	EA	PACIFIC
7040871	0041	SPRING, COMPRESSION, 1/8 OD, SST	1.000	EA	NORDEX

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4815657-C	IONSCAN - LS	S HPI Drawing: 4815657		Rev: 4	
Material	Item#	Description	Qty Per	UOM	Manufacturer
2811100	0042	Inlet Gasket (HPI)	1.000	EA	BRL
10801	0043	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE	2.000	EA	BERG SPAENAUR
10802	0044	SCREW, CAPTIVE, 6-32 X 21/32 LG	2.000	EA	BERG NORDEX
20641	0045	SCREW, 10-32 X 1.25 LG, PAN HD, SST	2.000	EA	PACIFIC
20659	0046	SCREW, 10-32 X 5/8 LG, PAN HD, SST	2.000	EA	PACIFIC
20614	0047	WASHER, FLAT, #10, SST	4.000	EA	NA
20623	0048	WASHER, LOCK, SPLIT, #10, SST	4.000	EA	NA
20378	0049	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	2.000	EA	NA
20618	0050	WASHER, FLAT, #8, SST	2.000	EA	SPAENAUR

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20626	0051	WASHER, LOCK, SPLIT, #8, SST	2.000	EA	SPAENAUR
20445	0052	SCREW, 8-32 X 3/8 LG, PAN HD, SST	2.000	EA	PACIFIC
20369	0053	SCREW, 10-32 X 3/4 LG, FLAT HD, SST	4.000	EA	PACIFIC
7043724	0054	REGULATOR, IN-LINE, 0-60 PSI	1.000	EA	SU-PELCO
2816970-C	0055	LABEL, CONFIGURATION HPI	1.000	EA	· · · · · · · · · · · · · · · · · · ·

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Bill of Materials - Assembly #:4818022NEG Sorted by Item Number

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4818022NEG-A	ROTARY DOCU	MENT SCANNER EXPLOSIVE, CAT Drawing:	and the second	Rev: 1	-	
Material	Item#	Description	Qty Per	UOM	Manu	facturer
11253-н	0000	CAL TUBE NEGATIVE MODE ASSEMBLY	1.000	EA	BRL	
13977	0000	CALIBRATION VERIF STANDARD - NEGATIVE	1.000	EA	NA	:
4810769-AG	0000	IMS ASSEMBLY, 400B *	1.000	EA	BRL	· · · · · · · · · · · · · · · · · · ·
6819363-A	0000	KIT, STANDARD MAINTENANCE, DOC SCANNER	1.000	EA	SD	· · · · · · · · · · · · · · · · · · ·
7040652	0000	BOX, ACCESSORIES, 400B 226AZ0349	1.000	EA	PINE	VALLEY
7043502	0000	FLUTE, KRAFT 350 # BC CORR. PRINTED 2	1.000	EA	PINE	VALLEY
7043511	. 0000	FLUTE, KRAFT 275 # BC COR PLAIN RSC GL	1.000	EA	PINE	VALLEY
7043518	0000	CAPS, ION. TOP & BOTTOM 400B	1.000	EA	PINE	VALLEY
9819580-D	0000	CONTROL PARAMETER, EXPL MODE, CATSA	1.000	EA	SD	- - 1
PS100524	0000	CALIBRATION PROCEDURE FOR CATSA DOC SCAN	1.000	EA	÷÷÷÷÷÷	
4818022-A	0001	ROTARY DOCUMENT SCANNER, BASIC, CATSA	1.000	EA	SD	
4812580-в	0002	TOP COVER ASSEMBLY, 400B	1.000	EA	BRL	
3815111-C	0003	FRONT COVER ASSY RDS SCANNER 400B	1.000	EA	BRL	1
1810877-A	0004	LABEL, SAFETY GROUND	1.000	EA	BRL	1
3810879	0005	BOTTLE, D/C DISPOSABLE 400B, CARTRIDGE,	1.000	EA	BRL	
3812874-A	0006	COVER ASSY, IMS INLET, RDS, 400B	1.000	EA	BRL	· · · · · · · · · · · · · · · · · · ·

2819364-A	0007	LABEL, CONFIGURATION, CATSA, R.D.S, 40	1.000	EA	SD
1813366-A	0008	TOKEN KIT(20) DOC SCANNER	5.000	EA	BRL
1811728-A	0010	LABEL, CAUTION	1.000	EA	BRL
1811726-A	0011	LABEL, HOT SURFACE	1.000	EA	BRL
1810881-A	0012	SPONGE	1.000	EA	BRL
13859	0013	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	5.000	EA	SPAENAUR
7040564	0014	LABEL, CIRCULAR RADIATION SYMBOL	1.000	EA	BETTERWAY PR
1810932-C	0015	LABEL, "CSA" DETECTOR MODULE	1.000	EA	BRL
1811727-в	0016	LABEL, I/O	1.000	EA	BRL

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4816100-D	DRIFT TUBE	ASSEMBLY, 500 DT Drawing: 4816100		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
1814557-A	0001	SOURCE SPACER ASSY IMS ASSY	1.000	EA	BRL
11112-В	0002	RING, REPELLING GOLD PLATE FROM # 1408	1.000	EA	BRL
11382-D	0003	MESH, REPELLING RING #11142 EACH SHEE	1.000	EA	BRL
3815932-В	0004	SUPPORT, GATING	1.000	EA	SD
14211-В	0005	HOLDER, SOURCE - GOLD PLATED #14090	1.000	EA	BRL
10640-C	0006	SOURCE, IMS DRIFT TUBE ASSY, M400	1.000	EA	BRL
11342-J	0007	GATING ASSEMBLY	1.000	EA	BRL
11133-в	0008	SPACER, 6.14 LG	2.000	EA	BRL
11611-в	0009	SPACER, 6.52 LG	15.000	EA	BRL
11612-в	0010	SPACER, 6.90 LG	10.000	EA	BRL
3815778-в	0011	INNER CONNECTOR PLATE, 500 DT	1.000	EA	SD
3815939-B	0012	OUTER CONNECTOR PLATE 500 DT	1.000	EA	SD
2810869-A	0013	INNER TUBE SUPPORT ASSY D.T. ASSY 400B	1.000	EA	BRL
2810872-A	0014	INNER TUBE BRAZING PROCES DRIFT TUBE A	. 1.000	EA	BRL
2810871-A	0015	INNER TUBE DRIFT ASSY, DRIFT TUBE, 40	1.000	EA	BRL
11325-G	0016	INSULATOR, TUBE, SUPPORT	2.000	EA	BRL

11327-G	0018	INSULATOR, TUBE, DRIFT	1.000	EA	BRL
2816676-A	0019	COLLECTOR ASSEMBLY, DRIFT TUBE ASSY	1.000	EA	SD
1810813-B	0020	SEAL, HIGH VOLTAGE WIRE 400B	4.000	EA	BRL 400B
1817670-A	0021	H.V. WIRE, 1700V DRIFT TUBE ASSY	1.000	EA	SD
1817667-A	0022	H.V. WIRE, 1407V DRIFT TUBE ASSY	1.000	EA	SD
10761	0023	O-RING, 3/32 ID X 7/32 ** BULK**	4.000	EA	ABLE ABLE
10764	0024	O-RING, 1/4 ID X 3/8 OD X 1/16 W, # 01	1.000	EA	ABLE
RoHS					
11106-в	0025	RING, DRIFT TUBE - GOLD #11609	8.000	EA	BRL
2819061-A	0026	GUARD SUPPORT & GRID GOLD PLATED, 500D	1.000	EA	SD

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DRIFT TUBE ASSEMBLY, 500 DT

4816100-D

Sorted by Item Number
Drawing: 4816100 Rev:

Material	Item#	Description	Qty Per	UOM	Manufacturer
11324-D	0027	INSULATOR, GUARD	1.000	EA	BRL
13969-A	0028	SHIELD, COLLECTOR - GOLD PLATED #14091	1.000	EA	BRL
15673-G	0029	TUBE, HV, 1700V	1.000	EA	BRL

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15674-G	0030	TUBE, HV, 1407V	1.000	EA	BRL
15675-G	0031	TUBE, HV, 1387V	1.000	EA	BRL
15676-G	0032	TUBE, HV, 57V	1.000	EA	BRL
11269-D	0033	CLAMP, SPLIT	3.000	EA	BRL
15028	0034	GASKET	1.000	EA	BRL
13555-в	0035	RESISTOR GROUP ASSEMBLY	1.000	EA	BRL
1817665-A	0036	H.V. WIRE ASSY, 1387V DRIFT TUBE ASSY	1.000	EA	SD
30024	0037	GAUGE, DETAILS, IMS DRIFT TUBE	1.000	EA	BRL
30037	0038	ASSEMBLY JIG, IMS DRIFT TUBE	1.000	EA	BRL
30035	0039	DRILL JIG, IMS DRIFT TUBE	1.000	EA	BRL
30095	0040	PUNCH SET, HARDENED TO 60-63 RC	1.000	EA	BRL
10803	0041	SPRING, COMPRESSION, 0.180 OD X 1/2 LG	3.000	EA	BERG
2820547-A	0042	INSULATOR, SOURCE HOLDER DRIFT TUBE AS	2.000	EA	SD
13970-в	0043	SUPPORT, GUARD, IMS DRIFT TUBE - GOLD	2.000	EA	BRL
1814574-A	0044	SPRING MODIFIED #10951	1.000	EA	BRL
11085	0045	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	3.000	EA	SPAENAUR
11027	0046	SCREW, M1.6 X 5 MM LG, CHEESE HD, SST	2.000	EA	PACIFIC
13908	0047	SCREW, M1.6 X 4 MM LG, FLAT HD, SST	2.000	EA	PACIFIC
11186	0048	SCREW, M2 X 8 MM LG, CHEESE HD, SST	3.000	EA	PACIFIC
20357	0049	SCREW, 4-40 X 5/16 LG, BINDING HD, SST	3.000	EA	PACIFIC
1817662-A	0050	H.V. WIRE ASSY, 57V DRIFT TUBE ASSY	1.000	EA	SD
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20437	0051	SCREW, 6-32 X 5/8 LG, PAN HD, SST	2.000	EA	PACIFIC
20625	0052	WASHER, LOCK, SPLIT, #6, SST	2.000	EA	SPAENAUR

Page: 2 of 3 Bill of Materials - Assembly #:4816100-Sorted by Item Number

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4816100-D	DRIFT TUBE	ASSEMBLY, 500 DT Drawing: 481610	0	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
10801	0053	WASHER, 1/8 ID X 0.013 THK, BELLEVILLE	6.000	EA	BERG SPAENAUR
11291-B	0054	WASHER, FLAT, M1.7, MODIFIED	4.000	EA	BRL
11042	0055	WASHER, FLAT, M2 X 0.3 MM THK, SST	3.000	EA	SPAENAUR
20617	0056	WASHER, FLAT, #6, SST	2.000	EA	P.F. NA
20191	0057	NUT, HEX, 2-56 X STD THK, SST	3.000	EA	SPAENAUR SPAENAUR
11028	0058	NUT, HEX, M1.6 X 1.3 MM THK, SST	4.000	EA	NA
30290-A	0061	PUNCH SET, HARDENED TO 60-63 RC	1.000	EA	BRL

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Bill of Materials - Assembly #:4816104-Sorted by Item Number

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4816104-Q	IMS-1 ASSY	Drawing: 481	6104	Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufacture
3817785-В	0000	DIAGRAM, IMS1 TO TFET1 WIRING	1.000	EA	SD
4816100-D	0001	DRIFT TUBE ASSEMBLY, 500 DT	1.000	EA	SD
2815680-В	0002	IMS TUBE ASSY, GRIND PROCESS	1.000	EA	SD
1815972-в	0003	FRONT GASKET	1.000	EA	SD
1820546-A	0004	GUARD, THERMAL IMS ASSY 500DT	1.000	EA	SD
2815934-C	0005	INSULATOR, FRONT, IMS-2	1.000	EA	SD
1815970-A	0006	INLET GASKET	1.000	EA	SD
3818922-A	0007	INLET, IMS-1, IMS ASSY	1.000	EA	SD
1817108-B	0010	GASKET, CONDENSER TUBE	2.000	EA	SD
1815973-В	0011	THERMAL SHIELD	1.000	EA	SD
1815940-D	0012	EXHAUSTER	1.000	EA	SD
1815681-A	0013	SPRING EXHAUST **GRIND BOTH ENDS***	1.000	EA	SD
1818563-B	0014	HOLDER/GUIDE ASSY, CONDENSER, 500	1.000	EA	SD
1816686-A	0016	CONDENSER TUBE ASSY	1.000	EA	SD
2816510-A	0017	BACK SUPPORT	1.000	EA	SD
1816511-A	0018	BACK MOUNT	1.000	EA	SD



3815943-D	0019	CALIBRANT BLOCK	1.000	EA	SD	
1815982-C	0020	CONDENSER SUPPORT	1.000	EA	SD	
2815960-D	0021	IMS TOP COVER	1.000	EA	SD	
1815931-B	0022	REAR GASKET	1.000	EA	SD	
2815964-E	0023	IMS BOTTOM COVER	1.000	EA	SD	
3815958-F	0024	IMS COVER	1.000	EA		
3815959-F	0025	IMS BACK COVER	1.000	EA		
2815956-C	0026	PLATE, BACK TEFLON	1.000	ĒA		
1815944-B	0027	CALBLOCK SUPPORT	1.000	EA	SD	
1813403-A	0028	GASKET, COPPER, 10-32	1.000	EA	BRL	

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IMS-1 ASSY		Drawing: 4816104		Rev: 1	
Item#	Description		Qty Per	UOM	Manufacturer
0029	BACK COVER INSULATION 1		1.000	EA	SD
0030	BACK MANIFOLD INSULATION		1.000	EA	SD
0031	BACK COVER INSULATION 2		1.000	EA	SD
0032	IMS BACK PLATE		1.000	EA	······
	IMS-1 ASSY Item# 0029 0030 0031 0032	IMS-1 ASSY Item# Description 0029 BACK COVER INSULATION 1 0030 BACK MANIFOLD INSULATION 0031 BACK COVER INSULATION 2 0032 IMS BACK PLATE	IMS-1 ASSYDrawing: 4816104Item#Description0029BACK COVER INSULATION 10030BACK MANIFOLD INSULATION0031BACK COVER INSULATION 20032IMS BACK PLATE	IMS-1 ASSYDrawing: 4816104Item#DescriptionQty Per0029BACK COVER INSULATION 11.0000030BACK MANIFOLD INSULATION1.0000031BACK COVER INSULATION 21.0000032IMS BACK PLATE1.000	IMS-1 ASSY Drawing: 4816104 Rev: 1 Item# Description Qty Per UOM 0029 BACK COVER INSULATION 1 1.000 EA 0030 BACK MANIFOLD INSULATION 1.000 EA 0031 BACK COVER INSULATION 2 1.000 EA 0032 IMS BACK PLATE 1.000 EA

18119/4-0	0033	CLIP ASSY, CONDUCTOR, IMS	1.000	EA	
2818541-A	0034	HOUSING, BOX PRE-AMP PCB 500DT	1.000	EA	SD
2819129T-A	0035	PRE-AMP PCB ASSY, TESTED 500DT	1.000	EA	SD
2818542-C	0036	COVER, PRE-AMP PCB, 500DT	1.000	EA	SD
11269-D	0037	CLAMP, SPLIT	1.000	EA	BRL
15606	0038	SPRING, MODIFIED MADE FROM 10803	1.000	EA	BRL
11085	0039	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	1.000	EA	SPAENAUR
20191	0040	NUT, HEX, 2-56 X STD THK, SST	1.000	EA	SPAENAUR SPAENAUR
1816013-A	0041	SCREW, FRONT CERAMIC * BLULK PART 1595	4.000	EA	SD
20625	0042	WASHER, LOCK, SPLIT, #6, SST	10.000	EA	SPAENAUR
7045230	0043	FLAT WASHER, 5/32 ID X 5/16" OD SST	4.000	EA	SPAENAUR
20430	0044	SCREW, 6-32 X 1/2 LG, PAN HD, SST	2.000	EA	P.F.
20424	0045	SCREW, 4-40 X 3/16 LG, PAN HD, SST	15.000	EA	PACIFIC
20624	0046	WASHER, LOCK, SPLIT, #4, SST	21.000	EA	SPAENAUR
7045420	0048	O-RING, VITON, 8.73MM ID X 1.78MM W	1.000	EA	ABLE
20421	0050	SCREW, 4-40 X 1/4 LG, PAN HD, SST	8.000	EA	PACIFIC
10764	0051	O-RING, 1/4 ID X 3/8 OD X 1/16 W, # 01	1.000	EA	ABLE
Pous					ABLE
Rons		and a second			

7042347	0053	RETAINING RING, EXTERNAL, 5/16 SHAFT	1.000	EA	SPAENA
1817783-A	0054	TUBING ASSY IMS - 1 TO COLD TRAP	1.000	EA	SD
Date: 05-14-2009 Time: 11:23:52			Page Bill of Materials Sorted b	: 2 of - Asse y Item)	5 mbly #:48 Number
4816104-Q	IMS-1 ASSY	Drawing: 48	16104	Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufa
20378	0055	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	2.000	EA	NA
7040420	0056	STUD, MINIATURE, SEALING	1.000	EA	BESWIC
7045048	0057	FITTING, 10-32, STUD, 1/2"	1.000	EA	BESWIC
7040502	0058	GROMMET, 9/32 ID 9/16 OD	2.000	EA	SAENAU
20420	0059	SCREW, 4-40 X 1/2 LG,	4.000	EA	P.F.
7044178	0060	CLIP MOUNTS MIN ORD QTY 450PCS	6.000	EA	MICRO
7045041	0061	STANDOFF, HEX FEMALE, 440 X 3/4" LG,	2.000	EA	RAF
7041338	0062	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	1.000	EA	SMALL
20416	0063	SCREW, 2-56 X 1/4 LG, PAN HD, SST	1.000	EA	PACIFI
20615	0064	WASHER, FLAT, #2, SST	1.000	EA	NA
10405	0065		1 000	FA	CDAENA

P.F. 7045040 0066 STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO 1.000 EA RAF 7040083 0067 SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H 4.000 EA SPARAUR 20438 0068 SCREW, 6-32 X 7/6 LG, PAN HD, SST 4.000 EA P.F. 1817168-C 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817169-C 0072 INS TUBE HEATER, LEFT 1.000 EA SD 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA RAF 7043923 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 FOS 1.000 EA MPP Tite: 11:23:52							
P.F. 7045040 0065 STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO 1.000 EA RAF 7040083 0067 SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H 4.000 EA SPARMAR 20438 0068 SCREW, 6-32 X 7/8 LG, FAN HD, SST 4.000 EA P.F. 1817168-0 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-0 0071 HEATER ASSY CAL ELOCK (LEFT) 1.000 EA SD 1817167-0 0071 HEATER ASSY CAL ELOCK (LEFT) 1.000 EA SD 1817167-0 0071 INS TUBE HEATER, LEFT 1.000 EA MICRO PLJ 7043923 0073 SCREW, THUME, 440 X 3/16" 1.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 FA APP 7044266 0076 FLUG, HOLE, .187 INCH 1.000 EA SPARMAUR Tota256							
P.F. 7045040 0066 STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO 1.000 EA RAF 7040083 0067 SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H 4.000 EA SPAENAUR 20438 0068 SCREW, 6-32 X 7/8 LG, FAN HD, SST 4.000 EA SPAENAUR 20438 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-C 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 7043923 0073 SCREW, THUME, 440 X 3/16" 1.000 EA MICRO PLJ 7043923 0074 STANDOFF, HEX MALE -MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA							
7045040 0066 STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO 1.000 EA RAF 7040083 0067 SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H 4.000 EA SPARMAUR 20438 0068 SCREW, 6-32 X 7/8 LG, FAAT PHILLIPS H 4.000 EA SPARMAUR 20438 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-C 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817166-D 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817165-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 1817169-C 0073 SCREW, THUME, 440 X 3/16" 1.000 EA MICRO PLI 7043923 0073 SCREW, THUME, 440 X 3/16" 1.000 EA MICRO PLI 7044266 0076 FLUG, HOLE, .187 INCH 1.000 EA SPAEMAUR 7044270 0077 CONNECTOR, PLU						P.F.	
7040083 0067 SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H 4.000 EA SPAENAUR 20438 0068 SCREW, 6-32 X 7/8 LG, PAN HD, SST 4.000 EA P.F. 1817166-C 0069 HEATER ASSY, INLET (LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA MICRO FLI 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA MICRO FLI 7043923 0074 STANDOFF, HEX MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 C	7045040	0066	STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO	1.000	EA	RAF	
20438 0068 SCREW, 6-32 X 7/8 LG, PAN HD, SST 4.000 EA P.F. 1817168-C 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-C 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817167-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA MICRO PLJ 7043923 0073 SCREW, THUME, 440 X 3/16" 1.000 EA MICRO PLJ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 FAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SI	7040083	0067	SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H	4.000	EA	SPAENA	UR
1817168-C 0069 HEATER ASSY, INLET(LEFT) 2.000 EA SD 1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817166-D 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA MICRO PLJ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO (AMI Sorted by Item Number Sorted by Item Number Sorted by Item Number 1816104-Q IMS-1 ASSY Drawing: 4616104 Rev: 1	20438	0068	SCREW, 6-32 X 7/8 LG, PAN HD, SST	4.000	EA	P.F.	
1817166-D 0070 INLET/CALBLOCK THC (LEFT) 2.000 EA SD 1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD 1817167-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA MICRO PLJ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 70442266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO MATE Sorted by Item Number Sorted by Item Number Sorted by Item Number 4816104-0 IMS-1 ASSY Drawing: 4816104 Rey: 1	1817168-C CSA CRITICAL	0069	HEATER ASSY, INLET (LEFT)	2.000	EA	SD	
1817167-C 0071 HEATER ASSY CAL BLOCK (LEFT) 1.000 EA SD CSA CRITICAL 1817169-C 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA MICRO PL/ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO MATERIAL Sorted by Item Number TYCO (AMI 11:23:52 Drawing: 4816104 Rev: 1	1817166-D	0070	INLET/CALBLOCK THC (LEFT)	2.000	EA	SD	
1817169-C CSA CRITICAL 0072 IMS TUBE HEATER, LEFT 1.000 EA SD 7043923 0073 SCREW, THUMB, 440 X 3/16" 1.000 EA MICRO PL/ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO MAT MICRO PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP Time: 11:23:52 Time: 11:23:52 Sorted by Item Number Sorted by Item Number 4816104-Q IMS-1 ASSY Drawing: 4816104 Rey: 1	1817167-C CSA CRITICAL	0071	HEATER ASSY CAL BLOCK (LEFT)	1.000	EA	SD	
7043923 0073 SCREW, THUME, 440 X 3/16" 1.000 EA MICRO PL/ 7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP Time: 11:23:52 Page: 3 of 5 Bill of Materials - Assembly #:4816: Sorted by Item Number 4816104-0 IMS-1 ASSY Drawing: 4816104 Rev: 1	1817169-C CSA CRITICAL	0072	IMS TUBE HEATER, LEFT	1.000	EA	SD	<u> </u>
7045042 0074 STANDOFF, HEX MALE-MALE, 4-40, ALUMINU 3.000 EA RAF 13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP Time: 11:23:52 Time: 11:23:52 Sorted by Item Number Sorted by Item Number	7043923	0073	SCREW, THUMB, 440 X 3/16"	1.000	EA	MICRO	PLASTI
13570 0075 SCREWLOCK KIT, FEMALE, 4-40 THREAD 2.000 PAA AMP 7044266 0076 PLUG, HOLE, .187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TVCO MIS Page: 3 of 5 Bill of Materials - Assembly #:48161 TVCO (AMI) Date: 05-14-2009 Bill of Materials - Assembly #:48161 Sorted by Item Number Sorted by Item Number 4816104-Q IMS-1 ASSY Drawing: 4816104 Rev: 1	7045042	0074	STANDOFF, HEX MALE-MALE, 4-40, ALUMINU	3.000	EA	RAF	
7044266 0076 PLUG, HOLE, 187 INCH 1.000 EA SPAENAUR 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP 7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO AMP TYCO AMP TYCO (AMI Date: 05-14-2009 Bill of Materials - Assembly #:48165 Sorted by Item Number Sorted by Item Number 4816104-Q IMS-1 ASSY Drawing: 4816104 Rev: 1	13570	0075	SCREWLOCK KIT, FEMALE, 4-40 THREAD	2.000	PAA	AMP	
7044270 0077 CONNECTOR, PLUG, SIZE 5, 50 POS 1.000 EA AMP TYCO (AMI Date: 05-14-2009 Bill of Materials - Assembly #:48165 Time: 11:23:52 Sorted by Item Number 4816104-Q IMS-1 ASSY Drawing: 4816104 Rev: 1	7044266	0076	PLUG, HOLE, .187 INCH	1.000	EA	SPAENA	UR
Page: 3 of 5 Date: 05-14-2009 Time: 11:23:52 Bill of Materials - Assembly #:48163 4816104-Q IMS-1 ASSY Drawing: 4816104	7044270	0077	CONNECTOR, PLUG, SIZE 5, 50 POS	1.000	EA	AMP TYCO (1	AMP)
Page: 3 of 5 Date: 05-14-2009 Time: 11:23:52 Bill of Materials - Assembly #:48163 Sorted by Item Number 4816104-Q IMS-1 ASSY Drawing: 4816104		<u> </u>					
4816104-Q IMS-1 ASSY Drawing: 4816104 Rev: 1	Date: 05-14-2009 Time: 11:23:52			Pag Bill of Material Sorted	e: 3 of s - Asse by Item	5 mbly #:48 Number	16104-
4816104-Q IMS-1 ASSY Drawing: 4816104 Rev: 1							
	4816104-Q	IMS-1 ASSY	Drawing: 48161	04	Rev: 1		

Material	Item#	Description	Qty Per	UOM	Manufacturer
7043926	0079	INSULATION, MICRO FIBER FELT, «" THK, WH	72.000	"2	JOHNS MANVIL
7045046	0080	SCREW, PLUG, 10-32 STAINLESS STEEL, VI	1.000	EA	BESWICK
7040497	0081	SCREW, 4-40 X 1/4 LG, HEX HD, NYLON	2.000	EA	SPAENAUR
7044056	0082	SCREW, 2-56 UNC X 1/8 BRASS, ROUND	5.000	ĒA	SPAENAUR
15102	0083	SCREW, 4-40 X 3/16 LG, FLAT HD, SST	2.000	EA	SPAENAUR
7040844	0084	CRIMP HOUSING, SINGLE ROW 8 PIN	1.000	EA	MOLEX
7044558	0085	TERMINAL, CRIMP, FEMALE BOX	4.000	EA	MOLEX
1817697-в	0086	LABEL, RADIATION	1.000	EA	SD
10946	0087	SLEEVING, BRAIDED, #5, WHITE	36.000	IN	CONNEXUS INC
20046	0088	TUBING, 1/8 ID, HEAT SHRINKABLE, BLK	2.400	IN	Alpha
20051	0089	TUBING, 3/8 ID, HEATSHK SHRINKABLE, BL	1.080	IN	Alpha
20045	0090	TUBING, 1/4 ID, HEAT SHRINKABLE, BLK	6.000	IN	Alpha
7045195	0092	GROMMET, RUBBER, 3/8"ID, 5/8"OD	1.000	EA	SPAENAUR
7043475	0093	LOCTITE, 50 ML BOTTLE	0.010	EA	SPAENAUR
7043126	0094	WASHER, LOCK, # 0 .062 ID X .137 .0D	1.000	EA	S.P. INC.
20517	0095	SLEEVING, 0.053 ID, 0.012 WALL, CLEAR	50.400	IN	Alpha
7040505	0096	WASHER, .143 ID .267 OD	2.000	EA	PACIFIC FAST
7045465	0097	WASHER, FLAT #0, 0.6211D X 0.1560D X 0	1.000	EA	NORDEX
7040542	0098	ADHESIVE, LOCTITE, 401	0.010	EA	LOCTITE
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1813214-B	0101	LABEL, CAUTION-RADIOACTIVE MATERIAL INT	1.000	EA	
1820576-В	0102	JUMPER WIRE IMS-1, 500DT	2.000	EA	SD
10945	0103	SLEEVING, BRAIDED, #3, WHITE	8.500	IN	NA
7040504	0104	SLEEVING, BRAIDED #1 WHITE	9.000	IN	CONNEXUS INC
10894	0105	TAPE, PTFE, FOR 1/8",1/4",3/8" PIPE	5.000	IN	SWAGELOCK
12275	0106	THERMAL COMPOUND ELECTROSONIC	0.002	EA	WAKEFIELD
7041586	0107	TUBING, 3/8 ID FIT SHRINKABLE VITON	6.000	IN	ALPHA
Date: 05-14-2009 Time: 11:23:52			Page Bill of Materials Sorted b	i: 4 of ; - Asse y Item	5 mbly #:4816104- Number

4816104-Q	IMS-1 ASSY	Drawing: 48	16104	Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufacturer
10987	0108	RELEASE AGENT, HEATER, 4 OZ	0.002	oz	WATLOW
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Bill of Materials - Assembly #:4816105-Sorted by Item Number

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4816105-Q	IMS-2 ASSY	Drawing: 4816105		Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufacturer
3817786-в	0000	DIAGRAM, IMS2 TO TFET2 WIRING	1.000	EA	SD
4816100-D	0001	DRIFT TUBE ASSEMBLY, 500 DT	1.000	EA	SD
2815680-В	0002	IMS TUBE ASSY, GRIND PROCESS	1.000	EA	SD
1815972-B	0003	FRONT GASKET	1.000	EA	SD
1820546-A	0004	GUARD, THERMAL IMS ASSY 500DT	1.000	EA	SD
2815933-в	0005	INSULATOR, FRONT, IMS-1	1.000	EA	SD
1815970-A	0006	INLET GASKET	1.000	EA	SD
3818923-В	0007	BLOCK INLET, IMS-2, IMS ASSY	1.000	EA	SD
1818928-A	0008	SPRING CLIP, NOISE DAMPING, METAL INLE	1.000	EA	SD
7045422	0009	PLUNGER, BALL 8-32 THREAD SS	1.000	EA	VLIER
1817108-в	0010	GASKET, CONDENSER TUBE	2.000	EA	SD
1815973-в	0011	THERMAL SHIELD	1.000	EA	SD
1815940-D	0012	EXHAUSTER	1.000	EA	SD
1815681-A	0013	SPRING EXHAUST **GRIND BOTH ENDS***	1.000	EA	SD
1818563-B	0014	HOLDER/GUIDE ASSY, CONDENSER, 500	1.000	EA	SD
1816686-A	0016	CONDENSER TUBE ASSY	1.000	EA	SD

2816510-A	0017	BACK SUPPORT	1.000	EA	SD	
1816511-A	0018	BACK MOUNT	1.000	EA	SD	
3815943-D	0019	CALIBRANT BLOCK	1.000	EA	SD	
1815982-C	0020	CONDENSER SUPPORT	1.000	EA	SD	
2815960-D	0021	IMS TOP COVER	1.000	EA	SD	1
1815931-B	0022	REAR GASKET	1.000	EA	SD	
2815964-E	0023	IMS BOTTOM COVER	1.000	EA	SD	
3815958-F	0024	IMS COVER	1.000	EA		
3815959-F	0025	IMS BACK COVER	1.000	EA		
2815956-C	0026	PLATE, BACK TEFLON	1.000	EA		
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Page: 1 of 5 Bill of Materials - Assembly #:4816105-Sorted by Item Number

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4816105-Q	IMS-2 ASSY		Drawing: 4816105		Rev: 1		
Material	Item#	Description		Qty Per	UOM	Manu	facturer
1815944-B	0027	CALBLOCK SUPPORT	· · · · · · · · · · · · · · · · · · ·	1.000	EA	SD	
1813403-A	0028	GASKET, COPPER, 10-32		1.000	EA	BRL	
1815963-A	0029	BACK COVER INSULATION 1		1.000	EA	SD	
1815969-A	0030	BACK MANIFOLD INSULATION		1.000	EA	SD	

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815968-A	0031	BACK COVER INSULATION 2	1.000	EA	SD
1815962-E	0032	IMS BACK PLATE	1.000	EA	
L811974-D	0033	CLIP ASSY, CONDUCTOR, IMS	1.000	EA	
2818541-A	0034	HOUSING, BOX PRE-AMP PCB 500DT	1.000	EA	SD
2819129T-A	0035	PRE-AMP PCB ASSY, TESTED 500DT	1.000	EA	SD
2818542-C	0036	COVER, PRE-AMP PCB, 500DT	1.000	EA	SD
11269-D	0037	CLAMP, SPLIT	1.000	EA	BRL
15606	0038	SPRING, MODIFIED MADE FROM 10803	1.000	EA	BRL
11085	0039	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	1.000	EA	SPAENAUR
20191	0040	NUT, HEX, 2-56 X STD THK, SST	1.000	EA	SPAENAUR SPAENAUR
L816013-A	0041	SCREW, FRONT CERAMIC * BLULK PART 1595	4.000	ËA	SD
20625	0042	WASHER, LOCK, SPLIT, #6, SST	10.000	EA	SPAENAUR
7045230	0043	FLAT WASHER, 5/32 ID X 5/16" OD SST	6.000	EA	SPAENAUR
20435	0044	SCREW, 6-32 X 3/4 LG, PAN HD, SST	2.000	EA	PACIFIC
20424	0045	SCREW, 4-40 X 3/16 LG, PAN HD, SST	15.000	EA	PACIFIC
20624	0046	WASHER, LOCK, SPLIT, #4, SST	21.000	EA	SPAENAUR
7045420	0048	O-RING, VITON, 8.73MM ID X 1.78MM W	1.000	EA	ABLE
RoHS					ADLE
20421	0050	SCREW, 4-40 X 1/4 LG, PAN HD, SST	8.000	EA	PACIFIC
10764	0051	O-RING, 1/4 ID X 3/8 OD X 1/16 W, # 01	1.000	EA	ABLE

RoHS					ABLE
7046139	0052	SPRING,0.42 OD,1.25"L, .035 DIA MUSI	1.000	EA	ASSOC SPRIN
Date: 05-14-2009 Time: 11:24:21			Page: Bill of Materials Sorted by	2 of 9 - Assemb Item No	5 oly #:4816105 umber
4816105-Q	IMS-2 ASSY	Drawing: 481610)5	Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufacture
7042347	0053	RETAINING RING, EXTERNAL, 5/16 SHAFT	1.000	EA	SPAENAUR
1817789-в	0054	TUBING ASSY IMS - 2 TO COLD TRAP	1.000	EA	SD
20378	0055	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	2.000	EA	NA
7040420	0056	STUD, MINIATURE, SEALING	1.000	EA	BESWICK
7045048	0057	FITTING, 10-32, STUD, 1/2"	1.000	EA	BESWICK
7040502	0058	GROMMET, 9/32 ID 9/16 OD	2.000	EA	SAENAUR
20420	0059	SCREW, 4-40 X 1/2 LG,	4.000	EA	P.F.
7044178	0060	CLIP MOUNTS MIN ORD QTY 450PCS	5.000	EA	MICRO PLAST
7045041	0061	STANDOFF, HEX FEMALE, 440 X 3/4" LG,	2.000	EA	RAF
	0062	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	1.000	EA	SMALL PARTS
7041338			1 000		

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20615	0064	WASHER, FLAT, #2, SST	1.000	EA	NA
12435	0065	WASHER, LOCK, SPLIT, #2, SST	3.000	EA	SPAENAUR P.F.
7045040	0066	STANDOFF, HEX, FEMALE, 440 X 1/2, NYLO	1.000	EA	RAF
7040083	0067	SCREW, 4-40 X 5/16 LG, FLAT PHILLIPS H	4.000	EA	SPAENAUR
20438	0068	SCREW, 6-32 X 7/8 LG, PAN HD, SST	4.000	EA	P.F.
1817206-E CSA CRITICAL	0069	HEATER ASSY INLET (RIGHT)	2.000	EA	SD
1817208-D	0070	INLET/CALBLOCK THC (RIGHT)	2.000	EA	SD
1817207-C CSA CRITICAL	0071	HEATER ASSY, CAL BLOCK RIGHT	1.000	EA	SD
1817209-C CSA CRITICAL	0072	IMS TUBE HEATER, RIGHT	1.000	EA	SD
7043923	0073	SCREW, THUMB, 440 X 3/16"	1.000	EA	MICRO PLASTI
7045042	0074	STANDOFF, HEX MALE-MALE, 4-40, ALUMINU	3.000	EA	RAF
13570	0075	SCREWLOCK KIT. FEMALE, 4-40 THREAD	2.000	PAA	AMP

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4816105-Q IMS-2 ASSY

Drawing: 4816105

Rev: 1

Material	Item#	Description .	Qty Per	UOM	Manufacturer
7044266	0076	PLUG, HOLE, .187 INCH	1.000	EA	SPAENAUR
7042665	0077	RECEPTACLE, D-T, 50 PINS	1.000	EA	TYCO (AMP) AMP
7043926	0079	INSULATION, MICRO FIBER FELT, «" THK, WH	72.000	"2	JOHNS MANVIL
7045047	0080	FITTING,10-32, MALE TO 1/16", VITON,	1.000/	EA	BESWICK
7040497	0081	SCREW, 4-40 X 1/4 LG, HEX HD, NYLON	2.000	EA	SPAENAUR
7044056	0082	SCREW, 2-56 UNC X 1/8 BRASS, ROUND	3.000	EA	SPAENAUR
15102	0083	SCREW, 4-40 X 3/16 LG, FLAT HD, SST	2.000	EA	SPAENAUR
7040844	0084	CRIMP HOUSING, SINGLE ROW 8 PIN	1.000	EA	MOLEX
7044558	0085	TERMINAL, CRIMP, FEMALE BOX	4.000	EA	MOLEX
1817697-в	0086	LABEL, RADIATION	1.000	EA	SD .
10946	0087	SLEEVING, BRAIDED, #5, WHITE	36.000	IN	CONNEXUS INC
20046	0088	TUBING, 1/8 ID, HEAT SHRINKABLE, BLK	2.400	IN	ALPHA
20051	0089	TUBING, 3/8 ID, HEATSHK SHRINKABLE, BL	1.080	IN	ALPHA
20045	0090	TUBING, 1/4 ID, HEAT SHRINKABLE, BLK	6.000	IN	ALPHA
7045195	0092	GROMMET, RUBBER, 3/8"ID, 5/8"OD	1.000	EA	SPAENAUR
7043475	0093	LOCTITE, 50 ML BOTTLE	0.010	EA	SPAENAUR
7043126	0094	WASHER, LOCK, # 0 .062 ID X .137 .0D	1.000	EA	S.P. INC.
20517	0095	SLEEVING, 0.053 ID, 0.012 WALL, CLEAR	50.400	IN	ALPHA
13850	0096	SETSCREW, 2-56 X 1/8 LG, HEX SOCKET, S	2.000	EA	PACIFIC

7041052	0097	SCREW, 2-56 X 1/8 LG, PAN HD	2.0	000	EA	SPAE	AUR
7045538	0098	HEX NUT #8032 W/EXTERNAL TOOTH WASHER	1.0	000	EA	SPAEN	IAUR
7045465	0099	WASHER, FLAT #0, 0.6211D X 0.1560D X 0	1.0	000	EA	NORDE	x
7040542	0100	ADHESIVE, LOCTITE, 401	0.0	010	EA	LOCT	TE
1813214-B	0101	LABEL, CAUTION-RADIOACTIVE MATERIAL INT	1.0	000	EA	+	
1820577-в	0102	JUMPER WIRE IMS-2, 500DT	2.0	000	EA	SD	2. 4 4 1
Date: 05-14-2009 Time: 11:24:21			Bill of Mat Sc	Page terials orted by	: 4 of - Assen y Item 1	5 mbly #:4 Number	81610
Date: 05-14-2009 Time: 11:24:21 4816105-Q	IMS-2 ASSY	Drawing: 481	Bill of Mat Sc 16105	Page terials prted by	: 4 of - Assen y Item 1 Rev: 1	5 mbly #:4 Number	81610
Date: 05-14-2009 Time: 11:24:21 4816105-0 Material	IMS-2 ASSY Item#	Drawing: 481 Description	Bill of Mat Sc 16105 Qty	Page terials orted by Per	: 4 of - Asser y Item 1 Rev: 1 UOM	5 mbly #:4 Number Manus	81610
Date: 05-14-2009 Time: 11:24:21 4816105-Q Material 10945	IMS-2 ASSY Item#	Drawing: 481 Description SLEEVING, BRAIDED, #3, WHITE	Bill of Mat Sc 16105 Qty 8.5	Page terials orted by Per 500	: 4 of - Asser y Item 1 Rev: 1 UOM IN	5 mbly #:4 Number Manua NA	81610
Date: 05-14-2009 Time: 11:24:21 4816105-Q Material 10945 7040504	IMS-2 ASSY Item# 0103 0104	Description SLEEVING, BRAIDED, #3, WHITE SLEEVING, BRAIDED #1 WHITE	Bill of Mat Sc 16105 Qty 8.5 9.0	Page terials brted by Per 500	: 4 of - Asser y Item 1 Rev: 1 UOM IN IN	5 mbly #:4 Number Manuf NA CONN	actur
Date: 05-14-2009 Time: 11:24:21 4816105-Q Material 10945 7040504 10894	IMS-2 ASSY Item# 0103 0104 0105	Drawing: 481 Description SLEEVING, BRAIDED, #3, WHITE SLEEVING, BRAIDED #1 WHITE TAPE, PTFE, FOR 1/8",1/4",3/8" PIPE	Bill of Mat Sc 16105 Qty 8.5 9.0 5.0	Page terials brted by Per 500 000	: 4 of - Asser y Item 1 Rev: 1 UOM IN IN IN	5 mbly #:4 Number Manuf NA CONN	actur XUS I
Date: 05-14-2009 Time: 11:24:21 4816105-Q Material 10945 7040504 10894 12275	IMS-2 ASSY Item# 0103 0104 0105 0106	Drawing: 481 Description SLEEVING, BRAIDED, #3, WHITE SLEEVING, BRAIDED #1 WHITE TAPE, PTFE, FOR 1/8",1/4",3/8" PIPE THERMAL COMPOUND ELECTROSONIC	Bill of Mat Sc 16105 Qty 8.5 9.0 5.0 0.0	Page terials brted by Per 500 000 000	: 4 of - Asser y Item 1 Rev: 1 UOM IN IN IN EA	5 mbly #:4 Number Manu NA CONN SWAG	actur XUS I LOCK
Date: 05-14-2009 Time: 11:24:21 4816105-Q Material 10945 7040504 10894 12275 7041586	IMS-2 ASSY Item# 0103 0104 0105 0106 0107	Drawing: 481 Description SLEEVING, BRAIDED, #3, WHITE SLEEVING, BRAIDED #1 WHITE TAPE, PTFE, FOR 1/8",1/4",3/8" PIPE THERMAL COMPOUND ELECTROSONIC TUBING, 3/8 ID FIT SHRINKABLE VITON	Bill of Mat Sc 16105 Qty 8.5 9.0 5.0 0.0 6.0	Page terials brted by Per 500 000 000 000 000	: 4 of - Asser y Item 1 Rev: 1 UOM IN IN IN EA IN	5 mbly #:4 Number Manu NA CONN SWAG WAKE	actur EXUS I ELOCK

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Bill of Materials - Assembly #:4816800-Sorted by Item Number

IONSCAN 500	D DT Drawing: 4816800		Rev:	· · · · ·
Item#	Description	Qty Per	UOM	Manufacturer
0000	SCHEMATIC, PNEUMATIC	1.000	EA	SD
0000	DIAGRAM, WIRING	1.000	EA	SD
0000	INTERBASE GENERIC ROYALTY *DO NOT PICK*	1.000	EA	BORLAND
0000	SOFTWARE SYSTEM, 500DT VER 2.04.007	1.000	EA	
0001	MECHANICAL ASSEMBLY IONSCAN 500DT	1.000	EA	
0002	PANEL, RIGHT 500 DT	1.000	EA	SD
0003	PANEL, LEFT 500 DT	1.000	EA	SD
0004	PRINTER PANEL ASSY, 500DT	1.000	EA	SD
0005	FRONT PANEL ASSEMBLY	1.000	EA	SD
0006	TOP PANEL ASSEMBLY	1.000	EA	SD
0007	HINGE COVER ASSY	1.000	EA	SD
0008	SCREW, 6-32 X 5/8 LG, PAN HD, SST	2.000	EA	PACIFIC
0009	DISPLAY MODULE ASSY	1.000	EA	SD
0010	SCREW, 8-32 X 5/16" FLAT HEAD PHILLIP	2.000	EA	MCMASTER-CAR
0011	SCREW, 8-32 X 3/8 LG, PAN HD, SST	2.000	EA	PACIFIC
0012	SCREW, 8-32 X 3/8" SEMS	6.000	EA	SPAENAUR
	IONSCAN 500 Item# 0000 0000 0000 0000 0000 0000 0000 0000 0000 0001 0002 0003 0004 0005 0006 0007 0008 0009 0010 0011 0012	IONSGAN 500 DTDrawing: 4816800Item#Description0000SCHEMATIC, PNEUMATIC0000DIAGRAM, WIRING0000INTERBASE GENERIC ROYALTY *DO NOT PICK*0000SOFTWARE SYSTEM,500DT VER 2.04.0070001MECHANICAL ASSEMBLY IONSCAN 500DT0002PANEL, RIGHT 500 DT0003PANEL, LEFT 500 DT0004PRINTER PANEL ASSY, 500DT0005FRONT PANEL ASSEMBLY0006TOP PANEL ASSEMBLY0007HINGE COVER ASSY0008SCREW, 6-32 X 5/8 LG, PAN HD, SST0010SCREW, 8-32 X 3/8 LG, PAN HD, SST0012SCREW, 8-32 X 3/8" SEMS	IONSCAN 500 DT Drawing: 4816500 Item# Description Qty Per 0000 SCHEMATIC, PNEUMATIC 1.000 0000 DIAGRAM, WIRING 1.000 0000 INTERBASE GENERIC ROYALTY *DO NOT PICK* 1.000 0000 SOFTWARE SYSTEM, 500DT VER 2.04.007 1.000 0001 MECHANICAL ASSEMBLY IONSCAN 500DT 1.000 0002 PANEL, RIGHT 500 DT 1.000 0003 PANEL, LEFT 500 DT 1.000 0004 PRINTER PANEL ASSY, 500DT 1.000 0005 FRONT PANEL ASSEMBLY 1.000 0006 TOP PANEL ASSEMBLY 1.000 0006 TOP PANEL ASSEMBLY 1.000 0007 HINGE COVER ASSY 1.000 0008 SCREW, 6-32 X 5/8 LG, PAN HD, SST 2.000 0010 SCREW, 8-32 X 3/8 LG, PAN HD, SST 2.000 0011 SCREW, 8-32 X 3/8" SEMS 6.000	IONSGAN 500 DT Drawing: 4816800 Rev. Item# Description Qty Per UOM 0000 SCHEMATIC, PNEUMATIC 1.000 EA 0000 DIAGRAM, WIRING 1.000 EA 0000 INTERBASE GENERIC ROYALTY *DO NOT PICK* 1.000 EA 0000 SOFTWARE SYSTEM, 500DT VER 2.04.007 1.000 EA 0001 MECHANICAL ASSEMBLY IONSCAN 500DT 1.000 EA 0002 PANEL, RIGHT 500 DT 1.000 EA 0003 PANEL, RIGHT 500 DT 1.000 EA 0004 PRINTER PANEL ASSY, 500DT 1.000 EA 0005 FRONT PANEL ASSEMBLY 1.000 EA 0005 FRONT PANEL ASSEMBLY 1.000 EA 0006 TOP FANEL ASSEMBLY 1.000 EA 0007 HINGE COVER ASSY 1.000 EA 0008 SCREW, 6-32 X 5/8 LG, PAN HD, SST 2.000 EA 0010 SCREW, 8-32 X 3/8 LG, PAN HD, SST 2.000 EA 0011 SCRE

10811	0013	WASHER, LOCK, #6, INTERNAL TOOTH	2.000	EA	SPAENAUR SPAENAUR
	0014	LABEL - HOT SURFACE	1.000	EA	SD
20626	0015	WASHER, LOCK, SPLIT, #8, SST	2.000	EA	SPAENAUR
7044155	0016	SCREW, SEM 4-40 X 1/4" LG PAN HD, PHI	1.000	EA	MCMASTER -CA
7044155	0016	SCREW, SEM 4-40 X 1/4" LG PAN HD, PHI	1.000	EA	MCMAS

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NOTES:

NOTES: CENTRE IN THE ADDRESS THROUGH THE HOLE 1. PIT A PI FLOW TUBEL (TEM 82. SEE STEP 1) AND TIGHTEN THE DEPT FLOW WILL TIERS, 720 AFRED 1. CHAT IN THE DEPT FLOW WILL TIERS, 720 AFRED 1. CHATEN THE DEPT FLOW WILL TIERS, 720 AFRED 2. APT FLOW TUBES TO BE DIRECTED AS SHOWN, 3. WIRE TO BE CONNECTED TO CASING, USING SCREW TEM 73. 4. WIRE TO BE CONNECTED TO GROUND, PREAMP PC8 ASSY (TEM 76) 5. WIRE TO BE CONNECTED TO GROUND, PREAMP PC8 ASSY (TEM 76) 5. WIRE TO BE CONNECTED TO PREAMP PC8 COVER, USING SCREW TIEN 80. 5. USING SCREW TIEN 80. 8. LOOP EXAMP PC8 ASSY AFTER SCIDERING, SEE WORK INSTRUCTIONS 4915553. 8. LOOP EXAMP PC8 ASSY AFTER SCIDERING, SEE WORK INSTRUCTIONS 4915553. 8. LOOP EXAMP PC8 ASSY AFTER SCIDERING, SEE WORK INSTRUCTIONS 4915553. 8. LOOP EXAMP PC8 ASSY AFTER SCIDERING, SEE WORK INSTRUCTIONS 4915553. 9. LOOP EXAMP PC8 ASSY AFTER SCIDERING, SEE WORK INSTRUCTIONS 4915553. 10. CUT 0. SOCI CONG CARP CREW SCREW TIERS 59, AND SCREW HORD, PART OF IMS INLET ASY (TIEM 12). 9. ALIGN TUBEST TIEM 83 AND TIEM 85 ASS SHOWN. 10. CUT 0. SOCI CONG CARP ON TAPE (TIEM # 10) AND APPLY TO THE SURFACE OF HEATER BELOW THE TAB NEXT TO COLLECTOR END.

ИСЛОВИ СТОРИСТВИИ СТОРИСТВИ СТОРИСТВИИ СТОРИСТВИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИСТВИИ СТОРИ

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SABRE 4000 D 80° 4815553 TITLE.

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SEE NOTE 5-WIRE TO BE BEND AS SHOWN ON SECTION B-B, SHEET 3.-







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Bill of Materials - Assembly #:4815553-Sorted by Item Number

4815553-J	IMS ASSEMBI	Y, SABRE 4000 Drawing	g: 4815553	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
7043463	0000	SPRAY, FLUX REMOVER	0.010	EA	MILLER STEPH
7043464	0000	SPRAY, CLEANING AGENT	0.010	EA	MILLER STEPH
4816963-B	0001	DRIFT TUBE ASSEMBLY, IMS K&M RES.	1.000	EA	SD
7041031	0002	BALL, 1MM DIA, SST TYPE 302	10.000	EA	SMALL PARTS
1811455-A	0003	SPRING, IMS CONNECTION	5.000	EA	BRL
1816994-B	0005	SPACER, CERAMIC, WIRE JOINT ASSY	5.000	EA	SD
1817099-B	0006	HV WIRE, CRIMP ASSY IMS SABRE 4000	1.000	EA	SD
1815599-A	0007	LEAD SHOT, MODIFIED	1.000	EA	SD
1811755-B	0008	FITTING, PURGE FLOW	1.000	EA	BRL
1815698-B	0009	PIPE, PURGE FLOW	1.000	EA	SD
7040633	0010	ADHESIVE KAPTON 1/2" TAPE (36 YRDS PE	30.000	IN	GRAHAM MUIR
1815452-A	0011	CABLE, IMS GROUND ASSY, SABRE	1.000	EA	SD
1815266-B	0012	IMS INLET SUB ASSY	1.000	EA	SD
7041480	0013	ADHESIVE, KAPTON TAPE 1/4"	10.200	IN	3M TOOLTRONIC
17651	0014	STANDOFF, 4-40 THD, 1/4 OD X 1/2 LG, P	2.000	EA	NA
7043126	0015	WASHER, LOCK, # 0 .062 ID X .137 .0D	2.000	EA	S.P. INC.
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11031	0016	WASHER, FLAT, M1.7 X 0.3 MM THK, SST	1.000	EA	SPAENAUR
12434	0017	SCREW, 2-56 X 5/16 LG, RND HD, SST	1.000	EA	PACIFIC
20615	0018	WASHER, FLAT, #2, SST	1.000	EA	NA
11079	0019	WASHER, FLAT, #4 X 1/32 THK, FIBER	1.000	EA	SPAENAUR
7044823	0020	CLAMP, CABLE, 5/32, MINIATURE	1.000	EA	MICRO PLASTI
16284	0021	WASHER, FLAT, #4 X 1/16 THK, FIBER	1.000	EA	NA
20046	0022	TUBING, 1/8 ID, HEAT SHRINKABLE, BLK	1.500	IN	ALPHA
20616	0038	WASHER, FLAT, #4, SST	1.000	EA	SPAENAUR
3811783-A	0040	INSULATOR, MOUNTING, IMS TUBE	1.000	EA	BRL

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4815553-J	IMS ASSEMB	LY, SABRE 4000	Drawing: 4815553		Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
1815021-A	0041	GASKET, GRAPHITE, IMS		1.000	EA	BRL
3819215-A	0042	NOZZLE, PURGE FLOW BIGGE	R O-RING, SABR	1.000	EA	SD
2819216-A	0043	SUPPORT, O-RING BIGGER O	O-RING SABRE 40	1.000	EA	SD



7045639	0044	O-RING 3/4 ID X 7/8 OD VITON	1.000	EA	ABLE
1811435-C	0045	INSULATOR, RING 1 IMS TUBE	1.000	EA	BRL
7043477	0048	SPRING, COMPRESSION .24 OD X .016 WIR	1.000	EA	ASSOCIATED
7041158	0049	SCREW, 0-80 X 1/8 LG, PAN SST	1.000	EA	SMALL PARTS
3814993-в	0050	INSULATOR, FRONT FLANGED DRUM	1.000	EA	BRL
1819213-A	0051	PLATE, MOUNTING FLANGED DRUM, SABRE 40	1.000	EA	SD
7043478	0052	SPACER, ALUMINA .187 OD X .094 ID X .2	4.000	EA	BORGES
7041032	0053	SCREW, 2-56 X 3/4 LG, FL HD, PHL DR, S	3.000	EA	SMALL PARTS INTEL
2819935-A	0054	HEATER-NEW, CASING, IMS	1.000	EA	SD
1815043-A	0055	PLATE, REAR IMS TUBE	1.000	EA	BRL
1811537-D	0056	GASKET, MEMBRANE, IMS	1.000	EA	BRL
7041339	0057	SCREW, 0-80 X 1/4 FLAT HD PHL DR, SST	3.000	EA	SMALL PARTS
7041337	0058	SCREW, 0-80 X 3/8, FLAT H PHL DR, SST	3.000	EA	SMALL PARTS
7041338	0059	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	3.000	EA	SMALL PARTS
1821182-A	0060	SCREW, DRUM MTG WITH DRY LUBRICANT	3.000	EA	SD
7041040	0061	SCREW, MACHINE, 0-80X3/16 F HD, PH DR	3.000	EA	SMALL PARTS
1811974-D	0062	CLIP ASSY, CONDUCTOR, IMS	1.000	EA	3
1812025-A	0069	SEAL GASKET, IMS	8.000	EA	BRL
1811466-E	0070	NUT, SPECIAL, DRIFT TUBE IMS	3.000	EA	BRL
20421	0073	SCREW, 4-40 X 1/4 LG, PAN HD, SST	4.000	EA	PACIFIC

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2811580-G	0075	HOUSING, BOX PRE-AMP PCB	1.000	EA	BRL
2811522-G	0076	PCB ASSY, PREAMP	1.000	EA	BRL

Page: 2 of 3 Bill of Materials - Assembly #:4815553-Sorted by Item Number

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4815553-J	IMS ASSEMBLY	, SABRE 4000	Drawing: 4815553		Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
2811581-D	0077	COVER, PREAMP PCB		1.000	EA	BRL
12435	0079	WASHER, LOCK, SPLIT	C, #2, SST	3.000	EA	P.F. SPAENAUR
20416	0080	SCREW, 2-56 X 1/4 1	LG, PAN HD, SST	2.000	EA	PACIFIC
20624	0081	WASHER, LOCK, SPLIT	r, #4, SST	2.000	EA	SPAENAUR
2811843-в	0082	HEAT INSULATOR, IMS	3	1.000	EA	BRL
1811846-A	0083	TUBE DRIFT FLOW AS:	SY	1.000	EA	BRL
1811848-A	0084	TUBE EXHAUST FLOW	ASSY	1.000	EA	BRL
1816624-A	0085	TUBE APT FLOW ASSY	, SABRE 4000	1.000	EA	SD .
2815519-В	0087	CABLE, IMS TO PD B	RD, SABRE 4000	1.000	EA	SD
1817697-В	0088	LABEL, RADIATION		1.000	EA	SD



3815029-C

20049



0089	DRUM, DUMMY FLANGED DRUM	1.000	EA	BRL
0090	TUBING, 3/32 ID, HEAT SHRINKABLE, BLK	6.000	IN	Alpha
0091	TUBING, 1/16 ID. HEAT SHRINKABLE. BL	18.000	IN	ALPHA

20043	0091	TUBING, 1/16 ID, HEAT SHRINKABLE, BL	18.000	IN	Alpha
10490	0092	CABLE TIE, MINIATURE, 4" FOR 3/4" DI	1.000	EA	PANDUIT
7041132	0093	SCREW, 2-56 X 5/8" LG, FL	1.000	EA	PF

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Bill of Materials - Assembly #:4816600-Sorted by Item Number

4816600-н	DETECTOR AS	SSY, SABRE 4000	Drawing: 4816600		Rev: 1	
Material	Item#	Description	e ⁷	Qty Per	UOM	Manufacturer
2816554-B	0000	SCHEMATIC, PNEUMATIC IMS, SABRE	- 4000	1.000	EA	SD
4816519-G	0000	PRODUCT STRUCTURE		1.000	EA	SD
7041540	0000	MOLD-DO NOT ORDER ACCOUNTING PU	JRPOSES ON	1.000	EA	SOUTH MEDIC
4816125-D	0001	HOUSING, RIGHT, SABRE 4000		1.000	EA	SD
20421	0002	SCREW, 4-40 X 1/4 LG, PAN HD, S	ST	7.000	EA	PACIFIC
20621	0003	WASHER, LOCK, #4, INTERNAL TOOT	Ϋ́Η	4.000	EA	NA SPAENAUR
1812178-В	0006	SPACER, MODIFIED		1.000	EA	BRL
2815301-D	0007	INSULATOR, FRONT IMS		1.000	EA	SD
1815302-A	0008	SPACER, PHENOLIC FRONT		2.000	EA	SD
7043353	0009	SETSCREW, 2-56 X 1/2 LG HEX-SH	KT SST	2.000	EA	
2811573-C	0010	PCB ASSY, SWITCHBOARD		1.000	EA	BRL
17651	0011	STANDOFF, 4-40 THD, 1/4 OD X 1/	/2 LG, P	1.000	EA	NA
10835	0012	SETSCREW, 4-40 X 7/16 LG, CUP H	PT HEX S	1.000	EA	SPAENAUR
7041326	0013	SPACER, 4-40 X 1/2 LG, M/F		1.000	EA	RAF ELECTRON
7041541	0014	STANDOFF, 1/4 HEX, 6-32 THD 2.25	LG ALUM	1.000	EA	RAF

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Page: 1 of 3 Bill of Materials - Assembly #:4816600-Sorted by Item Number

4816600-H	DETECTOR ASSY, SABRE 4000		Drawing: 4816600		. Rev: 1		
Material	Item#	Description		Qty Per	UOM	Manufacturer	
1812091-A	0026	MANIFOLD		1.000	EA	BRL	
20426	0027	SCREW, 4-40 X 3/8 LG, P	AN HD, SST	6.000	EA	P.F [.] .	
3816135-A	0028	DISPLAY ASSY, SABRE 400	0	1.000	EA	SD	

4815557-B	0029	FLOW MODULE ASSY, SABRE 4000	1.000	EA	SD
3815479-в	0030	NOSE ASSY, SABRE 4000	1.000	EA	SD
3815540-A	0031	ELECTRONICS SUBASSY, SABRE 4000	1.000	EA	
1811583-C	0032	BRACKET, STRAP ASSY	1.000	EA	BRL
4816126-D	0033	HOUSING, LEFT, SABRE 4000	1.000	EA	SD
20433	0034	SCREW, 6-32 X 1.25 LG, PN PAN HD, SST	1.000	EA	PACIFIC
20436	0035	SCREW, 6-32 X 3/8 LG, PAN HD, SST	4.000	EA	SPAENAUR
2816684-C	0036	PACK, APC, SABRE 4000	2.000	EA	
20616	0037	WASHER, FLAT, #4, SST	2.000	EA	SPAENAUR
7041427	0038	GUARD, FAN FOR 1 1/2" FAN	1.000	EA	KEYSTONE
11079	0039	WASHER, FLAT, #4 X 1/32 THK, FIBER	6.000	EA	SPAENAUR
7041429	0040	WASHER, DOUBLE, #3, .115 X.375 X .625	2.000	EA	SEASTROM
10976	0041	FERRULE, FRONT, 1/8 TUBE OD, BRASS	1.000	EA	HAM-LET SWAGELOK
15780	0042	FERRULE, BACK, 1/8 TUBE OD, BRASS	1.000	EA	HAM-LET SWAGELOK
2816541-A	0044	SWITCH COVER, SAMPLE SABRE 4000	1.000	EA	SD
2816542-A	0045	SWITCH COVER, SLIDE SABRE 4000	1.000	EA	SD
2811987-C	0046	FAN ASSEMBLY	1.000	EA	BRL
7041036	0047	FITTING, 3-56, SUB MINI BARBED, FITS	4.000	EA	CLIPPARD
1815611-A	0048	CABLE, FLAT, J1/CPU BRD TO J1/DISPLAY B	1.000	EA	SD
2816522-A	0049	CABLE PD BOARD TO HVPS BRD, SABRE 4000	1.000	EA	SD

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2811763-C	0050	CABLE, CPU TO SWITCHBOARD	1.000	EA	BRL
2815521-в	0051	CABLE, PD BRD TO OPTIC SENSOR, SABRE 4	1.000	EA	SD

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Page: 2 of 3 Bill of Materials - Assembly #:4816600-Sorted by Item Number

4816600-H	DETECTOR A	SSY, SABRE 4000 Drav	ving: 4816600	Rev	v: 1
Material	Item#	Description	Qty	Per U	OM Manufacturer
2816521-В	0052	CABLE, PD BOARD TO PREAMP, SABRE 400	00 1.0	00 E2	A SD
7041425 2.52FT	0053	TUBING, .045 ID X 1/8" OD VITON 25F	r 30.2	50 II	N EAGLE ELASTO
1813214-B	0057	LABEL, CAUTION-RADIOACTIVE MATERIAL	INT 1.0	00 E	A
7041515	0058	LABEL, RADIATION	1.0	00 E	A SETON
1816680-A	0061	LABEL, CONFIGURATION	1.0	00 E	A SD
10885	0062	SEALING COMPOUND	0.0	10 M	M LOCTITE
10947	0063	TUBING, 1/8 OD X 1/16 ID, CLEAR TEF	LON 4.0	00 II	N WAREHOUSE PL
20625	0064	WASHER, LOCK, SPLIT, #6, SST	5.0	00 E.	A SPAENAUR
1819930-A	0065	REACTANT TUBE ASSEMBLY, NEG, EXPL, S	ABR 1.0	00 E.	A SD
1811501-C	0066	CALIBRANT ASSEMBLY, POS MODE, NARC	1.0	00 E.	A BRL
1811499-C	0067	CALIBRANT ASSEMBLY, NEG MODE, EXPL	1.0	00 E.	A BRL

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1815026-A	0068	GASKET, TEFLON FLANGED DRUM		
2811733-D	0069	MEMBRANE ASSEMBLY		
3814994	0070	Drum Flanged MTG		

2811733-D	0069	MEMBRANE ASSEMBLY	1.000	EA	BRL
3814994	0070	Drum Flanged MTG	1.000	EA	BRL
7045476	0071	O-RING, .739"ID X .070"W, SILICONE	1.000	EA	ABLE
RoHS					ABLE
1813646-A	0072	FITTING, BARB, MODIFIED	1.000	EA	BRL
3816004-C	0074	PLATE, APC SUPPORT, SABRE 4000	1.000	EA	SD
3815996-D	0075	HVPS, PCB ASSY, SABRE 4000	1.000	EA	SD
15932	0076	TUBING, 3 AWG, THIN WALL, CLEAR TEFLON	1.000	IN	NA
7044007	0077	SPRING, FLAT,1", 0.01 THK	1.000	EA	SMALL PARTS
2817121-В	0078	INSULATION, HVPS	1.000	EA	SD
1818024-B	0080	GASKET, VITON, CALIBRANT SABRE 4000	2.000	EA	SD
1816475-C	0081	GASKET, REACTANT	1.000	EA	
7044951	0082	0-RING, VITON, 0.086 X .021	4.000	EA	ORINGSUSA
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Bill of Materials - Assembly #:4816963-Sorted by Item Number

4816963-В	DRIFT TUBE	ASSEMBLY, IMS K&M RES.	Drawing: 4816963		Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
3820548-A	0001	CASING, COMPLETE SABRE IMS	- <u> </u>	1.000	EA	SD
2811674-A	0009	SOURCE ASSEMBLY		1.000	EA	BRL
3811675-В	0014	GATE ASSEMBLY		1.000	EA	BRL
1811382-в	0015	MESH, REPELLING, IMS #11142		1.000	EA	BRL
1811381-E	0016	INSULATOR, SOURCE, IMS		1.000	EA	BRL
1811669-D	0017	SHIM, DRIFT REGION	. <u> </u>	2.000	EA	BRL
1811388-C	0018	GUARD, CLAMP PLATED PART		1.000	EA	BRL
1811390-C	0019	GUARD, RING, CONNECTOR IMS	· · · · · · · · · · · · · · · · · · ·	1.000	EA	BRL
1811389-C	0020	GUARD, COLLECTOR, IMS, HH		1.000	EA	BRL
3811692-F	0021	COLLECTOR SUB-ASSY		1.000	EA	BRL
1811960-A	0022	PAD, O'RING, COLLECTOR		1.000	EA	BRL
1813271-A	0023	CLAMP, CRUSHABLE SPACER	· · · · · · · · · · · · · · · · · · ·	1.000	EA	BRL
1813270-в	0024	SPACER, CRUSHABLE		2.000	EA	BRL
2811395-В	0031	PLUG, CASING, IMS		1.000	EA	BRL
7040877TC-A	0033	O-RING, TEFLON COATED, VITON, 13	.3 X 2.	1.000	EA	SD
1811408-E	0034	PAD, SPRING		1.000	EA	BRL

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7040878	0035	SPRING, COMPRESSION, .660 OD X .063 WI	1.000	EA	ALTYPE SPRIN
2816964-A	0036	RING ASSEMBLY, TRUNCATED	18.000	EA	SD
2813611-В	0037	SHIELD, IMS COLLECTOR	1.000	EA	BRL
7041622TC-A	0038	O-RING TEFLON COATED, VITON, 3/16"OD	1.000	EA	SD
1811943-C	0039	SPACER, HOUSING COLLECTOR PLATED	1.000	EA	BRL

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Bill of Materials - Assembly #:4819771-Sorted by Item Number

Date: 05-14-2009 Time: 09:50:33

4819771-A	DRIET TUBE	ASSY Drawing: 4819771	·	Rev: 2	<u> </u>
Material	Item#	Description	Qty Per	UOM	Manufacturer
3820548-A	0001	CASING, COMPLETE SABRE IMS	1.000	EA	SD
2811674-A	0002	SOURCE ASSEMBLY	1.000	EA	BRL
3811675-В	0003	GATE ASSEMBLY	1.000	EA	BRL
1811382-B	0004	MESH, REPELLING, IMS #11142	1.000	EA	BRL
1811381-E	0005	INSULATOR, SOURCE, IMS	1.000	EA	BRL
1811669-D	0006	SHIM, DRIFT REGION	2.000	EA	BRL
1811388-C	0007	GUARD, CLAMP PLATED PART	1.000	EA	BRL
1819813-A	0008	GUARD ASSY, DRIFT TUBE	1.000	EA	SD
3821497-A	0009	COLLECTOR & HOLDER ASSY	1.000	EA	
 1811960-A	0010	PAD, O'RING, COLLECTOR	1.000	EA	BRL
1813271-A	0011	CLAMP, CRUSHABLE SPACER	1.000	EA	BRL
1813270-В	0012	SPACER, CRUSHABLE	2.000	EA	BRL
2811395-в	0013	PLUG, CASING, IMS	1.000	EA	BRL
7040877TC-A	0014	O-RING, TEFLON COATED, VITON, 13.3 X 2.	1.000	EA	SD
1811408-E	0015	PAD, SPRING	1.000	EA	BRL
7040878	0016	SPRING, COMPRESSION, .660 OD X .063 WI	1.000	EA	ALTYPE SPRIN





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316964-A	0017	RING ASSEMBLY, TRUNCATED	18.000 EA SD
)41622TC-A	0018	O-RING TEFLON COATED, VITON, 3/16"OD	1.000 EA SD
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Bill of Materials - Assembly #:4820800-Sorted by Item Number

4820800-C	MULȚI MODE	THREAT DETECTOR Drawing: 482080	00	Rev: 8	
Material	Item#	Description	Qty Per	UOM	Manufacturer
4820728	0000	PRODUCT STRUCTURE	1.000	EA	SD
7046187	0000	CABLE, MICRO-CHANGE SINGLE KEY M12, 2	1.000	EA	MOLEX
6821585-C	0000	START-UP KIT MMTD	1.000	EA	SD
3819561-C	0000	PNEUMATIC SCHEMATIC	1.000	EA	SD
9821610-в	0000	OPERATING SYSTEM, V.00.159	1.000	EA	······································
4821860	0000	WIRING DIAGRAM, MMTD	1.000	EA	
2818908-в	0000	PACK, APC (CO2)	1.000	EA	
9818909-C	0000	STD. SOFTWARE, V1.03.024	1.000	EA	:
4820725-C	0001	BOTTOM ENCLOSURE ASSY	1.000	EA	SD
4820766-C	0003	DESORBER CASE ASSEMBLY	1.000	EA	SD
3820775-C	0004	TOP ENCLOSURE ASSY	1.000	EA	SD
2820904-A	0005	COVER PLATE ASSY	1.000	EA	SD
2821020-В	0006	GASKET, DESORBER	1.000	EA	SD .
7045108	0007	SCREW, SOCKET HEAD CAP, 8-32 X 1/2, ST	4.000	EA	SPAENAUR
7046074	0008	SCREW, 6-32 X 3/8, PAN, SS BLACK OXIDE	8.000	EA	MCMASTER-CAR
1821076-A	0009	PIN, HINGE	1.000	EA	SD

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7041161	0010	RETAINING RING, .125 DIA SHAFT, SST	2.000	EA	NORDEX
3820757-C	0011	DOOR, RIGHT SIDE	1.000	EA	SD
3820756-C	0012	DOOR, LEFT SIDE	1.000	EA	SD
7046453	0014	O-RING CORD EXTR, 2MM OD. VITON 55 DUR	51.000	IN	ABLE
20421	0015	SCREW, 4-40 X 1/4 LG, PAN HD, SST	1.000	EA	PACIFIC
20624	0016	WASHER, LOCK, SPLIT, #4, SST	1.000	EA	SPAENAUR
1821695-A	0017	CALIBRANT ASSY POS	1.000	EA	SD '
1821696P-A	0018	CALIBRRANT ASSY, NEG PROCESSED	3.000	EA	· · · · · · · · · · · · · · · · · · ·
1821681-A	0019	REACTANT ASSY, NEG	1.000	EA	SD .
7040722	0020	LABEL, MADE IN CANADA 3/4" X 1 3/8	1.000	EA	SETON

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4820800-C	MULTI MODE	THREAT DETECTOR Drawi	ng: 4820800	Rev: 8		
Material	Item#	Description	Qty Per	UOM	Manufacturer	
7045305	0021	LABEL, WEEE 500 PER ROLL	1.000	EA	BRADY	
7046626	0022	SCREW, 4-40 X 1/4, FLAT HEAD, 100 DEGRE	6.000	EA	MCMASTER-CAR	
13121	0023	SCREW, CAP, 8-32 X 3/8 LG, HEX SOCH,	s 4.000	EA	PACIFIC	
1821804-A	0024	SPACER, NEG CALIBRANT	1.000	EA	SD	

 1817762-A	0025	LABEL, c CSA US, UNIVERSAL	1.000	EA	SD
9821698-A ADD LABEL SUPPLIE	0026 ED WITH LICENS	MICROSOFT CE LICENSES PRO VERSION 5.0 E	1.000	EA	ARROW COMPUT
1822051-A	0027	LABEL, SOURCE & IMS	1.000	EA	

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Bill of Materials - Assembly #:4821625-Sorted by Item Number

4821625-C	IMS ASSY	Drawing: 4821625	·	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
7043463	0000	SPRAY, FLUX REMOVER	0.010	EA	MILLER STEPH
7043464	0000	SPRAY, CLEANING AGENT	0.010	EA	MILLER STEPH
4819771-A	0001	DRIFT TUBE ASSY	1.000	EA	SD
7041031	0002	BALL, 1MM DIA, SST TYPE 302	10.000	EA	SMALL PARTS
1811455-A	0003	SPRING, IMS CONNECTION	5.000	EA	BRL
1816994-B	0005	SPACER, CERAMIC, WIRE JOINT ASSY	5.000	EA	SD
1820511-A	0006	HV WIRE, CRIMP ASSY	1.000	EA	SD
1815599-A	0007	LEAD SHOT, MODIFIED	1.000	EA	SD ·
1811755-В	0008	FITTING, PURGE FLOW	1.000	EA	BRL
1815698-В	0009	PIPE, PURGE FLOW	1.000	EA	SD
7040633	0010	ADHESIVE KAPTON 1/2" TAPE (36 YRDS PE	30.500	IN	GRAHAM MUIR
1821623-в	0012	IMS INLET SUBASSY	1.000	EA	
7041480	0013	ADHESIVE, KAPTON TAPE 1/4"	10.200	IN	3M TOOLTRONIC
17651	0014	STANDOFF, 4-40 THD, 1/4 OD X 1/2 LG, P	2.000	EA	NA
7043126	0015	WASHER, LOCK, # 0 .062 ID X .137 .0D	2.000	EA	S.P. INC.

11031	0016	WASHER, FLAT, M1.7 X 0.3 MM THK, SST	1.000	EA	SPAENAUR
1815026-A	0023	GASKET, TEFLON FLANGED DRUM	1.000	EA	BRL
3821560-A	0024	DRUM, SCREW MTG	1.000	EA	SD
7043477	0025	SPRING, COMPRESSION .24 OD X .016 WIR	1.000	EA	ASSOCIATED S
7041032	0026	SCREW, 2-56 X 3/4 LG, FL HD, PHL DR, S	3.000	EA	INTEL SMALL PARTS
1821182-A	0027	SCREW, DRUM MTG WITH DRY LUBRICANT	3.000	EA	SD
12435	0028	WASHER, LOCK, SPLIT, #2, SST	2.000	EA	P.F. SPAENAUR
20616	0038	WASHER, FLAT, #4, SST	1.000	EA	SPAENAUR
3819668-в	0040	INSULATOR	1.000	EA	SD

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4821625-C	IMS ASSY	Drawing: 4821625		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
1815021-A	0041	GASKET, GRAPHITE, IMS	1.000	EA	BRL
3819215-A	0042	NOZZLE, PURGE FLOW BIGGER O-RING, SABR	1.000	EA	SD
2819216-A	0043	SUPPORT, O-RING BIGGER O-RING SABRE 40	1.000	EA	SD

7045639	0044	O-RING 3/4 ID X 7/8 OD VITON	1.000	EA	ABLE
1820524-В	0045	INSULATOR, RING 1, IMS	1.000	EA	SD
7041338	0049	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	2.000	EA	SMALL P.
2819935-A	0054	HEATER-NEW, CASING, IMS	1.000	EA	SD
1820526-A	0056	GASKET, MEMBRANE	1.000	EA	SD
7041339	0057	SCREW, 0-80 X 1/4 FLAT HD PHL DR, SST	3.000	EA	SMALL P
7041337	0058	SCREW, 0-80 X 3/8, FLAT H PHL DR, SST	3.000	EA	SMALL P
7041338	. 0059	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	6.000	EA	SMALL P
7041040	0061	SCREW, MACHINE, 0-80X3/16 F HD, PH DR	3.000	EA	SMALL P.
1821366-в	0062	CLIP ASSY, CONDUCTOR, IMS	1.000	EA	
1812025-A	0069	SEAL GASKET, IMS	8.000	EA	BRL
1811466-E	0070	NUT, SPECIAL, DRIFT TUBE IMS	3.000	EA	BRL
20421	0073	SCREW, 4-40 X 1/4 LG, PAN HD, SST	4.000	EA	PACIFIC
2821158-A	0075	HOUSING, PRE-AMP PCB	1.000	EA	SD
2821092C-C	0076	IMS PREAMP ASSY-COATED	1.000	EA	:
2821159-A	0077	COVER, PRE-AMP PCB	1.000	EA	SD
7040825	0080	SCREW, 2-56 X 3/16, PAN H PHILIPS DR,	2.000	EA	PACIFIC
20624	0081	WASHER, LOCK, SPLIT, #4, SST	2.000	EA	SPAENAU
2811843-в	0082	HEAT INSULATOR, IMS	1.000	EA	BRL
1811846-A	0083	TUBE DRIFT FLOW ASSY	1.000	EA	BRL
1811848-A	0084	TUBE EXHAUST FLOW ASSY	1.000	EA	BRL

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	0085	TUBE APT FLOW ASSY, SABRE 4000	1.000	EA	SD
2821626-A	0087	CABLE ASSY, IMS- PWR BRD	1.000	EA	SD

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4821625-C	IMS ASSY	Drawing: 4821625		Rev:	
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Material	Item#	Description	Qty Per	UOM	Manufacturer
1817697-в	8800	LABEL, RADIATION	1.000	EA	SD
20043	0091	TUBING, 1/16 ID, HEAT SHRINKABLE, BL	7.500	IN	Alpha
10490	0092	CABLE TIE, MINIATURE, 4" FOR 3/4" DI	1.000	EA	PANDUIT
2811733-D	0094	MEMBRANE ASSEMBLY	1.000	EA	BRL
7043478	0095	SPACER, ALUMINA .187 OD X .094 ID X .2	3.000	EA	BORGES
7046588	0096	O-RING,2.4MM WIDE X20.3MM ID,55DURO VI	1.000	EA	ABLE
3821618-в	0097	INSULATOR, FRONT DRUM	1.000	EA	
2821617-A	0098	PLATE, MOUNTING	1.000	EA	SD
2821616-C	0099	PLATE, REAR IMS TUBE	1.000	EA	SD

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Bill of Materials - Assembly #:4821100-B Sorted by Item Number

4821100-в	DETECTOR ,	CENTURION II Drawin	g: 4821100	Rev: 4	
Material	Item#	Description	Qty Per	NOU	Manufacturer Infor
1814593-C	0000	CLEAN AIR LINE (10 FT) ASSY	1.000	EA	BRL
1821149-A	0000	SAMPLE LINE (20 FT) KIT	1.000	EA	SD
3821102-A	0000	PNEUMATIC DIAGRAM CENTURION II DETECTO	DR 1.000	EA	SD
3821103-A	0000	ELECTRICAL BLOCK DIAGRAM CENTURION 2	1.000	EA	SD
4821125-A	0000	IMS MODULE ASSY	1.000	EA	SD
7040626	0000	CAP, FITTING, 1/8 TUBE	1.000	EA	SWAGELOK HAM-LET
7041935	0000	PLUG, UNUSED PORT 1/4 TUBE	1.000	EA	SWAGELOK HAM-LET
7043040	000Ò	FOAM (1 SET)	1.000	EA	PINE VALLEY PK
7043041	0000	CARTON 22 X 20 X 18 Centurion	1.000	EA	PINE VALLEY PK
7043042	0000	KIT BOX	1.000	EA	PINE VALLEY PK
7043862	0000	INTERBASE GENERIC ROYALTY *DO NOT PICH	(* 1.000	EA	BORLAND
7045280	0000	REDUCER, 1/4 TO 1/8 TUBE STAINLESS STE	1.000	EA	HAM-LET
4821101-A	0000	WIRING DIAGRAM, SCHEMATIC, CENTURION	1.000	EA	
9821345-B	0000	CONTROL PARAMETER CD	1.000	EA	
9821358-B	0000	CD, COMMAND AND CONTROL SOFTWARE	1.000	EA	

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2816498-A	0002	POWER SUPPLY, MODIFIED	1.000	EA	SD	
4821104-В	0001	DETECTOR ASM, CENTURION II	1.000	EA	SD	
3821099	0000	PRODUCT STRUCTURE DRAWING	1.000	EA		
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Bill of Materials - Assembly #:4821125-Sorted by Item Number

4821125-A	IMS MODULE	ASSY Drawing: 4821125		Rev: 1		
Material	Item#	Description	Qty Per	UOM	Manufacturer	
4815299-A	0001	BRACKET, IMS CENTURION	1.000	EA	SD	
4821126-В	0002	IMS TUBE ASSY	1.000	EA	SD	
7042563	0007	GROMMET, 1/8 ID X 1/16 GROOVE	1.000	EA	SPAENAUR	
20421	0008	SCREW, 4-40 X 1/4 LG, PAN HD, SST	1.000	EA	PACIFIC	
7042564	0009	STANDOFF, 3/16 HEX, #4-40 X 1 1/4 LG	1.000	EA	RAF	
1813833-A	0010	STANDOFF MODIFIED IMS	1.000	EA	BRL	
17651	0011	STANDOFF, 4-40 THD, 1/4 OD X 1/2 LG, P	1.000	EA	NA	
10947	0012	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	0.240	IN	WAREHOUSE PL	
20418	0013	SCREW, 2-56 X 3/8 LG, PAN HD, SST	2.000	EA	PACIFIC	
12435	0014	WASHER, LOCK, SPLIT, #2, SST	2.000	EA	P.F. SPAENAUR	
20624	0016	WASHER, LOCK, SPLIT, #4, SST	1.000	EA	SPAENAUR	
7043111	0017	REDUCING UNION	3.000	EA	HAM-LET	
7041515	0018	LABEL, RADIATION	1.000	EA	SETON	

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Bill of Materials - Assembly #:4821126-Sorted by Item Number

4821126-В	IMS TUBE AS	SSY Drawing: 4821126		Rev: 1	
Material	Item#	Description	Qty Per	UOM	Manufacturer
7043463	0000	SPRAY, FLUX REMOVER	0.010	EA	MILLER STEPH
7043464	0000	SPRAY, CLEANING AGENT	0.010	EA	MILLER STEPH
4816963-B	0001	DRIFT TUBE ASSEMBLY, IMS KEM RES.	1.000	EA	SD
7041031	0002	BALL, 1MM DIA, SST TYPE 302	10.000	EA	SMALL PARTS
1811455-A	0003	SPRING, IMS CONNECTION	5.000	EA	BRL
1816994-B	0005	SPACER, CERAMIC, WIRE JOINT ASSY	5.000	EA	SD
1816996-A	0006	WIRE HV, CRIMP ASSY, IMS	1.000	EA	SD
1815599-A	0007	LEAD SHOT, MODIFIED	1.000	EA	SD
1811755-B	0008	FITTING, PURGE FLOW	1.000	EA	BRL
1811756-C	0009	PIPE, PURGE FLOW	1.000	EA	BRL
7040633	0010	ADHESIVE KAPTON 1/2" TAPE (36 YRDS PE	30.500	IN	GRAHAM MUIR
2813796-A	0011	INLET WELDMENT	1.000	EA	BRL
1815266-B	0012	IMS INLET SUB ASSY	1.000	EA	SD
7041480	0013	ADHESIVE, KAPTON TAPE 1/4"	10.200	IN	3M TOOLTRONIC
17651	0014	STANDOFF, 4-40 THD, 1/4 OD X 1/2 LG, P	2.000	EA	NA

2814392-C	0015	INSULATOR, FRONT, IMS	1.000	EA	BRL
1814398-A	0016	STRIP, INSULATOR, IMS	1.000	EA	BRL
7040497	0017	SCREW, 4-40 X 1/4 LG, HEX HD, NYLON	2.000	EA	SPAENAUR
20615	0038	WASHER, FLAT, #2, SST	1.000	EA	NA
1815365-A	0039	CABLE ASSY, GROUND IMS	1.000	EA	SD
3811783-A	0040	INSULATOR, MOUNTING, IMS TUBE	1.000	EA	BRL
1815021-A	0041	GASKET, GRAPHITE, IMS	1.000	EA	BRL
3811762-D	0042	NOZZLE, PURGE REV D FOR SERVICE	1.000	EA	BRL
2811781-A	0043	SUPPORT, "O" RING	1.000	EA	BRL
7045739	0044	O-RING, 11/16ID x 13/160D,VITON	1.000	EA	ABLE

Page: 1 of 3 Bill of Materials - Assembly #:4821126-Sorted by Item Number

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4821126-в Drawing: 4821126 Rev: 1 IMS TUBE ASSY Manufacturer Material Item# Description Qty Per UOM BRL 1811435-C 0045 INSULATOR, RING 1 IMS TUBE 1.000 EA BRL 1811538-D 0051 GASKET, FRONT, IMS 1.000 EA PACIFIC 20414 0053 SCREW, 2-56 X 1 LG, PAN HD, SST 3.000 EA

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2819935-A	0054	HEATER-NEW, CASING, IMS	1.000	EA	SD
1815043-A	0055	PLATE, REAR IMS TUBE	1.000	EA	BF
1811537-D	0056	GASKET, MEMBRANE, IMS	1.000	EA	BF
7041339	0057	SCREW, 0-80 X 1/4 FLAT HD PHL DR, SST	6.000	EA	SN
7043397	0058	SCREW, 0-80X3/8 LG, PAN HD, PHILLIPS S	3.000	EA	M
7041338	0059	SCREW, 0-80 X 1/4 PAN HD, PHL DR, SST	2.000	EA	SN
7041040	0061	SCREW, MACHINE, 0-80X3/16 F HD, PH DR	3.000	EA	Sh
1821878-A	0062	CLIP ASSY, CONDUCTOR, IMS	1.000	EA	
7043126	0063	WASHER, LOCK, # 0 .062 ID X .137 .0D	4.000	EA	S
11031	0064	WASHER, FLAT, M1.7 X 0.3 MM THK, SST	4.000	EA	SI
1812025-A	0069	SEAL GASKET, IMS	8.000	EA	BI
1811466-E	0070	NUT, SPECIAL, DRIFT TUBE IMS	3.000	EA	BI
20421	0073	SCREW, 4-40 X 1/4 LG, PAN HD, SST	2.000	EA	PI
2821158-A	0075	HOUSING, PRE-AMP PCB	1.000	EA	SI
2821095-в	0076	IMS PREAMPLIFIER ASSY	1.000	EA	
2821159-A	0077	COVER, PRE-AMP PCB	1.000	EA	SI
12435	0079	WASHER, LOCK, SPLIT, #2, SST	2.000	EA	SI P
7040825	0080	SCREW, 2-56 X 3/16, PAN H PHILIPS DR,	2.000	EA	P
20624	0081	WASHER, LOCK, SPLIT, #4, SST	2.000	EA	S
2811843-в	0082	HEAT INSULATOR, IMS	1.000	EA	B

1811846-A	0083	TUBE DRIFT FLOW ASSY	1.000	EA	BRL	
1811848-A	0084	TUBE EXHAUST FLOW ASSY	1.000	EA	BRL	
Date: 05-14-2009 Time: 09:48:01			Page Bill of Materials Sorted 1	e: 2 of s - Asser by Item M	3 nbly #: Number	482112
					I.	
4821126-B	IMS TUBE A	SSY Drawing: 482	1126	Rev: 1		
4821126-B Material	IMS TUBE A	SSY Drawing: 482 Description	1126 Qty Per	Rev: 1 UOM	Manu	afactu
4821126-B Material 1811847-A	IMS TUBE A: Item# 0085	SSY Drawing: 482: Description TUBE APT FLOW ASSY	1126 Qty Per 1.000	Rev: 1 UOM EA	Manu BRL	factu
4821126-B Material 1811847-A 3821551-B	IMS TUBE A: Item# 0085 0087	SSY Drawing: 482: Description TUBE APT FLOW ASSY CABLE ASSY, IMS/INLET	1126 Qty Per 1.000 1.000	Rev: 1 UOM EA EA	Manu BRL SD	factu
4821126-B Material 1811847-A 3821551-B 1817697-B	IMS TUBE A: Item# 0085 0087 0088	SSY Drawing: 482: Description TUBE APT FLOW ASSY CABLE ASSY, IMS/INLET LABEL, RADIATION	1126 Qty Per 1.000 1.000 1.000	Rev: 1 UOM EA EA EA	Manu BRL SD SD	ifactu:
4821126-B Material 1811847-A 3821551-B 1817697-B 20043	IMS TUBE A: Item# 0085 0087 0088 0089	SSY Drawing: 482: Description TUBE APT FLOW ASSY CABLE ASSY, IMS/INLET LABEL, RADIATION TUBING, 1/16 ID, HEAT SHRINKABLE, BL	Qty Per 1.000 1.000 1.000 4.800	Rev: 1 UOM EA EA EA IN	Manu BRL SD SD ALPE	afactu:
4821126-B Material 1811847-A 3821551-B 1817697-B 20043 20046	IMS TUBE A: Item# 0085 0087 0088 0089 0090	SSY Drawing: 482: Description TUBE APT FLOW ASSY CABLE ASSY, IMS/INLET LABEL, RADIATION TUBING, 1/16 ID, HEAT SHRINKABLE, BL TUBING, 1/8 ID, HEAT SHRINKABLE, BLK	Qty Per 1.000 1.000 1.000 4.800 1.500	Rev: 1 UOM EA EA EA IN IN	Manu BRL SD SD ALPF ALPF	afactu A



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Bill of Materials - Assembly #:4815140-Sorted by Item Number

4815140-B	IMS ASSEMBLY	Drawing: 4815140		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
15373-к	0001	TUBE ASSEMBLY, IMS *	1.000	EA	BRL
4815158-A	0002	DRIFT TUBE ASSEMBLY SENTINEL II	1.000	EA	BRL
2810709-N	0003	PREAMP MODULE ASSEMBLY * IMS ASSY, 400	1.000	EA	BRL
15912-G	0004	CONDENSER TUBE ASSEMBLY*	1.000	EA	BRL
1810806-J	0005	CALIBRANT GAS ASSY, NEGAT EXPL, IMS 40	1.000	EA	BRL
1810861-F	0006	CALIBRANT GAS ASSY POS, NARC, IMS, 400	1.000	EA	BRL
15580-F	0007	PCB ASSEMBLY, HEATER* POWER DISTR, RE	1.000	EA	BRL
4810757-D	0008	HOUSING, IMS	1.000	EA	BRL
2810772-C	0011	SUPPORT RING, IMS 400B	1.000	EA	BRL
3810736-B	0012	BACK COVER, IMS, M400B	1.000	EA	BRL
2810854-A	0013	INSULATION 1/2 BACK COVER IMS, 400B	1.000	EA	BRL
2810855-A	0014	INSULATION 3/8 BACK COVER IMS 400B	1.000	EA	BRL
11269-D	0015	CLAMP, SPLIT	1.000	EA	BRI
2812222-В	0016	INSULATOR	1.000	EA	BRL
2815156-A	0017	IMS INLET, IMS ASSY	1.000	EA	SD
2815164-C	0018	IMS PURIFIER ASS'Y	1.000	EA	SD

15931-В	0019	SHIELD, THERMAL	1.000	EA	BRL
2810834-A	0020	TOP COVER, IMS 400B	1.000	EA	BRL 400B
2810730-C	0021	BACKPLATE, TOP, IMS 400B	1.000	EA	BRL
3810731-C	0022	BACKPLATE, BOTTOM IMS, 400B	1.000	EA	BRL
2810856-A	0023	SEAL SCREW, MODIFIED C/WSILICONE RING	1.000	EA	BRL
1818489-A	0024	HOLDER, CONDENSER TUBE, 400B	1.000	EA	SD
15606	0025	SPRING, MODIFIED MADE FROM 10803	1.000	EA	BRL
15562-B	0026	SHIELD, THERMAL RING	1.000	EA	BRL
1815155-B	0027	INLET LINER	1.000	EA	SD
1810853-A	0028	WIRE CLAMP, IMS 400B	1.000	EA	BRL

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4815140-B	IMS ASSEMB	LY Drawin	g: 4815140	Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
6815196-A	0030	KIT, IMS GASKET	1.000	EA	BRL
30170	0034	JIG, INLET GASKET	1.000	EA	BRL
3810883-в	0035	WIRING DIAGRAM, IMS 400B	1.000	EA	BRL
1811250-в	0036	HEATER BAND, ASSY IMS DETECTOR MODULE	1.000	EA	BRL

7040316	0044	CONNECTOR, PLUG DB 15, CRIMP SNAP-IN	1.000	EA	AMP AMP
15401	0045	CONNECTOR, RECEPTACLE, 7 PIN, HV, CPC	1.000	EA	AMP
7040284	0046	CONTACT, PIN CRIMP, SNAP-IN	4.000	EA	AMP
RoHS					AMP
15402	0047	CONTACT, PIN, 20-24 AWG, GOLD/NICKEL	4.000	EA	AMP
13570	0050	SCREWLOCK KIT, FEMALE, 4-40 THREAD	2.000	PAA	AMP
2812688-A	0051	INLET THERMOCOUPLE ASSY	1.000	EA	BRL
2812718-A	0052	IMS TUBE RTD	2.000	EA	BRL
1812687-A	0053	HEATER ASSY, INLET	2.000	EA	BRL
15530	0056	o-Ring #012 Viton 5/pk	1.000	EA	ABLE
RoHS					ABLE
7040500	0057	O-RING,5mm ID 1mm W, VITON	2.000	EA	ABLE
RoHS					ABLE
7040420	0058	STUD, MINIATURE, SEALING	2.000	EA	BESWI
13911	0059	CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3	1.000	EA	CLIPF
7040363	0060	CLAMP, CABLE, 3/32 DIA, NYLON	4.000	EA	MICRO
7040501	0061	CLAMP, CABLE 3/8 DIA, NYLON	1.000	EA	MICRO
10857	0065	CLAMP, HOSE, 1.062 TO 2 ID, SST	1.000	EA	SPAEL
17555	0066	GROMMET, RUBBER, 11/16 ID	1.000	EA	NA

15398	0068	SPACER, #4, 1/4 OD X 1/2 LG, NOT TAPPE	2.000	EA	SPAEN
15786	0071	SLEEVE, CLEAR	4.000	EA	WEIDM
Date: 05-14-2009 Time: 11:20:42			Page Bill of Materials Sorted b	a: 2 of 3 - Assei >y Item 1	5 mbly #:41 Number
4815140-B	IMS ASSEMB	LY Drawing: 481514	0	Rev:	
Material	Item#	Description	Qty Per	UOM	Manuf
15787	0072	TAG, MARKING, CUSTOM PRINTED "EXHAUST	1.000	EA	WEIDM
15788	0073	TAG, MARKING, CUSTOM PRINTED "NARCOTI	1.000	EA	WEIDM
15789	0074	TAG, MARKING, CUSTOM PRINTED "EXPLOSI	1.000	EA	WEIDM
15796	0075	TAG, MARKING, CUSTOM PRINTED "DPT	1.000	EA	WEIDM
10947	0080	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	70.080	IN	WAREH
20517	0081	SLEEVING, 0.053 ID, 0.012 WALL, CLEAR	50.400	IN	ALPHA
20504	0083	SLEEVING, 0.234 ID, 0.020 WALL, BLK PV	10.200	IN	ALPHA
7040504	0085	SLEEVING, BRAIDED #1 WHITE	19.920	IN	CONNE
10946	0086	SLEEVING, BRAIDED, #5, WHITE	6.000	IN	CONNE
15552	0087	INSULATION, CERAMIC FIBRE 401bs per bg	8.000	οz	CARBO
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7040499	0089	LACING CORD	10.200	IN	ALPHA
20595	0091	WIRE, BUS, 24 AWG, TINNED COPPER (UNCO	6.000	IN	BELDEN
15880	0093	BIT, INSERT, TORX, #6, FOR TAMPER RESI	1.000	EA	SPAENAUR
1811158-в	0095	GASKET, VITON, FITTING CLIPPARD	1.000	EA	BRL
7040566-в	0096	LABEL, CAUTION-RADIOACTIVE MATERIAL	1.000	EA	BETTERWAY PR
7040544	0097	LABEL, RADIOACTIVE MATER- IAL, CAUTION	1.000	EA	BETTERWAY PR
7040723	0098	LABEL, IMS SERIAL NUMBER	1.000	EA	BETTERWAY PR
11085	0103	SCREW, CAP, 2-56 X 1/4 LG, HEX SOCH, S	1.000	EA	SPAENAUR
20418	0104	SCREW, 2-56 X 3/8 LG, PAN HD, SST	4.000	EA	PACIFIC
20421	0106	SCREW, 4-40 X 1/4 LG, PAN HD, SST	20.000	EA	PACIFIC
20426	0107	SCREW, 4-40 X 3/8 LG, PAN HD, SST	9.000	EA	P.F.
7040084	0109	SCREW, 4-40 X 7/8 LG PAN HEAD	2.000	EA	PACIFIC
20422	0110	SCREW, 4-40 X 1.5 LG, PAN HD, SST	4.000	EA	PC
13760	0111	SCREW, 4-40 X 5/16 LG, FLAT HD, SST	1.000	EA	PACIFIC
Date: 05-14-2009 Time: 11:20:42		· · · · · · · · · · · · · · · · · · ·	Pac Bill of Material Sorted	ge: 3 of ls - Asse by Item	5 mbly #:4815140- Number
4815140-B	IMS ASSEMB	LY Drawing: 481	.5140	Rev:	

Material	Item#	Description	Qty Per	UOM	Manufacturer
20435	0113	SCREW, 6-32 X 3/4 LG, PAN HD, SST	2.000	EA	PACIFIC
15951	0115	SCREW, 6-32 X 3/4 LG, BUTTON HD, SST	4.000	EA	SPAENAUR
15878	0116	SCREW, 6-32 X 1 LG, BUTTON HD, SST	4.000	ĒA	SPAENAUR
13859	0118	SCREW, 4-40 X 1/4 LG, FLAT HD, SST	2.000	EA	SPAENAUR
12435	0126	WASHER, LOCK, SPLIT, #2, SST	4.000	EA	P.F. SPAENAUR
20624	0127	WASHER, LOCK, SPLIT, #4, SST	25.000	EA	SPAENAUR
20625	0128	WASHER, LOCK, SPLIT, #6, SST	13.000	EA	SPAENAUR
10811	0129	WASHER, LOCK, #6, INTERNAL TOOTH	1.000	EA	SPAENAUR SPAENAUR
7040505	0136	WASHER, .143 ID .267 OD	6.000	EA	PACIFIC FAST
20616	0137	WASHER, FLAT, #4, SST	11.000	EA	SPAENAUR
20617	0138	WASHER, FLAT, #6, SST	5.000	EA	P.F. NA
20191	0144	NUT, HEX, 2-56 X STD THK, SST	1.000	EA	SPAENAUR SPAENAUR
20193	0145	NUT, HEX, 6-32 X STD THK, SST	1.000	EA	NA P.F.
12275	0146	THERMAL COMPOUND ELECTROSONIC	2.000	EA	WAKEFIELD
2812726-A	0147	CAL BLOCK SENSOR IMS	1.000	EA	BRL
20621	0148	WASHER, LOCK, #4, INTERNAL TOOTH	10.000	EA	NA SPAENAUR

10975	0149	NUT, HEX, 1/8 TUBE OD, BRASS	7.000	EA	SWA	GELOK
10976	0150	FERRULE, FRONT, 1/8 TUBE OD, BRASS	7.000	EA	HAM SWA	-let Gelok
15780	0151	FERRULE, BACK, 1/8 TUBE OD, BRASS	7.000	EA	SWA HAM	GELOK -let
15242	0153	BUSHING	4.000	EA	CDN	BEARING
15339-в	0154	INSULATOR, IMS JM	1.000	EA	BRL	
Date: 05-14-2009 Time: 11:20:42			Bill of Materials Sorted b	- Asse / Item	mbly # Number	4815140
Date: 05-14-2009 Time: 11:20:42 4815140-B Material	IMS ASSEMB	Drawing: 481 Description	Fage Bill of Materials Sorted by	- Asse 7 Item Rev: UOM	mbly # Number Man	4815140
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A	IMS ASSEMB Item# 0155	Drawing: 481 Description GASKET, IMS INLET	Bill of Materials Sorted by Qty Per 1.000	- Asse 7 Item WOM EA	mbly # Number Man SD	4815140
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A 20659	IMS ASSEMB Item# 0155 0156	LY Drawing: 481 Description GASKET, IMS INLET SCREW, 10-32 X 5/8 LG, PAN HD, SST	Eill of Materials Sorted by Qty Per 1.000 4.000	- Asse y Item UOM EA EA	mbly # Number Man SD PAC	4815140 ufacture IFIC
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A 20659 2813635-B	IMS ASSEMB Item# 0155 0156 0157	LY Drawing: 481 Description GASKET, IMS INLET SCREW, 10-32 X 5/8 LG, PAN HD, SST IMS BRACKET, TEST ASSY	Eill of Materials Sorted by Qty Per 1.000 4.000 1.000	- Asse y Item UOM EA EA EA	mbly # Number Man SD PAC BRL	ufacture IFIC
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A 20659 2813635-B 20430	IMS ASSEMB Item# 0155 0156 0157 0158	LY Drawing: 481 Description GASKET, IMS INLET SCREW, 10-32 X 5/8 LG, PAN HD, SST IMS BRACKET, TEST ASSY SCREW, 6-32 X 1/2 LG, PAN HD, SST	Page Bill of Materials Sorted by Qty Per 1.000 4.000 1.000 2.000	Rev: UOM EA EA EA EA EA	Man SD PAC P.F	4815140 ufacture IFIC
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A 20659 2813635-B 20430 10812	IMS ASSEME Item# 0155 0156 0157 0158 0159	LYDrawing: 481DescriptionGASKET, IMS INLETSCREW, 10-32 X 5/8 LG, PAN HD, SSTIMS BRACKET, TEST ASSYSCREW, 6-32 X 1/2 LG, PAN HD, SSTWASHER, LOCK, #4, FLAT, EXTERNAL TOOTH	Page Bill of Materials Sorted by Qty Per 1.000 4.000 1.000 2.000 4.000	Rev: UOM EA EA EA EA EA EA	Man SD PAC BRL P.F SPA	4815140 ufacture IFIC : ENAUR
Date: 05-14-2009 Time: 11:20:42 4815140-B Material 1815163-A 20659 2813635-B 20430 10812 7043058	IMS ASSEME Item# 0155 0156 0157 0158 0159 0160	LY Drawing: 481 Description GASKET, IMS INLET SCREW, 10-32 X 5/8 LG, PAN HD, SST IMS BRACKET, TEST ASSY SCREW, 6-32 X 1/2 LG, PAN HD, SST WASHER, LOCK, #4, FLAT, EXTERNAL TOOTH SCREW 4-40, 1/2 LG HEX HEAD, NYLON	Page Bill of Materials Sorted by Qty Per 1.000 4.000 2.000 4.000 4.000	Rev: UOM EA EA EA EA EA EA	Man Number Man SD PAC BRL P.F SPA SPA	4815140 ufacture IFIC ENAUR ENAUR

815198-B	0162	SPRING, GLA	ASS LINER		 1.000	EA	SD	
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4817835-B	ANALYZING A	ASSEMBLY SENTINEL IIMC Drawing: 4817835		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
3818685-C	0001	CARTRIDGE ASSY, FLAT MESH	1.000	EA	SD
2818092-В	0002	HOOD ASSY	1.000	EA	SD
4817837-C	0003	2ND STAGE PRECONCENTRATOR ASSY, 2MC	1.000	EA	SD
4818294-C	0004	IMS ASSY	1.000	EA	SD
4818293-A	0005	FLOW MODULE ASSY	1.000	EA	SD
20446	0006	SCREW, 8-32 X 5/8 LG, PAN HD, SST	3.000	EA	PACIFIC ENF
20626	0007	WASHER, LOCK, SPLIT, #8, SST	3.000	EA	SPAENAUR
20618	0008	WASHER, FLAT, #8, SST	3.000	EA	SPAENAUR
7041308	0009	TUBING, SHRINKABLE .75 ID X .031 WALL	3.000	IN	Alpha Alpha
10947	0010	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	12.000	IN	WAREHOUSE PL
7040090	0011	UNION, BULKHEAD 1/8 SHORT	1.000	EA	SWAGELOCK
	0012	TUBE, METAL, ANALYZING	1.000	EA	SD
7041663	0013	TUBING, NYLON, 1/4", BLACK, 1/4" O.D / .18	192.000	IN	SMC PNEUMATI
7045182	0014	CLAMP, WIRE ROUTING, 1/2"	1.000	EA	RICHCO
4817841-B	0015	PRECONCENTRATOR ASSY	1.000	EA	SD

 SILICONE	TUBING,	O.D, 0.25	" I.D 0.125	 2.500	IN	SILASTI
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4817837-C	2ND STAGE	PRECONCENTRATOR ASSY, 2MCDrawing: 4817837		Rev:	
Material	Item#	Description	Qty Per	UOM	Manufacturer
4819594-A	0001	VALVE ASSEMBLY, SENTINEL IIMC	1.000	EA	SD
3818109-В	0002	PLATE, 2ND STAGE IMS	1.000	EA	SD
2818106-в	0003	COMPONENTS ASSY	1.000	EA	SD
2817838-C	0004	MESH ASSY, 2ND STAGE SENTINEL IIMC	1.000	EA	SD
1818110-в	0005	SLEEVE, MAIN VALVE	1.000	EA	SD
1818115-A	0006	BRACKET, TRANSFORMER	1.000	EA	SD
7042536	0007	TRANSFORMER 1.5 VAC @ 40A	1.000	EA	SIGNAL
1818116-A	0008	BRACKET PLATE	4.000	EA	SD
1814275-A	0009	BRACKET, TERMOC. CONNECTOR 2ND STAGE PR	1.000	EA	BRL
2817326-B	0010	PORT, SAMPLE ENTRANCE	1.000	EA	SD
1815189-A	0011	COOLER PIPE 2ND STAGE PRECONCENTRATOR	1.000	EA	SD
20363	0012	SCREW, 10-32 X 1/2 LG, FLAT HD, SST	10.000	EA	PACIFIC
20395	0013	SCREW, 8-32 X 1/2 LG, FLAT HD, SST	4.000	EA	PACIFIC
20386	0014	SCREW, 6-32 X 1/4 LG, FLAT HD, SST	2.000	EA	PACIFIC
7043199	0015	SCREW, BINDING HEAD, 1/4" -20 X 9/16	2.000	EA	SPAENAUR
20625	0016	WASHER, LOCK, SPLIT, #6, SST	5.000	EA	SPAENAUR

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20617	0017	WASHER, FLAT, #6, SST	1.000	EA	P.F. NA
20445	0018	SCREW, 8-32 X 3/8 LG, PAN HD, SST	2.000	EA	PACIFIC
7043246	0020	LOCKWASHER, TOOTH INT. EXT. FLAT	2.000	EA	SPAENAUR
7043250	0021	WASHER, STEEL FLAT # 8, 1/2" OD	2.000	EA	SPAENAUR
20440	0022	SCREW, 8-32 X 1/2 LG, PAN HD, SST	2.000	EA	
20626	0023	WASHER, LOCK, SPLIT, #8, SST	2.000	EA	SPAENAUR
20618	0024	WASHER, FLAT, #8, SST	2.000	EA	SPAENAUR
20413	0025	SCREW, 10-32 X 3/8 LG, PAN HD, SST	2.000	EA	PACIFIC
20614	0026	WASHER, FLAT, #10, SST	2.000	EA	NA

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4817837-C	2ND STAGE 1	PRECONCENTRATOR ASSY, 2MC	Drawing: 4817837		Rev:	
Material	Item#	Description		Qty Per	UOM	Manufacturer
20623	0027	WASHER, LOCK, SPLIT, #10, S	ST	2.000	EA	NA
7043221	0028	WASHER, LOCK COUNTER SUNK #	8	4.000	EA	SPAENAUR
1818211-B	0029	COOLER TUBE HOLDER		1.000	EA	SD

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7045098	0030	UNION, BULKHEAD, 3/8 DIA TUBE	1.000	EA	SWAGELOK
7043219	0031	WASHER, LOCK COUNTER SUNK # 10	2.000	EA	SPAENAUR
1818378-A	0032	LATCH, INSERT	2.000	EA	SD
15543	0033	SCREW, 6-32 X 5/16 LG, PAN HD, SST	2.000	EA	PACIFIC
2817574-в	0034	IR TEMPERATURE MEASURE SYSTEM MODIFIED	1.000	EA	SD
20435	0035	SCREW, 6-32 X 3/4 LG, PAN HD, SST	2.000	EA	PACIFIC
15530	0036	o-Ring #012 Viton 5/pk	1.000	EA	ABLE
Rohs					
13746	0037	CLAMP, CABLE, 1/2 ID, NYLON	1.000	EA	SPAENAU
20436	0038	SCREW, 6-32 X 3/8 LG, PAN HD, SST	1.000	EA	SPAENAU
2818205-A	0039	SCHEMATIC, SECONDARY ASSY	1.000	EA	SD
13570	0040	SCREWLOCK KIT, FEMALE, 4-40 THREAD	1.000	PAA	AMP
4817842-B	0041	WIRING 2 ND STAGE PRE-CON SENTINEL IIMC	1.000	EA	SD

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4818000	SE	NTINEL 208/220V	Constant D)rwg: 481	18000		Rev: B	Co	mm: ASSY	ECN: 15	999
ExtPanic St	iftem#	Description,	Ory Per-	UOM	PT	BT	Commodity		Manufacturers Information	s Hearing	CN #
2817254	0	WIRING DIAGRAM, EMBEDDED COMPUTER	1.0000	EA	Ţ	E	TOOL	SD	2817254		
4817847	0	PRODUCT STRUCTURE SENTINEL IIMC	1.0000	EA	Т	E	MISC	SD	4817847		
4818200	0	PNEUMATIC DIAGRAM	1.0000	EA	Т	E	MISC	SD	4818200		
4818202	0	WRING DIAGRAM	1.0000	EA	т	E	MISC	SD	4818202		
4818204	0	HIGH VOLTAGE WIRING SENTINEL IIMC	1.0000	EA	Т	E	MISC	SD	4818204		
7044465	0	MICROSOFT WINDOWS SOFTWARE XP PRO OE	1.0000	EA	В	N	SOFTWARE	MICROSOFT	XP PRO OEM		:
7044933	0	CRATE, SKINS, 96 X 48 X 48	1.0000	EA	В	N	MISC	CUSTOM PACKA	96X48X48		:
7044934	0	CRATE, PORTAL, 90 X 48 X 38	1.0000	EA	В	N	MISC	CUSTOM PACKA	90X48X38		<u>.</u>
7044935	0	CRATE, SAMPLING STATION, 90 X 54 X 38	1.0000	EA	В	N	MISC	CUSTOM PACKA	90X54X38		;
9818470	0	CONTROL PARAMETER MC EXPL	1.0000	EA	Т	E	SOFTWARE	SD	9818470		
4817862	1	PORTAL ASSY	1.0000	EA	A	N	ASSY	SD	4817862		· · · · · · · · · · · · · · · · · · ·
4818330	2	PORTAL ASSY, TOP	1.0000	EA	S	N	ASSY	SD	4818330		
4817840	3	SAMPLING STATION ASSY SENTINEL IIMC	1.0000	EA	A	N	ASSY	SD	4817840		
4815727	4	SAMPLING STATION ASSY, TOP	1.0000	EA	S	N	ASSY	SD	4815727		:
3819644	5	OPERATOR DOOR ASSY, RIGHT	1.0000	EA	A	N	ASSY	SD	3819644	15999	
3816477	6	ACCESS DOOR ASSY, RIGHT	1.0000	EA	A	N	ASSY	SD	3816477		1
2816584	7	PANEL ASSY, RIGHT, LOWER, SERVICE	1.0000	EA	В	N	ASSY	SD	2816584		1
3818324	8	PANEL ASSY, OPERATOR	1.0000	ĒA	В	N	ASSY	SD	3818324		
3818322	9	PANEL ASSY, PATRON PORTAL LEFT	1.0000	EA	A	N	ASSY	SD	3818322		
3818323	10	PANEL ASSY, PORTAL PATRON RIGHT	1.0000	EA	A	N	ASSY	SD	3818323		
2817095	11	PANEL ASSY, UPPER RIGHT SERVICE	1.0000	EA	В	N	ASSY	SD	2817095		3
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4818000	SI	ENTINEL 2MC 208/220V		Drwg: 48	18000		Rev: B	Ċc	omm: ASSY ECN	: 15999
Part# DP	fitem#5	Description	Oty Per-	UOM	Пети	BT	Commodity		Manufacturers Information	ECN#
2817030	12	PANEL ASSY, TOP SAMPLING STATION	1.0000	EA	A	N	ASSY	SD	2817030	
2816583	13	PANEL ASSY, LOWER SIDE	2.0000	EA	В	N	ASSY	SD	2816583	
2816890	14	SPEAKER BOX ASSY	1.0000	EA	А	N	ASSY	SD	2816890	
2816582	15	PANEL ASSY, UPPER SIDE	2.0000	EA	В	N	ASSY	SD	2816582	
3816924	16	COVER, CAMERA	1.0000	EA	В	N	MACH. PART	SD	3816924	
2818988	17	ROOF FILTER, POLYESTER	1.0000	EA	В	N	MISC	SD	2818988	
7044008	18	FILTER, AIR, FIBERGLASS, 14" X 14" X 1"	1.0000	EA	В	N	MISC	MCMASTER-CAR	2063K473	
7044774	19	NUT,HEX,3/8 - 16,GRADE 5 ZINC - PLATED STEEL	4.0000	EA	В	N	HARDWARE	MCMASTER-CAR	95462A031	
20844	20	WASHER, LOCK, SPLIT, 3/8, SST	4.0000	EA	Y	E	HARDWARE	P.f.	3/8 LOCKWASHER	······
13380	21	WASHER, FLAT, 3/8 X 0.048 THK, SST	4.0000	EA	Y	E	HARDWARE	NA	658-018	
7044852	22	SCREW, CARRIAGE, 3/8"- 16 X 3 1/2" LG	4.0000	EA	В	N	HARDWARE	MCMASTER-CAR	90185A638	
3817438	23	CHARCOAL ASSY	1.0000	EA	A	N	ASSY	SD	3817438	
7042021	25	FASTENER, VELSTRAP 23/12 LG	2.0000	EA	Y	E	HARDWARE	SPAENAUR	888-435	
20430	26	SCREW, 6-32 X 1/2 LG, PAN HD, SST	4.0000	EA	Y	Е	HARDWARE	P.F.	6-32 UNC X 1/2 PAN	
20617	27	WASHER, FLAT, #6, SST	4.0000	EA	Y	E	HARDWARE	NA P.F.	#6 WASHER FLAT SST #6, WASHER, FLAT, SST	
20625	28	WASHER, LOCK, SPLIT, #6, SST	4.0000	EA	Y	E	HARDWARE	SPAENAUR	W-2024	
2816455	29	COVER, FILTER ATLANTIC-1	4.0000	EA	В	N	MACH. PART	SD	2816455	
20487	31	SCREW, CAP, 1/4-20 X 1.5 LG, HEX SOCH, SST	20.0000	EA	Y	E	HARDWARE	PACIFIC	HX-18	
20619	32	WASHER, FLAT, 1/4" BOLT X 1/2" O.D X .062 THK	26.0000	EA	Y	E.	HARDWARE	SPAENAUR	658-016	
20627	33	WASHER, LOCK, SPLIT, 1/4, SST	26.0000	EA	Y	Ε	HARDWARE	SPAENAUR	667-002	



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4818000	SE	NTINEL 208/220V	D)rwg: 481	8000		Rev: B	(Comm: ASSY	ECN: 15	99
Part R	fitem#	Description	Qty Per	UOM	PT	BT	Commodity		Manufacturers Information		CN #
7040538	34	SCREW, 1/4 - 20 X 3/4 PAN HD, SST	6.0000	EA	Y	E	HARDWARE	PAN	1/4- 20 X 3/4		
20407	35	SCREW, 10-32 X 1/2 LG, PAN HD, SST	4.0000	EA	Y	E	HARDWARE	PACIFIC	10-32 UNF X 1/2 PAN		
20623	36	WASHER, LOCK, SPLIT, #10, SST	4.0000	EA	Y	Е	HARDWARE	NA	#10 LOCKWASHER		
20614	37	WASHER, FLAT, #10, SST	4.0000	EA	Y	E	HARDWARE	NA	#10 STD WASHER		
1817761	38	NAMEPLATE, SENTINEL II NEG. MODE	1.0000	EA	В	N	MISC	SD	1817761		1
1817762	39	LABEL,C CSA US, UNIVERSAL	1.0000	EA	Y	E	MISC	SD	1817762		
7045229	40	CLIP, .650 X 1.28, STEEL	3.0000	EA	В	N	HARDWARE	KEYSTONE	79		
7040722	41	LABEL, MADE IN CANADA 3/4" X 1 3/8"	1.0000	EA	В	N	MISC	SETON	27273	15590	
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Part Notes for Assembly:

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4818293-A	FLOW MODULE	ASSY Drawing: 4818293		Rev: 2	
Material	Item#	Description	Otv Per	UOM	Manufacturer
4818222-B	0000	FLOW AIR TUBE ASSY INSTRUCTION	1.000	 EA	SD
4810691-B	0001	BRACKET, FLOW MODULE 400B	1.000	EA	BRL
4810692-A	0002	MANIFOLD 1, FLOW MODULE ASSY, 400B	1.000	EA	BRL
2810693-A	0003	MANIFOLD #2 FLOW MODULE ASSY, 400B	1.000	EA	BRL
1811231-B	0004	VALVE, VACUUM, ASSEMBLY 400B	1.000	EA	BRL
1811230-C	0005	VALVE, PRESSURE ASSEMBLY 400B	1.000	EA	BRL
7040708	0007	FITTING, COMPRESSION, MIN MINIATURE	2.000	EA	SWAGELOK
1810714-E	0008	FITTING, COMPRESSION .007 ORIFICE, MOD	1.000	EA	BRL
7040032	0009	SCREW, PLUG, VITON-O-RING	3.000	EA	BESWICK ENGI
1811238-В	0010	VALVE, 2-WAY PLUG ASSY	1.000	EA	BRL
2810754-Z	0011	FLOW CONTROL MODULE PCB ASSEMBLY	1.000	EA	BRL 400B
7040087	0012	FITTING, MINIATURE BULKHD	2.000	EA	BESWICK ENGN
7040088	0013	FITTING, ELBOW, ADJUST- ABLE, POSITION	1.000	EA	BESWICK ENGN
7040398	0015	FITTING, ID TUBE, MINI VITON-O-RING	2.000	EA	BESWICK ENG.
15539 7040090 CAN BE	0016 A SUBSTITUTE F	UNION, BULKHEAD. 1/8" OR ITEM 16	6.000	EA	SWAGELOK HAM-LET

1811239-В	0017	VALVE, EXHAUST/FILTER ASSEMBLY	1.000	EA	BRL
10762	0018	O-RING, 1/8 ID X 1/4 OD X 1/16 W	4.000	EA	ABLE NA
20425	0019	SCREW, 4-40 X 3/4 LG, PAN HD, SST	4.000	EA	
20624	0020	WASHER, LOCK, SPLIT, #4, SST	8.000	EA	SPAENAUR
20049	0021	TUBING, 3/32 ID, HEAT SHRINKABLE, BLK	3.000	IN	ALPHA
20426	0022	SCREW, 4-40 X 3/8 LG, PAN HD, SST	4.000	EA	P.F.
15623	0024	SCREW, 4-40 X 3/8 LG, FLAT HD	6.000	EA	PACIFIC
1813403-A	0025	GASKET, COPPER, 10-32	4.000	EA	BRL
1811240-в	0026	VALVE, 3-WAY BYPASS ASSY	1.000	EA	BRL

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4818293-A	FLOW MODUL	E ASSY Drawing: 4818293		Rev: 2	
Material	Item#	Description	Qty Per	UOM	Manüfacturer
1811241-B	0027	VALVE, POSITIVE ASSY NARC MODE	1.000	EA	BRL
1810713-E	0029	FITTING, COMPRESSION .006 ORIFICE, MOD	1.000	EA	BRL
20680	0030	STRAP, TIEDOWN	2.000	EA	PANDUIT

10915	0031	TUBING, 1/4 OD X 1/8 ID, BEV-A-LINE-I	1.500	IN	WAREHOUSE PL
15788	0033	TAG, MARKING, CUSTOM PRINTED "NARCOTI	1.000	EA	WEIDMULLER
15789	0034	TAG, MARKING, CUSTOM PRINTED "EXPLOSI	1.000	EA	WEIDMULLER
15946	0035	TAG, MARKING, CUSTOM PRINTED "REACTAN	2.000	EA	WEIDMULLER
15942	0036	TAG, MARKING, CUSTOM PRINTED "BYPASS	2.000	EA	WEIDMULLER
15787	0037	TAG, MARKING, CUSTOM PRINTED "EXHAUST	1.000	EA	WEIDMULLER
15796	0038	TAG, MARKING, CUSTOM PRINTED "DPT	1.000	EA	WEIDMULLER
15786	0039	SLEEVE, CLEAR	8.000	EA	WEIDMULLER
10947	0040	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	212.400	IN	WAREHOUSE PL
13911	0043	CONNECTOR, MALE, 1/8 TUBE CPRSN X 10-3	15.000	EA	CLIPPARD
20452	0044	SCREW, 10-32 X 1/4 LG, RND HD, SST	1.000	EA	PACIFIC
1811158-в	0048	GASKET, VITON, FITTING CLIPPARD	14.000	EA	BRL
15922	0049	WIRE MARKER, '3', SLEEVE TYPE	1.000	EA	WEIDMULLER
10490	0050	CABLE TIE, MINIATURE, 4" FOR 3/4" DI	3.000	EA	PANDUIT
20607	0051	WIRE, BUS, 26 AWG, TINNED COPPER (UNCO	0.200	IN	BELDEN
7040302	0052	WIRE 26, AWG, STRD, BLK INSUL	10.000	IN	WIRE
11079	0053	WASHER, FLAT, #4 X 1/32 THK, FIBER	4.000	EA	SPAENAUR
7046104	0054	ORIFICE CHOKE, .003 VITON	2.000	EA	BESWICK
15937	0055	TEE	1.000	EA	NA

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4818660-F

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			Qty Per	UOM	
Material	Item#	Description			Manufacturer
4818656-D	0001	FRAME, WITH BRACKETS	1.000	EA	SD
4818682-A	0002	PNEUMATIC ASSY, SENTINEL IIMD	1.000	EA	SD
4818296-B	0003	DETECTOR MODULE	1.000	EA	SD
4817834~A	0004	BLOWER AND DAMPER ASSY SENTINEL IIMC	1.000	EA	SD
4818724-C	0005	DISTRIBUTION BOX, MODIFICATION, SENTINE	1.000	EA	SD
4816950-B	0006	INLET DUCT, SENTINEL II	1.000	EA	SD
4818850~E	0007	POWER DISTRIBUTION, SAMPLING, SENTINEL	1.000	EA	SD
4818851-D	0008	WIRING ASSY, SAMPLING SENTINEL IIMD	1.000	EA	SD
4819840-A	0009	ANALYZING ASSY, SENT IIMD	1.000	EA	SD
3817542-в	0010	MUFFLER ASSY	1.000	EA	SD
3818297-Е	0011	CPU & PRINTER ASSY	1.000	EA	SD
3818299-A	0012	TERMINAL BLOCK ASSY	1.000	EA	SD
3819862-в	0013	INSTRUMENTATION ASSY, SENTINEL IIMD	1.000	EA	SD
3816226-A	0014	TRAY, SPONGE	1.000	EA	SD
2816186-В	0015	COVER, SPONGE TRAY	1.000	EA	SD
3818887-C	0016	SS RELAY & MOTOR CONTROLLER ASSY	1.000	EA	SD

Drawing: 4818660



SAMPLING STATION ASSY SENTINEL IIMD
					1:
3815759-A	0017	VERIFICATION MODULE ASSY	1.000	EA	SD
2816729-A	0019	TERMINAL BLOCK 24V ASSY	1.000	EA	SD
2816191-C	0020	BRACKET, DISTRIBUTION BOX	1.000	EA	SD
4813327-D	0022	DRIERITE TANK, LLAPU SEE 4812599	1.000	EA	BRL
2814641-в	0023	GUARD, INSIDE PANEL	1.000	EA	BRL
2814640-в	0024	MESH, DUCT INLET SENTINEL II	1.000	EA	BRL
2814081-В	0026	GASKET, DAMPER-PRECON'R PORTAL ASSY	1.000	EA	BRL
1816440-A	0028	RELAY K II MODIFICATION	1.000	EA	SD
1816042-A	0029	GUARD, TRANSFORMER	1.000	EA	SD
1816036-в	0030	SHIELD, CARD CAGE KC	1.000	EA	SD
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4818660-F	SAMPLING ST	TATION ASSY SENTINEL IIMD Drawing: 4818660		Rev: 2	
Material	Item#	Description	Qty Per	UOM	Manufacturer
1814346-D	0032	BLOCK, VERIFICATION PROBE INLET	1.000	EA	BRL
1814234-A	0033	GASKET, ROUND DUCT	1.000	EA	BRL
12997	0034	STANDOFF, HEX, 6-32 THD, 1/2 LG, ALUM	4.000	EA	NA
7041811	0035	CLAMP, HOSE, 7 1/8" - 10" DIA	2.000	EA	MCMASTER
12997 7041811	0034	STANDOFF, HEX, 6-32 THD, 1/2 LG, ALUM CLAMP, HOSE, 7 1/8" - 10" DIA	4.000	EA	

7042875	0036	STANDOFF,1/2 HEX MALE - FEMALE, 3/4	2.000	EA	RAF
7045197	0037	TRANSFORMER, POWER, STEP DOWN	1.000	EA	SIGNAL TRANS
20407	0038	SCREW, 10-32 X 1/2 LG, PAN HD, SST	22.000	EA	PACIFIC
20614	0039	WASHER, FLAT, #10, SST	34.000	EA	AN
20623	0040	WASHER, LOCK, SPLIT, #10, SST	34.000	EA	NA
20404	0041	SCREW, 1/4-20 X 1/2 LG, PAN HD, SST	10.000	EA	PACIFIC
20619	0042	WASHER, FLAT, 1/4" BOLT X 1/2" O.D	36.000	EA	SPAENAUR
20627	0043	WASHER, LOCK, SPLIT, 1/4, SST	56.000	EA	SPAENAUR
13486	0044	SCREW, 5/16-18 X 1 LG, UNSLOTTED HEX H	33.000	EA	PACIFIC
13495	0045	WASHER, FLAT, 5/16, SST	49.000	EA	NA
13951	0046	WASHER, LOCK, 5/16, INTERNAL TOOTH	10.000	EA	NA
20430	0048	SCREW, 6-32 X 1/2 LG, PAN HD, SST	4.000	EA	P.F.
20617	0049	WASHER, FLAT, #6, SST	19.000	EA	P.F. NA
20625	0050	WASHER, LOCK, SPLIT, #6, SST	19.000	EA	SPAENAUR
20426	0051	SCREW, 4-40 X 3/8 LG, PAN HD, SST	3.000	EA	P.F.
20616	0052	WASHER, FLAT, #4, SST	5.000	EA	SPAENAUR
20624	0053	WASHER, LOCK, SPLIT, #4, SST	5.000	EA	SPAENAUR
20436	0055	SCREW, 6-32 X 3/8 LG, PAN HD, SST	11.000	EA	SPAENAUR
20431	0057	SCREW, 6-32 X 1/4 LG, PAN HD, SST	4.000	EA	P.F.
13487	0058	SCREW, CAP, 1/4-20 X 5/8 LG, HEX SOCH	4.000	EA	PACIFIC

7044695	0059	SCREW,#10-32 X 1 3/4 LG, STEEL, ZINC P	2.000	EA	SPAEN
Date: 05-26-2009 Time: 09:17:21			Page: Bill of Materials Sorted by	2 of - Assem Item N	5 bly #:4 umber
4818660-F	SAMPLING S	TATION ASSY SENTINEL IIMD Drawing: 48:	18660	Rev: 2	
Material	Item#	Description	Qty Per	UOM	Manuf
13113	0060	SCREW, CAP, 10-24 X 1/2 LG, HEX SOCH,	2.000	EA	PACIF
2812535-A	0062	SUPPORT, DRIERITE TANK STATION ASS'Y	1.000	EA	BRL
7042021	0063	FASTENER, VELSTRAP 23/12 LG	2.000	EA	SPAEN
7044150	0064	TRANSFORMER, 240V TO 120V 50/60HZ, 100	1.000	EA	REX
1817122-A	0065	COVER, SAFETY	2.000	EA	SD
7044147	0066	COVER, UTILITY BOX	1.000	EA	IBERV
7042287	0067	UTILITY BOX 1-7/8" DEEP	1.000	EA	IBERV
7044170	0069	RECEPTACLE, 125/250V, 15A	1.000	EA	TES LEVIT
7043983	0070	SCREW, THREAD-CUTTING, #6-32 X 1/2 LG	4.000	EA	MCMAS
1816049-A	0073	SHIELD, CARD CAGE	1.000	EA	SD
	0074	NUT. HEX. 4-40 X 3/32 THK. NYLON	2.000	EA	NA

10947	0075	TUBING, 1/8 OD X 1/16 ID, CLEAR TEFLON	84.000	IN	WAREHOUSE PL
7042770	0076	SILICONE TUBING, O.D, 0.25" I.D 0.125	360.000	· IN	SILASTIC
7042800	0079	U-BOLT, 5/16-18, 1 3/4" WIDTH	2.000	EA	SPAENAUR
7042799	0080	NUT, HEX 5/16-18	4.000	EA	SPAENAUR
13480	0081	WASHER, LOCK, SPLIT, 5/16	26.000	EA	NA
7044483	0082	SPONGE, ABSORBENT, 6" X 3 1/2" X 1,	1.000	EA	MCMASTER-CAR
7042281	0083	CABLE CONNECTOR, 1/2" STRAIGHT, TYPE	2.000	EA	IBERVILLE
7043804	0084	LABEL, "HAZARDOUS VOLTAGE INSIDE	1.000	EA	HAZARD COMM
4818645-B	0096	VALVES ASSY, NEW BRACKETS	1.000	EA	SD
13494	0098	SCREW, CAP, 1/4-20 X 1 LG, HEX SOCH, S	2.000	EA	SPAENAUR
4818625-A	0099	VACUUM BLOWER ASSY	1.000	EA	SD
1817720-в	0100	BRACKET, CLIP MNTG	1.000	EA	SD
7044559	0101	CLIP, SPRING, FOR 0.590 COMPONENT	2.000	EA	SEASTROM MAN
7044543	0102	FUSEHOLDER FOR 1/4" X 1 1/4" FUSES,2	1.000	EA	BUSSMANN BUSSMANN

Date: 05-26-2009 Time: 09:17:21 Page: 3 of 5 Bill of Materials - Assembly # 4818660-Sorted by Item Number

4818660-F

SAMPLING STATION ASSY SENTINEL IIMD

Drawing: 4818660

Rev: 2

Material	Item#	Description	Qty Per	UOM	Manufacturer
1817643-B	0103	TUBE, FLEX 7 X 34	1.000	EA	SD
20667	0105	TAPE, ALUMINUM 2" X 180' / ROLL	132.000	IN	MCMASTER-CAR
1814126-A	0106	TAG, MAKING CUSTOM PRINTED" LL1	1.000	EA	WEIDMULLER
15786	0107	SLEEVE, CLEAR	2.000	EA	WEIDMULLER
1814730-A	0108	TAG MARKING CUSTOM PRINTED "1	1.000	EA	BRL
7040708	0109	FITTING, COMPRESSION, MIN MINIATURE	2.000	EA	SWAGELOK
13484	0110	SCREW, CAP, 5/16-18 X 1 LG, HEX SOCH,	12.000	EA	PACIFIC
20189	0111	NUT, HEX, 1/4-20 X STD THK, SST	4.000	EA	P.F. SPAENAUR
20190	0112	NUT, HEX, 10-32 X STD THK, SST	6.000	EA	NA
11054	0114	SCREW, 10-32 X 1/2 LG, HEX HD, SST	4.000	EA	PACIFIC
13117	0115	SCREW, CAP, 1/4-20 X 1/2 LG, HEX SOCH	4.000	EA	PACIFIC
3818680-C	0116	AIR COMPRESSOR ASSY	1.000	EA	SD
7042725	0117	VIBRATION MOUNT	8.000	EA	REIDTOOL SUP
14234	0118	SCREW, 1/4-20 X 3/4 LG, PAN HD, SST	24.000	EA	
3818574-A	0119	PLATE, COMPRESSOR ASSY	1.000	EA	SD
13380	0120	WASHER, FLAT, 3/8 X 0.048 THK, SST	8.000	EA	NA
2818578-B	0121	BAR, AIR FILTER ASSY SUPPORT, LEFT	1.000	EA	SD
2818579-В	0122	BAR, AIR FILTER ASSY SUPPORT, RIGHT	1.000	EA	SD
3818624-A	0123	AIR FILTER ASSY	1.000	EA	SD

7045405	0125	FILTER, VACUUM	1.000	EA	VTEC
20458	0126	SCREW, 10-32 X 3/4 LG, RND HD, SST	4.000	EA	PACIFIC
2818667-A	0127	SAMPLE ENTRANCE PORT	1.000	EA	SD
7044722	0128	FITTING, HOSE BARB 1"HOSE TO 3/4 PIPE	1.000	EA	VERSA
2818888-в	0129	FAN ASSY, VACUUM BLOWER SENTINEL IIMD	1.000	EA	SD
7045411	0130	TUBING, NYLON 11, 8MM O.D BLACK	122.400	IN	MCMASTER-CAR

Date: 05-26-2009 Time: 09:17:21 Page: 4 of 5 Bill of Materials - Assembly #:4818660-Sorted by Item Number

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SAMPLING ST	TATION ASSY SENTINEL IIMD Drawing: 4818660		Rev: 2	
Item#	Description	Qty Per	UOM	Manufacturer
0131	BLEEDING SYSTEM ASSY, SENTINEL IIMD	1.000	EA	SD
0132	TERMINAL STRIP, 6 POLES, #10AWG, 300V	1.000	EA	WIELAND
0133	SCREW, 6-32 X 7/8 LG, PAN HD, SST	2.000	EA	P.F.
0134	SCREW, CAP, 1/4-20 X 3/4 LG, HEX SOCH	2.000	EA	PACIFIC
0135	WASHER, LOCK, SPLIT, 5/16	3.000	EA	NA
0136	GROMMET, RUBBER	0.250	EA	SPAENAUR
0137	SCREW, 1/4-20 X 3/4 LG, PAN HD, SST	2.000	EA	
	SAMPLING S Item# 0131 0132 0133 0134 0135 0136 0137	SAMPLING STATION ASSY SENTINEL IIMDDrawing: 4818660Item#Description0131BLEEDING SYSTEM ASSY, SENTINEL IIMD0132TERMINAL STRIP, 6 POLES, #10AWG, 300V0133SCREW, 6-32 X 7/8 LG, PAN HD, SST0134SCREW, CAP, 1/4-20 X 3/4 LG, HEX SOCH0135WASHER, LOCK, SPLIT, 5/160136GROMMET, RUBBER0137SCREW, 1/4-20 X 3/4 LG, PAN HD, SST	SAMPLING STATION ASSY SENTINEL IIMD Drawing: 4818660 Item# Description Qty Per 0131 BLEEDING SYSTEM ASSY, SENTINEL IIMD 1.000 0132 TERMINAL STRIP, 6 POLES, #10AWG, 300V 1.000 0133 SCREW, 6-32 X 7/8 LG, PAN HD, SST 2.000 0134 SCREW, CAP, 1/4-20 X 3/4 LG, HEX SOCH 2.000 0135 WASHER, LOCK, SPLIT, 5/16 3.000 0136 GROMMET, RUBBER 0.250 0137 SCREW, 1/4-20 X 3/4 LG, PAN HD, SST 2.000	SAMPLING STATION ASSY SENTINEL IIMD Drawing: 4818660 Rev: 2 Item# Description Qty Per UOM 0131 BLEEDING SYSTEM ASSY, SENTINEL IIMD 1.000 EA 0132 TERMINAL STRIP, 6 POLES, #10AWG, 300V 1.000 EA 0133 SCREW, 6-32 X 7/8 LG, PAN HD, SST 2.000 EA 0134 SCREW, CAP, 1/4-20 X 3/4 LG, HEX SOCH 2.000 EA 0135 WASHER, LOCK, SPLIT, 5/16 3.000 EA 0136 GROMMET, RUBBER 0.250 EA 0137 SCREW, 1/4-20 X 3/4 LG, PAN HD, SST 2.000 EA

smiths								ENGINEE	RING C		R (E	CO)						
ECR#	ECO#		TD#					REQUESTED BY	/: /:		<u> </u>	DEPART	MENT:		RE	ASON CODE:	:	
1	16778	}						James Gray				Sustai	ning		Cust	tomer Reque	st	
DATE			L	L		MC	DDEL:			ASSEMB	<u> </u>		- 1			,		
16/07/2009	9					Va	rious			VARIOUS PRODU	CTS:				All product	s		
DWG / DOC#	0.0	<u>і</u> эт #	1	DE	SCRIPTIO	N		REV (From)	PEV (To)	DWG / DOC#				DESCRIPTION			EV (Ecom)	BEV (
4810768	4810	0768	DE	TECTOR	MODULE.	400B. E	BASIC	AZ	AZ1	4820800	48	20800	MULTI	MODE THREAT DET	ECTOR		C9	C10
4815374	4815	5374	IMS	S MODULL	LE ASSY, C	ENTU	RION	В	B1	4816800	48	16800		IONCAN 500 DT			F	F1
4815733	4815	5733	INSI	DE PANEL	LASSY, LE	FT-BO	оттом	A1	A2	4816800BT	481	6800BT	ION	SCAN 500DT W BATT	ERY		B1	Bź
4816104	4816	6104		P	MS-1 ASSY	,		Q1	Q2	4817092BT	481	7092BT	MECHANICAL AS	SEMBLY IONSCAN 5	00DT W BAT	TERY	В	B1
4816105	4816	6105	· ·		MS-2 ASSY	, 		Q1	Q2									
4816600	4816	600	D	ETECTOR	R ASSY, SA	BRE 4	1000	н			-							
481/092	481/	092	MECHA	ANICAL AS	SSEMBLY #	ONSC/	AN 500DT	J			-							
4819890	4017	890	PRECON	IGE PREC	TOR ASS		TINEL IMD	A1	A2		+					_		
4820726	4820	726	THEOOR	ANA	nni on Assi, servinite umu . ni na													
ASON FOR CHANGE:								1		Attach m	arked-up	documents	s, drawings, and/o	r BoMs, and test resu	ults, to printe	ed copy for a	oproval.	
16014 - Replace Iter 16015 - Replace Iter 16600 - Replace Iter 17092 - Replace Iter 17837 - Replace Iter 19890 - Replace Iter 20726 - Replace Iter 106800 - Replace Iter 16800BT - Replace 17092BT - Replace	ms #50, #59 ms #50, #59 ms #2, #24, ; m # 12 with T m #15 with T m #32 with T ms #6, #19 w ms #7, #23 w m #12 with T Item #12 with Item #12 with	with Tam with Tam #34, #35 Tamperpro amperpro vith Tamp vith Tamp amperpro h Tampen h Tampen	nperproof Scr nperproof Scr with Tamper roof Screw oof Screw oof Screw oof Screw perproof Screw oof Screw rproof Screw rproof Screw	rews proof Scr pws pews	rews													
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FINISHED	GOODS		Yes	R	ework			PARTS IN STOC	ж	Yes	Rew	ork	PAR	PARTS ON ORDER Yes			Rework	
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terns Engineer Signatu	ure	4301	Vinay F	Rajput	Date:								Do the Finan	cial Controller need to	sign?			No
cument Control Approv	/al		İ		Date:										-			
	REQUIR	ED ATTAC	CHMENTS			T			REQUIRED AC	TIONS					ECO EFFEC	CTIVE DATE		
F/W Validation		No				F	Replace previou	s revisions or mark	them as 'obsolete'.			Ye	IS					
g. Test Report		No	1				Submit changes	to CSA for approva	ıl.			Ye	15		REQUIRED	ACTIONS		
work Instruction		Yes					Submit changes	to Customer for app	proval.			Ye	Guantity of Fi	nished Goods on hand				
st Analysis		Yes				Ś	Set First Article					N	o Quantity of W	ork in Progress on har	nd			
aning Procedure Requ	ired	No				F	Field Service Bul	lletin				Ye	Guantity of pa	arts in stock				
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Items	to be ma	de t	amper	-proof								
Product	Assy #	Item #	Current P/N	Current Spec	Supplier	Current Driver hose	New P/N	New Sner	New Supplier	New Other have	Drawton Meade Lindate? Drive De	* 1000
4008	4810768	85	20659	#10-32 X 5/8" Pao HD	Pacific 10-32 LINE X 5/8 PAN	Philios		#10.32 X 5/8" Button HD	Aaron's Security Screws 7051SC2156	5/32" Pinun Hey Spaenaur 876,770	324	4.4
500DT	4817092	12	20395	#8-32 X 1/2" Flat HD	Pacific 8-32 UNC X 1/2 FLAT	Phillips		#8-32 X 1/2" Flat HD	Spaenaur 381-356	5/32" Pip-in Hex Spaenaur 876-770		1-4
500DT	4816800-201	12	7044967	#8-32 X 3/8" /w captive lock	we Spaenaur 460-023	Phillips		#8-32 X 3/8" Button HD	Spaenaur 381-355	5/32" Pip-in Hex Spaenaur 876-770	Yes	
500DT	4816800BT-B	12	7044967	#8-32 X 3/8" Av captive lock	wi Spaenaur 460-023	Phillips		#8-32 X 3/8" Putton HD	Spaenaur 381-355	5/32" Pin in Hey Speenaur 876-770	Yes	
500DT	4816800-F	12	7044967	#8-32 X 3/8" Av captive lock	we Spaenaur 460-023	Philips		#8-32 X 3/8" Button HD	Spaepaur 381-355	5/32" Pin in Hex Spaenaur 876-770	Ves	
500DT	4816104	59	20420	#4-40 X 1/2"	Pacific 4-40 X 1/2 LG	Phillips		#4-40 X 1/2" Button HD	Aaron's Security Screws 7041SC2025	Torx T-8-H Tamper Resistant	1941	89
500DT	4816104	50	20421	#4-40 X 1/4" Pan HD	Pacific 4-40 UNC X 1/4 PAN	Phillips		#4-40 X 1/4" Button HD	Aaron's Security Screws 7041SC2021	Torx T-8-H Tamper Resistant	185	44
500DT	4816105	59	20420	#4-40 X 1/2"	Pacific 4-40 X 1/2 LG	Phillips	1	#4-40 X 1/2" Button HD	Aaron's Security Screws 7041SC2025	Toox T-8-H Tamper Resistant	1941	89
500DT	4816105	50	20421	#4-40 X 1/4" Pan HD	Pacific 4-40 UNC X 1/4 PAN	Phillips		#4-40 X 1/4" Button HD	Aaron's Security Screws 7041SC2021	Torx T-8-H Tamper Resistant	185	44
Centurion	4815374	13	20415	#2-56 X 1/2" Pan HD	Pacific	Phillips		#2-56 X 1/2" Button HD	Aaron's Security Screws 7041SC2007	Torx T-8-H Tamper Resistant	202	3
Centurion	4815374	8	20421	#4-40 X 1/4" Pan HD	Pacific 4-40 UNC X 1/4 PAN	Phillips	1	#4-40 X 1/4" Button HD	Aaron's Security Screws 7041SC2021	Torx T-8-H Tamper Resistant	185	44
MMTD	4820726	6	20420	#4-40 X 1/2"	Pacific 4-40 X 1/2 LG	Phillips		#4-40 X 1/2" Button HD	Aaron's Security Screws 7041SC2025	Torx T-8-H Tamper Resistant	194.	89
MMTD	4820726	19	7045603	#4-40 X 3/16" /w captive loc	ky McMaster Carr 95345A422	Phillips #1		#4-40 X 3/16" Button HD	Aaron's Security Screws 7041SC2020	Torx T-8-H Tamper Resistant	Yes	
MMTD	4820800	7	7045108	#8-32 X 1/2" Socket Head 0	Car Spaenaur HX-2010	Hex		Custom Fastener	Aaron's Security Screws 7041SC2020	5/32" Pin-in Hex Spaenaur 876-770	113	4 20 000 pc
MMTD	4820800	23	13121	#8-32 X 3/8" Socket Head 0	Car Pacific HX-2009	Hex		Custom Fastener	Aaron's Security Screws 7041SC2020	5/32" Pin-in Hex Spaenaur 876-770	105	3 20 000 pc
Sabre 4000	4816600	24	20418	#2-56 X 3/8" Pan HD	Pacific 2-56 UNC X 3/8 PAN	Phillips		#2-56 X 3/8" Button HD	Aaron's Security Screws 7041SC2005	Torx T-6-H Tamper Resistant	179	28
Sabre 4000	4816600	2	20421	#4-40 X 1/4" Pan HD	Pacific 4-40 UNC X 1/4 PAN	Phillips		#4-40 X 1/4" Button HD	Aaron's Security Screws 7041SC2021	Torx T-8-H Tamper Resistant	185 -	44
Sabre 4000	4816600	34	20433	#6-32 X 1 1/4" Pan HD	Pacific	Phillips		#6-32 X 1 1/4" Button HD	Aaron's Security Screws 7041 SC2062	Torx TR10 Tamper Resistant		
Sabre 4000	4816600	35	20436	#6-32 X 3/8" Pan HD	Spaenaur MS-2428P	Phillios		#6-32 X 3/8" Button HD	Speenaur 381-654	Torx TR10 Tamper Resistant		
Sentinel	4819890	32	20407	#10-32 X 1/2" Pan HD	Pacific	Phillips		#10-32 X 1/2" Button HD	Spaenaur 381-362	5/32" Pin-in Hex Spaenaur 876-770		
Sentinel	4815733	4	7043922	Used in 4817862-A	Southco E5-6-215-101	Slot	C	Southoo E5-6-195-101		Pin-in Hex Southco Key E3-11-1		
Sentinel	4817837	15	7043199	1/4"-20 X 9/16 /w captive lo	ck Spaenaur 460-016	Philips		1/4"-20 X 9-16" Button Hi	E Aaron's Security Screws 7041SC2189	Torx T-27-H Tamper Resistant	Yes	
Items	which ar	e alr	eady ta	amper-proof		1					a an	
4008	4810760	116	15878	HIG. 32 Y 1" Button UD	Someoner 381 657	Tory TR10 Tamper	Desistant					
Sentinal	4818204	116	15878	HB 32 Y 1" Dutton LD	Space 184 501-057	Tory TR10 Tamper	Desistant					
4000	4810760	114	15870	NE 32 X 1/2" Butten HD	Concorner 281 656	Tary TP10 Tamper	Desistant					
4000	4010700	446	15051	MC 22 X 3/4" Dutton HD	Spaenaur 381 656	Tory TR10 Tamper	Resistant				-	
50000	4916104	41	15051	MC 32 X 3/4" Butten UD	Concerner 201 GEC	Totx TR10 Tamper	Depistant					
5000T	4010104	41	15051	MG-32 X 3/4" Button HD	Spaenau 381 656	Torx TR10 Tamper	Desistant					
Sentinel	4010100	115	15051	#6-32 X 3/4" Dutton HD	Spacing 381 656	Torx TR10 Tamper	Resistant					
500DT	4816104	41	1816013.4	Modified from 15051	Spateriatar 301-000	Tory TP10 Tamper	Resistant					
50001	4816105	41	1816013-4	Modified from 15051		Tory TR10 Tamper	Desistant					
Centurion	4815374	Assure	NRC that only	v Smiths-Trained personell ho	Id key/are allowed to service		1 COBIOCON N	1				
Items	which wi	ll no	t be ma	ade tamper-pro	oof							
Centurion	4815374	1	4815299	PEM PEC2-632-62	See Drawing							
Centurion	4813757	53	20414	#2.56 X 1" Pan HD	Pacific	Phillips	Not Nacassan	#2.56 X 1" Button HD	Aaron's Security Screws 7041902013	Tory T.S. H Tamper Paristant	2023	62
SOODT	4816103	22	7043628	#8.32 Shallow Head Should	SOP A 7Y 5-CE5	SM	Not Nacessary	Part Solidine	Caronie Service Sciews /041302013	I WA TOPT TOTAL TOTAL OF TRESIDICITY	203.0	76
MMTD	4820725	11	7046025	#6-32 X 310 Shoulder Len	t FAR SB 4112	Phillips #2	Not Necessary					
MMITTO	4820725	1 11	1821284 D	Madified from 7046025		Division #1	Alet Manager					

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CAUTION: RADIOACTIVE MATERIAL ISOTOPE: NI-63 AMOUNT: 15 mCl (5) 7677 tobe updated CAUTION: RADIOACTIVE MATERIAL

AMOUNT: 15 mCi ISOTOPE: Ni-63 DATE:

CAUTION: RADIOACTIVE MATERIAL

This device contains a sealed radioactive source: Ni63 at 15 Millicuries. Disassembly of the IMS detector and removal of the radioactive source MUST NEVER be attempted except by the manufacturer. Model

Serial No.

This detector contains RADIOACTIVE MATERIAL and has been manufactured in compliance with U.S. NRC safety criteria in 10 CFR 32.27. The purchaser is exempt from any regulatory requirements. This label shall be maintained on the device in legible condition. smiths



Removal of this label is prohibited.

Mississauga, ON

CAUTION: RADIOACTIVE MATERIAL

This device contains two sealed radioactive sources: Ni63 at 15 Millicuries each Disassembly of the IMS detector(s) and removal of the radioactive source(s)

in compliance with U.S. NRC safety criteria in 10 CFR 32.27. The purchaser is exempt from any regulatory requirements.

This label shall be maintained on the device in a legible condition. Removal of this label is prohibited.

Smiths Detection issauga, ON

smiths



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Millicuries. There is no direct radiation hazard. This equipment must be handled in accordance with the licensing requirements of the applicable nuclear regulatory agency. DISASSEMBLY OF THE IMS DETECTOR CELL AND REMOVAL OF THE RADIOACTIVE SOURCE MUST NEVER BEATTEMPTED EXCEPT BY THE MANUFACTURER.

CAUTION: RADIOACTIVE MATERIAL

This device contains a sealed radioactive source: Ni63 at 15 Millicuries. There is no direct radiation hazard. DISASSEMBLY OF THE IMS CELL AND REMOVAL OF THE RADIOACTIVE SOURCE MUST NEVER BEATTEMPTED except by the manufacturer.



CAUTION: RADIOACTIVE MATERIAL

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THIS DEVICE CONTAINS & SEALED RADIOACTIVE SOURCE : NI - 63 AT 15 MILLICURIES THERE IS NO DIRECT RADIATION HAZARD. DISASSEMBLY OF THE IMS CELL AND REMOVAL OF THE RADIOACTIVE SOURCE MUST NEVER BE ATTEMPTED

EXCEPT BY THE MANUFACTURER

Device	regulatory	assay	rad hazard	nameplate**	IMS	trefoil
Ionscan 500DT	1822245	1817697	1822246	1817852	1817697	7040564
Ionscan 400B	1822244	1817697	1822246	2811085	1817697	7040564
Ionscan document scanner	1822244	1817697	1822246	2811085	1817697	7040564
Ionscan LS	1822244	1817697	1822246	2811085	1817697	7040564
Sabre 4000	1822244	1817697	1822246	1816567	1817697	7041515
Sabre 400FR	1822244	1817697	1822246	1816567	1817697	7041515
Sabre EXV	1822244	1817697	1822246	1821189	1817697	7041515
MMTD		1822051	1822247	1821086	1817697	
Centurion	1822244	1817697	1822246	1814585	1817697	7041515
Centurion II	1822244	1817697	1822246	1814585	1817697	7041515
Sentinel II	1822244	1817697	1822246	1817761	1817697	
<u>а принатира и на на поста на транска и поста на поста (н. 1976). Со поста на поста на поста на поста на поста</u>				** nameplates		
				and SN. These are located on		detector/ IMS and finished
Location(s)	finished product	detector/ IMS	detector/ IMS	finished	detector/ IMS	trefoils are not already present

From: BETTERWAY PRINTING

PROOF COPY for 1822250A ACTUAL SIZE - 4.0 X 2.0" Grey background, Black text Stock: Silver imprintable Mylar

CAUTION: RADIOACTIVE MATERIAL

This package contains 15 mCi of Nickel-63 RADIOACTIVE MATERIAL and has been manufactured in compliance with U.S. N.R.C. safety criteria in 10 CFR 32.27, by SMITHS DETECTION, Mississauga, ON. The purchaser is exempt from any regulatory requirements.



manufactured in compliance with U.S. N.R.C. safety criteria in 10 CFR 32.27, by SMITHS DETECTION, Mississauga, ON. The purchaser is exempt from any regulatory requirements.

COST: 500 = \$ 275.00 1 New Plate = \$105.00 (Black)



COST: 500 = \$ 275.00 1 New Plate = \$105.00 (Blue)

Please return with approval or indicated changes to: (416) 466-1613

SMITHS - P1822250 and P1822251A

From: BETTERWAY PRINTING

PROOF COPY for 1817697C

ACTUAL SIZE 2.5" x 0.75"



COST: 500 = \$ 250.00 1 New Plate = \$105.00



Please return fax with approval or indicated changes to: (416) 466-1613

SMITHS - P1817697C



		REVISIONS	******************************		
REV.	DESCRIPTION	DATE	NWG	CHKD	AUTH
Λ1	ECO# 16679	6 AFR, 2009	BL	CSL and	DR A

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1. MATERIAL: .002" THK. ALUMINUM 7940 FOIL WITH PRESSURE SENSITIVE ADHESIVE.

2. LETTERS - BLUE, BACKGROUND - GRAY/SILVER.

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*********************	DIMENSIONS AND TOLERANCES ARE IN INCHES UNLESS OTHERWISE NOTED .X ± 0.02 X° ± 1°	DO NOT THIS DR MATL:	SEE NOTE	NGE CODE: 35471	THIRD ANGLE PROJECTION	smith bringing tech	ns detection
	$\begin{array}{c} xx \ \pm \ 0.01 \\ xxx \ \pm \ 0.005 \end{array} \left \frac{x}{x} \ \pm \ 1/32 \right $	FINISH:	NONE		SCALE 1:1		ONTARIO; CANADA
	THIS DOCUMENT INCLUDES PROPRIETARY INFORMATION OF SMITHS DETECTION WHICH MAY NOT BE USED	DRAWN: DATE: CHK'D: DATE:	BL MAR. 25/09 CSL -5L	ĽAE	BEL, SOI		E & IMS
	FOR THE BENEFIT OF OTHERS WITHOUT WRITTEN CONSENT.	APP'D: DATE: 4	DR	A NO.	18220	51	A1 SHEET

From: BETTERWAY PRINTING

PROOF COPY for 7040564 Rev. 02

ACTUAL SIZE - 1"Diam." Yellow background, Magenta Symbol Stock: Gloss litho



COST: 500 = \$ 215.00 1 New Plate = \$105.00 (Yellow) 1 New Plate = \$105.00 (Magenta)



Please return fax with approval or indicated changes to: (416) 466-1613

From: BETTERWAY PRINTING

PROOF COPY for 7041515 Rev. 02

ACTUAL SIZE - 0.437"Diam." Yellow background, Magenta Symbol Stock: Gloss litho



COST: 500 = \$ 210.00 1 New Plate = \$105.00 (Yellow) 1 New Plate = \$105.00 (Magenta)

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	Please check copy carefully for size, spelling, layout and other specifications. Your signed approval accepts responsibility for any errors.	
	PROOF O.K. AS IS	
	APPROVED WITH CHANGES	
	NEW PROOF REQUIRED	
~~~~	SIGNATURE & DATE	

Please return fax with approval or indicated changes to: (416) 466-1613



SMITHS - P7041515-02

### From: BETTERWAY PRINTING

2nd. PROOF COPY for 1822244A

ACTUAL SIZE - 3.125 X 1.875" Grey background, Blue and Black text/Radiation Symbol Stock: Silver imprintable Mylar



1 New Plate = \$105.00 (Black)

# Please return fax with approval or indicated changes to: (416) 466-1613

SIGNATURE & DATE

### From: BETTERWAY PRINTING

2nd. PROOF COPY for 1822245A

ACTUAL SIZE - 4.0 X 1.437"

Grey background, Blue and Black text/Radiation Symbol Stock: Silver imprintable Mylar





Please return fax with approval or indicated changes to: (416) 466-1613

#### **To: James Gray** From: BETTERWAY PRINTING PROOF COPY for 11822246A ACTUAL SIZE - 3.0 X 1.25" Grey background, Blue text Stock: Silver imprintable Mylar CAUTION: RADIOACTIVE MATERIAL This device contains a sealed radioactive source: Ni63 at 15 Millicuries. There is no direct radiation hazard. Please check copy carefully DISASSEMBLY OF THE IMS CELL AND REMOVAL OF THE RADIOACTIVE SOURCE MUST NEVER BE ATTEMPTED for size, spelling, layout except by the manufacturer.. and other specifications. Your signed approval accepts responsibility for any errors. PROOF O.K. AS IS APPROVED WITH _CHANGES COST: 500 = \$265.00NEW PROOF REQUIRED 1 New Plate = \$105.00 (Blue) Note: Authors Alterations 1 New Plate = \$105.00 (Black) incur a \$5. charge SIGNATURE & DATE

# Please return fax with approval or indicated changes to: (416) 466-1613


## **To: James Gray**

### From: BETTERWAY PRINTING

PROOF COPY for 1822250A

ACTUAL SIZE - 4.0 X 2.0" Grey background, Black text Stock: Silver imprintable Mylar

#### **CAUTION: RADIOACTIVE MATERIAL**

This package contains 15 mCi of Nickel-63 RADIOACTIVE MATERIAL and has been manufactured in compliance with U.S. N.R.C. safety criteria in 10 CFR 32.27, by SMITHS DETECTION, Mississauga, ON. The purchaser is exempt from any regulatory requirements.

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PROOF COPY for 1822251A ACTUAL SIZE - 4.0 X 2.0" Grey background,Blue text Stock: Silver imprintable Mylar

**CAUTION: RADIOACTIVE MATERIAL** This package contains **30 mCi** of Nickel-63 RADIOACTIVE MATERIAL and has been manufactured in compliance with U.S. N.R.C. safety criteria in 10 CFR 32.27,

by SMITHS DETECTION, Mississauga, ON. The purchaser is exempt from any regulatory requirements.

COST: 500 = \$ 275.00 1 New Plate = \$105.00 (Black)



COST: 500 = \$ 275.00 1 New Plate = \$105.00 (Blue)

# Please return with approval or indicated changes to: (416) 466-1613

SMITHS - P1822250 and P1822251A

### PHOTOS OF LABELS ON DEVICES

### SMITHS EXEMPT SSD APPLICATION

September 2, 2009

T. Brandon IRSC, Inc.

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Figure 1 Sabre 4000, EXV, & FR



Figure 2 Sabre 4000, EXV, & FR



Figure 3 Sabre 4000, EXV, & FR



Figure 4 Centurion



Figure 5 Centurion - IMS



Figure 6 Centurion - IMS



Figure 7 IONSCAN 500DT



Figure 8 IONSCAN 500DT



Figure 9 IONSCAN 500DT



Figure 10 IONSCAN 500DT - IMS



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Figure 11 IONSCAN 400B, LS, & Doc Scanner
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Figure 12 IONSCAN 400B, LS & Doc Scanner



Figure 13 IONSCAN 400B, LS, & Doc Scanner



Figure 14 IONSCAN 400B, LS, & Doc Scanner



Figure 15 IONSCAN 400B, LS, & Doc Scanner



Figure 16 MMTD



Figure 17 Sentinel II



Figure 18 Sentinel II



Figure 19 Sentinel II

### Use Conditions Tables for Smiths Exempt SSD Application

8/31/09 T. Brandon IRSC.

Model	Min Us Hand Ten (°F)	se and ling np (°C)	Max an Hanc Ter (°F)	Use d lling np (°C)	Max Use and Handling RH (%)	Mi Stor Ter (°F)	in age np (°C)	Ma Stor Ter (°F)	ax rage np   (°C)	Max Storage RH (%)	M Trans Ter (°F)	in sport np (°C)	Ma Trans Ter (°F)	ax sport np (°C)	Max Transport RH (%)
IONSCAN 400B	32	0.	104	40	95 non- condensing	32	0	140	60	95 non- condensing	-40	-40	158	70	95 non- condensing
IONSCAN LS	32	0	104	40	95 non- condensing	32	0	140	60	95 non- condensing	-40	-40	158	70	95 non- condensing
IONSCAN Document Scanner	32	0	104	40	95 non- condensing	32	0	140	60	95 non- condensing	-40	-40	158	70	95 non- condensing
IONSCAN 500DT	32	0	104	40	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sabre 4000	32	0	113	45	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sabre 4000FR	32	0	113	45	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sabre EXV	32	0	104	40	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
MMTD	20	-7	130	54	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sabre Centurion	41	5	104	40	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sabre Centurion II	41	5	104	40	95 non- condensing	-4	-20	158	70	95 non- condensing	-40	-40	158	70	95 non- condensing
Sentinel II	32	0	104	40	95 non- condensing	32	0	140	60	95 non- condensing	-40	-40	158	70	95 non- condensing

Temperature ratings per device.

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	Max Use	Max	Max	Max	
Model	Vibration	Handling	Storage	Transport	
	Vioration	Vibration	Vibration	Vibration	
IONSCAN	None	None	None	500 Hz	
400B	Expected	Expected	Expected	$@49 \text{ m/s}^2$	
IONSCAN	None	None	None	500 Hz	
LS	Expected	Expected	Expected	$(a)49 \text{ m/s}^2$	
IONSCAN	None	None	None	500 Hz	
Document	Expected	Expected Expected		@49 m/s ²	
Scanner			-		
IONSCAN	None	None	None	500 Hz	
500DT	Expected	Expected	Expected	$@49 \text{ m/s}^2$	
	None	None	None	500 Hz	
Sabre 4000	. Expected	Expected	Expected	$@49 \text{ m/s}^2$	
Sabre	None	None	None	500 Hz	
4000FR	Expected	Expected	Expected	$@49 \text{ m/s}^2$	
	None	None	None	500 Hz	
Sabre EXV	Expected	Expected	Expected	$(a)49 \text{ m/s}^2$	
	None	None	None	500 Hz	
MMTD	Expected	Expected	Expected	$@49 \text{ m/s}^2$	
	Typical	Typical	None	500 Hz	
Sabre	building	building	Expected	$(a)49 \text{ m/s}^2$	
Centurion	vibration	vibration	_		
	Typical	Typical	None	500 Hz	
Sabre	building	building	Expected	$(a)49 \text{ m/s}^2$	
Centurion II	vibration	vibration	-		
	Typical	Typical	None	500 Hz	
	building	building	Expected	$(a)49 \text{ m/s}^2$	
Sentinel II	vibration	vibration			

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Maximum allowable vibration per device

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			Max	Max
Model	Max Use Impact	Max Handling Impact	Storage	Transport
	-		Impact	Impact
IONSCAN	None Expected	Equivalent force of 50g	None	None
400B	-	dropped from 1 m	Expected	Expected
IONSCAN	None Expected	Equivalent force of 50g	None	None
LS		dropped from 1 m	Expected	Expected
IONSCAN	None Expected	Equivalent force of 50g	None	None
Document		dropped from 1 m	Expected	Expected
Scanner				
IONSCAN	None Expected	Equivalent force of 50g	None	None
500DT		dropped from 1 m	Expected	Expected
	Equivalent force	Equivalent force of 50g	None	None
	of 50g dropped	dropped from 1 m	Expected	Expected
Sabre 4000	from 1 m		_	
	Equivalent force	Equivalent force of 50g	None	None
Sabre	of 50g dropped	dropped from 1 m	Expected	Expected
4000FR	from 1 m		_	_
	Equivalent force	Equivalent force of 50g	None	None
Sabre	of 50g dropped	dropped from 1 m	Expected	Expected
EXV	from 1 m		- ·	-
	Equivalent force	Equivalent force of 50g	None	None
	of 50g dropped	dropped from 1 m	Expected	Expected
MMTD	from 1 m			_
Sabre	None Expected	Equivalent force of 50g	None	None
Centurion		dropped from 1 m	Expected	Expected
Sabre	None Expected	Equivalent force of 50g	None	None
Centurion		dropped from 1 m	Expected	Expected
II				
	None Expected	Equivalent force of 50g	None	None
Sentinel II		dropped from 1 m	Expected	Expected

Maximum Impact per device

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