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201 Evans Lane St. Louis, MO 63121-1126

6 November 2003 In Reply Refer To DEFE – 20513

United States Nuclear Regulatory Commission Material Safety Branch Division of Industrial and Medical Nuclear Safety Washington, DC 20555-0001

Subject: Application for Material Registration and Material Distribution License

Enclosure: (I) Application for Material Registration and Evaluation Fee (II) Application for Material Distribution License and Evaluation Fee

Dear Sir or Madam:

Systems & Electronics Inc. (SEI), located in St. Louis, Missouri, hereby submits an original and one copy each of Enclosure (I) Application for Material Registration and Enclosure (II) Application for Material Distribution License for review and approval.

As required, each application is accompanied with a check for the one time evaluation fee.

SEI is in the process of completing the Application for Material Possession License and will forward the application, with a check for the one time evaluation fee, to the Materials Licensing Branch in Region III.

Should there be any questions or comments, please contact me at 314-553-4335.

Sincerely,

hur Kuto

Allan K. Kaste Vice President, Human Resources

\_\*Solutions \*Experience \*Innovation\_\_

Enclosure (I) DEFE-20513

Application for Material Registration And Evaluation Fee

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Fee Category 9B

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#### **Application for Material Registration**

#### **10.1 Summary Information**

#### 10.1.1 Manufacturer and Distributor

Systems & Electronics Inc. 201 Evans Lane St. Louis, MO 63136

10.1.2 Custom User

Not Applicable

#### 10.1.3 Other Companies Involved

Manufacturer:

Distributor:

SRB Technologies (CANADA) Inc. 320-140 Boundary Road Pembroke, Ontario K8A 6W5 SRB Technologies 2580 Landmark Dr. Winston Salem, NC 27013

#### 10.1.4 Definitions

Equipment:	This refers to the Main Electronics Assembly (MEA) and Tripod Adapter Plate of the Man portable Surveillance and Tracking Radar System (MSTAR) produced by SEI. The MSTAR system is a ground surveillance RADAR.
Device:	Refers to the circular/cylindrical level that is the subject of this application described in attachment 1 and attachment 2.

10.1.5 Model	Number, Sealed	Source or Device Ty	pe, and Principal	Use Code
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Manufacturer	Part Number	Sealed Source or Device	Principal Use Code	Licensing requirement
Systems & Electronics Inc.	ES 6510-01	Level gauge	Self Luminous Light Source	Exempt

#### 10.1.6 Radionuclides Used in the Product

Radionuclide	Activity (Ci)	Maximum Activity (Ci)	Currently Registered	Sealed Source Mfr.	Model Number	Registration Number
Tritium (H3)	0.18	10.0	Yes	SRB Technologies (CANADA) Inc.	Betalight 152080G0400B	NC585S102S

#### 10.1.7 Leak Test Frequency

The SEI part number ES6510-01 (SRB part number 1544003) is leak tested at the manufacturer (SRB Technologies Inc.) in accordance with an industrial standards ANSI-N43.4 (ANSI-N540) as described in the SRBT Radiation Safety Manual, document # RSP-006 rev E (attachment 3).

Systems and Electronics Inc. will verify Leak Test results by reviewing documentation, provided by SRBT, upon receiving inspection of the device and perform an inspection of the device as well as an inspection of the next higher level of assembly following installation of the device in accordance with SEI quality procedures S QAI-33, MSTAR TRITIUM LEVEL INSPECTION, (attachment 4).

#### 10.1.8 Certification and Signature of a Management Representative

The following person is a legal representative of Systems & Electronics Inc. and is authorized to make binding commitments and to sign official documents on behalf of Systems & Electronics Inc.

Date: 11/8/03

Signature:

Mr. Allan Kaste (Vice President of Human Resources) Systems & Electronics Inc. St. Louis, MO 63136 (314) 553- 4335 akaste@seistl.com

#### 10.2 Conditions of Use

#### 10.2.1 Types of Users

The device will be attached to a man portable RADAR that will be used to perform artillery fire correction, surveillance and target acquisition operations. The operators of the RADAR system will be primarily security/military personnel.

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#### 10.2.2 Locations of Use

The locations of use will be outdoors along the perimeter of positions that are of strategic and tactical interest. The climatic and geographical ranges are wide and are more appropriately defined by the environmental conditions delineated in the RADAR system specification (see 10.2.6). The device is part of the system when installed and must operate within the same environmental conditions as the system.

#### 10.2.3 Proximity to user

Based on the configuration of the RADAR system (vehicle mounted or man portable) and the activity (setup or operation) the user will be anywhere from the immediate position (set-up) of the device up to 30 meters away (maximum dismounted operation).

#### 10.2.4 Frequency of use

The set-up and leveling of the equipment and use of the device is dependant on the mission scenario but reasonably the operator could be expected to perform a set-up at least once every 24 hours and no more than once every 2 hours over a 24 hour period.

#### 10.2.5 Liklihood that device will be used as part of another system

The device is designed to be used with equipment it is attached to. Functionally, it provides a visual indication to the operator that the equipment is level. The device is not compatible with stand alone operations. The device requires unique design criteria be applied to its installation in other equipment. Certainly, it could be installed in another system or application if that system provided the specific physical interface to allow its installation.

#### **10.2.6 Environmental Conditions**

The leveling device, as attached to the RADAR, may be exposed to one or more of the following environmental conditions during use, handling, storage or transportation.

#### 10.2.6.1 Corrosion

No dissimilar materials are used in the design or construction of the device. Corrosive agents may be used in the maintenance of the attached equipment although because of the aluminum and glass construction of the device, it will tolerate corrosive agents for periods of time associated with maintenance activities. There are no exposed rubber seals that would degrade if exposed to hydrocarbon based cleaners.

#### 10.2.6.2 Vibration

The equipment shall withstand the vibration spectra described in MIL-STD-810E 514.4, I-3.4.7 Category 8 - Ground Mobile, using vibration data of Table 514.4-AII without degradation.

#### 10.2.6.3 Impact

The equipment shall withstand shocks associated with handling (mounting, dismounting, carrying, stowing) without degradation. Handling shock shall be defined as: 1/2 sine pulse acceleration of 30g for duration of 11 milliseconds using MIL-STD-810C, Method 516.2 Procedure 1.

#### **10.2.6.4 Puncture**

There is no system level requirement that addresses a puncture threat. It would be extremely difficult to drive, even an ice pick, let alone a screwdriver, through the device far enough and with enough force to penetrate the machined aluminum cylinder that houses the GTLS or the aluminum bossing that the cylinder is surrounded by. During maintenance, if it is necessary to remove the device using a screw driver, there is a minor risk of puncturing the bubble vial on top of the device. There would have to be a repeated attempts, with intent, to break the bubble vial (on top) and then to penetrate the thicker phosphor coated glass on the bottom of the vial. This glass is supported by packed epoxy that is used to suspend the GTLS in the device. Certainly, it could be done but it would require a tool not used in maintenance and repeated attempts with intent.

#### 10.2.6.5 Compressive Loads

There are no compressive loads applied to the equipment or device during its operation or maintenance.

#### 10.2.6.6 Explosion

There are <u>no</u> explosive risks associated with the device or equipment the device is attached to. Since the system is used by a military force, there are munitions carried by the user, the user may be targeted by enemy forces, or the user may traverse areas that are mined.

#### 10.2.6.7 Flooding

The climatic and geographical areas where the device will be deployed may include areas that are susceptible to flooding. Certainly, the system or device would not be knowingly placed in a location with an emanate risk of flooding.

#### 10.2.6.8 **Poor Air quality**

The climatic and geographical areas where the device will be deployed may include areas that are susceptible to poor air quality.

#### 10.2.6.9 Temperature

Operation from -40°C to 55°C, Storage from -46°C to +71°C.

#### **10.2.6.10** Temperature Change

Not Specified

#### 10.2.6.11 Power cycling

Not applicable. The power source used by the device for illumination is the sealed Tritium gas source. No external power source interfaces with the device.

#### 10.2.6.12 Working Life of Sources

The expected working life of the source used in this device is between 15 and 20 years.

#### **10.3** Construction of the Product

The body of the ES 6510-01 (shown in attachment 1) is a machined aluminum cylinder with an attached aluminum flange. The flange has three equally spaced counter bored holes around its perimeter used to attach the assembly to the next higher assembly. The next level of assembly has an aluminum boss of appropriate size to accommodate the level. A bubble vial is inserted and epoxied to the upper interior portion of the machined aluminum cylinder. The bubble vial is a sealed glass container that contains mineral water. The inside of the bubble vial is coated with phosphor on one side. The Tritium gas vial is suspended and compacted in epoxy underneath the bubble vial.

#### 10.3.1 Operational summary

The bubble within the level indicates the offset between the gravity vector and the normal vector (as mounted) from the surface represented by the mounting flange. A centered bubble with respect to the assembly indicates that the level assembly and attached hardware are level with respect to gravity by finding the marked center of the vial. The bubble is back lit by the gaseous tritium light source (GTLS) that is self illuminating by way of the beta particles emanating from the vial of tritium and exciting the phosphor that is coated on the lower interior of the bubble vial.

#### **10.3.2** Primary Components

- The machined aluminum cylinder with attachment flange
- The bubble vial
- The enclosed sealed source

#### 10.3.3 Safety Features

The safety features are included in the overall design of the level as opposed to a specific component. The glass enclosure of the Tritium vial will prevent the emission of the beta particles from going beyond the sealed source. The layout and design of the level effectively protects the sealed source within the device from exposure to the environment or breakage from improper or unexpectedly harsh handling of the equipment the device is attached to. The device is also protected from damage by the assemblies that it is installed into.

#### 10.4 Labeling

The SEI part number ES6510-01, NRC registration number, and Trefoil symbol will be attached to the device. The Engraving method or Label material, attachment method and durability will be specified on the drawing. (attachment 1).

#### **10.5 Prototype Testing**

#### 10.5.1 Sources

The source used as a component of this device is registered with the NRC as NCS585S102S by SRB Technologies Inc. as a Self-illuminated Hydrogen 3 ( $H_3$ ) sealed source type D Disc, Radial Pip.

#### 10.5.2 Devices

The leveling device is manufactured by SRB Technologies (CANADA) Inc. In accordance with the procedures and policies imposed by the Canadian Nuclear Safety Commission (CNSC), this device is certified to be in accordance with applicable Canadian Nuclear Safety Guidelines. In obtaining this certification, SRB Technologies was required to provide evidence that the subject device was designed to survive without leakage during and after exposure to risk environments and hazards as defined by the CNSC.

#### 10.6 Radiation Profiles

There is no measurable radiation emitted from the device as Beta radiation will not penetrate the glass of the vial that contains the gaseous tritium  $(H_3)$ .

#### **10.7** Quality Control and Quality Assurance

SEI is an ISO 9000 registered company. SEI's ISO 9000 registration letter is attached as attachment 5. SRB is a ISO 9000 registered company. SRB's ISO 9000 registration letter is attached as attachment 6. The applicable receiving inspection procedures are followed for the SRB manufactured level device. SRB will provide certificate of conformance verifying that testing has been performed in accordance with ANSI-N540 specification. SEI will inspect this evidence, the level itself and the associated next higher assemblies in accordance with their quality assurance procedure S QAI-33.

#### 10.8 Installation, Servicing, and Instructions to Users

Maintenance of the level device as part of the assembly will only involve removal and replacement of the device. Removal of the level device is performed by removal of three screws that attach the level device to the boss hole created for its installation. SEI has a documented Replace or Repair process in place for the Level devices in accordance with the quality assurance procedure S QAI-33. Placement and location of the level on the portable RADAR MEA and adapter plate are shown in attachment 7. The level is installed into the MSTAR per the 599020 drawing included as attachment 8 (see applicable installation notes on drawing) and the 599114 drawing included as attachment 9.

Attachment 1 Page 1 of 5

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#### REQUIREMENTS

ES6510

- 1. <u>SCOPE</u>. THIS DRAWING ESTABLISHES THE DETAIL REQUIREMENTS FOR A CIRCULAR, BUBBLE LEVEL. ES6510-01 IS ILLUMINATED BY A GASEOUS TRITIUM LIGHT SOURCE AND ES6510-02 OMITS THE LIGHT SOURCE.
- 2. <u>CONFIGURATION AND DIMENSIONS</u>. THE CONFIGURATION AND DIMENSIONS SHALL BE AS DETAILED IN FIGURE 1.
- 3. <u>MATERIALS</u>. THE MATERIALS USED IN THE CONSTRUCTION OF THE LEVEL SHALL BE OF SUFFICIENT QUALITY TO ASSURE THAT THE LEVEL CAN WITHSTAND THE OPERATING AND STORAGE ENVIRONMENTS DEFINED HEREIN.
- 4. <u>ENVIRONMENTAL</u>. THE OPERATING AND NON-OPERATING ENVIRONMENT SHALL BE AS SPECIFIED IN TABLE I.
- 5. <u>LIGHT SOURCE</u>. THE LIGHT SOURCE USED TO ILLUMINATE THE LEVEL SHALL BE A GASEOUS TRITIUM TYPE THAT COMPLIES WITH GREAT BRITAIN DEFENSE STANDARD 62-4 (CAGE CODE K0851) FOR ES6510-01 ONLY.
- 5.1 <u>SAFETY CONSIDERATIONS</u>. THE GASEOUS TRITIUM LIGHT SOURCE CONTAINS RADIOACTIVE MATERIALS. ALL SAFETY CONSIDERATIONS DEFINED IN DEFENSE STANDARD 62-4 SHALL BE FOLLOWED.
- 6. <u>PERFORMANCE</u>. THE LEVEL SHALL MEET THE PERFORMANCE REQUIREMENTS SPECIFIED IN TABLE II.
- 7. <u>MARKING</u>. THE GRADUATIONS ON THE VIAL OF THE LEVEL SHALL SHOW NO SIGN OF BEING WATER SOLUBLE. THE GRADUATIONS SHALL BE FREE FROM DISTORTION WITH CLEAR SHARP EDGES AND SHALL NOT RUB OFF. THE PARTS SHALL BE IDENTIFIED IN ACCORDANCE WITH MIL-STD-130 WITH THE MANUFACTURER'S IDENTIFICATION AND PART NUMBER. THE UNIT SHIPPING CONTAINER SHALL BE MARKED WITH THE ELECTRONICS & SPACE CORP. (E&S CORP.) CONTROL NUMBER.

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7.1 <u>E&S\_CORP. CONTROL NUMBER.</u>

ES6510-01 DASH NUMBER DEFINING CONFIGURATION -01 WITH LIGHT SOURCE -02 NO LIGHT SOURCE DRAWING NUMBER

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SD FORM 481-3 (28 MAY 91)(CF)

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TABLE	I.	ENVIRONMENTAL.

TEMPERATURE RANGE OPERATING NON-OPERATING	-40°C TO +55°C -62°C TO +71°C
HUMIDITY	MIL-STD-810E, METHOD 507.3, PROCEDURE I, 45 CYCLES
SHOCK NON-OPERATING	SHALL NOT BE DAMAGED BY HANDLING SHOCK DEFINED AS 1/2 SINE PULSE, ACCELERATION OF 30g FOR DURATION OF 11 ms USING MIL-STD-810E, METHOD 516.2, PROCEDURE I
VIBRATION NON-OPERATING	SHALL NOT BE DAMAGED BY EXPOSURE TO MIL-STD-810E, METHOD 514.4, I-3.4.7, CATEGORY 8 - GROUND MOBILE, USING VIBRATION DATA OF TABLE 514.4-AII
FUNGUS	THE UNIT SHALL BE FUNGUS INERT

TABLE II. PERFORMANCE.

COALESCENCE	WHEN THE LEVEL IS SHAKEN VIGOROUSLY, THE BUBBLES SHALL COALESCE INTO ONE LARGE BUBBLE WITHIN ONE SECOND AT 15°C TO 32°C
PRECIPITATE OR SOLID	NO PRECIPITATE OR SOLID SHALL FORM AT -62°C
BUBBLE MOVEMENT AND SIZE	THE BUBBLE SHALL HAVE A UNIFORM MOVEMENT OVER THE GRADUATED PORTION OF THE LEVEL AND SHALL BE OF THE SIZE SPECIFIED IN FIGURE 1
SENSITIVITY	10 TO 12 ANGULAR MINUTES PER MILLIMETER OF RUNOUT

SIZE	CAGE	NO.	
A	204	18	ES6510
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8. QUALITY CONFORMANCE INSPECTION.

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- 8.1 <u>VISUAL AND MECHANICAL</u>. THE PARTS SUPPLIED TO THIS DRAWING SHALL BE SUBJECTED TO A VISUAL AND MECHANICAL INSPECTION TO ASSURE COMPLIANCE WITH FIGURE 1 AND PARA 7.
- 9. <u>PACKING AND PACKAGING</u>. THE PARTS SHALL BE PACKAGED IN A MANNER SUFFICIENT TO ASSURE ARRIVAL AT DESTINATION WITHOUT DAMAGE WHEN SHIPPED BY COMMON COMMERCIAL CARRIER.
- 10. VENDOR(S) SHALL MAKE NO CHANGE TO PRODUCT(S) SUPPLIED TO THIS DRAWING WHICH WOULD AFFECT INTERCHANGEABILITY OR DEGRADE EITHER PERFORMANCE OR RELIABILITY OF THE PRODUCT WITHOUT PRIOR NOTICE.
- 11. IDENTIFICATION OF THE "SUGGESTED SOURCE(S) OF SUPPLY" HEREON IS NOT TO BE CONSTRUED AS A GUARANTEE OF PRESENT OR CONTINUED AVAILABILITY AS A SOURCE OF SUPPLY FOR THE ITEM(S).

E&S CORP.	SUGGESTED SOURCE(S) OF SUPPLY				
CONTROL	SUPPLIER DATA				
NUMBER	CAGE CODE	PART NUMBER	NAME AND ADDRESS		
ES6510-01	K5628	1544003	SAUNDERS-ROE DEVELOPMENTS LTD MILLINGTON ROAD HAYES MIDDX UB3 4NB ENGLAND		
	OTBT2	1544003	SRB TECHNOLOGIES, INC. 2580 LANDMARK DR. WINSTON SALEM, NC 27103		
ES6510-02	K5628	1544003-1	SAUNDERS-ROE DEVELOPMENTS LTD MILLINGTON ROAD HAYES MIDDX UB3 4NB ENGLAND		
	OTBT2	1544003-1	SRB TECHNOLOGIES, INC. 2580 LANDMARK DR. WINSTON SALEM, NC 27103		

size A	A 20418		ES651	10	
SCALE	NONE	REV C	SHEET	5	



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Attachment 2 Page 2 of 4

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Attachment 2 Page 3 of 4

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SRB Technologies ( Radiation Safety	Canada) Inc. y Manual	Document # RSP	Section 006	Page 1 of 2
Revision:	Date:	<u> </u>	Approved:	
E	J	une 26, 2003		

# SURFACE CONTAMINATION ASSESSMENT OF GTLS's

# 1. PURPOSE:

The purpose of this procedure is to describe the method of analysis used at SRBT to determine the amount of removable radioactive contamination in the form of tritium on the product material prior to placement in storage, for submission to assembly, or preparation for shipping.

# 2. SCOPE:

This procedure describes the Soak Testing procedure for tritium filled light sources to assure compliance with the applicable regulations and/or standards. The standards used are ANSI-N43.4, *Classification of Radioactive Self-Luminous Light Sources*, and Def. Stan. 62-4/4. The standard used is dependent upon the customer-stated requirement(s) and/or the regulatory requirement(s).

# 3. APPARATUS:

3.3

3.5

The following items are required to perform the procedures as described herein:

- 3.1 Liquid Scintillation Counting System
- 3.2 Liquid Scintillation Cocktail: Ultima Gold<sup>tm</sup> XR high flash point LSC-cocktail, or similar
  - LSC vials
- 3.4 Sampler

7-ml plastic with appropriate rack Eppendorf 1,000ul pipetter with 1-ml pipette tip, or similar

- NIST tritium reference standards: Wallac Internal Standards, Cat. No.1210-120, or similar
- 3.6 Holding rack for samples (optional)

# 4. PROCEDURE:

Note:

All sample, blank and standards preparations are performed wearing protective gloves to both protect the operator from possible contamination and the samples, blanks and standards from cross contamination. Gloves are to be changed often during the process to assure that the possibility of cross contamination is minimized. Use unique identifiers for bins and vials.

- 4.1 The following procedure describes the steps for leach testing of GTLS's:
  - 4.1.1 Place one or more Betalights in a clean wash bin noting the number of lights.
  - 4.1.2 Add a *known volume* of water to the bin, usually 100 or 1,000 ml.
  - 4.1.3 Add the *same volume* of water to a clean empty bin to be assessed as background.
  - 4.1.4 Cover the bins and allow to remain undisturbed for 4 hours in accordance with Def.Stan. 62-4/4, or for 24 hours in accordance with ANSI-N43.4. Uniquely identify bins for scintillation purposes.
  - 4.1.5 Take a 1ml. sample of water from each bin, including the required number of samples from the background bin and place in *uniquely identified* vials. Indicate the identification and number of lights on the vial caps.
  - 4.1.6 Add 4ml. of LSC cocktail solution to each vial, cap and shake vigorously.
  - 4.1.7 Analyze vials on the Liquid Scintillation Counter in accordance with the protocol set up for the LSC instrument being used.
  - 4.1.8 Transfer the betalight information and calculated results to the Results form.
  - 4.1.9 Segregate passes from failures and forward passed lights to assembly.
  - 4.1.10. Complete information documents as per document procedures.
  - 4.1.11. File reports.

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SRB Technologies (Canac Radiation Safety Man	la) Inc. Jal	Document # RSP	Section 006	Page 2 of 2
Revision:	Date:		Approved:	
E		June 26, 2003		

# 5. LIQUID SCINTILLATION COUNTING:

The samples are analyzed using liquid scintillation counting methods and in accordance with the SRBT(C)I LSC QA Program.

# 6. CALCULATIONS:

The following formula is used to calculate the activity in solution due to leaching, leaking and/or dissolution of tritium into the water during the 4-hour or 24-hour leach testing:

6.1 Activity (Bq) =  $\frac{\int X (cpm) - bkgd (cpm) x volume (ml)}{efficiency (cpm/dpm) x 60sec/min x no. of lights}$ 

where X is the number of cpm for the sample determined by LSC.

The following procedure is used to determine the amount of removable contamination by wipe test. It is used when requested by the customer:

# 7. Acceptance Criteria

For the leach testing, the acceptable maximum activity per light is 185 Bq.(5.0 nCi) as per Def.Stan. 62-4/4 or 1850 Bq. (50.0 nCi) as per ANSI-N43.4.

# 8. Procedure Review:

The Corporate Health Physicist reviews this procedure at least annually and makes revisions as required.

# 9. Responsibilities

#### President

The President is responsible for the daily operations of the SRBT(C)I facility located in Pembroke, Ontario.

#### **Corporate Health Physicist**

The Corporate Health Physicist is responsible for the radiation and industrial safety programs of the SRBT(C)I facility located in Pembroke, Ontario.

#### **QA Manager**

The QA Manager is responsible for the quality assurance and quality control programs of the SRBT(C)I facility located in Pembroke, Ontario.

#### LSC Analyst

The analyst is responsible to follow the procedures as stated in the Radiation Safety Procedures Manual.

# 10. Procedural Deviation

The Corporate Health Physicist or a designate may only authorize any deviation from this procedure. The deviation must be noted on the report form and signed and dated by the Corporate Health Physicist or designate.

# 11. Document Control

Documentation relative to Betalight Scintillation is maintained by the Health Physics department. Records are retained in accordance with Section 28 of the CNSC document General Nuclear Safety & Control Regulations. Section 28 requires that records be retained for a period ending 1 year after the expiry of the license that authorizes the activity in respect of which the records are kept.

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# **QUALITY ASSURANCE INSTRUCTION (QAI)**

NO. SQAI-33 REV. A

#### TITLE: MSTAR TRITIUM LEVEL INSPECTION

INITIAL RELEASE DATE: 7/2/03

PAGE 1 OF \_\_\_\_\_

INITIAL	ISSUE	LATEST REVISION					
T. MINER	7/2/03	LARRY PETERSON	9/19/03				
PREPARED BY	DATE	Prepared By	Date				
William Almstedt	7/2/03	William Almstedt	9/19/03				
APPROVED BY	DATE	Approved By	Date				
APPROVED BY	DATE	Approved By	Date				
William Almstedt APPROVED BY APPROVED BY	DATE 7/2/03 DATE DATE	William Almstedt         Approved By         Approved By	Date 9/19/03 Date Date				

#### **1.0 PURPOSE**

The purpose of this document is to provide visual inspection instructions for inspection of the tritium level used on the MSTAR System.

#### **1.1 APPLICABILITY**

This document applies to all MSTAR programs and all assemblies that require the tritium level.

#### 2.0 APPLICABLE DOCUMENTS

#### 3.0 PROCEDURE

- **3.1 RECEIVING INSPECTION LEVEL** 
  - 3.1.1 Review the supplier Certificate of Conformance for conformance to the requirements in the Purchase Order Quality Provisions.
  - 3.1.2 Visual inspect level for any visual damage either to the housing or bezel.
  - 3.1.3 Visual inspect level for any leakage.
  - 3.1.4 Tilt level and observe level bubble moves.
  - 3.1.5 Verify that level illuminates in darkness.
  - 3.1.6 Indicate acceptance by stamping AEC card.
- 3.2 INSPECTION TRIPOD ADAPTER
  - 3.2.1 Visual inspect level for proper assembly per drawing.
  - 3.2.2 Check that mounting screws are tight.
  - 3.2.3 Visual inspect level for any damage.
  - 3.2.4 Visual inspect level for any leakage.
  - 3.2.5 Verify that the Trefoil marker has been applied, is secure legible and in correct location per drawing.
  - 3.2.6 Tilt Adapter and observe level bubble moves.
  - 3.2.7 Verify that the level illuminates in darkness.
  - 3.2.8 Indicate acceptance by stamping ELWA.

#### 3.3 INSPECTION MAIN ELECTRICAL ASSEMBLY (MEA)

- 3.3.1 Visual inspect level for proper assembly per drawing.
- 3.3.2 Check that mounting screws are tight.
- 3.3.3 Visual inspect level for any damage.
- 3.3.4 Visual inspect level for any leakage.
- 3.3.5 Tilt MEA and observe level bubble moves.
- 3.3.6 Verify that level illuminates in darkness.

3.3.7 Verify that the Trefoil marker has been applied to the cover, is secure and legible.

3.3.8 Indicate acceptance by stamping the ELWA

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QS FORM 7-4.4ft (1/8/97) ATTACHMENT 4



# **CERTIFICATE OF REGISTRATION**

This is to certify that the Quality Management System of:

SYSTEMS & ELECTRONICS INC. 201 EVANS LANE ST. LOUIS, MISSOURI 63121

has been assessed and approved by National Quality Assurance, U.S.A., against the following quality assurance management system standard:

ISO 9001: 2000

The Quality Management System is applicable to

DESIGN, DEVELOP, INTEGRATE, MANUFACTURE, INSTALL AND SERVICE COMPLEX MECHANICAL SYSTEMS, ELECTRO-MECHANICAL EQUIPMENT AND ELECTRONIC COMPONENTS FOR DEFENSE AND COMMERCIAL MARKETS

The approval is subject to the company maintaining its system to the required standards, which will be monitored by NQA, U.S.A.

Certificate No: 10346

Date: July 9, 1998 Reissued: June 24, 2002 Valid Until: August 7, 2004



For and on behalf of



# Certificate of Registration

This is to certify that KPMG Quality Registrar has registered the Quality System of

# SRB Technologies (Canada) Inc.

320 - 140 Boundary Road, Pembroke, Ontario K8A 6W5

to the Quality System Standard

# ISO 9001:1994

The Quality System is applicable to

Design and manufacture of tritium filled light sources (Betalights ®), self powered luminous signs, markers and emergency lighting for military, commercial, aerospace and scientific applications.

This registration is given subject to the terms and conditions governing the use of this certificate as described in the agreement between KPMG Quality Registrar Inc. and the holder thereof. Registration does not assure the effectiveness of the Quality System or the products or services produced by it.



ISO 9001 REGISTERED Registration Number: 683 Issue Date: September 19, 1997 Renewal Date: January 17, 2001 Expiry Date: September 18, 2003

Mark J. O'Gillwar

Mark J. O'Sullivan President KPMG Quality Registrar Inc. Toronto, Ontario, Canada MSL 1B2



Main Electronics Assembly (MEA) Location of ES6510-01 (Level, Cylidrical) on the MSTAR man portable RADAR Attachment 7 (1 of 2)



Adapter Plate Assembly (Tripod) Location of ES6510-01 (Level, Cylidrical) on the MSTAR man portable RADAR Attachment 7 (2 of 2)

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<ul> <li>INSTALL WITH CORROSION INHIBITIVE COMPOUND. MIL-S-BI733, TO PROVIDE AN ENVIRONMENTAL SEAL AT THE THREADED HOLES.</li> <li>BOND FLEXSPLINE (PART OF ITEM 5) TO SLIP RING ROTOR (ITEM 3) USING ITEM 53 ADDESIVE WITH ITEM 54 ACTIVATOR. APPLY ACTIVATOR AND ADDESIVE PER MANUFACTURER'S INSTRUCTIONS.</li> </ul>	ADD -307	7		CO 123346 SH 1 OF 4	REVISIONS           PORE REV PER ECP 46ECP-0103 GB 19-09-09 RJ           A         REV PER ECP 46ECP-0103 GB 19-09-09 RJ           B         REV PER ECP 46ECP-0116 GB 19-09-09 RJ           C         REV PER CO 118161 GB 19-09-09 GB           D         REV PER CO 122015 JF 02-08-19 GB           F         REV PER CO 122165 GB 02-09-09 GB	RL F
Indirections:         Item 5 transmission consists of three components: CIRCULAR SPLINE, FLEXSPLINE, AND WAVE GENERATOR.         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-22473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-20473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-20473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-20473 (ps406-2 grade c).         Image: Apply Locking compound per Mil-s-20473 (ps406				I         I         I         I         I         I         I         Stresson           I         I         I         I         I         I         I         Stresson         Streson         <	98946-3         46         COYER           98947-3         45         SPACER           6510-01         44         LEYEL           5795-802         43         WASHER           8450-01A         42         WASHER           364-02A06         41         SCREW           361-02A05         40         SCREW	
<ul> <li>A) AFTER ASSEMBLING BELT DRIVE COMPONENTS AND ITEM 13 HOUSING, RETURN THE SLIP RING ROTOR TO ITS ZERO POSITION ±2" (REF NOTE 12).</li> <li>B) INSTALL ITEM 15 RESOLVER ASSY AS SHOWN IN SECTION C-C (NOTE LOCATIONS OF BI AND B2 RESOLVERS). SECURE THE BI RESOLVER SHAFT TO THE COUPLING WITH THE COUPLING SETSCREWS. POSITION ITEM 17 GEAR ON B2 RESOLVER SHAFT AS SHOWN IN VIEW E AND SECURE WITH SETSCREW. APPLY LOCKING COMPOUND, MIL-S-22473 (PS406-2 GRADE C) TO ALL SETSCREW THREADS.</li> <li>C) ITEM 17 ANTI-BACKLASH GEAR MUST BE PRELOADED WHEN IT I BROUGHT INTO MESH WITH THE GEAR OF ITEM 11. PRELOADED IS</li> </ul>	S (AR (AR ) AR ) AR ) SP	598931-305 56 SLIP RING 598910-303 55 CHASSIS ASSY ES9648-01 54 ACTIVATOR		12       12 <td< td=""><td>364-04A16         39         SCREW           364-04A16         39         SCREW           36440-04A         38         WASHER; LOCK           364-05A20         37         SCREW           149CN432R         36         WASHER           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A10         34         SCREW           364-05A10         33         SCREW</td><td></td></td<>	364-04A16         39         SCREW           364-04A16         39         SCREW           36440-04A         38         WASHER; LOCK           364-05A20         37         SCREW           149CN432R         36         WASHER           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A12         35         SCREW           364-04A10         34         SCREW           364-05A10         33         SCREW	
OBTAINED BY ROTATING THE FLOATING PORTION OF THE GEAR 2-3 TEETH FROM ITS "FREE" POSITION IN THE DIRECTION WHICH EXTENSS THE SPRINGS CONNECTING THE TWO GEAR PORT THE "FREE" POSITION IS DEFINED AS THE POSITION AT WHIC SPRING EXTENSION IS INITIATED. 10 NO CORRESPONDING BALLOON CALLOUT IN FIELD OF DRAWING. 9 BELT TENSIONING PROCEDURE: INSTALL BELT DRIVE COMPONENTS AS SHOWN WITH THE FOUR MOTOR MOUNTING SCREWS LOOSE. SCREWS MUST BE LOOSE ENOUGH TO ALLOW THE MOTOR TO MOVE UNDER AN APPLIED LOAD OF .9 NEWTONS (.2 LB), BUT NOT LOOSE ENOUGH TO ALLOW NOTICEABLE ROCKING OF THE MOTOR. WITH THE ASSEMBLY ORIENTED AS SHOWN IN SECTION A-A AND THE BRAKE RELEASED, APPLY A FORCE	IONS         AR         AR         AR         AR         AR         AR         AR         SP           I         I         I         I         I         I         SP         I         SP         I         I         SP         I         SP         I         I         I         SP         I         I         I         SP         I         I         I         SP         I         I         I         I         SP         I         I         I         I         SP         I         I         I         I         I         SP         I         I         I         I         I         SP         I	ES9649-01         53         ADHESIVE           ES9515-01         52         WARKER, IDENTIFICATION           ES9513-01         51         ESD         PLATE           MS21266-2N         50         GROMMET, PLASTIC           M46146-11DWY         49         ADHESIVE           ES9662-03         48         PRIME COAT           A1         GREASE         GREASE           INNTIFICTION         IffW         MOMENCATION OF	MIL - A - 46 1 46	12         12<	B447-05A       32       WASHER         364-06A16       31       SCREW         B444-06A       30       WASHER         B447-06A       29       WASHER         B447-06A       29       WASHER         B447-06A       29       WASHER         B447-04A       28       WASHER         B447-04A       28       WASHER         B447-04A       26       WASHER         364-04A10       27       SCREW         B443-04A       26       WASHER         364-04A08       25       SCREW	D
<ul> <li>F. OF 9.8 NEWTONS±1.0 NEWTON (2.2 B±.2 LB) IN A DIRECT RADIAL TO THE LARGE PULLEY AS SHOWN IN SECTION B-B. TIGHT MOTOR MOUNTING SCREWS BEFORE REMOVING THE TENSIONING FOR COUPLING TO FILEN 10, REMOVE (2) SETSCREWS FROM ONE END OF ITEM 14 COUPLING AND BOND THIS END OF COUPLING TO ITEM 6 SHAFT USING ITEM 53 ADHESIVE WITH ITEM 54 ACTIVATOR. APPLY ACTIVATOR AND ADHESIVE PER MANUFACTURER'S INSTRUCTIONS. POSITION COUPLING SO THAT THE SETSCREWS ON THE FREE END OF THE COUPLING AND R-BOND THIS END OF THAT THE SETSCREWS ON THE FREE END OF THE COUPLING AT THE SETSCREWS ON THE FREE END OF THE COUPLING AND R-BOTOR AT ITS ZERO POSITION. COUPLING MAY BE BONDED TO THE SHAFT PRIOR TO SHAFT INSTALLATION BY POSITIONING THE</li> </ul>	ION PER DASH RO.	LIST OF WATERIALS OF	PARTS LIST	6         6         6         6         6         MS           1         1         1         1         1         59           6         6         6         6         5P         ES           1         -         1         -         599           -         1         -         599           -         1         -         599           4         4         4         4         51506         3021           1         1         1         1         59         1           1         1         1         1         59         1	51957-14     24     SCREW       98943-3     23     HEAT SINK       9205-02     22     HEAT SINK       9065-305     21     CIRCUIT CARD ASSY       13/24     3065-303     20       8-65-303     20     CIRCUIT CARD ASSY       8-66.800-1     19       SPACER       99070-3     18       BRKT, CONNECTOR       6-75-0001     17       GEAR, JABL	
A PROPERLY PACK GREASE IN THE WAVE GENERATOR BEARING.	LITEM 22 HEATSIN A SCREW IS ALSO SHOULDER WASHER SUBSTITUTE ITEM SUBSTITUTE ITEM	K IS SUPPLIED WITH AN INSULATING SUPPLIED, DISCARD THE SUPPLIED , ITEM 36 WASHER AND ITEM 24 SCR : 599065-1 : 599065-301	SHOULDER WASHER. IF SCREW. ASSENDLE WITH EW AS SHOWN.	6         6         6         6         6         SP         ES           1         1         1         1         59         59         1         1         1         59         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         59         1         1         1         1         1         59         1	8600-01         16         CLAMP           99060-1         15         RESOLVER ASSY           98936-2         14         COUPLING ASSY           99058-1         13         HSG, RESOLVER	
<ul> <li>B) APPLY GREASE TO THE TOOTH BED OF THE CIRCULAR SPLINE AND FLEX SPLINE.</li> <li>C) APPLY GREASE TO THE OUTER SURFACE OF THE OUTER RACE OF THE WAVE GENERATOR BEARING.</li> <li>D) APPLY GREASE TO THE SLIDING SURFACES OF THE OLDHAM COUP IN THE WAVE GENERATOR. THIS REQUIRES TEMPORARY REMOVAL THE SNAP RING ON THE WAVE GENERATOR HUB.</li> <li>E) APPLY A VERY THIN FILM OF GREASE TO ALL EXPOSED SURFACE AS A RUST PREVENTATIVE.</li> <li>F) THE REMAINDER OF THIS GREASE IS TO BE APPLIED TO THE INTERIOR OF THE FLEX SPLINE (THE FLEX SPLINE ACTS AS A RESERVIOR FOR THE GREASE) IN SUCH A WAY THAT THE THICK IS GREATER REAR THE FLEX SPLINE MOUNTING BOSS AND GRADUALLY TAPERS OFF NEAR THE AREA WHERE THE WAVE</li> </ul>	LING 22. SYMBOL SP DENOT OF 22. SYMBOL SP DENOT OBTAIN 144mm +0 DETAILED IN SEC ASSOCIATED PRIM AROUND EDGE OF APPLY A THIN LA	REASE, AVAILABLE FROM; MINIATURE DIVISION CAGE 4092 ES VENDOR ITEM - SEE SPECIFICATI mm/-imm OF ITEM NO 50 AND PLACE TION F-F. USE ADHESIVE, ITEM NO E COAT, ITEM NO. 48, TO ATTACH G OPENING. YER OF ITEM 47 GREASE TO THE TEE O RECEIVE TREFOIL MARKER BY WIPT	PRECISION BEARINGS OF MPB CORPORATION ON CONTROL DWG. AROUND OPENING A 49, AND ROMMET, ITEM 50, TH OF ITEM 17 GEAR. NG WITH	1     1     1     1     1     5       1     1     1     1     1     5       1     1     1     1     1     5       1     1     1     1     1     5       1     1     1     1     1     5       1     1     1     1     1     5       1     1     1     1     1     5       2     2     2     2     2       1     1     1     1     5       1     1     1     1     5       1     1     1     1     5	90934-1         12         BELI, TIMING           99057-1         II         PULLEY ASSY           98932-1         IO         PULLEY           98922-1         9         MOTOR ASSY           99056-1         8         HOUSINGLASSY           99056-1         7         BEARING           99059-3         6         SHAFT           8928-301         5         TRANSHISSION, WECH	
GENERATOR IS LOCATED. Supplied with connector p2 to Adapter using JACK POST Supplied with connector. A single flat washer and lockwash (Supplied) shall be installed under the JACKPOST NUT. DISC ANY ADDITIONAL HARDWARE SUPPLIED WITH THE JACK POSTS. Install and torgue to 0.56±0.05 Newton-Meters (5±0.5 LB-1 Install AND torgue to 3.4±0.3 Newton-Meters (30±3 LB-1N). UNLESS OTHERWISE SPECIFIED:	ULCONTAMINATED ULCONTAMINATED SHEET. AVOID TO SHEET. AVOID TO TREFOIL TO CLEA DOES NOT HANG O PART OF COVER A PRESS DOWN FIRM A ROLLER OR WED UNCONTAMINATED OF PLATE BY DRA	USOPROPYL ALCONL. REMOVE TREFOI UCHING ADHESIVE SURFACE. IMMEDIA NED SURFACE. POSITION TREFOIL SC VER EDGES OF COVER (ITEM 46) NOR TTACHING HAROWARE (ITEMS 41,42,4 LY WITH FINGERS. ROLL OUT AIR BU GE. O RECEIVE ESD PLATE BY WIPING WI ISOPROPYL ALCONOL. REMOVE BACKI WING FINGER ACROSS EDGE TOWARD B	TH NG ACK	1         1         1         1         591           -         -         1         1         591           -         -         1         1         591           1         1         -         1         591           1         1         -         1         591           1         1         -         1         591           -         -         1         -         591           1         1         -         1         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         1         -         591           -         -         -         1         591           -         -         1	98966-9     4     GASKET, O-RING       8931-301     3     SLIP RING       8910-301     2     CHASSIS ASSY       98910-1     1     CHASSIS ASSY       1     CHASSIS ASSY     DESCRIPTION       0     NOTE     DESCRIPTION       0     NOTE     DESCRIPTION       0     NOTE     CONTACT NO       0     NOTE     CONTACT NO	
DIMENSIONS ARE IN MILLIMETERS. MIL-STD-I30 BY STENCIL: 20418ASSY 599020-(V). MARK VARIABLE (V) AS APPLICABLE. LOCATE APPROXIMATELY AS SHOWN. NOTES: 8 7	OF PLATE. DO N ADHESIVE SURFAC CLEANED SURFACE ROLL OUT AIR BU	DI USE FINGERNAIL. AVOID TOUCHIN E. APPLY PLATE IMMEDIATELY TO . PRESS DOWN FIRMLY WITH FINGER BBLES WITH A ROLLER OR WEDGE.	S. S. S. S. S. S. S. S. S. S. S. S. S. S	4 C -305 588800 WSTAR 3 E -303 588800 WSTAR 2 C -1 588800 WSTAR 1 E DASH WEATLY WSEP ON SH REV APPLICATION 3	A of 15'         Control 1         ST. LOUIS, WISSOURI 63135           100 ± 0° 30'         DB GR MUSSFILL 98-12-21 Control 1         BASE ASSEMBLY - GR MUSSFIL 99-04-26 ANGULATION HEAD           115 ± 2'         FI 20 418         599020           Arvo         I kews 1/1   mit or         I mitt or           2         I kews 1/1   mit or         I mitt or	

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Attachment 8 Page 1 of 4 .



Attachment 8 Page 2 of 4



Attachment 8 Page 3 of 4



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*				- 1/ - 30	SHOWN 3 IDENTICAL EXCEPT A	S NOTED	TADD
с	17. SP INDICATES VENDOR	TEM. SEE SPECIFICATION CON	ROL DRAWING				ES8359A09A24 16 P
	ANODIZE MAY BE OMIT ANODIZE MAY BE OMIT AHARD ANODIZE PER MIL I BREAK ALL SHARP EDGE INSTALL INSERTS PER	15. FED FROM INDICATED SURFACES. CC A-8625, TYPE III, CLASS 2, TH S. MS51835.	UNVERSION COAT NON-ANODIZED SURFAC	ES PER MIL-C-5541,CLASS IA.	WAS: MS51923-164		-305 14 MS39086-494 13 P1 MS51831-108 12 MS51830-108 11 -9 10 -3 9
В	10 INTERPRET SURFACE RC 9 SURFACE FINISH 125 8 FILLET RADII TO BE . ALTERNATE MATERIAL:	ND SURFACE TEXTURE APPLY AFTER DUGHNESS PER ANSI B46.I. UNLESS OTHERWISE SPECIFIED 015 <sup>+.000</sup> UNLESS OTHERWISE SPEC 303 CRES BAR, COND A PER ASTM	IFIED. A582.	ADD		- 3 - 3 - 1 - 1 (SP) - 1 - 1 - 4 - 4 - 1 - 1	MS24693-C17 8 ES6510-01 7 MS39086-470 6 PI NAS1149C0532R 5 -11 4
	ALTERNATE MATERIAL: INSTALL ITEM 5 WASHE KNOB AND SHAFT TO TU IDENTIFY PER MIL-STO APPLY MIL-G-23827 GR	AL ALLOY PLATE 6061 T651 PER / RS AS REQUIRED TO MINIMIZE THE IRN FREELY IN ITEM 2. 	MS-00-250/II OR ASTM B209 GAP BETWEEN ITEMS 2 AND 4 WHILE A CILLING: 98255ASSY599II4-(V) MARK EM 3 SCREW.	ALLOWING THE ASSEMBLED VARIABLE (V) AS APPLICABLE.	CATE APPROXIWATELY AS SHOWN.	- 1 - 1 - 1 - 1 - 303-303-301 - 1 374 CA - 122-5600 - 122-5600	-1 3 -5 2 -301 1 Int IDENTIFIES OF CONTRACT UNICESS OTHER SPECIFIED CONTRACT DIMETSING AND IS CONTRACT
A	ZZS INSTALL WITH CORROST I DIMENSIONING AND TOLE NOTES:	ON PREVENTATIVE COMPOUND, MIL- RANCING PER ANSI YI4.5M-1982.	PRF-16173, CLASS I, GRADE I.		ADD	-30.3 END ITEH MSTAR) -1 END ITEH MSTAR DAS: A SEABLY MODEL APPLICATION	TOLERANCES ON DECIMANS E ANGLES ILE ± .1         CONTRAC DECIMANS ILE ± .03           JE = ± .03         Sector Sector ILE ± .015         CONTRAC DECIMANS CONTRAC ILE ± .015           ILE ± .015         ± Z'         APVD           FE(f BO         APVD

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Attachment 9 Page 1 of 2

