

**ELGEMS**

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TO : Seung Lee – NRC fax 301-415-5369  
FROM : Sergio Steinfeld – Elgems  
CC : Jim Beebe – GEMS fax 414-548-5197

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Dear Mr. Lee

6/10/99

The letter bellow provides the required information you asked in your E-mail of 3/10/99.  
The answers are in bold letters just after your question.  
The following appendices are attached

- page 3-3 & 3-4 of the MG ATC Operation Manual.
  - Sketch drawing named : MG ATC Rod Unit – Removing the Brass Filter
  - Engineering Drawing No. LBL-000424-01 Warning Label
1. Please provide more detailed description for the transmission scan mask on page 3-3 in MG ATC Operational Manual. There are no Figure 3-4 and Table 8-1 as specified. Why is thallium used in example? Is this used in this Rod Unit as a sealed source?
- a) **Attached updated pages 3-3/4 with detailed description for the transmission scan mask. If you are satisfy, let me know and I send you all the updated MG ATC Operation Manual Rev 2.0.**
  - b) **Two emission isotopes injecting into patient are used for Cardiology Imaging: Technetium Tc99 and Thallium Tl201.**
  - c) **The Gd153 is used as transmission sealed source.**
2. In the description of radiation safety feature of device, you stated that "The rod source Gd-153 is sealed with the exposed end having an additional 3.0 mm brass filter strip which reduces the equivalent source activity to 244 mCi for scanning purposes and extends the source life." Please provide the methodology how to extend the source life. How is the brass strip removed and what is its frequency?

**The ATC Rod Unit contains the Gd-153 radioactive source with half life time of 242 days. The initial nominal activity of the source is 450 mCi. At the time of the option installation, an additional 3.0 mm brass filter strip is used, which reduces the equivalent(effective) source activity to 244 mCi for scanning purposes. After approximately one half life time, the filter strip is removed. This allows the full strength of the remaining activity to be used for an additional half life, thus extending the useful life of the source. After one year from the source installation, the source should be renewed and the filter strip is placed back.**

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The procedure of removing the filter does not require to disassemble any part of the rod unit and takes a few minutes. The filter is located on the external side of the Rod Unit in front of the collimator (See the drawing attached). During the procedure, the shutter is in its close position. The procedure includes the following simple steps:

- a) Unscrew the locking screw on the rod unit.
- b) Remove the brass strip by sliding it out.
- c) Return and screw the locking screw.

No radiation exposure caused by the procedure. The measured radiation exposure was not exceed 0.0005 mRem, which considered as negligible comparing to background level.

3. Please provide label for the line source shipping container as specified in page H-3 in accordance with 10 CFR 20.1904.

I asked DuPont to provide both corrected labels (see paragraph 4/b) on :

- a) the shipping lead container, containing one radioactive line source (see copy of the label in the original submission file appendix E, page E-7).
- b) the type A Carton box, containing two shipping lead containers.

After received them , I will send you immediately.

4. Please note the maximum Gd-153 source allowed with 20% tolerance is 540 mCi. Your application indicates that the sources to be used in the devices will be 450 mCi. Please reflect this maximum source activity of 540 mCi in the source and its container label.
  - a) Attached the corrected engineering drawing of the warning label on the Rod Unit (drawing LBL-000424-01). We add the maximum activity of the source: Max. Gd153 540mCi. The service engineer should fill, in the site, the actual activity of the source & date according to the source manufacturing (DuPont) provided report.
  - b) I asked DuPont to add in both labels, the source shipping lead container label (seeing in the original submission file, appendix E, page E-7) and the Type A carton box label, the maximal and actual activity of the sources.

Dr. Tsukerman and myself would like to thank you for answering our phone calling and clarifying the requested information.

If you have any questions, please call me at (972) 4 8563642 ( fax 972-4-577662) or send me an E-mail to [sergio\\_steinfeld@elgems.com](mailto:sergio_steinfeld@elgems.com) .

Regards  
Sergio Steinfeld

## Transmission Scan Mask

The transmission scan mask (TSM) defines an acquisition region which moves synchronously with the opposite transmission line source across the detector field of view. (See Figure 3-1)

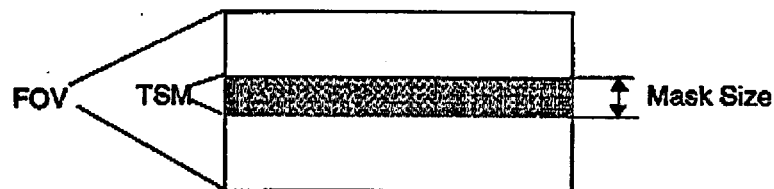
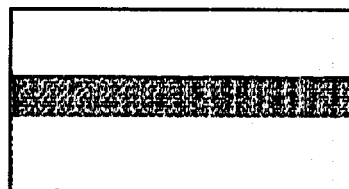


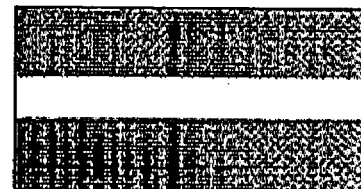
Figure 3-1. Transmission Source Mask

Transmission Energy Window  
100 KeV



Positive TSM

Emission Energy Window



Negative TSM

Figure 3-2. Energy Windows

One of the main purposes of the mask (TSM) is to reduce the crosstalk from the emission isotopes into the transmission image [9]

The transmission image acquires only events which are in the 100 keV energy window corresponding to the  $Gd^{153}$  transmission energy, and also inside the mask (Figure 3-1)

The mask size is an adjustable parameter in the acquisition template, which can be defined as positive or negative. See Figure 3-2

The shaded area of the detector FOV shows where the acquisition takes place. No acquisition occurs in the blank areas.

A "positive" mask acquires events in the region of the transmission source, but a "negative" mask acquires events outside the region of the transmission source.

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The mask, in combination with energy discrimination is used to separate transmission and emission events. For example, all the photons in the 100 keV energy window, detected outside of the mask, are scattered from either the 140 keV Tc99m peak, or 167 keV Te201 peak, from the emission isotopes.

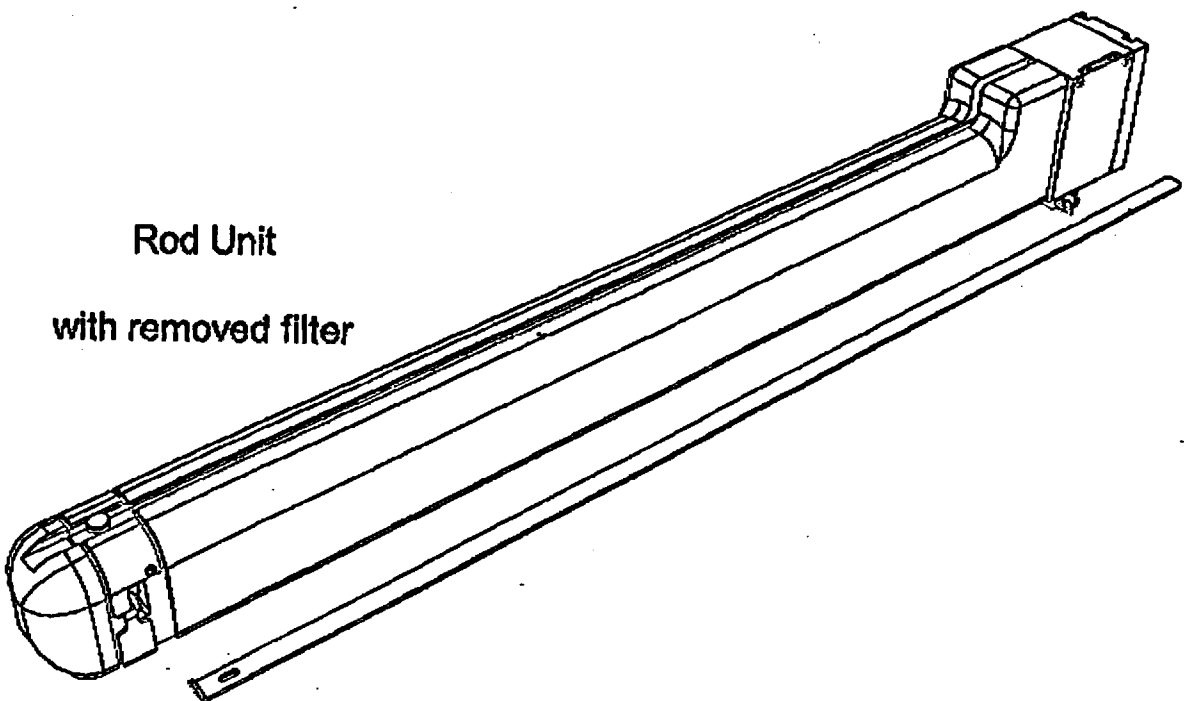
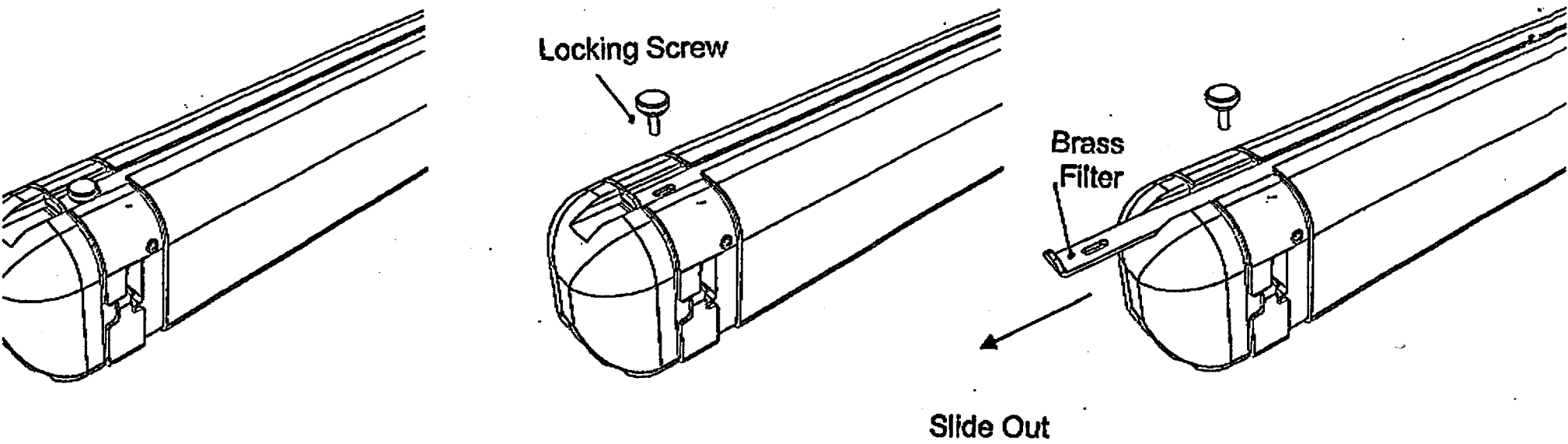
A small fraction of scattered photons from emission isotopes (crosstalk) is acquired inside the mask, which contaminates the transmission scan. In order to correct this contamination, the scattered photons with energy of 100KeV are acquired during the emission stage (crosstalk image) and subtracted with appropriate weight from the transmission scan during the iterative reconstruction.

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## Features

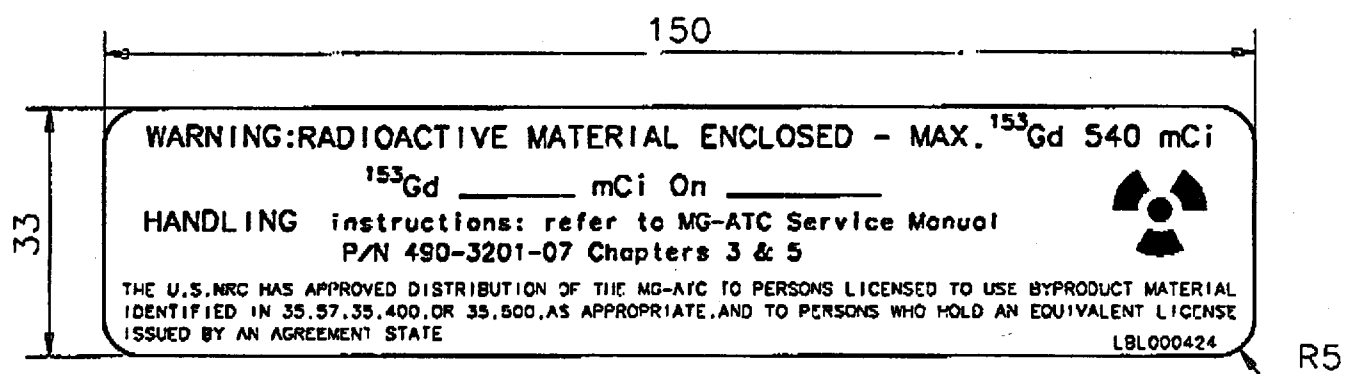
- Parallel Transmission and Emission Geometry using two detector emission and two detector transmission imaging allows fast acquisition of 180 degree cardiac acquisitions using 90 degree gantry rotation.
- 100keV Transmission energy allows transmission scans to be performed in patients already injected with either 201 TI or 99m Tc.
- Long-lived (242 day half life) solid sealed 153 Gd gamma source housed in transmission scan rod.
- Can be used to obtain transmission images with any of the MG ATC range of parallel-hole tomography collimators.
- No collimator changing or setup required to switch from emission to transmission imaging.
- The ATC Rod Units are mounted permanently on the gantry. When both units are parked, there is no restriction on gantry operation in any acquisition mode.
- Attenuation Corrected Reconstruction Algorithm installed as an upgrade to the processing features implemented on GENIE as a part of this option.

# MG ATC Rod Unit – Removing the Brass Strip Filter



ZONE	DESCRIPTION	APPR.	DATE	REV	CHANGE ORD.
	NEW DOCUMENT			AA	EO-00206
				01	

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R5

1. MATERIAL - LEXAN 0.3 MM
2. FONT - DARK GRAY PANTONE 446
3. BACKGROUND LIGHT GRAY PANTONE 427
4. - TRANSPARENT
5. ADHESIVE: MAC TAC COVER BY PAPER

**O.C.**  
 TESTS OF 15 SECONDS RUBBING WITH WATER,  
 ISO-PROPANOL AND METHANOL  
 AFTER ADHESION INSPECT THAT  
 THE TEXT IS READABLE AND CLEAR  
 AND THAT THE BORDERS OF THE LABEL  
 ARE NOT FOLDED

DESIGNER	NAME	DATE	EUROPEAN PROJECTION	EQUIPMENT	ASSEMBLY NAME
DESIGN CONTROL	DANY A.	11.05.99	DEFAULT DIMENSIONS : MM.	MG-ATC	
CHECKER	DANY A.	11.05.99	FINISH		No. 3
APPROVAL	BAR ILAN		<input checked="" type="checkbox"/>	SCALE	NAME
	YOSSI H.			1.0:1.0	WARNING LABEL
CONTENTS PROPERTY OF ECEMS LTD. NO UNAUTHORIZED USE PERMIT			TOL. NOT SPECIFIED :	DWG. SIZE	DRAWING No.
				1	

**CONVERSATION RECORD**  
(C:\SJJ\elgems.con)

**TYPE:**

Outgoing Telephone  
Incoming Telephone: (972) 4-8563642  
Meeting

**NAME OF PERSON CONTACTED:**  
Sergio Steinfeld

**ORGANIZATION:**  
ELGEMS

**TIME:**  
10:00 AM

**DATE:**  
10/5/99

**SUBJECT:**  
Clarification of page H-3 and labeling

**SUMMARY:**

The lead shipping container has one sealed source and the cardboard carton box has two lead shipping containers. DuPont will put the label having maximum allowable activity and actual activity on the lead shipping container each. The Rod Unit has the label showing the maximum allowable activity and the service man will put down the actual activity on the Rod Unit when the sealed source arrives at the installing site.

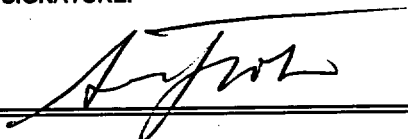
**ACTION REQUIRED:**

**PLACE THIS RECORD IN:**  
Registration File NR-  
QA File  
Incident File  
General File

**PERSON DOCUMENTING THE CONVERSATION:**

Seung J. Lee

**SIGNATURE:**



**DATE:**

10/05/99