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Advanced Radiation Service

271 PLAINFIELD ROAD

EDISON, NEW JERSEY 08820

March 12, 1985

U.S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

Reference: Docket No. 030-08048
Mail Control No. 12765

Gentlemen,

The management of Advanced Radiation Service regretfully aknowledge that our Administrative and Operations and Emergency Procedures Manuals were not prepared with the utmost in accuracy. Our paid consultant on these matters, Mr. Joseph Dewton, is responsible for these errors and inaccuracies and has since been releived of any consultation duties involving Advanced Radiation Service. We hope that the following answers to your queries and amendments provided will satisfy any requirement for the renewal of our License No. 29-14171-01. Please feel free to contact me at any time if there be any remaining questions or doubts regarding the enclosed information. Thank you for your cooperation and patience in this matter.

Sincerily,
Anton S. Kurtz

Anton S. Kurtz
President
Advanced Radiation Service, Inc.

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"OFFICIAL RECORD COPY"

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March 12, 1985

U.S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

RE: Mail Control No. 12765
Docket No. 030-08048

Gentlemen,

Below are the answers to questions and clarifications listed in letters from your office dated August 6, 1984 and February 12, 1985. These are in regard to our application of renewal of License No. 29-14171-01. We hope you find these answers satisfactory.

1. Advanced Radiation Service, Inc. has not ye disposed of the cobalt-60 Model 571 rod source.This instrument had previously been stored at 1079 East Grand Street, Elizabeth, N.J., but currently is being stored at Advanced Radiation Service, Inc. This instrument will be returned to Technical Operations to be disposed of. All references to this Model have been deleted from our Administrative and Operations and Emergency Procedures Manuals, as it is no longer in use.

2.
A. The sentence,"If the dosimeter is discovered to not be fully discharged, the wearer should stop work immediately and notify Mr. Kurtz .....", contained in the Operations and Emergency Procedures Manual, IV., iii Pocket dosimeters, paragraph 3 page 7, sentence 2, has hereby been amended to read as follows:
"If the dosimeter is discovered to be fully discharged, the wearer shall stop work immediately and notify Mr. Kurtz, who will send the wearer's film badge immediately to Landauer for processing to determine whether an overexposure has occured."

In addition, the sentence, "The dosimeter must be charged to zero prior to each shift and recorded in the dosimeter log.", contained in Ops and Em Proc. IV., iii Pocket dosimeters, paragraph 2 page 7, sentence 1, has hereby been amended to read as follows:
"The dosimeter must be charged to zero prior to each shift. At the end of each shift (daily), the total must be entered in the dosimeter log, known in this Manual as 'Utilization Log', form 1, page 37a."

B. We have determined that the strength of the Cesium 137 in Model 3060 calibrator, made by Dosimeter Corporation of America is 5 microcuries. This Model, therefore, needs no specific N.R.C. license and need not be included in our application for license renewal.

C. The sentence, "Surveys should also be used to confirm that exterior surfaces of transportation vehicles .....", contained in Ops and Em Proc. V., i

C. (cont) General, paragraph 1 page 8, sentence 2, has hereby been amended to read as follows:
"Surveys shall also be used to confirm that the exterior surfaces of transportation vehicles are within acceptable unrestricted limits."

D. The sentence which reads, ".....and three feet from the outside surfaces of vehicles", contained in Ops and Em Proc. V., iii Occasions for conducting Radiation Surveys, paragraph 2 page 9, sentence 1, has hereby been amended to read as follows:
"To confirm that radiation levels in the passenger compartment and not more than 18 inches from any external surface of the vehicles used to transport licensed material are within required limits."

E. References to "and 500 mr during a calender year to persons continually present" and "five hundred millirem per calender year", contained in Ops and Em Proc. VI., i, page 10, and VI., viii 2 c), page 11, respectively, have been deleted in accordance to 10 CFR 20.105 (b).

F. The definition of Radiation Area, as stated in Ops and Em Proc., has been revised to indicate a 2 mr/hr limit by amending sentence 1 in sect VI., ii Radiation Area, paragraph 1 page 10, to read as follows:
"Any area accessible to personnel in which radiation exists, originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one hour a dose in excess of 2 mr, or in five consecutive days a dose of 100 mr."

G. We have thouroughly revised our operating procedures of Model 533 and Model 660 radiographic exposure devices. We have incorporated the steps suggested under 2g of your letter indicating in these procedures when to establish restricted areas and when to perform surveys. Model 680 radiographic exposure device is nolonger used by Advanced Radiation Service and has therefore been deleted from all references in the Ops and Em Proc. Manual.

H. A copy of the Model 650 source exchanger procedure has been enclosed for your approval, see attachment A.

I. We cannot find the statement to which you refer in question 2i of your letter. We are enclosing a copy of the page 17a to which you refer. That statement does not appear on this page.

J. Our original statement, that all cobalt-60 sources must only be changed by Technical Operations and not by Advanced Radiation Service, is accurate.All references, therefore, to Model 771 source changer procedures have been deleted.

K. All survey meter calibration will be performed by a service company. The operating instructions for Model T/O-571 Meter Calibration Kit are to be deleted as they are not used by Advanced Radiation Service. All references to the Model T/O-571, furthermore, have been deleted from our Ops and Em Proc. Maual.

L. The sentence, "Perform physical radiation survey of device to assure that source is in shielded position", contained in Ops and Em Proc. IX., i Plant Emergency, 2, page 18, has hereby been amended to read as follows:
"Perform physical radiation survey with a survey instrument to include the entire circumference of the radiographic exposure device and the guide tube being used. This is to ensure that the source has been returned to it's shielded position."

M. Section E, of Ops and Em Proc. IX., ii Accidents involving source, 4, has hereby been amended to include the present, correct telephone number of the Region I office of the Nuclear Regulatory Commission, King of Prussia PA, which is (215) 337-5000.

N. The sentence, "Perform radiation surveys to ensure that the radiation level inside the driver's compartment does not exceed 2 mr/hr and that the radiation level outside the vehicle does not exceed 1 mr/hr", contained in the Ops and Em Proc. X., v, paragraph 1 page 22, sentence 1, has hereby been amended to read as follows:
"Perform radiation surveys to ensure that radiation levels not more than 18 inches from the external surface shall not exceed 2 mr/hr."

O. The sentence, "Survey three feet from the exterior surfaces of the package to ensure that radiation levels do not exceed 10 milliroentgens per hour.", contained in Ops and Em Proc. Part I Receivingg Radioactive Material, paragraph 4 number 2, page 25a, has hereby been amended to read as follows:
"Upon receipt of the package (but not later then 3 hours after the package is received at the licensee's facility if the package is received during normal working hours, or 18 hours if received after normal working hours), a survey shall be made to ensure that radiation levels do not exceed 10 millirem at three feet from the external surface of the package. If the package is found to exceed these limits, the licensee shall immediately notify the director of the N.R.C., Region I by telephone or telegraph."

P. All references to DOT regulations in "Shipping of Radioactive Material", Parts II and III, 1. through 10., pages 25b to 25j have been revised to reflect the most current regulations in Title 49.

Q. Surveys of the radiographic exposure device to ensure no abnormal leakage and the recording of these surveys have always been a part of the procedure during Inspection and Maintenance by Advanced Radiation Service. These records are maintained on Form 1, page 37b and Form 2, page 38 of the Ops and Em Proc. Manual. However, to clarify this inspection procedure, the sentence, "Take survey of camera to check for any sign of abnormal radiation leakage. Readings over 200 mr/hr for a new source (maximum capacity) at the surface of the camera are abnormal.", contained in Ops and Em Proc. XI., Inspection and Maintenance Procedures, 5, has hereby been amended to read as follows:
"Take survey of camera to check for any sign of abnormal radiation leakage. Record survey results in daily Utilization Log and Daily Maintenance and Inspection Report.

(CONT)

2.
Q. (cont) Readings over 200 mr/hr for a new source (Maximum Capacity) at the surface of the camera are abnormal."

In addition to the above changes, there has also been a revision of Form 2, page 31 (Daily Maintenance and Inspection Report) in response to question 2q of your letter. This revision will be included to record camera surveys on this report.

R. Form 6a, page 43 of the Ops and Em Proc. Manual has hereby been deleted. This form (6a), was originally included in the manual as a facsimile of the form used by our service company for calibration records. Advanced Radiation Service does not calibrate it's own survey meters.

3.
A. The definition of Radiation Area as it exists in Administrative Manual, 3), G, page 2 has hereby been amended to coincide with that definition stated in Ops and Em Proc. II, (e), page 2 and VI., ii, page 10. This definition, of Radiation Area , shall now read as follows:
"Radiation Area - Any area accessible to personnel in which radiation exists, originating in whole or in part within licensed material, at such levels that a major portion of the body could receive in any one hour a dose in excess of 2 mr, or in any consecutive five days a dose in excess of 100mr."

B. All references to survey meter calibration and the Tech Ops Model 733 source, and it's use as a calibration instrument have been deleted in our Administrative Manual. This deletion covers pages 6 through 9 presently in our Manual.

C. Advanced Radiation Service does not require that our radiographers receive no more than 10 mr in one hour. This was a technical error in our Administrative Manual. We have corrected the error by deleting the phrase, "..... or shows a reading in excess of 10 mr/hr," in Ad man., Item 7 Dosimeter Calibrator, paragraph 3 page 7, sentence 2.

D. We have incorporated your suggestion that Assistant Radiographers be given classroon experience and instruction in the operation of radiographic equipment during actual radiographic operations. We have found this reccomendation to be quite usefull. This provision has also bee incorporated in our Ad Man.. Hereby amending 8, i, page 8 to read as follows:

"B. Training of persons to be Radiographer's Assistants.
Trainees will undergo the following training to become a Radiographer's Assistant;

i. Initial Classroom Instruction. A minimum of 16 hours of formal classroom instruction, to be divided as follows;

* 1 Hour - Responsibilities,duties,limitations.
* 2 Hours - Introduction to basic principles of radiation safety.
* 1 Hour - Introduction to the use of personal monitoring equipment.
* 8 Hours - The nature and importance of Operating and Emergency Procedures, Introduction to federal regulations applicable to industrial radiography with sealed sources.
* 4 Hours - 'Hands on' training and instruction in the use of radiographic equipment during actual radiographic exposures.

3.

E. The questions that you have listed from our "Sample Questions and Expected Answers for Test to be Radiographer/Assistant Radiographer.", Item 8e page 12 in Ad man., as having wrong or incomplete answers are listed below; first as originally stated, then as amended per your request.

a) Question 1
"What is the correct way to survey the projector after an exposure?"
E.A. - "Approach projector observing the survey meter and extend instrument into the area which would represent the collumated radiation field."
Amended Question/Expected Answer:
"What is the correct way to survey the projector after an exposure?"
E.A. - "Approach projector observing the survey meter. Survey the entire circumference of the projector, and along the entire length of the source guide tube to ensure the source has been returned to it's shielded position."

b) Question 18
"Ca6 a body exposure of 2 mr/hr continuously be considered safe?"
E.A. - "No, because radiation in excess of natural background radiation can never be considered safe."
Amended Question/Expected Answer:
"Can a body exposure in excess of 2 mr/hr continuously be considered safe?"
E.A. - "No, although continuous doses of 2 mr/hr are considered safe by N.R.C. regulations, doses in excess of 2 mr/hr are potentially dangerous or assuradly dangerous as they progress and should therefore be considered dangerous and avoided."

c) Question 35
"Six inches of high density concrete offer twice the protection against Iridium 192 as which of the following:
(1) about 3"
(2) about 4"
(3) about 5"
E.A. - about 5"
Amended Question/Expected Answer:
"Six inches of high density concrete offer twice the protection against Iridium 192 as which of the following:
(1) about 3"
(2) about 4"
(3) about 5"
E.A. - about 4"

d) Question 39
We do not have a HVL for sand. In this case question 39 is erroneous and has been deleted from future examinations.

e) Question 41
"The radiation from 1 curie of CO^{60} is attenuated in air to approximately 5 mr/hr at a distance of:30 feet, 50 feet, 100 feet.
E.A. - 30 feet.
Amended Question/Expected Answer:
"The radiation from 1 curie of CO^{60} is attenuated in air to approximately 5 mr/hr at a distance of: approx. 50 feet, approx. 120 feet, approx. 170 feet
E.A. - approx. 170 feet.

3.

F. The procedure for the qualification of previously trained Radiographers and Assistant Radiographers is contained in our Administrative Manual, page 8 C., IV Procedures for testing new employees at Advanced Radiation Service. After further review, however, this section was found to be unclear and has been revised to read as follows:

"C. IV. Procedures for testing previously trained employees at Advanced Radiation Service.

Mr Kurtz will take the following measures before assigning new employees to radiographic operations.

* Record work experience and substantiate by phone calls, certificates and any other pertinant sources.
* Train them in specific Operating and Emergency Procedures in effect at ARS, as well as specific training in the equipment used by ARS. (equipment to include specific exposure devices, survey meters, source changers)
* Administer a written and practical examination to determine each new employee's background and experience pertaining to radiographic operations, and to determine whether the new employee shall be qualified as a Radiographer or as an Assistant Radiographer.
* After determination has been made as to the extent of the new employee's previous training, and ARS qualification assigned, Mr. Kurtz will observe actual field procedure to further ensure the qualifications assigned.
* Mr. Kurtz will also determine, from the results of tests and observation, the scope and extent of any additional training that may be needed by a new employee at Advanced Radiation Service.
* If additional training is found to be necessary in any new employee, Mr. Kurtz shall administer such training.

G. Assistant Radiographers will be inspected both seperately and as a working team to ensure that both personal safety procedures and general safety procedures that may affect both men are being observed. If an Assistant Radiographer or Radiographer does not participate in radiographic operations for a period exceeding three months, the Assistant Radiographer or Radiographer in question will be inspected apon his return to the performance of radiographic operations.

H. We have removed all NRC regulations submitted as part of our Administrative manual at your suggestion. We have also indicated that current copies of 10 CFR 19,20,21,30,34, and 71 are maintained and are available to all workers.

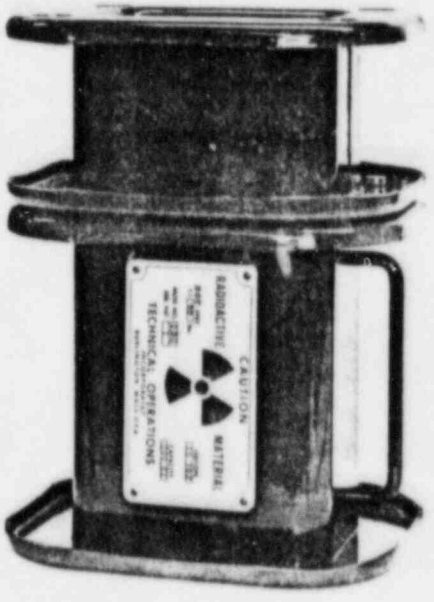
OPERATING INSTRUCTIONS

SOURCE CHANGER
Model 650

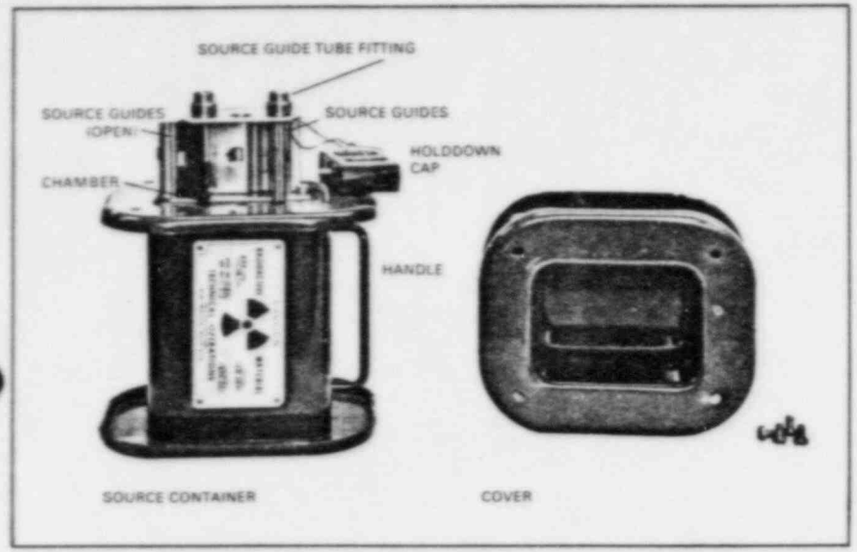
TECHNICAL OPERATIONS, INC.
Radiation Products Division
Burlington, Mass. 01803

OPERATING INSTRUCTIONS

SOURCE CHANGER
Model 650



TECHNICAL OPERATIONS, INC.
Radiation Products Division
Burlington, Mass. 01803



Model 650 Source Changer
(Source in a chamber – Parts Identification)

NOTICE

This container is for shipping **only** licensed sources of Technical Operations, Inc. No attempt to use this equipment should be made unless the user is thoroughly familiar with the instructions in this manual.

USER WAIVER AGREEMENT

The user agrees that Technical Operations, Inc. is not liable for any claims alleged to be due to use of the product.

The AEC forbids the use of this equipment and the exchange of sources unless the user is specifically authorized by the terms of his license.

If user is not authorized to make source changes, contact Picker Industrial. It has licensed personnel that can perform this operation. If user wishes to be licensed to perform source changes, application should be made to the Atomic Energy Commission, Division of Licensing and Regulations, Washington, 25, D.C. The application, in letter form, should specify by whom and under what conditions source exchanges are to be made. Refer to this instruction manual for detailed procedures. Additional copies may be obtained for incorporation in your operating procedures manual.

GENERAL DESCRIPTION

The Source Changer Model 650 is a portable shielding container for transferring encapsulated radioisotope sources into radiography projectors. The changer is designed to safely contain the radiographic sources during shipment and to permit field exchange of old for new sources without exposing the operator to unsafe radiation levels. The source changer has depleted uranium for shielding. The design of the unit meets the Type B requirements of the Department of Transportation.

QUICK REFERENCE DATA

Source types	Sealed sources (Tech Ops sources only) Isotope: Iridium 192 and Cobalt 60 Radiation: gamma rays Tech Ops: Model A424-1 Iridium Model A424-5 Cobalt Model 531-B Iridium
Container capacity	Iridium 192 – 200 curies Cobalt 60 – 75 millicuries
Shielding	Depleted uranium (U^{238}) – Wt. 35 lb.
Housing	Steel
Design	Complies with DOT – 55 & Type B Packaging
Effective radiation shielding	Well below regulatory mR/hr limits prescribed in 10 CFR 34. 21 and 49 CFR 389 (i), 393 (i).
Dimensions	13 1/4 H x 10 L x 8 1/4 W – inches
Shipping weight	66 lb.

SHIPMENT DATA

Every loaded Model 650 source changer is shipped with the following items:

1. Source decay chart and leak test certification. *Keep for user's records.*
2. Source identification (ID) plate. *Affix to user's projector.*
3. Return shipping labels.
4. Tamperproof seals.
5. Instruction Manual.

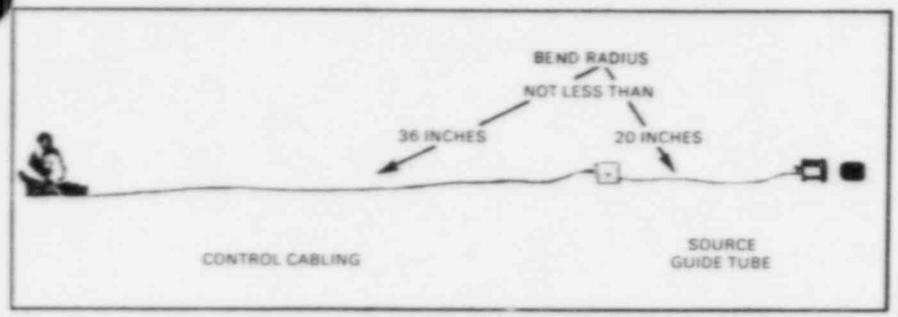
OPERATING INSTRUCTIONS - SOURCE CHANGING

WARNING

RADIATION HAZARD. All the precautions used when making radiographic exposures are applicable, in accordance with 10 CFR 34.

A. Locate source changer and projector in an area where the source may be exposed.

B. As illustrated in figure below, place units to minimize any bend radius in the source guide tube (7-ft. extension) and control cabling.



Typical Source-exchange Arrangement

1. Set projector as for an exposure.
2. Open source changer.
   a. To remove cover: break seal and unbolt.
   b. To remove source holddown cap: break seal and unbolt.

CAUTION

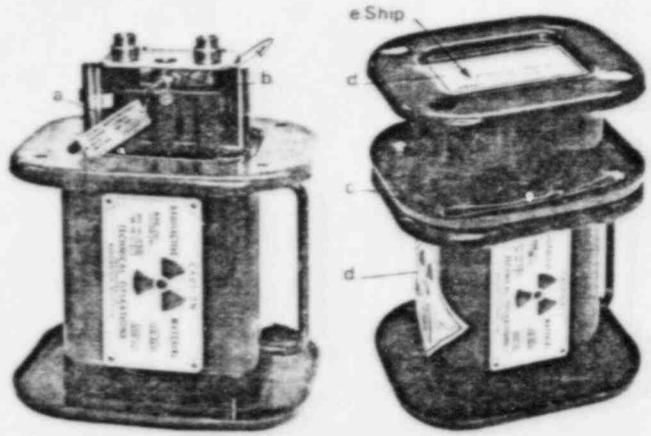
When cap is removed, source connector is exposed. Special care should be taken not to dislodge source when handling the changer.

3. Connect extension source guide tube from projector to the fitting above empty chamber. (Avoid sharp bends.)
4. Close and latch the source guides.
5. Crank source into the source changer.
   a. Survey this operation with a gamma survey meter to be sure source has been transferred from projector to changer.
   b. With a survey meter verify radiation level does not exceed 200 mR/hr at the surface of changer.
6. Open guides. Disconnect cable from source assembly. See instructions of figure A.
7. Disconnect the guide tube from changer. (If a new source is not to be transferred, go to step 15.)
8. Connect the guide tube to the fitting above chamber containing new source. (Avoid sharp bends.)
9. Crank projector drive cable until connector butts to source connector.
10. Couple the connectors. See instructions of figure A.

WARNING

When testing connectors for proper connection, do not move source more than 1/2 inch from its stored position.

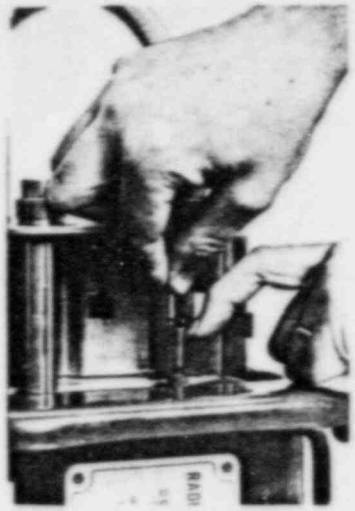
11. Close and latch the source guides.
12. Crank source to full retraction within projector.
    a. Survey this operation with a gamma survey meter to be sure source has been transferred into the projector.
    b. With a survey meter verify radiation level does not exceed 200 mR/hr at the surface of the projector.
13. Disconnect the source guide tube from changer.
14. Affix ID plate of new source to projector.
15. Prepare source changer for shipping:
    a. Attach ID plate of old source to holddown cap.
    b. Bolt holddown cap in place and seal. (Source guides open)
    c. Bolt changer cover in place and seal.
    d. Affix proper shipping labels and return to Technical Operations, Inc.
    e. Ship PREPAID



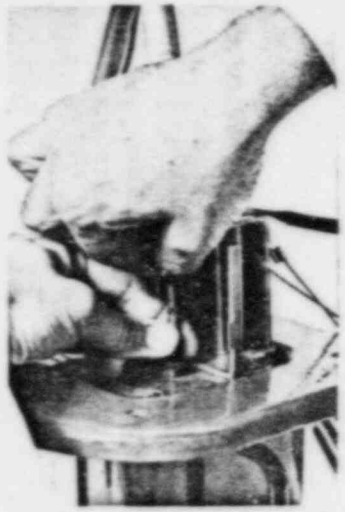
Preparing Source Changer for Shipment

NOTE

Please return container promptly. Rental charges will be made for containers held beyond normal transportation time.



Connecting/Disconnecting



Testing Connection

WARNING

Do not move source assembly more than 1/2 inch from its stored position when connecting/disconnecting or when testing for proper connection.

TO ENGAGE CONNECTORS

1. With fingernail move lock pin back from keyway. (Pressure on pin is downward toward stored position of source.)
2. Slide drive-cable connector into keyed sleeve and release pin.
3. Test connection by pulling between source and drive cable. (Note WARNING.)

TO DISENGAGE CONNECTORS

1. With fingernail move lock pin back from keyway.
2. Slide drive-cable connector out through keyway and release pin.

CAUTION

Move connector sideways only. Do not bend or twist.

Figure A. Procedures for engaging and disengaging the Model 550 source-assembly connector. Testing for proper connection must be performed.

Radiation Products Division, a division of Technical Operations, Inc. produces and manufactures a complete line of industrial radiographic devices. Its hot-lab facilities, modern and well-equipped, are available to industry for special projects and study programs.

PRODUCTS

Radioisotope sealed sources

Gamma Ray Projectors – portable & mobile

RADIOGRAPHIC ACCESSORIES

Calibrators

Irradiators

Radiation Area Monitors

Image Evaluation Instruments

Write or call Picker Industrial or Radiation Products Division for complete information.