

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

INSTRUCTIONS - Complete items 1 through 6 if this is an initial application or a application for renewal of a license. Information contained in previous applications filed with the Commission with respect to items 1 through 5 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 6 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Materials Branch. Upon receipt of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the licensee is subject to Title 10, Code of Federal Regulations, Part 20, and the license fee provisions of Title 10, Code of Federal Regulations, Part 170. The license fee category should be stated in item 6 and the appropriate fee enclosed. (See Note in Instruction Sheet)

1. NAME AND STREET ADDRESS OF APPLICANT (Include city, State and zip code. Include ZIP Code and telephone number.)

HAMILTON WATCH COMPANY, INC.
941 Wheatland Avenue
Lancaster, Pa. 17604

11. STREET ADDRESS, AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from item 1, include ZIP Code)

SAME

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

ASSEMBLY AREA

3. PREVIOUS LICENSE NUMBERS (If this is an application for renewal of a license please include and give number.)

License Application #37-03572-07E.
Refer to Supplement #3.

4. INDIVIDUAL USER(S) (Name and title of individual who will use or directly supervise use of byproduct material. Give background and experience in item 5 and 6.)

Bernard Cattin, V.P. Director of
Operations
Park McKinney, Production Manager
Olivier Barrelet, Research & Development
Manager

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer. If other than individual user, attach resume of his training and experience as in items 8 and 9.)

Olivier Barrelet

Refer to Supplement #5.

6. (a) BYPRODUCT MATERIAL (Name and mass number of isotope)

Tritium

(Hydrogen 3)

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MOLECULES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME (If known, indicate also name of manufacturer, model number, or other identification data for each source.)

Tritium as a gas in sealed borosilicate glass sources manufactured by American Atomic Corporation #60328 up to 6,290 Ci/3H at any one time (no single source to contain more than 200 mCi/3H).

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED (If byproduct material is for "human use," Supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

Tritium filled tubes to be placed behind a liquid crystal display within a digital watch, permitting reading of time in low ambient light. For sale and distribution of Hamilton Watch to persons as authorized by Sec. 32.22, 10 CFR 32. Hamilton LCD watches will be manufactured under California Radioactive Material).

7904250383

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4

(Use supplemental sheets if necessary)

a. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
b. Principles and practices of radiation protection	AMERICAN ATOMICS	3 DAYS	(Yes) No	(Yes) No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Training with Radiologic monitor equipment. OVERHOFF	1 Day	(Yes) No	(Yes) No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Reading of material	several days	(Yes) No	(Yes) No
d. Biological effects of radiation	Reading of material	several days	(Yes) No	(Yes) No

9. EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
³ H		MODULUS AMERICAN ATOMICS CORP. SUNCRUX OVERHOFF ASSOCIATES	ON THE JOB COURSE ON THE JOB ON THE JOB	Handling ³ H

10. RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mCi/l)	WINDOW THICKNESS (mg/cm ²)	USE (Monitoring, surveying, measuring)
Tritium Air Monitor Betatec Model 210 (Overhoff & Assoc.)	1	Tritium	5mCi/m ³ TO 2000 mCi/meters		SURVEY
Calibrator CL-1	1	Tritium			CALIBRATION

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE

REFER TO SUPPLEMENT #11.

12. PAM BADGES, DOSIMETERS, AND BIO ASSAY PROCEDURES USED (Do the badges use the method of calibrating and processing, or name of supplier)

REFER TO SUPPLEMENT #12.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

- 13. FACILITIES AND EQUIPMENT Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hood, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No REFER TO SUPPLEMENT #13.
- 14. RADIATION PROTECTION PROGRAM Describe the radiation protection program including control measures. If application covers sealed sources, submit test testing procedures where applicable, name, training, and experience of person to perform such tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. REFER TO SUPPLEMENT #14.
- 15. WASTE DISPOSAL If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. AMERICAN ATOMICS CORP. REF. #15.

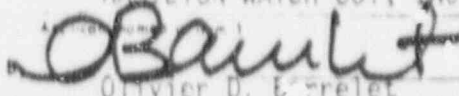
CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

License Fee Category \$ _____

Fee Enclosed \$ _____

Date March 30, 1979

HAMILTON WATCH CO., INC.

 Olivier D. Effelet
 Manager Research & Development
 Title of certifying officer:
 Radiation Safety Officer

WARNING — 18 U.S.C., Section 1001, Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17602 U.S.A. TELEPHONE 717

SUPPLEMENT TO ATOMIC ENERGY COMMISSION FORM 313

SUPPLEMENT SECTION 3

This license is to be amended to License #37-03572-07E for the use of Tritium.

SUPPLEMENT SECTION 5

Olivier D. Barrelet has attended a complete seminar at American Atomics in regard to:

- a) Principles and practices of radiation protection.
- b) Radioactivity measurement standardization and monitoring techniques and instruments.
- c) Mathematics and calculations basic to the use and measurement of radioactivity.
- d) Biological effects of radiation.

SUPPLEMENT SECTION 11

Same as License Application #37-03572-07E.

Page 1, Supplement Section 11.

SUPPLEMENT SECTION 12

Same as License Application #37-03572-07E.

Page 1, Supplement Section 12.

SUPPLEMENT SECTION 13

Same as License Application #37-03572-07E.

Page 1, Supplement Section 13.

SUPPLEMENT SECTION 14

Same as License Application #37-03572-07E.

Page 1, Supplement Section 14.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17602 U.S.A. (717) 394-7161

SUPPLEMENT SECTION 15

Same as License Application #37-03572-07E.

Page 2, Supplement Section 15.

HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717)394-7161

SUMMARY

1. The description of the product and its intended use.
2. Type and quantity of by-product materials.
3. Chemical and Physical Form.
4. Solubility in water and body fluids of the forms of the by-product material.
5. Maximum External Radiation.
6. Degree of Access.
7. Details of construction and design.
8. Total quantity of by-product material expected to be distributed in the product annually.
9. Expected life of the product.
10. Method of Labeling.
11. Procedures for prototype testing.
12. Results of prototype tests.
13. List of Part Numbers.
14. External Radiation Dosage and Dose Commitments.
 - 14.1. Individual User.
 - 14.2. Dose Commitment, Inhalation and Absorption of T_2O .
 - 14.3. Skin Dosage T_2 .
15. Distribution, Handling and Storage.
 - 15.1. Dose Commitment, Inhalation and Absorption of T_2O .
 - 15.2. Skin Dosage T_2 .
16. Retail Sales.
 - 16.1. Dose Commitment, Inhalation and Absorption of T_2O .
 - 16.2. Skin Dosage T_2 .

HAMILTON WATCH CO. INC.

1300 WEST 10TH AVENUE, DENVER, COLORADO 80202, U.S.A. (303) 733-7161

17. Effectiveness of Containment.
18. Disposal.
19. Dose Probabilities.
 - 19.1. Individual User.
 - 19.2. Dose Commitment, Inhalation T_2O and Absorption.
 - 19.3. Skin Dosage T_2 .
20. Handling and Storage of Quantities of Watches.
 - 20.1. Dosage Commitment, Inhalation and Absorption T_2O .
 - 20.2. Skin Dosage T_2 .
21. Quality Control procedures to be followed.
22. Receiving and Stores.
23. Module Repair.
24. List of Photographs.
25. List of Prints.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717) 394-7161

SUBJECT: Information Required per Sec. 32.22 for Use Under 30.19, 10 CFR 30.

1. The Description of the Product and its Intended Use.

The Hamilton Watch part number, see Point 13, are multifunction liquid crystal display (LCD) digital watches. The time is continuously displayed and may be viewed in high ambient light or in the dark without the need to depress a button. This leaves the user's both hands free for such required things as driving.

Each cased liquid crystal display module contains one gaseous tritium light source, (GTLS) having a maximum tritium content of 200 mci. The GTLS is used for the illumination of the display. (See photograph 1). The 25 mm module consists of three basic parts:

- 1.1. The two clamps (made out of stainless steel) that retains the display, translector, connectors and source holder (GTLS). Photographs 4, 5, 6.
- 1.2. The printed circuit board (display side) that contains the encapsulated integrated circuit, the gaseous tritium light source and associated electronic components (Photograph 9).
- 1.3. The Printed Circuit Board with four threaded bushings that hold the display and display clamps together by four screws. The plastic carrier, made out of high temperature resistant blue nylon, contains the Printed Circuit Board, and the display and the battery.

2. Type and Quantity of By-Product Materials

Each watch module will contain one gaseous tritium light device (GTLD) that carries one gaseous tritium light source (GTLS). Each GTLS, Liquid Crystal Display, TLQ IX, 9858-C and TLQ IX, 9858-5, module has a maximum 200 mCi^{3H} per watch module.

3. Chemical and Physical Form

Same as License Application #37-03572-07E.

Page 5, Paragraph 3.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17601 U.S.A. TEL: 717/394-7161

4. Solubility in Water and Body Fluids of the Forms of the By-Product Material.

Same as License Application #37-03572-07E,
Page 6, Paragraph 4.

5. Maximum External Radiation.

Same as License Application #37-03572-07E,
Page 6, Paragraph 5.

6. Degree of Access.

The watch cases for use with Modulus module #2030 and 2020 are all designed to prevent access to the tritium luminous source. The module is held in the case by a tight interference fit rendering removal without special tools very difficult. The outside of the module has 3 flexible plastic hooks clamping the battery onto the module. These 3 hooks are also used to hold the module inside the case. A special tool is required to remove the module outside the watchcase. (Photo 14.) The casebacks used shall be screwbacks without battery hatches. However, removal of the case back to replace the battery should only have to be done every 6 years or more. Back removal by anyone other than a jeweler or authorized Hamilton Watch Co. service personnel is unlikely. Even upon removal of the case back, the interference fit of the module in the case makes removal very difficult without special tool, unavailable to the general public. Should the module sub-assembly be removed from the case, further disassembly is unlikely as described in Section 7.

Similar to cases used with our presently used modules, it is not possible to remove the watch crystal with the module sub-assembly in place. Should the crystal be removed or broken, it is not possible to remove the module through the crystal opening.

7. Details of Construction and Design.

The liquid crystal display module #2030 and 2020 containing a tritium light source has been designed to safely nest the source panel (GTLS) within a printed circuit board type pan and the liquid crystal display. The GTLS is mounted into the printed circuit board cavity with a silicone RTV adhesive. The GTLS supplier (American Atomics Corp., Tucson, Arizona) shall deliver batches which are accompanied by a certificate of compliance with a radiation test report.

A translector is placed over the GTLS cavity with the liquid crystal display, along with the connectors. The display is clamped to the board by means of two stainless steel clamps. The tritium display light assembly cannot be removed through the front of the module without destruction of the module. The display is retained in the module by two stainless steel clamps. Disassembly of the module by removal of the assembly screws is impeded by covering the complete screw heads with epoxy to the display clamp. (See photograph #1.)



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717) 396-7161

The printed-circuit-board-type-pan protects the tritium tube from the backside.

In addition, one large button type battery is placed and solidly attached on the backside of the entire module (caseback side). The battery shall give the tube an additional protection, by covering the entire printed circuit board. Three hooks used to hold the battery to the module allow the module to be forcibly inserted into the watch case by means of a press fit. A special vacuum type tool, not available to the general public, is required to remove the module from the case. See photograph 14. A specially designed tool is required to remove the caseback for eventual battery replacement.

8. Total Quantity of By-Product Material Expected to be Distributed in the Product Annually.

Hamilton Watch Company expects that it will distribute a maximum of 20,000 LCD watches with tritium illumination per calendar year. At 200 mCi per watch, a maximum of 4,000 Ci of tritium will be distributed.

9. Expected Life of the Product.

Same as License Application #37-03572-07E.
Page 7, Paragraph 9.

10. Method of Labeling.

The back of the watch case shall be marked with the symbol (^3H) and the name of Hamilton Watch Company.

11. Procedures for Prototype Testing.

Five complete prototypes, part TLQ IX, 9858-C and TLQ IX, 9858-5 $\frac{1}{2}$, watches were submitted to performance test to American Atomics Corporation.

12. Results of Prototype Tests.

The five prototypes of each Liquid Crystal Display watch were found to meet the performance test levels of 1444444, therefore the Hamilton Watch Company watch #TLQ IX, 9858-C and TLQ IX, 9858-5 $\frac{1}{2}$, has a performance of classification of T₂GC1444444. Thus under normal conditions of watch usage, the release of tritium from the watch is highly unlikely. (See test results from American Atomics enclosed.)



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717)394-7161

13. List of Part Numbers

13.1. TLQ IX, Chrono

Hamilton Head Number (Module & Case) TLQ IX, 9858-C

Modulus Module Number 2030

13.2. TLQ IX, 5½

Hamilton Head Number (Module & Case) TLQ IX, 9858-5½

Modulus Module Number 2020

HAMILTON WATCH CO., INC.

14. External Radiation Dosage and Dose Commitments RE 10 CFR 32.23 (a).

14.1. Individual User

Calculations are the same as License Application #37-03572-07E.

Page 9, Paragraph 14.1.



14.2. Dose Commitment, Inhalation and Absorption of T_2O .

Calculations are the same as License Application 37-03572-07E
Page 10, Paragraph 14.2.

14.3. Skin Dosage T_2

Calculations are the same as License Application 37-03572-07E
Page 10, Paragraph 14.3.

15. Distribution, Handling and Storage RE 10 CFR 32.23 (b).

Calculations are the same as License Application 37-03572-07E
Page 10, Paragraph 15.



15.1. Dose Commitment, Inhalation and Absorption of T_2O

Calculations are the same as License Application 37-03572-07E

Page 11, Paragraph 15.1.

15.2. Skin Dosage T_2

Calculations are the same as License Application 37-03572-07E

Page 11, Paragraph 15.2.

16. Retail Sales RE 10 CFR 32.23 (b).

Calculations are the same as License Application 37-03572-07E

Page 11, Paragraph 16.



16.1. Dose Commitment, Inhalation and Absorption T_2

Calculations are the same as License Application 37-03572-07E

Page 12, Paragraph 16.1.

16.2. Skin Dosage T_2

Calculations are the same as License Application 37-03572-07E

Page 12, Paragraph 16.2.

17. Effectiveness of Containment RE 10 CFR 32.23 (c).

Calculations are the same as License Application 37-03572-07E

Page 12, Paragraph 17.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717) 394-7161

18. Disposal RE 10 CFR 32.23 (d).

The TLQ IX, 9858-C and TLQ IX, 9858-5 $\frac{1}{2}$ watch is designed and constructed to withstand severe environmental conditions. In the unlikely event of the disposal or replacement of the referenced watch in an incinerator or a landfill, the large movement over a landfill area, usually of considerable size, and through an incinerator, points to a low probability of creating a tritium concentration for producing radiation dosage levels in excess of those in Column 3, Table Sec. 32.24, 10 CFR 32.

19. Dose Probabilities RE 10 CFR 32.23 (d).

While it is highly unlikely that the referenced Hamilton TLQ IX, 9858-C and TLQ IX, 9858-5 $\frac{1}{2}$ watch can be damaged to the extent of release of tritium gas from the sealed sources, external dosage and dose commitment calculation have been made based.

19.1. Individual User.

Calculations are the same as License Application #37-03572-07E.

Page 13, Paragraph 19.1.

19.2. Dose Commitment, Inhalation T₂O and Absorption.

Calculations are the same as License Application #37-03572-07E.

Page 13, Paragraph 19.2.



19.3. Skin Dosage T₂

Same as License Application #37-03572-07E.

Page 14, Paragraph 19.3. and additional information provided in File #B9036, October 31, 1977, Question 2, Page 2, Skin Dose Calculation.

20. Handling and Storage of Quantities of Watches.

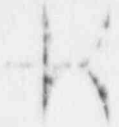
Same as License Application #37-03572-07E.

Page 14, Paragraph 20.

20.1. Dosage Commitment, Inhalation and Absorption T₂₀.

Same as License Application #37-03572-07E.

Page 14, Paragraph 20.1.



HAMILTON WATCH CO., INC.

LANCASTER, PENNSYLVANIA 17604 U.S.A. (717) 398-7161

20.2. Skin Dosage T₂

Same as License Application #37-03573-07E.

Page 15, Paragraph 20.2, with the exception of:

LCQ 11-L, #98731-L, should read TLQ IX 9858-C and TLQ IX 9858-5 $\frac{1}{2}$.

21. Quality Control Procedures to be Followed.

(A) Manufacturer - The supplier of the gaseous tritium light device (GILD) will certify that the tritium used in the manufacture of each lot shipped has a stated tritium oxide content from the vendor of the gas of less than one percent.

All AA #60328 tritium sources will be subjected to the following tests and inspection prior to assembly into source holder.

21.1. Dimensional Check.

21.2. Visual - Brightness 150 micro lamberts minimum.

21.3. Twenty-four hour immersion in water to determine conformance to tritium loss of not more than 0.10 μ Ci in 24 hours. The manufacturer has liquid scintillation counting equipment and data processing systems for handling this test requirement.

All the AA #60328 tritium sources passing the preceding tests will be assembled into source holder. Use of silicone RTV type adhesive or equivalent to bond the tube (1) to the source holders has been demonstrated by the manufacturer in previous applications of tritium luminous sources in maintaining a seal of long term stability.



HAMILTON WATCH CO., INC.

LANTCASTER, PENNSYLVANIA 17004 U.S.A. (717) 334-7161

Following a visual inspection of the assembled source holders, the units are random sampled per 32.110 (b) (8) for diffusion tests.

The manufacturer will provide a certificate of inspection with each shipment of completed light sources in source holder.

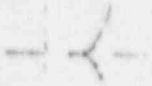
22. Receiving and Stores.

Same as License Application #37-03572-07E.

Page 16, Paragraph 22.

23. Module Repair.

Repair of all tritium modules, TLQ 1X, 9850-C and TLQ 1X, 9858-5 $\frac{1}{2}$ with tritium light sources will be made at Hamilton Watch Co. or at Hamilton Watch Co.'s licensed service centers.

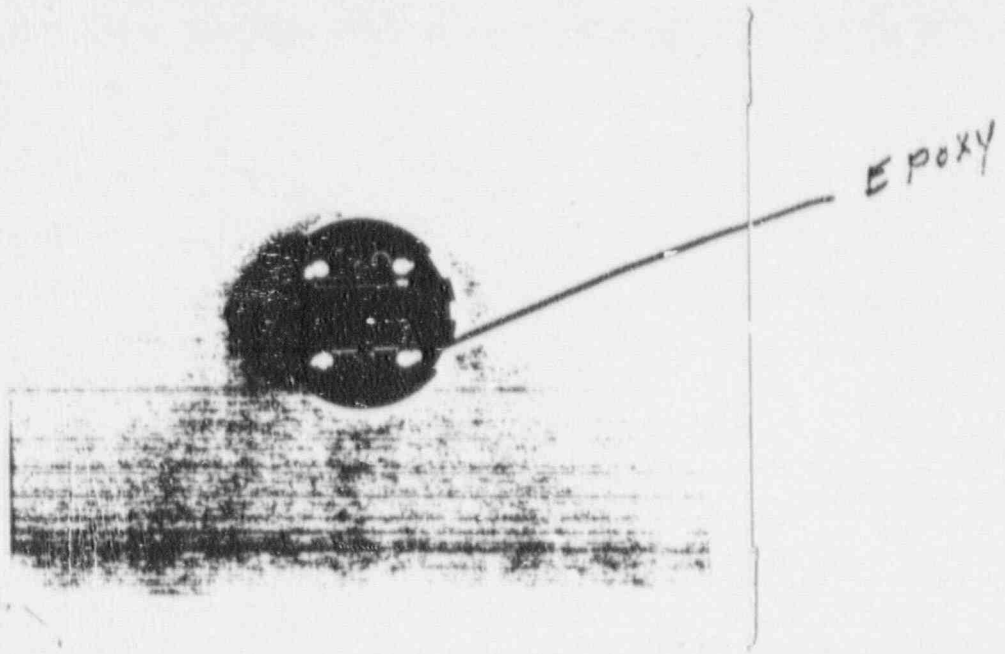


HAMILTON WATCH CO., INC.

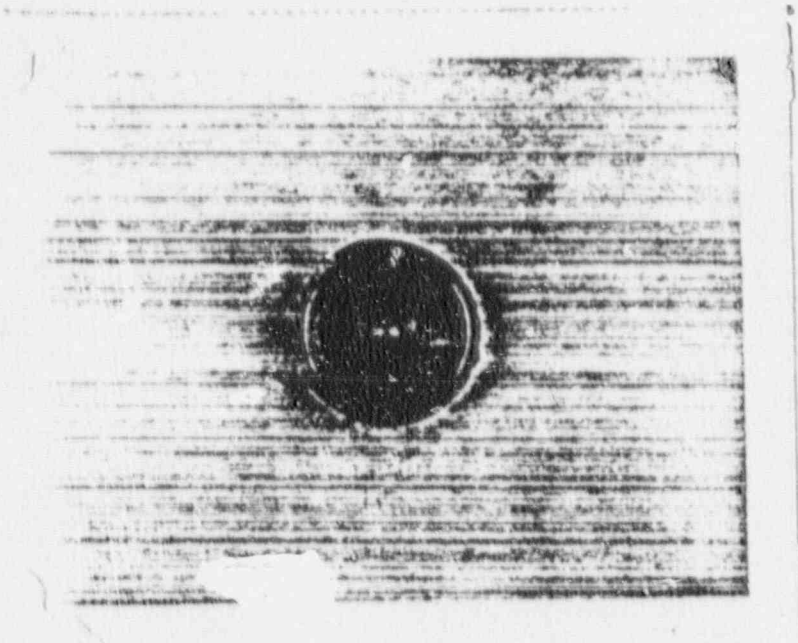
LANCASTER, PENNSYLVANIA 17604 U.S.A. (717)394-7161

24. LIST OF PHOTOGRAPHS

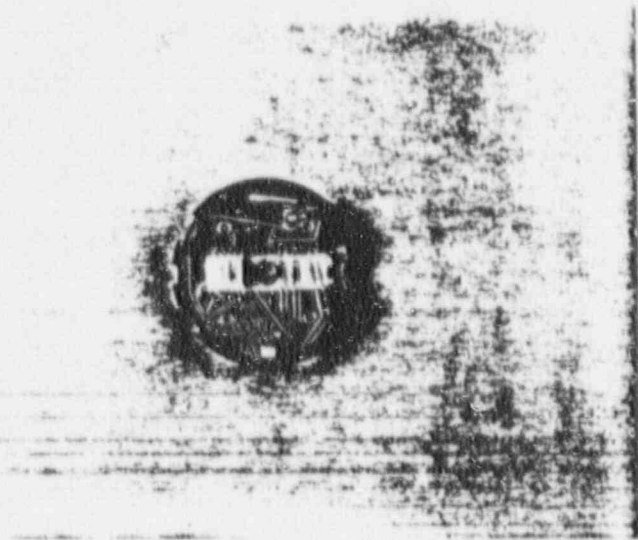
1. Complete LCD Module - Display Side, Showing Epoxy Over Screwheads.
2. Complete LCD Module, Backside Showing Battery.
3. Module Showing Module Backside, Without Battery.
4. Stainless Steel Clamps and Screws Used to Hold the Display Carrier Together.
5. Liquid Crystal Display, Elastomeric Connector, and Display Clamp.
6. Tritium Transflector Covering and Protecting the Tritium Source. (Display Removed.)
7. Battery Placed on Module Backside for Tritium Tube Protection.
8. Plastic Carrier Showing the Tritium Tube - Display and Transflector Removed.
9. Printed Circuit Board Substrate (C-MOS Circuit Side). Display Side.
10. Plastic Carrier.
11. Complete Case with Tritium Module.
12. Complete Case with Tritium Module with Caseback Remove, Showing O-Ring.
13. Tool to Remove Caseback.
14. Special Vacuum Tool Required to Remove the Module from Inside the Case.



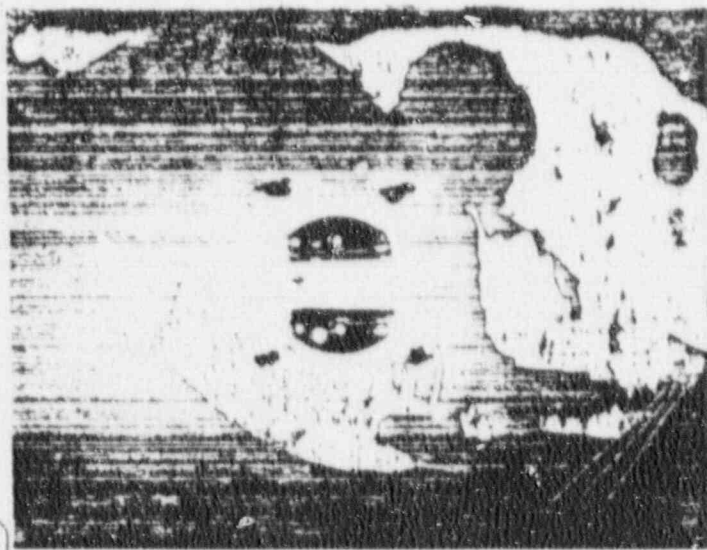
#1. COMPLETE LCD MODULE - DISPLAY SIDE,
SHOWING EPOXY OVER SCREWHEADS.



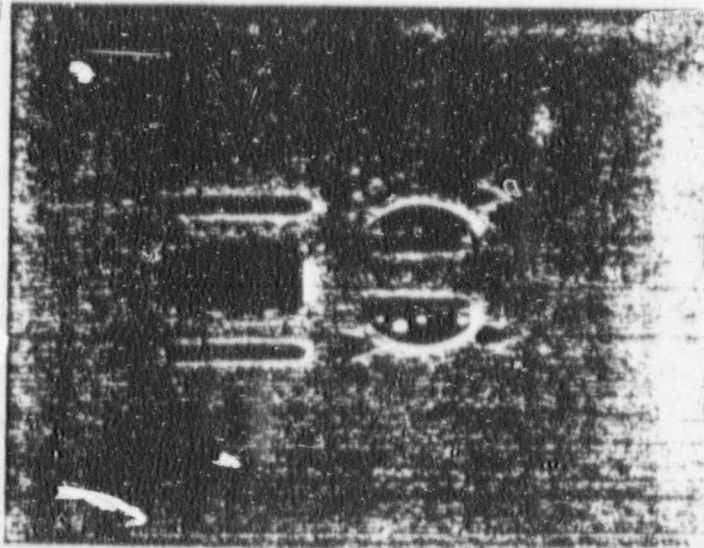
#2. COMPLETE LCD MODULE, BACKSIDE SHOWING BATTERY.



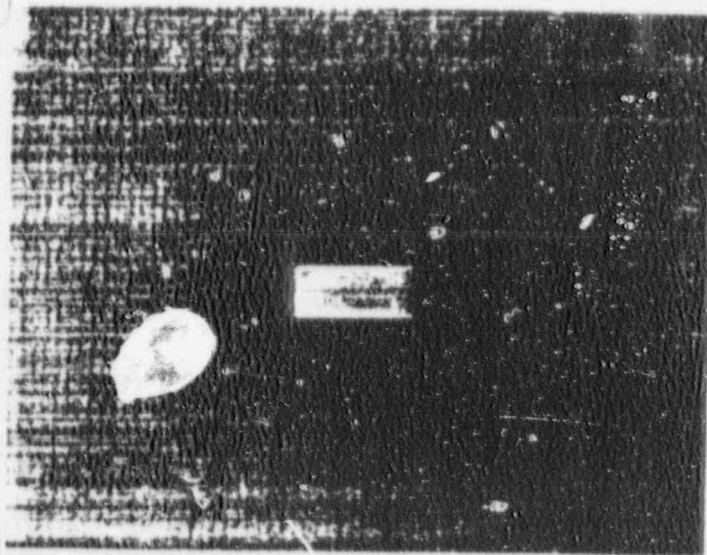
#3. MODULE SHOWING MODULE BACKSIDE, WITHOUT BATTERY.



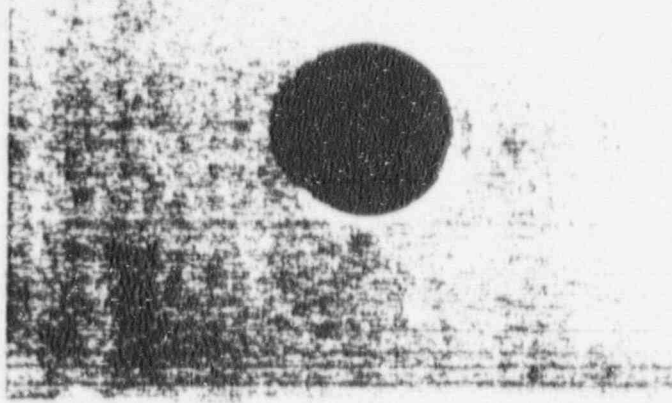
#4. STAINLESS STEEL CLAMPS AND SCREWS USED TO HOLD THE DISPLAY AND CARRIER TOGETHER.



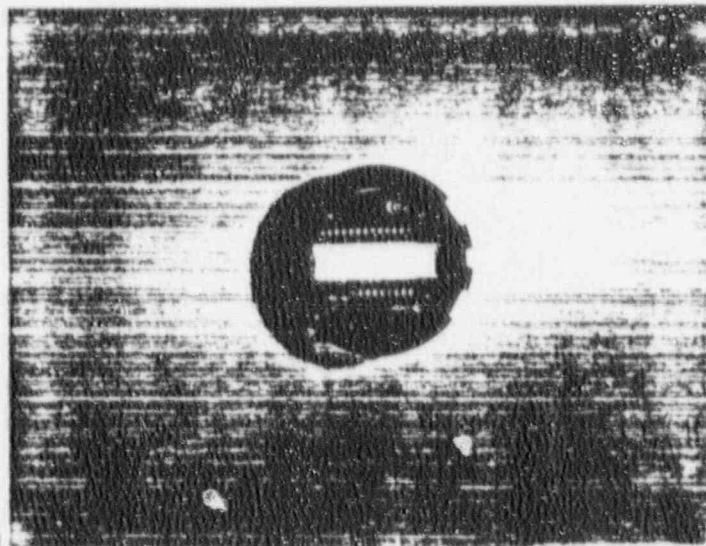
#5. LIQUID CRYSTAL DISPLAY, ELASTOMERIC CONNECTOR,
AND DISPLAY CLAMP.



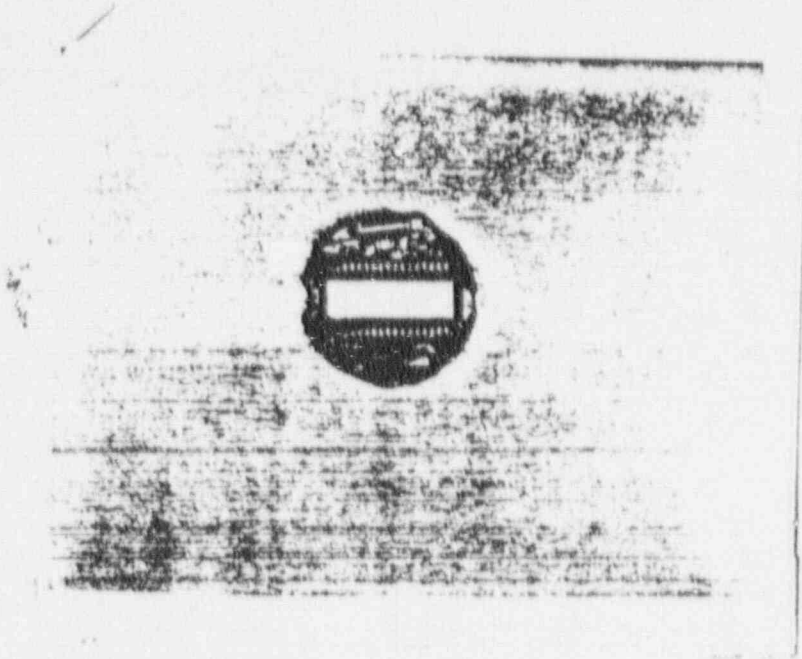
#6. TRITIUM TRANSFLECTOR COVERING AND PROTECTING
THE TRITIUM SOURCE. (DISPLAY REMOVED.)



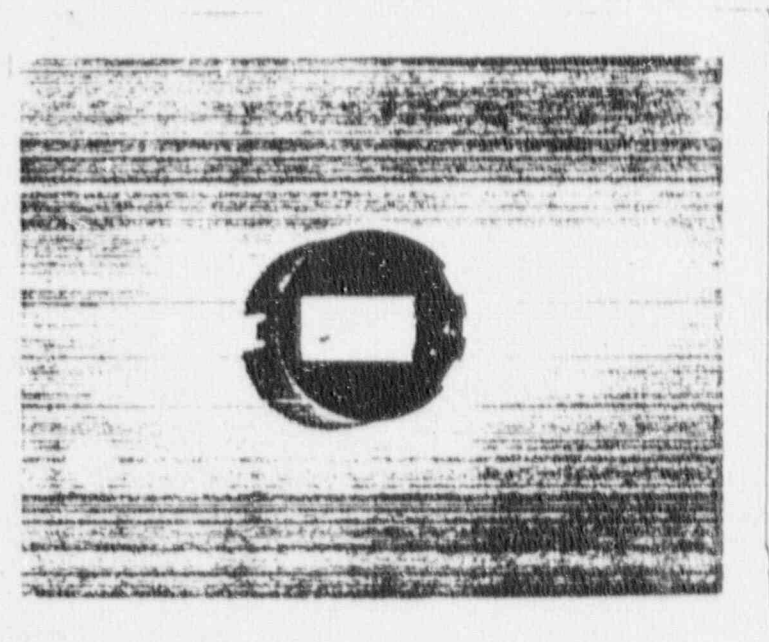
#7. BATTERY PLACED ON MODULE BACKSIDE FOR TRITIUM TUBE PROTECTION.



#8. PLASTIC CARRIER SHOWING THE TRITIUM TUBE -
DISPLAY AND TRANSFLECTOR REMOVED.



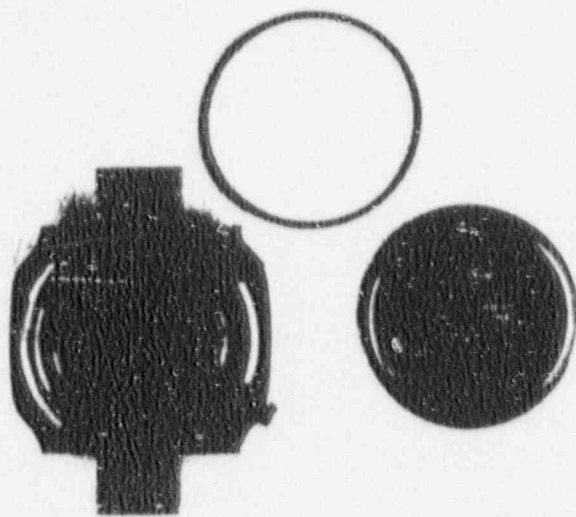
#9. PRINTED CIRCUIT BOARD SUBSTRATE (C-MOS CIRCUIT SIDE),
DISPLAY SIDE.



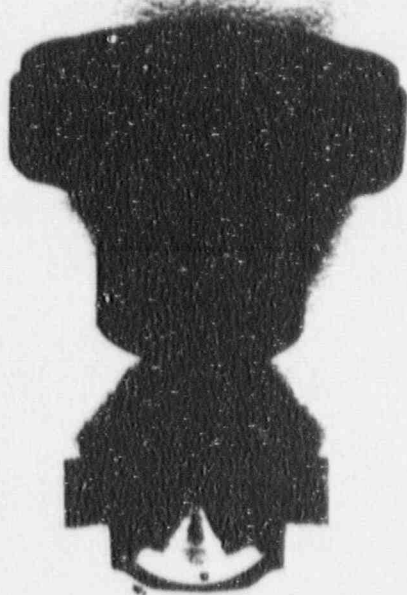
#10. PLASTIC CARRIER.



#11. COMPLETE CASE WITH TRITIUM MODULE



#12. COMPLETE CASE WITH TRITIUM MODULE WITH
CASEBACK REMOVED, SHOWING O-RING.



#13. TOOL TO REMOVE CASEBACK.



#14. SPECIAL VACUUM TOOL REQUIRED TO REMOVE THE MODULE FROM INSIDE THE CASE.

25. List of Prints

25.1. Exploded view, Chrono #2030, Print #10521

25.2. Exploded view, 5½ regular #2020, Print #10520

AMERICAN ATOMICS CORPORATION

425 SOUTH FLUMER AVE . TUCSON, ARIZONA 85719

TEST REPORT

(27 486)
AREA CODE 602

TO: Hamilton Watch Company
Box 420 - 945 Wheatland Avenue
Lancaster, PA 17604
ATT: Olivier E. Barrelet, Manager, Research & Development

SUBJECT: Performance Tests per American Atomics Corporation (AAC) Test Specification AAC/HWCO-1177. Tests authorized under Hamilton Watch Co. (HWCO) Purchase Order #60731.

This is to certify that tests per the referenced specification were conducted on each of five (5) prototype watch samples of HWCO LCD digital watch model identified as follows:

<u>HWCO</u> <u>Watch Head</u>	<u>HWCO</u> <u>Head</u>	<u>Modulus</u> <u>Module</u>	<u>AAC</u> <u>Chronolite^R</u>	<u>Max. Tritium Content</u> <u>(Millicuries)</u> <u>Per Watch</u>
TLQ 1X	9858-5 $\frac{1}{2}$	2020 Y/G	60328	200

RESULTS:

- A) Testing - Tests were conducted as per the following sections of the referenced test specification:
- 3.1 Temperature Test
 - 3.2 Thermal Shock Test
 - 3.3 Reduced Pressure Test
 - 3.4 Impact Test
 - 3.5 Vibration Test

Each watch was examined visually after completion of each test. As there was no apparent failure of any watch during the above tests, the immersion test was carried out in accordance with Sec. 3.6, AAC/HWCO-1177. Following completion of this test, the amount of tritium contained in each bath was determined by liquid scintillation counting to be as follows:

<u>HWCO</u> <u>Head</u>	<u>Sample</u>	<u>Type Bath</u>	<u>Nanocuries Tritium</u> <u>Summation</u> <u>of Both Baths</u>
9858-5 $\frac{1}{2}$	1	Hot and Cold	12
	2	Hot and Cold	24
	3	Hot and Cold	12
	4	Hot and Cold	5
	5	Hot and Cold	17



HAMILTON WATCH TEST REPORT
Page Two

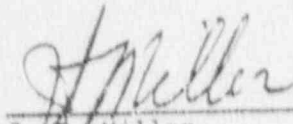
B) Inspection:

Each prototype sample watch was examined and evaluated in accordance with Sec. 4.1 of the referenced specification and was found to comply with the requirements of this section.

Each prototype sample watch then was soak tested in accordance with Sec. 4.2 of the referenced specification. The results of these tests are as follows:

<u>HWCO Head</u>	<u>Sample</u>	<u>Tritium in Solution Nanocuries</u>
9858-54	1	4
	2	5
	3	7
	4	5
	5	18

CONCLUSION: The results of the tests and examinations of the five (5) prototype sample watches of the referenced Hamilton Watch Company watch, as described herein, indicate that each watch complies with the performance requirements of AAC Test Specification AAC/HWCO-1177.



J. A. Miller
Quality Assurance Supervisor
March 22, 1979

AMERICAN ATOMICS CORPORATION

425 SOUTH PLUMER AVE. TUCSON, ARIZONA 85719

TEST REPORT

672 4881
AREA CODE 602

TO: Hamilton Watch Company
Box 420 - 945 Wheatland Avenue
Lancaster, PA 17604
ATT: Olivier E. Barrelet, Manager, Research & Development

SUBJECT: Performance Thsts per American Atomics Corporation (AAC) Test Specification AAC/HWCO-1177. Tests authorized under Hamilton Watch Co. (HWCO) Purchase Order #60731.

This is to certify that tests per the referenced specification were conducted on each of five (5) prototype watch samples of HWCO LCD-digital watches, containing Chronolite^R light sources, identified as follows:

<u>HWCO</u> <u>Watch Head</u>	<u>HWCO</u> <u>Head</u>	<u>Modulus</u> <u>Module</u>	<u>AAC</u> <u>Chronolite^R</u>	<u>Max. Tritium Content</u> <u>(Millicuries)</u> <u>Per Watch</u>
TLQ 1X	9858-C	2030 Y/G	60328	200
TLQ 1X	9858-A	2040 Y/G	60328	200
TLQ 1	99501	1820 Y/G	60284	200
	99511	1820 Y/G	60284	200

RESULTS: A) Testing - Tests were conducted as per the following sections of the referenced test specification:

- 3.1 Temperature Test
- 3.2 Thermal Shock Test
- 3.3 Reduced Pressure Test
- 3.4 Impact Test
- 3.5 Vibration Test

Each watch was examined visually after completion of each test. As there was no apparent failure of any watch during the above tests, the immersion test was carried out in accordance with Sec. 3.6, AAC/HWCO-1177. Following completion of this test, the amount of tritium contained in each bath was determined by liquid scintillation counting to be as follows:

<u>HWCO</u> <u>Head</u>	<u>Sample</u>	<u>Type Bath</u>	<u>Nanocuries Tritium</u> <u>Summation</u> <u>of Both Baths</u>
<u>9858-C</u>	1	Hot and Cold	4
	2	Hot and Cold	4
	3	Hot and Cold	4
	4	Hot and Cold	3
	5	Hot and Cold	3



HAMILTON WATCH TEST REPORT

Page Two

February 27, 1979

<u>HWCO Head</u>	<u>Sample</u>	<u>Type Bath</u>	<u>Nanocuries Tritium Summation of Both Baths</u>
9858-A	1	Hot and Cold	3
	2	Hot and Cold	0
	3	Hot and Cold	4
	4	Hot and Cold	3
	5	Hot and Cold	4
99501-99511	1	Hot and Cold	2
	2	Hot and Cold	5
	3	Hot and Cold	3
	4	Hot and Cold	2
	5	Hot and Cold	2

B) Inspection:

Each prototype sample watch was examined and evaluated in accordance with Sec. 4.1 of the referenced specification and was found to comply with the requirements of this section.

Each prototype sample watch then was soak tested in accordance with Sec. 4.2 of the referenced specification. The results of these tests are as follows:

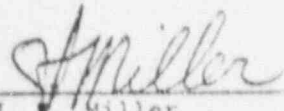
<u>HWCO Head</u>	<u>Sample</u>	<u>Tritium in Solution Nanocuries</u>
<u>9858-C</u>	1	41
	2	1
	3	49
	4	27
	5	44
9858-A	1	3
	2	16
	3	44
	4	43
	5	44
99501-99511	1	41
	2	15
	3	49
	4	2
	5	2

HAMILTON WATCH TEST REPORT

Page Three

February 27, 1979

CONCLUSION: The results of the tests and examinations of the five (5) prototype sample watches of each Hamilton Watch Company watch, as described herein, indicate that each watch complies with the performance requirements of AAC Test Specification AAC/HWCO-1177.



J. W. Miller
Quality Assurance Supervisor
February 27, 1979

REV	DESCRIPTION	APP	DATE

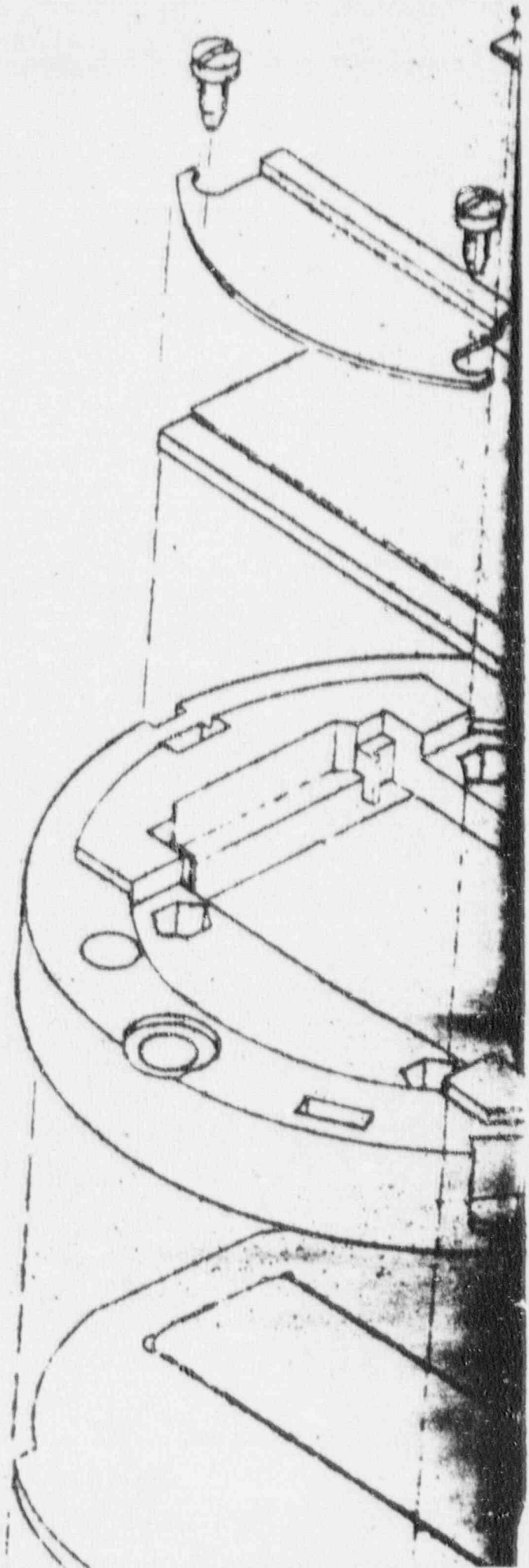
— SCREW # 10467
(TO BE COVERED WITH EPOXY)

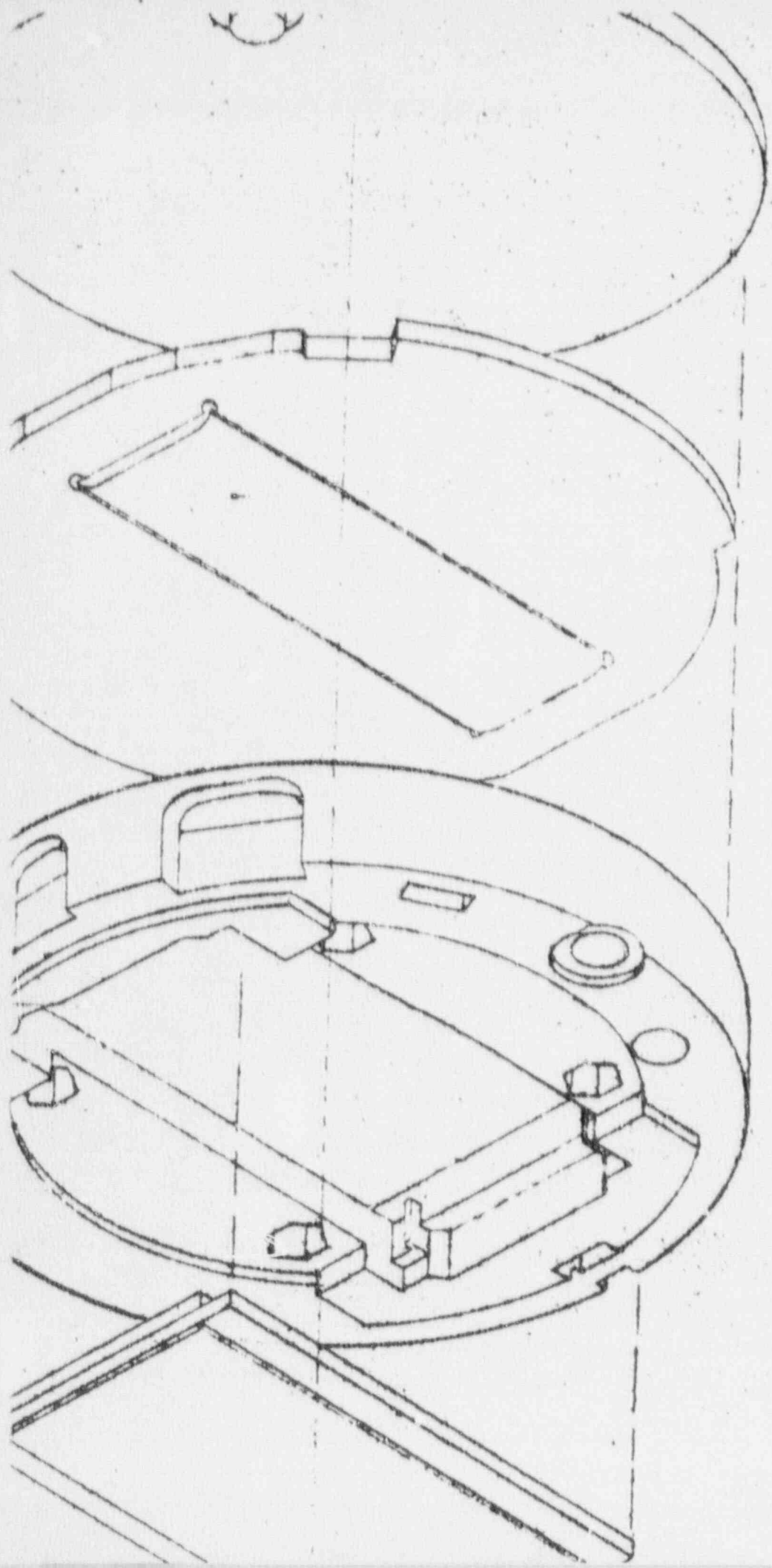
— LCD CLIP # 10472

— DISPLAY # 10512

— PLASTIC FRAME # 10482

— TRITIUM TUBE # AA 60528

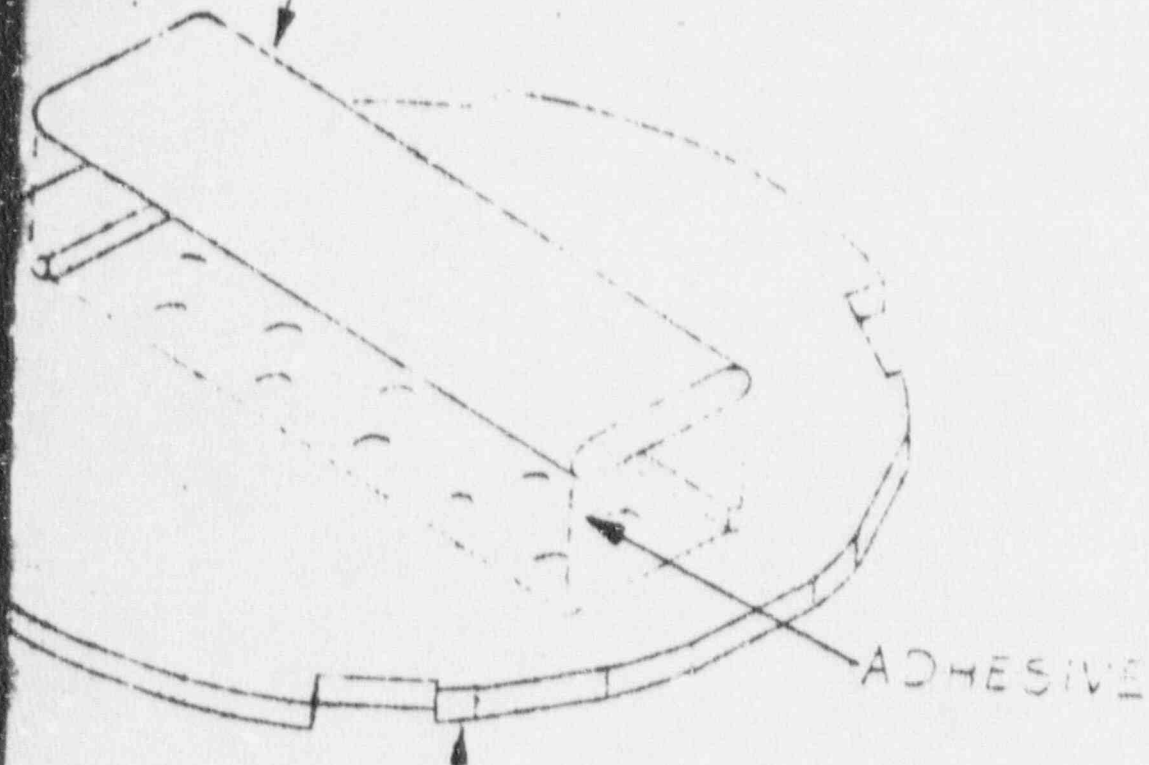




DISPLAY # 10512

PLASTIC FRAME # 10482

TRITIUM TUBE # AA 60528



ADHESIVE

CIRCUIT BOARD / BACKPACK # 10515

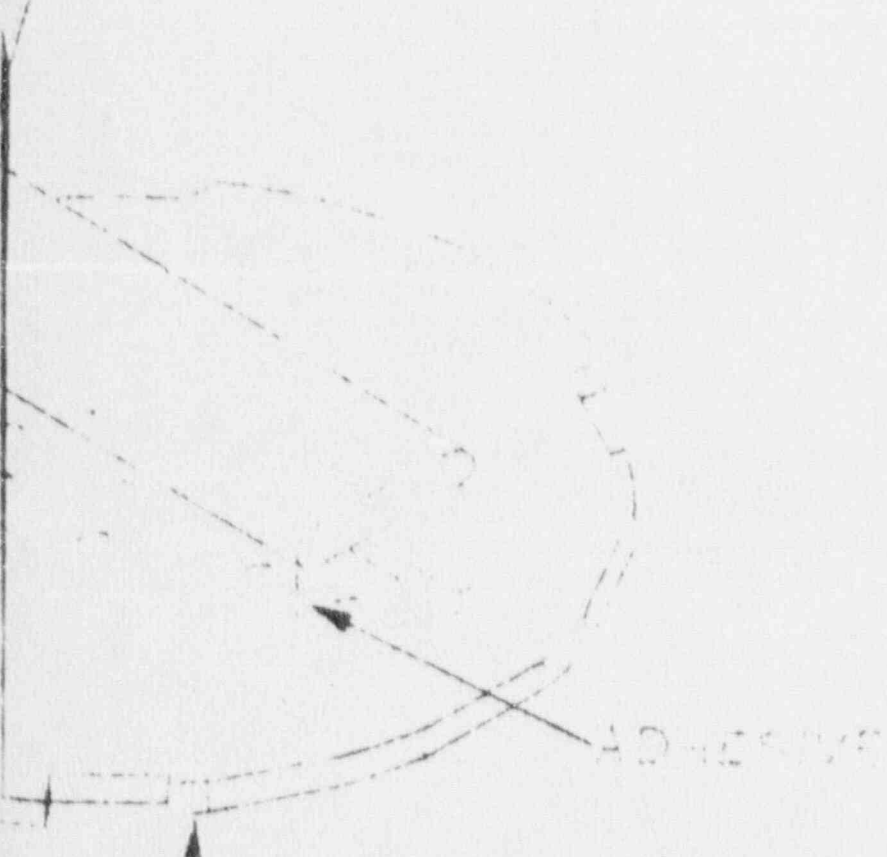
BATTERY # S23P-15

TOL. :	MENS MODEL 2030
FIN SH:	EXPLODED VIEW
SCALE: 6X	2030 CHECKED
10521	MODULUS INC.

10512

FRAME # 10482

TRUSS # A-A 60325



BOARD / SHEET # 10510

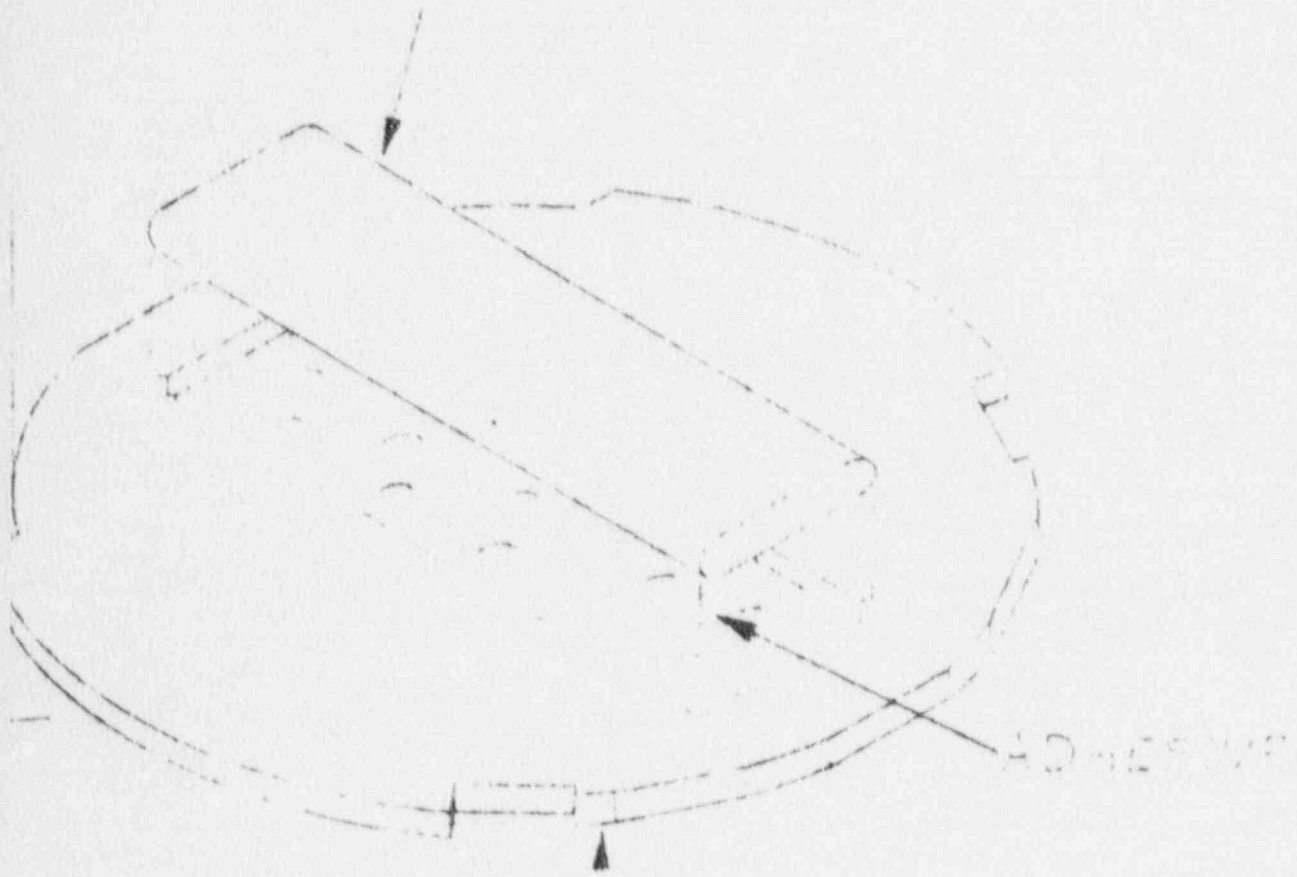
BY # 1030-15

TO: : FINISH: SCALE: 6X	MENS MODE 2040 EMPLOYED MEN 200 REGIME
	ADHESIVE

— DISPLAY # 10512

— PLASTIC FRAME # 10482

TRITIUM TUBE # A-A 60325



CIRCUIT BOARD / SP. BOARD # 10510

— BATTERY # 10221

