REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: NR-575-D-101-S DATE: SEP 2 4 1982 PAGE 1 OF 4

DEVICE TYPE: Gaseous Tritium Light Sources (GTLS) in Military Fire Control Products

MODEL: M17 Fire Control Quadrant, M18 Fire Control Quadrant

MANUFACTURER/DISTRIBUTOR: Ruoff & Sons, Inc.
1030 Rose Avenue
Runnemede, NJ 08078

MANUFACTURER/DISTRIBUTOR: Department of the Army
U.S. Army Armanent Readiness Command (ARRCOM)
Rock Island, IL (License No. 12-00722-06)

SEALED SOURCE MODEL DESIGNATION: U.S. Army Part No. 11730922-2 and
[illegible] (See Table 1)

ISOTOPE: Hydrogen-3
Hydrogen-3

MAXIMUM ACTIVITY: 1.875 curies
1.950 curies

LEAK TEST FREQUENCY: Not required

PRINCIPAL USE: (R) Gas Sources

CUSTOM DEVICE: X YES ____ NO

CUSTOM USER: Department of the Army
U.S. Army Armament Readiness Command (ARRCOM)
Rock Island, IL

8403020107 840209
PDR FOIA
HAMMITT84-74 PDR

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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NO: NR-575-D-101-S DATE: SEP 2 4 1982

DEVICE TYPE: GTLS in Military Fire Control Products

DESCRIPTION:

Tritium radioluminous lamps (MB Microtec Models T4279-1 and T4280-1 or Brandhurst P1644 and P1643) are encorporated in the M17 and M18 Fire Control Quadrants by the U.S. Army M198 Towed Howitzer. The Tritium lamps are used for night illumination of level vials and mechanical counters in the M17 and M18 devices. The Tritium gas is encapsulated in borosilicate glass which is coated with a phospher that emits visible light on activation by the radioactive Tritium. The glass envelop is secured by RTV Silicon adhesive to either an aluminum alloy or polycarbonate structure which is then mounted to the instrument to be illuminated. The RTV compound acts as a shock absorber in cushioning the lamp when exposed to the environments of the weapons system.

LABELING:

Fire control devices are labeled in accordance with 10 CFR Part 20 and labels are attached to the device with adhesives or screws.

Enclosures 1, 2 and 3 illustrate typical designs for the sealed light sources and their primary containment for assembly in the M17 and M18 fire control quadrants.

The M17 and M18 Fire Control Quadrants are used on the Army's M198 towed Howitzer and are subjected to Harsh field environments both during training exercises and military deployment of the weapon. These instruments are used by gunners to control elevation and bearing of the gun system. Typical environments include a wide range of temperatures, vibration, shock and outdoor weathering.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO: NR-575-D-101-S DATE: SEP 2 4 1982

DEVICE TYPE: GTLS in Military Fire Control Quadrants

PROTOTYPE TESTING:

These devices have been prototype tested by the U.S. Army using laboratory and field testing under actual operating conditions. Following extensive field testing of the devices on military Howitzers, they were examined by the U.S. Army environmental hygiene agency and found to meet requirements.

EXTERNAL RADIATION LEVELS:

None expected. The low energy beta emitter is encapsulated in glass and further contained in an aluminum alloy or polycarbonate housing.

QUALITY ASSURANCE AND CONTROL:

An acceptable quality assurance and control program is described in Ruoff & Sons, Inc. application dated June 14, 1982.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

These devices shall be distributed only to specifically licensed military users.

SAFETY ANALYSIS SUMMARY:

The M17 and M18 fire control quadrants have been designed and prototype tested for the Department of the Army (see License No. 12-00722-06). These products contain gaseous Tritium activated light sources manufactured by either Brandhurst Company, Ltd. or MB Microtec. The products are to be assembled by Ruoff & Sons, Inc. in accordance with detailed military specifications. Assembly and testing of the products and quality assurance and control are in accordance with military specifications. Additionally, light sources used in the fire control products have been tested by the source manufacturer in accordance with ANSI N540.

Extensive military field testing of the M17 and M18 fire control mechanisms have been conducted with the devices installed on Howitzer guns which have fired several thousand rounds. The U.S. Army's environmental hygiene laboratory has performed radiological tests on the products and found them to satisfactorily contain the Tritium gas.

Based on the above considerations and the information and test data contained in the references cited below, we conclude that the M17 and M18 Fire Control Quadrants containing the sealed Tritium light sources specified above are acceptable for licensing purposes.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

DEVICE TYPE: GTLS in Military Fire Control Quadrants

REFERENCES:

The following supporting documents are hereby incorporated by reference and are made a part of this registry document:

° Ruoff & Sons, Inc. application dated May 29, 1981 and enclosures thereto (Control No. 11559)

° Ruoff & Sons, Inc. letter dated August 16, 1982 and enclosures thereto

° NRC License No. 12-00722-06 issued to Department of Army Rock Island Arsenal

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: ______________   Reviewer: Earl W. Wright

Date: SEP 2 4 1982   Concurrence: Bernard Singer

Table 1

U.S. Army P/N	MB-Microtec P/N	Brandhurst PN	Activity Per Source
11730922-2	T4279-1	P 1644	450 millicuries
11729510-2	T4280-1	P 1643	75 millicuries

Tritium gas is contained in laser sealed borosilicate glass vial filled with 99% pure (less than 1% Tritium oxide) Tritium (H-3).

NOTE

LIGHT ASSEMBLY SHALL BE ALLOWED TO CURE AT LEAST 5 DAYS AT ROOM TEMPERATURE, PRIOR TO ASSEMBLING INTO THE SEALED INSTRUMENT

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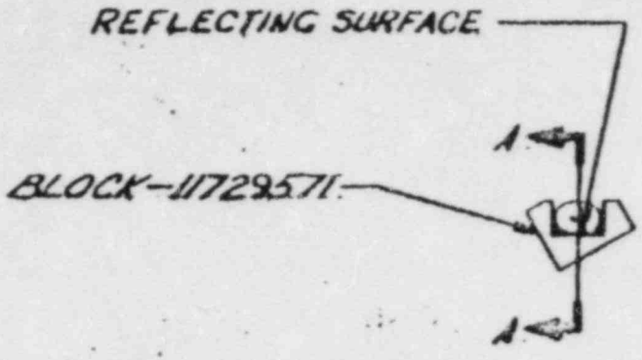
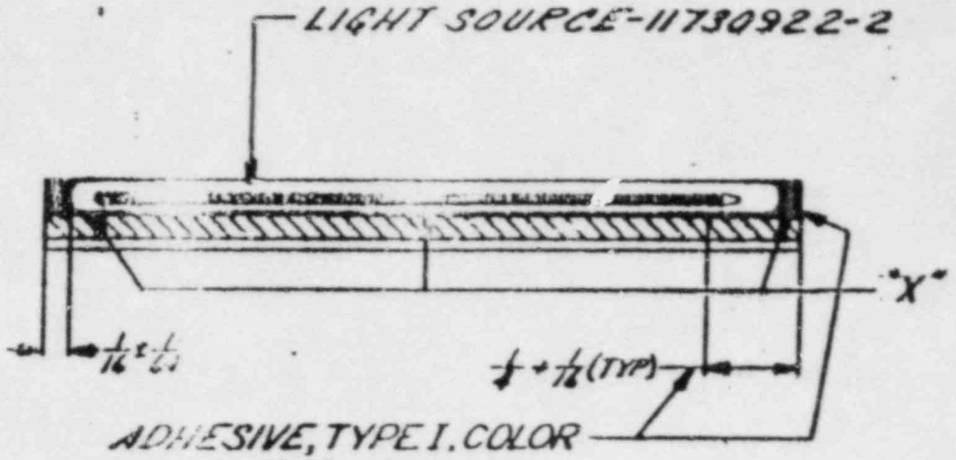
	SELECTED FOR PRODUCTION RELEASE	
-	PRODUCTION RELEASE	





REQUIREMENTS

1. MARKING, LABELING AND SHIPPING SHALL BE ACCORDANCE WITH MIL-STD-1555
2. THERE SHALL BE NO EVIDENCE OF PHYSICAL FAILURE SUCH AS FRACTURING OR LIGHT LOSS DUE TO EXPOSING THE LIGHT ASSEMBLY TO -80°F AND +160°F FOR A PERIOD OF EIGHT HOURS AT EACH TEMPERATURE.
3. REMOVABLE RADIOLOGICAL CONTAMINATION BY WIPING SHALL BE LESS THAN 1000 DPM.
4. BRIGHTNESS LEVEL-400 MICROLAMBERTS (MIN).

5. HANDLING, SHIPPING, LABELING AND DISPOSAL OF RADIOACTIVE COMMODITIES SHALL BE IN ACCORDANCE WITH DSHM 4145.8 "RADIOACTIVE COMMODITIES IN THE DOD SUPPLY SYSTEM"
6. THE BRIGHTNESS LEVEL OF THE POTTED ASSEMBLY MUST BE A MINIMUM OF 95% OF THE BRIGHTNESS LEVEL OF THE UNPOTTED LAMP AS SPECIFIED IN LAMP DWG.

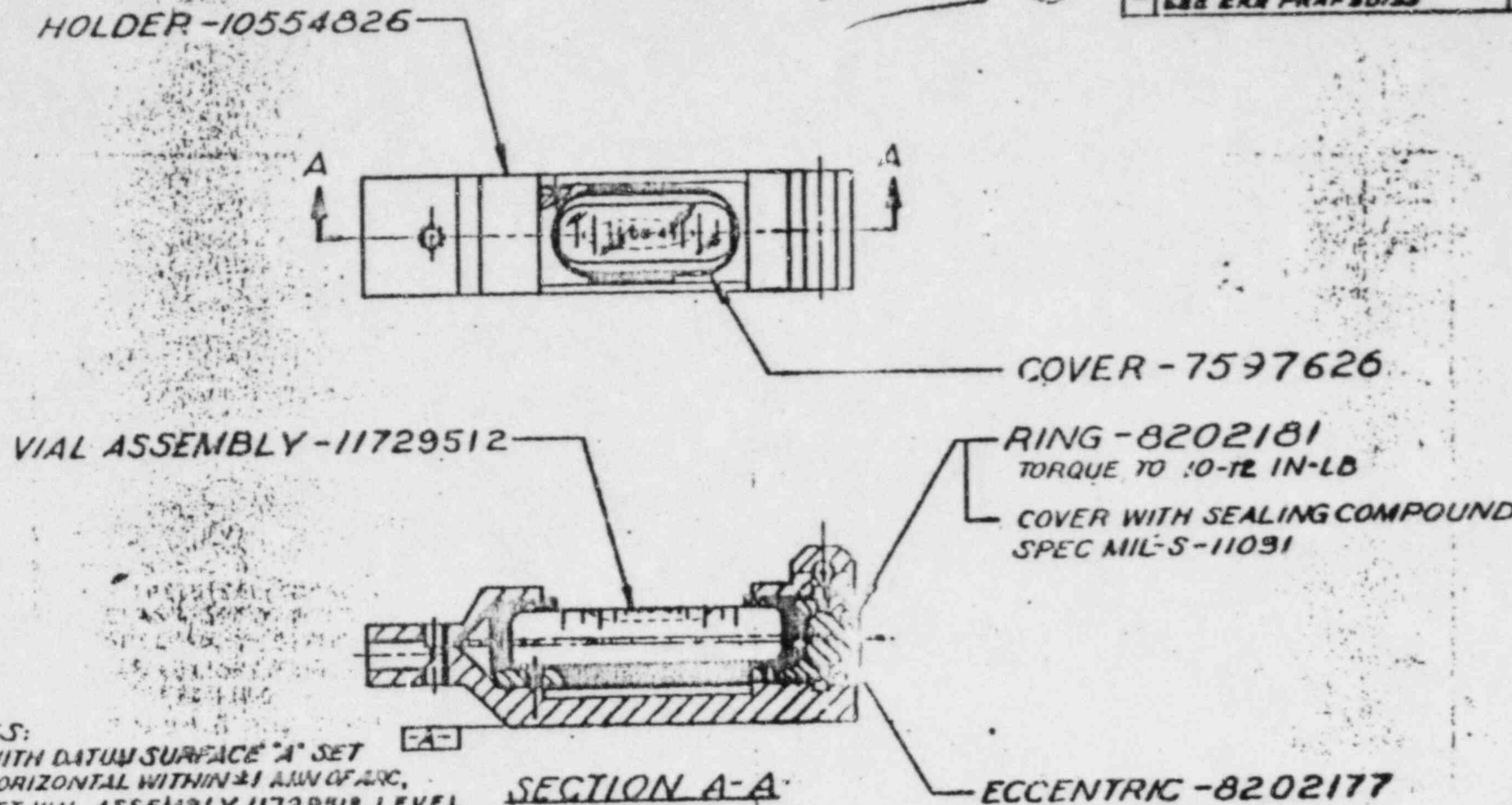
(FOR 2013 ATTACHED)

APPLICABLE DOCUMENTS

PARTS LIST - PL 11729559
SOAP - 11729559

PART No. 11729559

FINISH	MATERIAL	1 JUNE 1971	LIGHT ASSEMBLY
F11729532	QQAL FC		C 10200 11729559



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LTR	DESCRIPTION	DATE	APPROVED
X2	SEE ERR FRAPX3098		
—	PRODUCTION RELEASE SEE ERR FRAF80128		

NOTES:
1. WITH DATUM SURFACE "A" SET HORIZONTAL WITHIN ±1 MIN OF ARC, SET VIAL ASSEMBLY 11729512 LEVEL WITHIN A GRADUATION LINE WIDTH.

APPLICABLE DOCUMENTS
PARTS LIST-PL10554827

PART No. 10554827

F11729530	QUANT F.C.
F11729575	QUANT F.C.

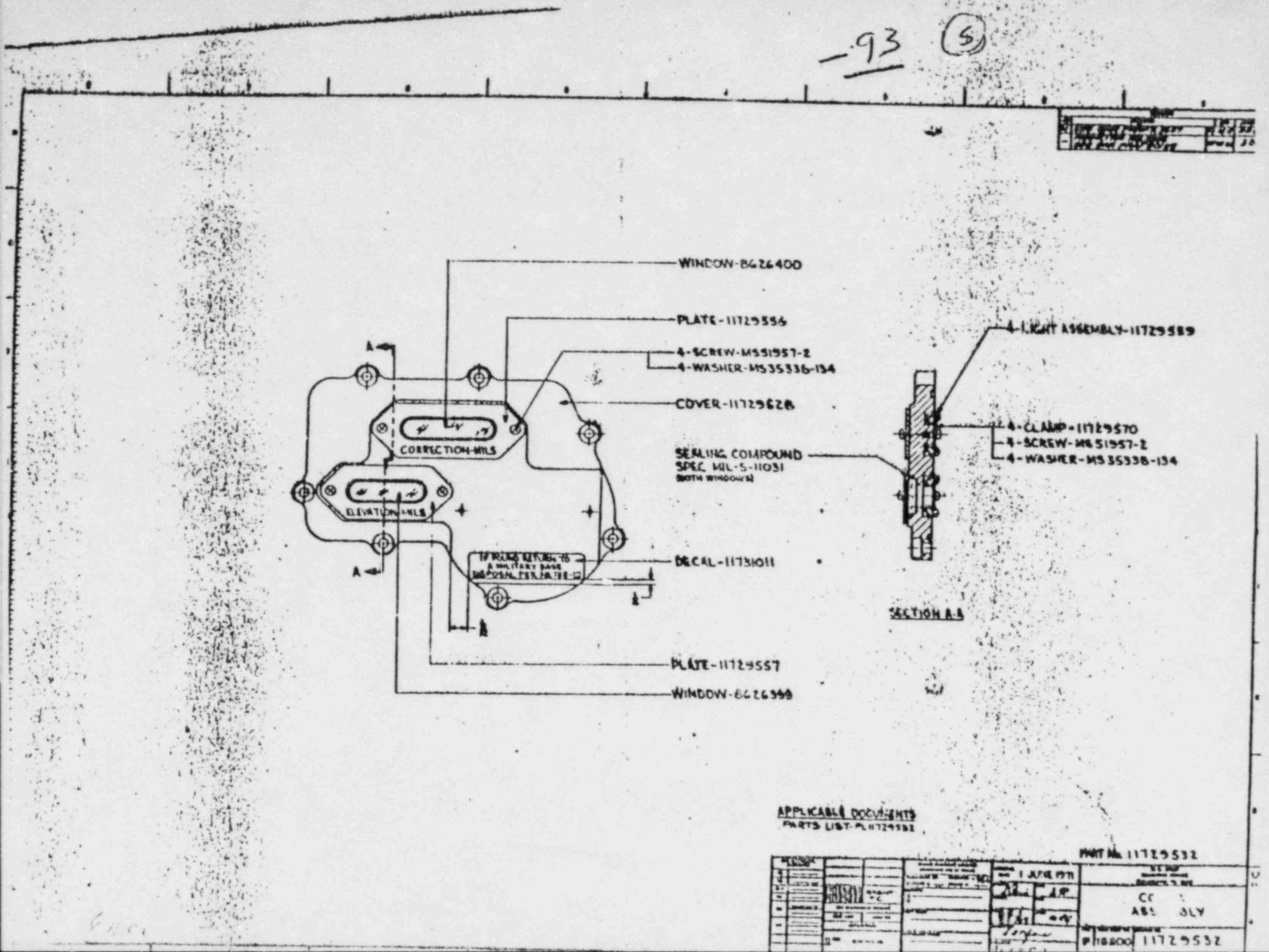
ORIGINAL DATE 1 JUNE 1971

U.S. ARMY
FRANKFORD ARSENAL
PHILADELPHIA, PA.

HOLDER, VIAL ASSEMBLY

C 19200 10554827

-93 (5)


WINDOW-8626400
PLATE-11729556
4-SCREW-MS51957-2
4-WASHER-MS35336-134
COVER-11729628
SEALING COMPOUND
SPEC MIL-S-11031
(BOTH WINDOWS)
DECAL-11731011
PLATE-11729557
WINDOW-8626399
CORRECTION-MILS
ELEVATION-MILS
IF FOUND RETURN TO A MILITARY BASE
A
4-LIGHT ASSEMBLY-11729589
4-CLAMP-11729570
4-SCREW-MS51957-2
4-WASHER-MS35338-134
SECTION A-A
APPLICABLE DOCUMENTS
PARTS LIST-PL11729532
PART No. 11729532
1 JUNE 1971
CC
ABS BLY
11729532