

W-L-116a**OCTOBER 6, 1958****SUPERSEDING****Int. Fed. Spec. W-L-00116 (CSA-FSS)****January 30, 1958 and****Fed. Spec. W-L-116****June 15, 1951****FEDERAL SPECIFICATION****LAMPS, FLUORESCENT**

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. CLASSIFICATION

1.1 Sizes and colors. — This specification covers fluorescent lamps for general lighting service, as shown in table I.

2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS

2.1 Specifications and standards.—The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification:

Federal Specifications:

W-B-30—Ballast, Fluorescent Lamp.

W-S-755—Starter, Fluorescent Lamp.

PPP-B-585—Boxes, Wood, Wirebound.

PPP-B-591—Boxes, Fiberboard, Wood-Cleated.

PPP-B-601—Boxes, Wood, Cleated-Plywood.

PPP-B-621—Boxes, Wood, Nailed and Lock-Corner.

PPP-B-636—Boxes, Fiber.

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging, and Packing Levels.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Informa-

tion in the Index of Federal Specifications, Standards, and Handbooks and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications, Standards, and Handbooks from established distribution points in their agencies.)

Military Specifications:

JAN-P-100—Packaging and Packing for Overseas Shipment, General Specifications.

MIL-P-116—Preservation, Methods of.

MIL-B-10377—Box, Wood, Cleated, Veneer, Paper Overlaid.

Military Standards:

MIL-STD-129—Marking For Shipment and Storage.

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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TABLE I.—*Sizes, colors, and ratings*

Lamp size		Base	Color ¹	Rated aver. lab. life ² (hours)	Min- imum lumens at 100 hours	Main- tenance aver. lumens at 40% of rated life
Nominal watts	Bulb					
Preheat type lamps						
6.....	T-5	Miniature bipin.....	White.....	6000	200	140
8.....	T-5	Miniature bipin.....	White.....	6000	310	230
15.....	T-8	Medium bipin.....	White and warm white.....	7500	700	510
15.....	T-8	Medium bipin.....	Cool white.....	7500	650	500
15.....	T-8	Medium bipin.....	Daylight.....	7500	590	470
20.....	T-12	Medium bipin.....	White & warm white.....	7500	940	730
20.....	T-12	Medium bipin.....	Cool white.....	7500	900	710
20.....	T-12	Medium bipin.....	Daylight.....	7500	820	670
40 ³	T-12	Medium bipin.....	White & warm white.....	7500	2500	2100
40 ³	T-12	Medium bipin.....	Cool white.....	7500	2350	2050
40 ³	T-12	Medium bipin.....	Daylight.....	7500	2150	1850
90.....	T-17	Mogul bipin.....	White & warm white.....	7500	4900	3900
90.....	T-17	Mogul bipin.....	Cool white.....	7500	4600	3700
90.....	T-17	Mogul bipin.....	Daylight.....	7500	4300	3500
Instant start-lamps						
37 (72") ⁴	T-8	Single pin.....	White & warm white.....	7500	2450	2000
37 (72") ⁴	T-8	Single pin.....	Cool white.....	7500	2400	1950
37 (72") ⁴	T-8	Single pin.....	Daylight.....	7500	2100	1800
49 (96") ⁴	T-8	Single pin.....	White & warm white.....	7500	3300	2700
49 (96") ⁴	T-8	Single pin.....	Cool white.....	7500	3200	2600
49 (96") ⁴	T-8	Single pin.....	Daylight.....	7500	3000	2400
38 (48") ⁴	T-12	Single pin.....	White & warm white.....	7500	2300	1900
38 (48") ⁴	T-12	Single pin.....	Cool white.....	7500	2150	1800
38 (48") ⁴	T-12	Single pin.....	Daylight.....	7500	2000	1700
73 (96") ⁴	T-12	Single pin.....	White & warm white.....	7500	4900	4100
73 (96") ⁴	T-12	Single pin.....	Cool white.....	7500	4700	3900
73 (96") ⁴	T-12	Single pin.....	Daylight.....	7500	4300	3600

¹ Approximate color temperature: Warm White, 3000°K; White 3500°K; Cool White, 4500°K; Daylight, 6500°K. The colors herein listed as "Warm White" and "Cool White" are designated by the lamp industry as "Standard Warm White" and "Standard Cool White" respectively.

² Three burning hours per start.

³ Specified values are at 0.200 ampere.

⁴ Specified values are at 0.425 ampere.

⁵ Requirements applicable also to rapid start lamps.

2.2 Other publications.—The following publications of the issues in effect on date of invitation for bids, form a part of this specification:

American Standards Association Standards:

C78.400 to 78.1000—American Standard

Dimensional and Electrical Characteristics of Fluorescent Lamps.

C82.3—American Standard Specification For Fluorescent Lamp Reference Ballasts.

C78.376—American Standard Specification for Fluorescent Lamps Chromaticity.

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(Copies of American Standards Association's standards may be obtained by writing to their address, 70 E. 45th Street, New York 17, New York.)

Consolidated Freight Classification Rules and Container Specifications.

(Application for copies should be addressed to the Consolidated Classification Committee, 202 Chicago Union Station, Chicago 6, Illinois.)

National Motor Freight Classification Rules and Container Specifications.

(Application for copies should be addressed to the American Trucking Association, 1424 - 16th Street, N.W., Washington, D. C.).

3. REQUIREMENTS

3.1 General.—The lamps shall be designed and made so that they will satisfactorily meet the lighting service conditions.

3.2 Life to failure.—The lamps furnished under this specification shall give an average total life to failure not less than the total rated life in hours specified in table I, as modified by paragraph 4.14.

3.3 Lumens at 100 hours.—The lumens at 100 hours of the lamps furnished under this specification shall equal, or exceed, the value specified in table I under column headed "Minimum lumens at 100 hours" as modified by paragraph 4.9.

3.4 Lumen maintenance.—The average lumen output of the lamps furnished under this specification, as determined at 40 percent of rated life in accordance with paragraph 4.15, shall equal, or exceed, the value specified in table I under column headed "Maintenance: Average lumens at 40 percent of rated life" as modified by paragraph 4.16.

3.5 Dimensions.—The dimensions of the lamps furnished under this specification shall be in accordance with the values listed in tables IIa and IIb and in American Standard C78.

3.6 Color.—The International Commission on Illumination chromaticity coordinates, x

and y , representing the color of the light emitted by the lamps furnished shall conform to the values listed in table III, as modified by paragraph 4.10, and with tolerances as specified in American Standard C78.376.

TABLE IIa.—Dimensions

Lamp size		Bipin base	Face-to-face	Face to end of pin	
Nominal watts	Bulb		Maximum	Maximum	Minimum
			<i>Inches</i>	<i>Inches</i>	<i>Inches</i>
15.....	T-8	Medium	17.219	17.500	17.406
20.....	T-12	Medium	23.219	23.500	23.406
40.....	T-12	Medium	47.219	47.500	47.406
90.....	T-17	Mogul	58.300	58.931	58.719

TABLE IIb.—Dimensions

Lamp size		Base	Length from ends of opposite pins	
Nominal length	Bulb		Maximum	Minimum
<i>Inches</i>			<i>Inches</i>	<i>Inches</i>
72.....	T-8	Single pin	70.00	69.75
96.....	T-8	Single pin	94.00	93.75
48.....	T-12	Single pin	46.00	45.75
96.....	T-12	Single pin	94.00	93.75

TABLE III.—Chromaticity coordinates

Color	Chromaticity coordinates	
	x	y
Cool White	0.372	0.374
Warm White	0.437	0.405
White	0.409	0.398
Daylight	0.311	0.338

3.7 Identification marking.—The rating and the manufacturer's name or trade-mark shall be placed on the bulb of each lamp. The

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marking shall show the color and either the nominal watts or nominal length.

3.8 Workmanship and materials. — The manufacturer is given the widest range in the selection of materials and processes of manufacture in order that electric fluorescent lamps of maximum quality may be produced.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Test procedure.—All tests shall be made in a competent and expert engineering manner at the expense of the purchaser, excepting that when initial tests and inspections are made at the factory, the manufacturer will be required to supply the necessary equipment, assistance, power, and facilities for making such initial tests and inspections. The manufacturer shall have the privilege of witnessing and verifying all tests of his lamps made hereunder, and shall also have the privilege of having access to the records of such tests at all reasonable times. The method of test procedure may be modified in any particular, provided that it is mutually agreed that such modified procedure will yield results equivalent to those obtained with the procedure specified herein.

4.2 Submission for inspection. — Lamps shall not be submitted for inspection prior to 5 days from the time that they are manufactured.

4.3 Lot definition.—A lot shall be all of the lamps of any one size and color offered for acceptance at any one time.

PHYSICAL INSPECTION TEST

4.4 Lamp selection and test quantity.—The number of lamps to be taken by the inspector for physical inspection shall be not less than 5 percent (minimum 10 lamps) of the lot, taken at random and proportionately from the individual packages of the lot. Lamps thus taken for inspection are known as the "inspection-test lamps".

4.5 Rejection for minor physical defects.—Minor physical defects are those which mar the appearance of the lamps or are otherwise incompatible with good workmanship or good service. A lot may be rejected without further test if 10 percent plus 1 lamp (20 percent plus 1 lamp when tested elsewhere than at the factory) or more of the inspection-test lamps have minor physical defects.

4.6 Rejection for major physical defects.—Major physical defects are those which render lamps inoperative or which would cause them unquestionably to give poor service. A lot may be rejected without further test if 1 percent plus two lamps (2 percent plus four lamps when tested elsewhere than at the factory) or more of the inspection-test lamps have major physical defects. Individual lamps having major physical defects may be rejected and eliminated from an accepted lot, and shall be replaced by the manufacturer without additional charge.

4.7 Dimensions.—Any lamps which fail to conform to the dimensions specified in tables IIa and IIb and in American Standard C78, shall be considered to have major physical defects.

INITIAL RATING TEST

4.8 Lamp selection and test quantity.—The number of lamps taken for rating shall be not less than 1 percent (minimum 10, maximum 48 lamps) of the lot, taken at random and proportionately from the individual packages of the lot. The lamps may be chosen from those taken for physical inspection (paragraph 4.4) and are known as the "rating-test-lamps". The rating-test lamps must have been burned or seasoned for 100 hours before the initial rating test is made.

4.9 Rejection for deviating from rating.—A lot of lamps may be rejected if 20 percent plus two lamps (30 percent plus 2 lamps when tested elsewhere than at the factory) or more of the rating-test lamps, measured in accordance with paragraph 4.9.1, consume higher

than nominal wattage by more than 5 percent (7 percent for 15-watt lamps) or fall below the minimum lumens at 100 hours value listed in table I. Individual lamps may be rejected and eliminated from an accepted lot if they fall outside allowable limits by more than an additional 4 percent and shall be replaced by the manufacturer without additional charge.

4.9.1 Rating test conditions.—Lamps shall be operated with a reference ballast at its design line voltage from a 60-cycle supply and shall in case of preheat lamps, be started with proper cathode preheating. The reference ballast shall be in accordance with American Standard C82.3. The supply voltage shall be such that the r.m.s. summation of harmonic components shall not exceed 3 percent of the fundamental component. Lamps and ballast shall have reached stable conditions before readings are taken. Lamps shall be measured at an ambient temperature between 24° and 26°C.

4.10 Rejection for color.—Five of the lamps taken in accordance with paragraph 4.8, shall be tested under the test conditions of paragraph 4.9.1, for compliance with paragraph 3.6. A 10-inch section at the middle of each lamp shall be measured. Any lot of lamps may be rejected if more than one of the lamps tested fail to comply with the requirements of paragraph 3.6.

LIFE PERFORMANCE TEST

4.11 Lamp selection and test quantities.—The lamps for the life performance test shall be selected from the rating-test lamps at the ratio of not less than 4 from the first 1,000 lamps of any lot and at least 1 lamp from each 500 lamps (or part thereof) by which the lot exceeds 1,000 lamps. The life-test lamps selected shall be representative of the rating-test lamps.

4.11.1 Life-test lamps to be counted as part of quantity delivered.—The life-test lamps selected by the inspector will be destroyed in the course of the life test. The inspector will

place a card in each container from which a life-test lamp has been taken, stating:

“The United States Government lamp inspector has removed the lamp from this carton as part of the inspection of lamps in this package, and has sent the lamp to the National Bureau of Standards, Washington, D. C., for the required life test.”

Lamps destroyed in life test are to be counted as part of the quantity of lamps delivered by the contractor to the United States Government.

4.12 Life-test conditions.—Life-test lamps shall be operated with selected lamp ballasts at their design voltage on a 60-cycle voltage supply meeting the requirements of paragraph 4.9.1. 15- and 20-watt lamps shall be operated on lag circuits. 40-, and 90-watt lamps shall be operated, half of them leading and half of them lagging on two-lamp ballasts. The ballasts for preheat lamps shall be in accordance with Federal Specification W-B-30 and shall fall within one-half the range established in that specification. The operating cycle shall be 3 hours with power applied and 20 minutes with power off. Lamps of the preheat type shall be started by means of starters providing preheat times in accordance with Federal Specification W-S-755.

4.13 Lamp life.—The life of a lamp is the number of hours during which it provides illumination without failure in accordance with the conditions of paragraph 4.12.

4.14 Rejection for failure to meet life requirements.—Any lot of lamps provided that such lot is represented on test by the minimum required number of lamps (not less than 10), selected in accordance with paragraph 4.11, may be rejected if more than 10 percent plus one lamp of the life-test lamps fail before 40 percent of rated life. The lot may also be rejected if the average hours' life of the life-test lamps falls below the life value given in table I by more than the life tolerance specified in table IV for the number of life-test lamps averaged.

W-L-116a**4.15 Determination of lumen maintenance.**

—When life-test lamps cycled in accordance with paragraph 4.12 have burned for 40 percent of rated life, they shall be measured for lumens under the test conditions of paragraph 4.9.1.

TABLE IV.—Life tolerance¹

Number of lamps averaged	Allowable percent variation from rated life	Number of lamps averaged	Allowable percent variation from rated life
250 and above	5	24-20	12
249-100	6	19-18	13
99-55	7	17-16	14
54-45	8	15-14	15
44-35	9	13-12	16
34-30	10	11	17
29-25	11	10	18

¹ On account of the natural and inherent variations in individual lamp performance, the average test results of a small number of test samples cannot be depended upon to indicate exactly the average for larger quantity from which the test samples were taken. The tables of allowable variation are devised in accordance with the observed accuracy of lamp-testing methods and the observed variations in lamp performance.

4.16 Rejection for failure to meet lumen maintenance requirements.—Any lot of lamps may be rejected provided such lot is represented on test by the minimum required number of lamps (not less than 10) in accordance with paragraph 4.11 if the average lumens after 40 percent of rated life, determined in accordance with paragraph 4.15, fall below the value specified in table I by more than the tolerance specified in table V.

4.17 Inspection and tests of preparation for delivery requirements.—The preservation, packaging, packing, and marking of the equipment shall be subject to inspection and tests by Government inspectors to determine compliance with the requirements of section 5 of this specification. The contractor shall provide the necessary facilities and supplies for inspection and tests made prior to final acceptance.

TABLE V.—Maintenance tolerances¹

Number of lamps tested	Allowable percent variation
100 and above	2
99-25	4
24-10	6

¹ On account of the natural and inherent variations in individual lamp performance, the average test results of a small number of test samples cannot be depended upon to indicate exactly the average for the larger quantity from which the test samples were taken. The tables of allowable variation are devised in accordance with the observed accuracy of lamp-testing methods and the observed variations in lamp performance.

5. PREPARATION FOR DELIVERY

For civil agency procurement the definitions and applications of levels of preservation, packaging, and packing protection are defined in Federal Standard No. 102.

5.1 Preservation and packaging.

5.1.1 Level A.—Lamps up to and including 48 inches in length shall be packaged in quantities of 24 each. Lamps 72 inches and 96 inches in length shall be packaged in quantities of 12 each. Each lamp shall be placed in a corrugated paperboard sleeve. Lamps of like description in the quantities specified above, shall be packaged in conformance with Military Specification MIL-P-116, method IC-5, utilizing boxes conforming to Federal Specification PPP-B-636 (class 2). Noncorrosive cushioning material shall be placed in the ends of the boxes to protect the pins.

5.1.2 Level C.—Lamps shall be packaged in accordance with contractor's best commercial practice.

5.2 Packing.

5.2.1 Level A.—The packaged lamps shall be packed in close-fitting boxes conforming to Federal Specification PPP-B-621 (class 2), PPP-B-601 (overseas type), PPP-B-585

(class 3), PPP-B-591 (overseas type, PPP-B-636 (class 3) or Military Specification MIL-B-10377 (overseas type). The contents shall be cushioned and braced in accordance with Military Specification JAN-P-100. The gross weight shall not exceed approximately 200 pounds for wood or wood cleated boxes and the weight limitations of the applicable specification for fiber boxes. The boxes shall be closed and strapped in accordance with the appendix to the applicable box specification. Strapping shall be flat steel, type I, class B.

5.2.2 Level B.—The packaged lamps shall be packed as specified in paragraph 5.2.1, except that boxes shall be the domestic type or class.

5.2.3 Level C.—Lamps shall be packed in exterior shipping containers that can meet rail Consolidated or Uniform Freight Classification Rules, Regulations, and Tariffs or tariffs of other common carriers as applicable to the mode of transportation to insure safe delivery at the lowest cost for packing and freight charges combined.

5.3 Marking.

5.3.1 Nonmilitary agencies. — Shipping containers shall bear standard marking with the name and size of the commodity as defined by the contract or order under which the shipment is made, the quantity of each type contained therein, the name of the contractor, the number of the contract or order, and the name and address of the consignee.

5.3.2 Military agencies.—Interior packages and shipping containers shall be marked in accordance with Military Standard MIL-STD-129.

6. NOTES

6.1 Ordering data. — Purchasers should specify size and color of lamps required, should exercise any desired options offered herein, and should specify the following (see 1.1 and 6.2):

- a. Title, symbol, and date of this specification.
- b. Size and color of lamps.
- c. Levels of preservation, packaging, and packaging required (see 5.1 and 5.2).
- d. Marking required (see 5.3).

6.2 Qualifying to supply lamps.

6.2.1 Current contractors. — A contractor currently supplying fluorescent lamps to the Government must qualify as follows in order to have his bid for the ensuing contract period considered.

6.2.1.1 Of all preheat lamps presented by contractor during the first 10 months of the contract period and whose life test is completed during those 10 months, not more than 10 percent plus 1 lamp shall fail before 3,000 burning hours. In addition, not more than 20 percent plus 1 lamp of all life-test lamps tested to 5,000 hours shall fail before 5,000 burning hours provided that at least 30 lamps comprise the 5,000 hour test. The weighted average lumens at 3,000 hours of the preheat lamps tested, expressed for each size and color of lamps as a percentage of the values listed in the last column of table I of this specification, shall not fall below 100 by more than the tolerance for the total number of lamps tested as listed in table V.

6.2.1.2 In addition to the life-test lamps selected in accordance with paragraph 4.11, additional life-test lamps may be selected at a point of delivery. Samples selected at points of delivery, shall not exceed 40 percent of the total number of test lamps for any qualification period. When lamps are selected at a delivery point, the lot size shall number at least 1,000, lamps from which a maximum of 10 lamps will be taken at random and proportionately from the individual packages of the lot. The lamps will be transported directly to the National Bureau of Standards for 100 hours of burning prior to measurement for initial lumens. Life-test lamps selected at a point of delivery shall be so selected within one month of date of delivery.

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6.2.1.3 The requirements of 6.2.1, 6.2.1.1, and 6.2.1.2 apply to any current contractor *only insofar as he supplies lamps of his own manufacture*. If a current contractor supplies one or more brands of lamps not of his own manufacture, such brand or brands shall be considered as part of the qualification test or tests of the manufacturer or manufacturers of such brand or brands.

6.2.2 *Prospective bidders.*—A prospective bidder not currently supplying lamps to the Government on contract must qualify as follows in order to have his bid for the ensuing contract period considered:

6.2.2.1 Upon notice from the prospective bidder, not less than 11 months before the expiration of the current contract period, to the Federal Supply Service, of his intention to bid to supply fluorescent lamps on contract to the Government during the ensuing contract period, the Federal Supply Service will notify the National Bureau of Standards to make a qualification test of the prospective bidder's product. The National Bureau of Standards will set an inspection date and will notify the prospective bidder to have ready for inspection by a Government lamp inspector, 7,200 40-watt preheat lamps, of which 2,400 shall be White or Warm White, 2,400 shall be Cool White, and 2,400 shall be Daylight.

6.2.2.1.1 The procedure specified in 6.2.2.1 applies only to any prospective bidder who contemplates supplying lamps of his own manufacture. If a prospective bidder contemplates supplying lamps not of his own manufacture, the manufacturer of the lamps, if not already undergoing qualification test as a current contractor, shall give notice to the Federal Supply Service as required in 6.2.2.1 as though he were the prospective bidder. If the manufacturer of the lamps is already undergoing qualification test as a current contractor, no further qualification test is required.

6.2.2.2 The Government lamp inspector will inspect the lamps in accordance with this specification. The inspector will take at random 10 lamps of each color presented for inspection and will send the lamps thus taken to the National Bureau of Standards for photometric rating and life test. These life-test lamps shall be supplied by the prospective bidder without charge and all transportation charges shall be prepaid by the prospective bidder. The Government lamp inspector will at the same time inspect the facilities of the prospective bidder to determine whether they are suitable and sufficient to enable him to inspect lamps efficiently at the factory or warehouse of the prospective bidder, if the prospective bidder should be awarded a contract to supply fluorescent lamps to the Government during the ensuing contract period.

6.2.2.3 The lamps selected by the Government lamp inspector for life test shall be photometered at the National Bureau of Standards. If 20 percent plus two lamps or *more of all of these lamps are outside of the initial rating tolerances*, the bid for the ensuing contract period of the prospective bidder will not be considered by the Federal Supply Service.

6.2.2.4 The life test of the various sizes of lamps selected by the Government lamp inspector shall be conducted at the National Bureau of Standards in accordance with the provisions of this specification. The Federal Supply Service will consider the bid of the prospective bidder for the ensuing contract period only if not more than 10 percent plus one of the life-test lamps fail before 3,000 hours of burning, and in addition only if not more than 20 percent plus one lamp of the life-test lamps fail before 5,000 hours burning time.

6.2.2.5 The Federal Supply Service will consider the bid of the prospective bidder only if the weighted average lumens at 3,000 hours of the life-test lamps, expressed for each color of lamp tested as a percentage of the values

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listed in the last column of table I of this specification, does not fall below 100 by more than the tolerance for the total number of lamps tested as listed in table V.

6.2.3 Only one qualification test of any one manufacturer's lamps shall be made in any one contract period.

6.3 Transportation description.—Transportation description applicable to this item is:

Lamps fluorescent other than Neon

Carload minimum weight, 15,000 and 22,000 pounds subject to Rule 34, Uniform Freight Classification

Motor volume minimum weight, 22,000 pounds

Notice. — When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

MILITARY INTERESTS:

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Navy—Y Sh S MC

Air Force—WADC.

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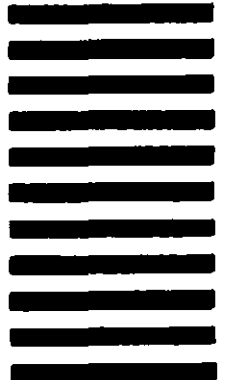
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