

MIL-E-1/1432A  
16 March 1971  
~~SUPERSEDING~~  
MIL-E-1/1432  
5 January 1962

**MILITARY SPECIFICATION SHEET**

**ELECTRON TUBE, GAS SWITCHING**

**TYPE 721B**

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-1.

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

DESCRIPTION: TR, fixed tuned, cell type, frequency range 2,700 to 3,300 MHz

ABSOLUTE RATINGS:

Parameter:	Incident power	I <sub>i</sub>	Ebb (open circuit)	tk	AH
Unit:	kw	μAdc	Vdc	sec	ft
Maximum:	100	200	-1,000	5	10,000
Minimum:	---	---	-800	---	---

PHYSICAL CHARACTERISTICS:

Dimensions: See figure 1  
Mount: See figures 2 and 3

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GENERAL:

Qualification - Required

721B

METHOD	REQUIREMENT OR TEST	CONDITIONS	SYMBOL	LIMITS		UNIT
				MIN	MAX	
	<u>Qualification inspection</u>					
4021	Degradation due to vibration	See note 4	$\Delta F$	---	1	MHz
4466	Temperature coefficient of frequency	Method B	$\Delta F$	-20	+20	MHz
4471	Recovery time	F = 2,800 to 3,330 MHz; po = 50 kw $\pm$ 10%; prf = 1,000 pps $\pm$ 10%; tp = 1.0 $\mu$ s $\pm$ 10%; $\sigma'$ = 1.2:1; Ii = 100 $\mu$ Adc (see note 3); Ri = 0.5 Meg	t	---	7	$\mu$ s
4475	Intrinsic Q (high-Q external cavity) (1)	See figure 2, cavity C	Qo	2,500	---	---
4476	Intrinsic P (P') (1)	po = 4 watts (see figure 3)	Pj	7	30	VA
4476	Intrinsic P (relative) (2)	po = 4 watts (see note 3)	Pj	7	30	VA
	<u>Quality conformance inspection, part 1 (see note 1)</u>					
4401	Ignitor ignition time	Ebb = 750 Vdc $\pm$ 2% Ri = 4 Meg $\pm$ 2%	t	---	5	sec
4421	Ignitor interaction ( $\Delta Q$ )	Ii = 100 $\mu$ Adc	$\Delta Q$	---	150	---
4431	Tuning (TR tubes) (1)	F = 3,090 MHz (see figure 2)	$\Delta F$	3,075	3,105	MHz
---	Ignitor current	See figure 4	Ii	60	110	$\mu$ Adc
4475	Intrinsic Q (high-Q external cavity) (2)	See figure 2	Qo	2,500	---	---
---	Water-vapor content		$\Delta Pj/Pj$	0.4	0.7	---
	<u>Quality conformance inspection, part 2</u>					
1031	Low-frequency vibration	See note 4	---	---	---	---
4431	Tuning (TR tubes) (2)	See figure 2 F = 3,330 MHz, cavity B F = 3,135 MHz, cavity C F = 2,800 MHz, cavity D (see note 5)	$\Delta F$ $\Delta F$ $\Delta F$	3,297 3,104 2,772	3,363 3,166 2,828	MHz MHz MHz
---	Seal test	See note 6	---	---	---	---
	<u>Quality conformance inspection, part 3</u>					
---	Life-test provisions	Group B; Ii = 300 $\mu$ Adc	t	750	---	hrs

METHOD	REQUIREMENT OR TEST	CONDITIONS	SYMBOL	LIMITS		UNIT
				MIN	MAX	
	<u>Quality conformance inspection, part 3</u> -Continued					
---	Life-test end points:					
4471	Recovery time	F = 2,800 to 3,350 MHz; p <sub>o</sub> = 50 kw ± 10%; prr = 1,000 pps ± 10%; t <sub>p</sub> = 1.0 μs ± 10%; σ' = 1.2:1; I <sub>i</sub> = 100 μA dc; R <sub>i</sub> = 0.5 Meg (see note 2)	t	---	30	μs
---	Water-vapor content		ΔP <sub>j</sub> /P <sub>j</sub>	0.2	---	---

## NOTES:

1. Unless otherwise specified, the AQL for all tests listed under quality conformance inspection, part 1, shall be 1.0, inspection level II.
2. The cavity shall be tuned to resonance at the simulated signal frequency. The loss of signal in the tube, at the specified time after start of the pulse, shall be not more than 3 dB in excess of the loss at 800 to 1,000 μs after the pulse.
3. The tube shall be tested on a relative basis. The tube shall be capable of being tuned to resonance as indicated by a pronounced peak in the output within the range of the provided tuning adjustment which shall not exceed the specified limits. Adjust frequency to be consistent with tuning (2). The reading of the output meter when the gap is fired to acceptance limits established by tests made on standard tubes with known P<sub>j</sub> values. The acceptance limits are determined from the observed output reading with known intrinsic P<sub>j</sub> values within the test limits on the assumption that the readings of this meter are directly proportioned to the values of intrinsic P<sub>j</sub>.
4. The tube shall be mounted as shown on figure 2. There shall be no evidence of ignitor short as indicated by a neon lamp short indicator during vibration. The resonant frequency in the test cavity as shown in detail C on figure 2, shall not change by more than the specified value.
5. The tube shall resonate at the specified wave length of the cavity within the specified limits. The input and output coupling shall be adjusted as for intrinsic Q test.
6. On evidence of satisfactory quality, the inspector may limit this test to 10 tubes each month. The tube and cavity shall be subjected to 12 temperature cycles from 0° to 100°C and may be allowed to come to equilibrium at room temperature in going from one extreme to the other. Time for each cycle shall not exceed 2-1/2 hours. The tube shall then pass the ignitor current tests 24 hours after cycling. The tube shall not be returned to stock at the conclusion of this test.

Custodians:  
Army - EL  
Navy - EC  
Air Force - 80

Preparing activity: Navy - EC

Agent: DSA - ES

(Project 5960-2425-51)

Review activities:  
Army -  
Navy -  
Air Force - 11, 17  
DSA - ES

User activities:  
Army - WC  
Navy - AS, MC, CG, SE

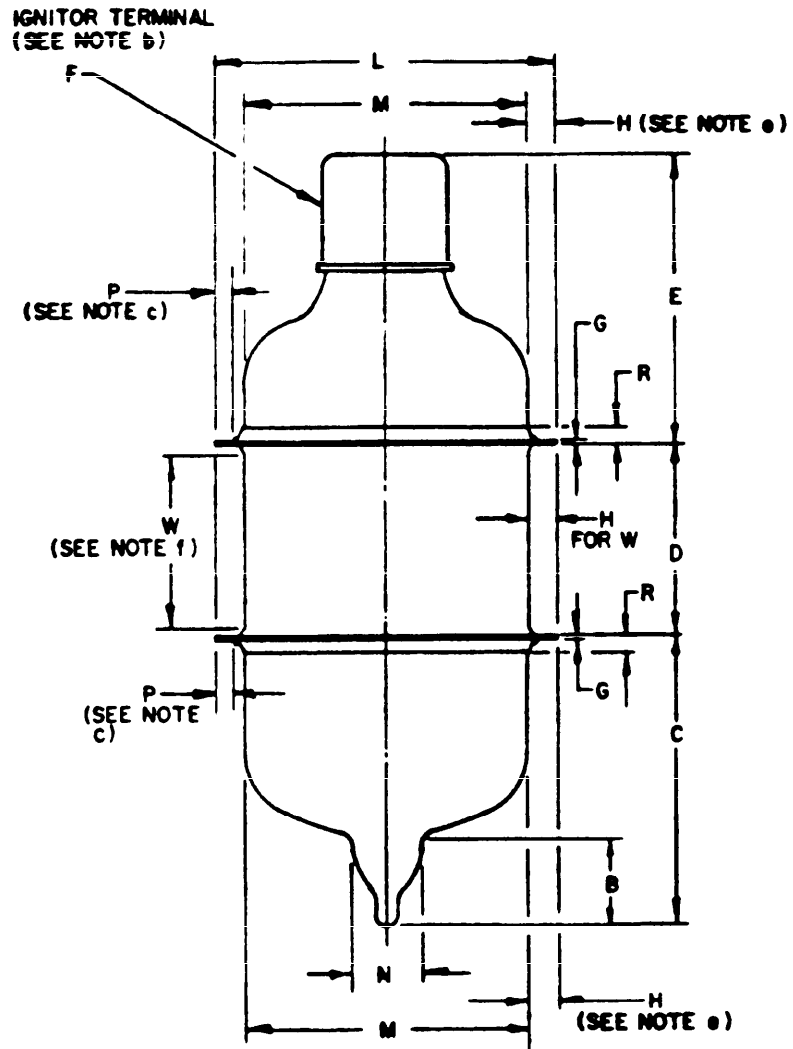


FIGURE 1. Outline drawing of electron tube type 721B.

Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Qualification inspection		
F	Cap: C1-5(EIA)	
Qualification inspection, part 1 (see note 1)		
D	.825(20.96)	.830(21.08)
P	.078 (1.98)	
Qualification inspection, part 2		
C		1.250(31.75)
E	1.125(28.58)	1.250(31.75)
H	.141 (3.58)	
L	1.484 dia (37.69)	1.516 dia (38.51)
Reference dimensions		
B	.375 (9.53)	
G	.010 (.25)	
M	1.125 dia (28.58)	
N	.313 dia (7.95)	
R	.031 (.79)	
W	.703(17.86)	

## NOTES:

- a. Contact disks shall be concentric within 0.010 with respect to each other.
- b. Ignitor terminal shall be concentric with adjacent contact disk within 0.063.
- c. Dimension P defines that portion of the contact disks, measured radially, which shall be smooth and free from splits or tears and which shall be flat to the extent defined by dimension D.
- d. Contact disks shall be plated gold 10 msi minimum or silver 15 msi minimum. Plating may be omitted from edges of contact disks. Qualification inspection shall apply.
- e. Dimension H applies around entire circumference of contact disks except at fillet between contact disk and glass envelope.
- f. Dimension W defines extent of dimension H between contact disks, located centrally.

FIGURE 1. Outline drawing of electron tube type 721B - Continued.

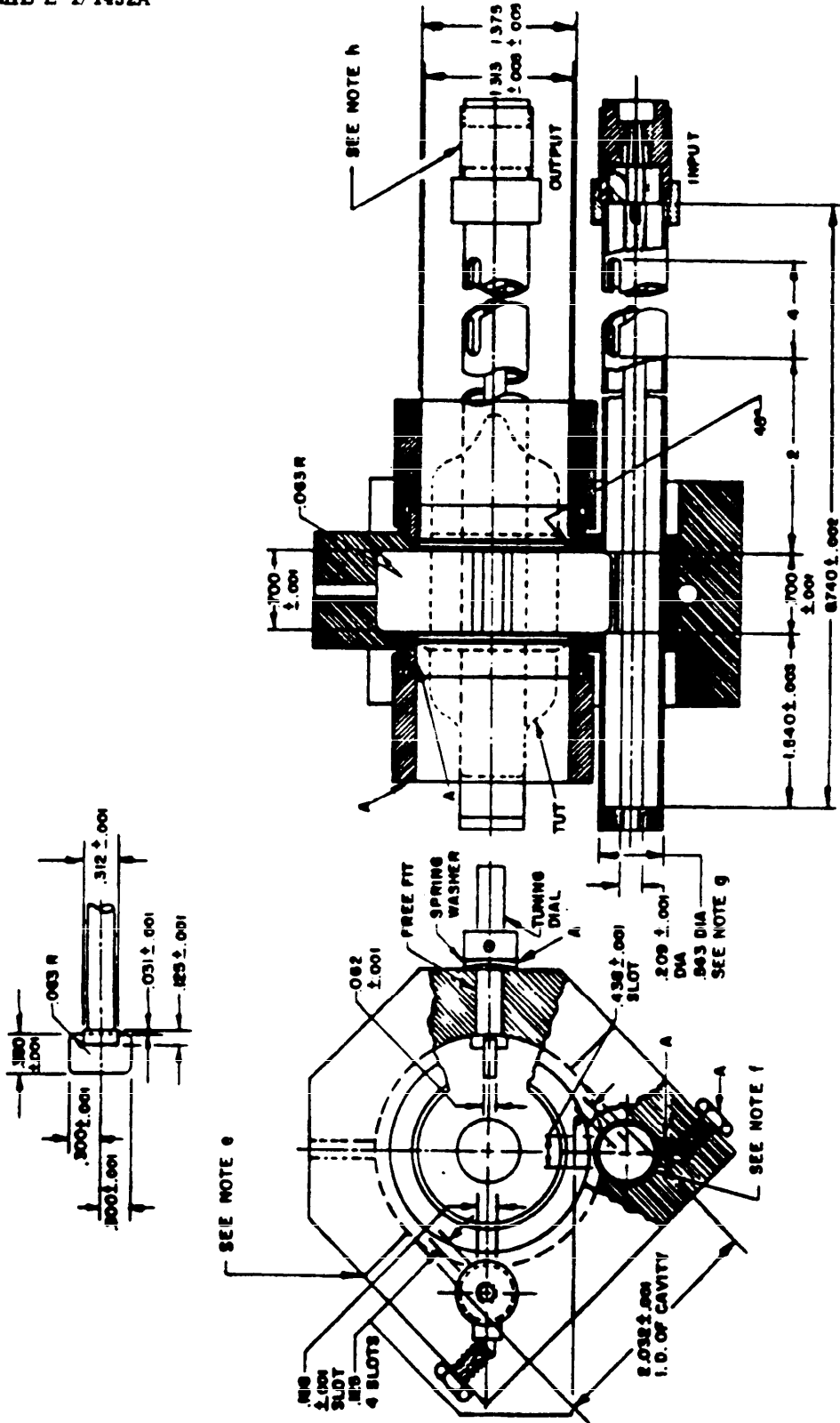


FIGURE 2. Test cavity.

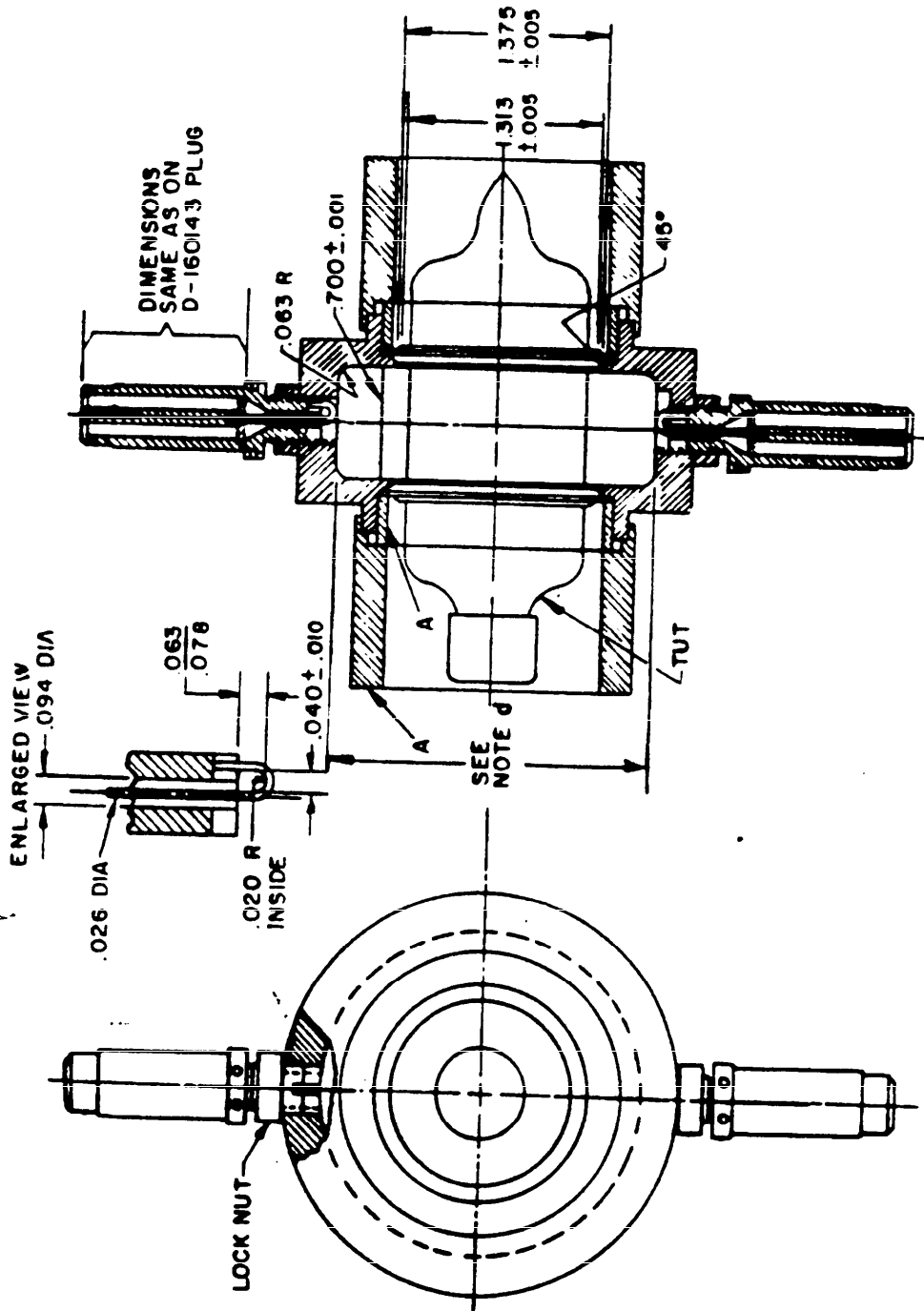


FIGURE 2. Test cavity - Continued.

INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM
.001	.03	.040	1.02	.300	7.62	1.540	39.12
.002	.05	.062	1.57	.312	7.92	2.000	50.80
.003	.08	.063	1.60	.350	8.89	2.032	51.61
.005	.13	.078	1.98	.438	11.13	4.000	101.60
.010	.25	.094	2.39	.563	14.30	8.740	222.00
.020	.51	.125	3.18	.700	17.78		
.026	.66	.188	4.78	1.313	33.35		
.031	.79	.209	5.31	1.375	34.93		

**NOTES:**

- a. Dimensions are in inches.
- b. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
- c. All parts except those marked A must be silver plated 50 msi and polished.
- d. This dimension shall be according to the following schedule:  
 Cavity B 1.750(44.45 mm) ±.001(.03 mm).  
 Cavity C 2.000(50.80 mm) ±.001(.03 mm).  
 Cavity D 2.500(63.50 mm) ±.001(.03 mm).
- e. Cavity split along this line both halves of cavity to be in alinement when assembled.
- f. Slot in matching unit to be in alinement with opening in cavity and secured by set screws.
- g. No. 24 B & S gage brass tubing.
- h. Connector for type N plug assembly.

**FIGURE 2. Test cavity - Continued.**





INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM	INCHES	MM
.005	.13	.188	4.78	.626	15.90	1.000	25.40	1.953	49.61
.010	.25	.240	6.10	.685	17.40	1.156	29.36	2.094	53.19
.030	.76	.245	6.22	.689	17.50	1.375	34.93	2.124	53.95
.032	.81	.250	6.35	.750	19.05	1.376	34.95	2.125	53.98
.050	1.27	.280	7.11	.751	19.08	1.385	35.18	2.670	67.82
.064	1.63	.282	7.16	.781	19.84	1.530	38.86	3.812	96.82
.094	2.39	.438	11.13	.813	20.65	1.532	38.91	4.188	106.38
.107	2.72	.500	12.70	.816	20.73	1.590	40.39		
.125	3.18	.563	14.30	.821	20.85	1.595	40.51		
.149	3.78	.578	14.68	.875	22.23	1.609	40.87		
.183	4.65	.625	15.88	.938	23.83	1.906	48.41		

NOTES:

- a. Dimensions are in inches.
- b. Metric equivalents (to nearest .001 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

FIGURE 3. Test cavity - Continued.

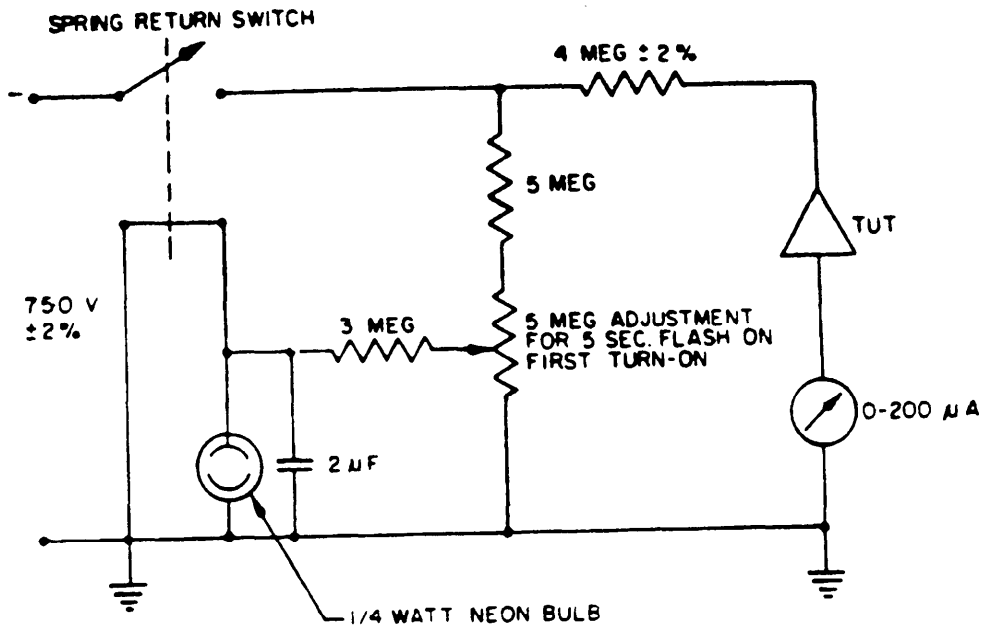


FIGURE 4. Ignitor discharge circuit.



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NAVAL ELECTRONIC SYSTEMS COMMAND  
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**SPECIFICATION ANALYSIS SHEET**

Form Approved  
Budget Bureau No. 22-R255

**INSTRUCTIONS:** This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

**SPECIFICATION**

**ORGANIZATION**

**CITY AND STATE**

**CONTRACT NUMBER**

**MATERIAL PROCURED UNDER A**

**DIRECT GOVERNMENT CONTRACT**       **SUBCONTRACT**

**1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?**

**A. GIVE PARAGRAPH NUMBER AND WORDING.**

**B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES**

**2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID**

**3. IS THE SPECIFICATION RESTRICTIVE?**

**YES**       **NO (If "yes", in what way?)**

**4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)**

**SUBMITTED BY (Printed or typed name and activity - Optional)**

**DATE**

**DD FORM 1426**  
1 JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

S/N-0102-014-1801      C-28264