

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, KLYSTRON

TYPE 2K41

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

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

DESCRIPTION: CW, tunable frequency range 2,660 to 3,310 MHz, integral cavity, rated power output 50 mW

ABSOLUTE RATINGS:

Parameter:	Ef	Ers	Irs	Prs	Ec	Ic	Er	Ehk	Alt
Unit:	V	Vdc	mAdc	W	Vdc	mAdc	Vdc	Vdc	ft
Maximum:	6.93	1,250	60	75	-200	25	-750	±45	10,000
Minimum:	5.7	---	---	---	+50	---	0	---	---

PHYSICAL CHARACTERISTICS:

Dimensions:	See figure 1	Base:	Shortened medium octal
Cathode:	Unipotential, oxide coated		8-pin, low-loss phenolic
Output:	Side terminals	Cap:	Small, C1-1

TEST CONDITIONS:

Parameter:	Ef	Ers	Irs	Er	F
Unit:	V	Vdc	mAdc	Vdc	MHz
Test condition 1:	6.3	1,000	60	-60 to -150	F3
Test condition 2:	6.3	500	25(max)	-50 to -200	F3

FREQUENCY		
F	MHz	±
F1	2,660	1%
F2	3,000	1%
F3	3,310	1%

GENERAL:

Qualification - Not required

METHOD	REQUIREMENT OR TEST	NOTES	TESTS	CONDITIONS	SYMBOL	LIMITS		UNIT
						MINIMUM	MAXIMUM	
	<u>Quality conformance inspection, part 1</u>	1	-					
4289	Heater current, nonoperating	-	-	$E_f = 6.3 \text{ V}$	I_f	0.90	1.10	A
1261	Electrode voltage (grid)	3	1		E_c	20	50	Vdc
1266	Grid current	3	1		I_c	0	25	mAdc
1256	Electrode current (resonator)	-	-	$E_c = -60 \text{ Vdc}$	I_{rs}	---	100	μAdc
4229	Total reflector current	3, 4, 5	1	$E_c/I_{rs} = 40 \text{ mAdc}$	I_r	0	5	μAdc
1231	Emission current	3, 5	1	$E_f = 5.7 \text{ Vac}$	I_{rs}	44	---	mAdc
4250	Power output(1)	5, 6	2		P_o	50	---	mW
4223	Mechanical tuning range	-	-	Lower limit Upper limit	F F	---	3, 310 ---	MHz MHz
	<u>Quality conformance inspection, part 2</u>							
4270	Heater - cathode leakage	-	-	$E_{hk} = \pm 45 \text{ Vdc}$	I_{hk}	0	150	μAdc
1266	Grid emission	-	-	$E_f = 8.0 \text{ Vac}$; $t_k = 20 \text{ minutes}$; $E_c = 0$; $E_g = 18 \text{ Vac}$	I_{sg}	0	500	μAdc
	<u>Quality conformance inspection, part 3</u>							
---	Life test	-	2	Group C; $E_r = 0$	t	500	---	hrs
---	Life-test end point:							
4250	Power output (1)	6	2		P_o	35	---	mW
1031	High-frequency vibration	9	-	No voltages applied	---	---	---	---
4250	Power output (2)	6, 9	2	F1 and F2	P_o	50	---	mW
4223	Mechanical tuning range (vernier)	7a, 9	-	Positions 1 and 2 Position 3 Position 4	ΔF ΔF ΔF	275 250 165	---	MHz MHz MHz
4223	Resettability	7b, 9	-	Positions 1 and 4 Positions 2 and 3	ΔF ΔF	---	10 70	MHz MHz
4027	Temperature coefficient	8, 9	2	F2	$\Delta F/\Delta T$	---	+0.12	MHz/ $^{\circ}\text{C}$
4223	Mechanical tuning fatigue	2, 9	1		---	200	---	Cycles

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. This test shall consist of complete cycles of the large, four-position, tuning knob.
3. The TUT shall not be oscillating during the test. If the TUT oscillates with the specified voltages applied, then detune the resonator until the oscillation ceases.
4. Apply heater voltage for 1 minute. Then apply other voltages plus the heater voltage for 2 minutes, and read the total deflector current at the end of this 2-minute period.
5. This test to be performed at the conclusion of the holding period.
6. There shall be no line tuning mechanism between the transmission line and the TUT. The output power measurements on the TUT shall be made with the output line coupled through a UG-275/U connector into a $50 \pm 10\%$ ohms resistive load consisting of a section, (approximately 25-feet long or 20 dB of attenuation), of 50-ohms lossy line (RG-21/U) operating into a load adjusted to $50 \pm 10\%$ ohms at the operating frequency. As an alternate method, this load may be simulated by any other output network that has the same electrical characteristics at the operating frequency.
7. Test position 1: vernier out then vernier in; return to vernier out and recheck; repeat for positions 2 and 3. Test position 4: vernier in then vernier out; return to vernier in and recheck.
 - (a) In neither direction shall the vernier tuning range be less than the limit specified.
 - (b) The difference between the initial reading and the recheck at each position shall not be greater than the limit specified.
8. The initial frequency shall be allowed to stabilize by operation at practically constant ambient temperature for at least 10 minutes. The temperature range for the test shall be over the range of -10° to $+40^{\circ}$ C. The rate of change of ambient temperature shall not be greater than 2° C per minute. During the test, the TUT shall be operated in a rectangular enclosure that has a base at least 1-foot square. The enclosure shall be at least 20-inches high. An airblast shall be directed at the TUT. The rate of airflow past the tube shall be maintained as nearly as constant as practical. The air within the enclosure shall also be circulated.
9. This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes with an acceptance number of zero, and a second sample of three tubes with a combined acceptance number of one. In the event of failure, the test will be made as a part of quality conformance inspection, part 2, code level D, with an AQL of 6.5. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.
10. Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Army - EL
Navy - EC
Air Force - 85

Review activities:

Army - MU
Air Force - 80
DSA - ES

User activities:

Army - ME, WC
Navy - AS, OS, MC, CG, SH
Air Force - 11

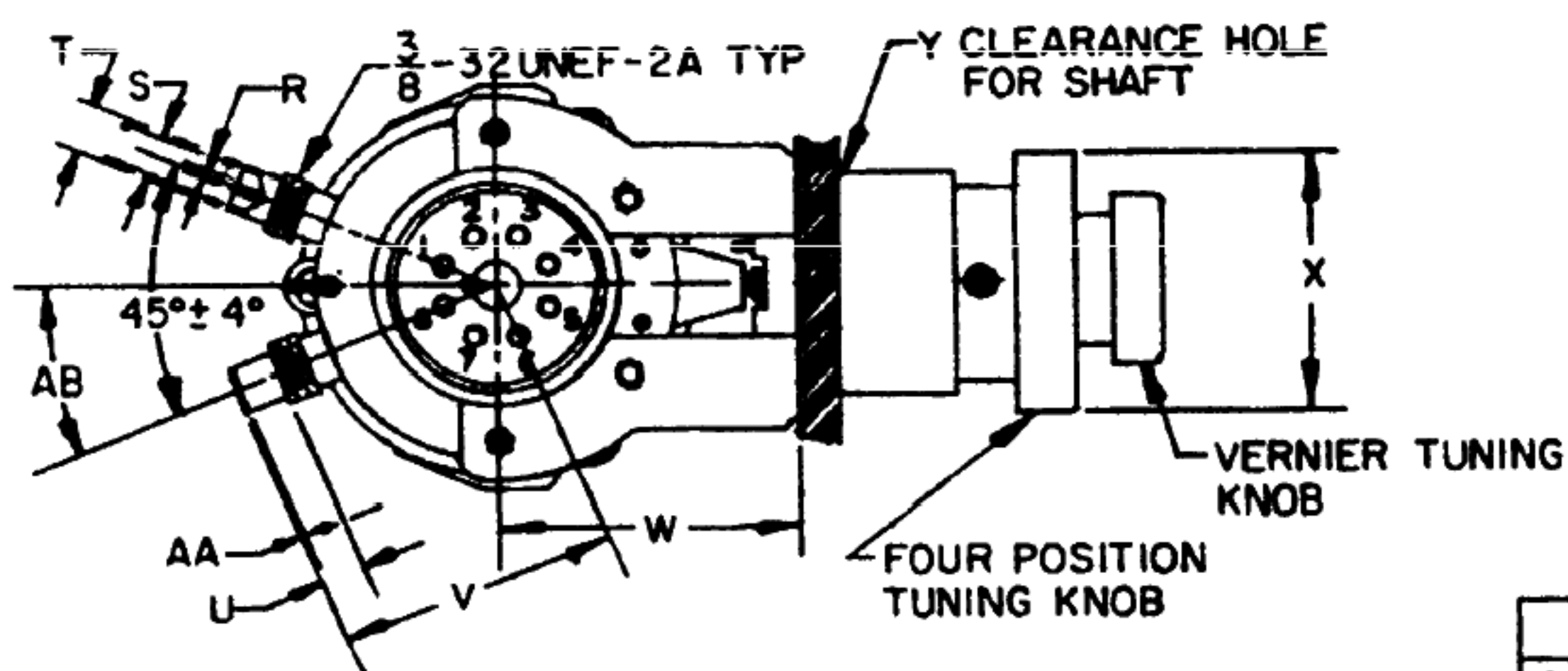
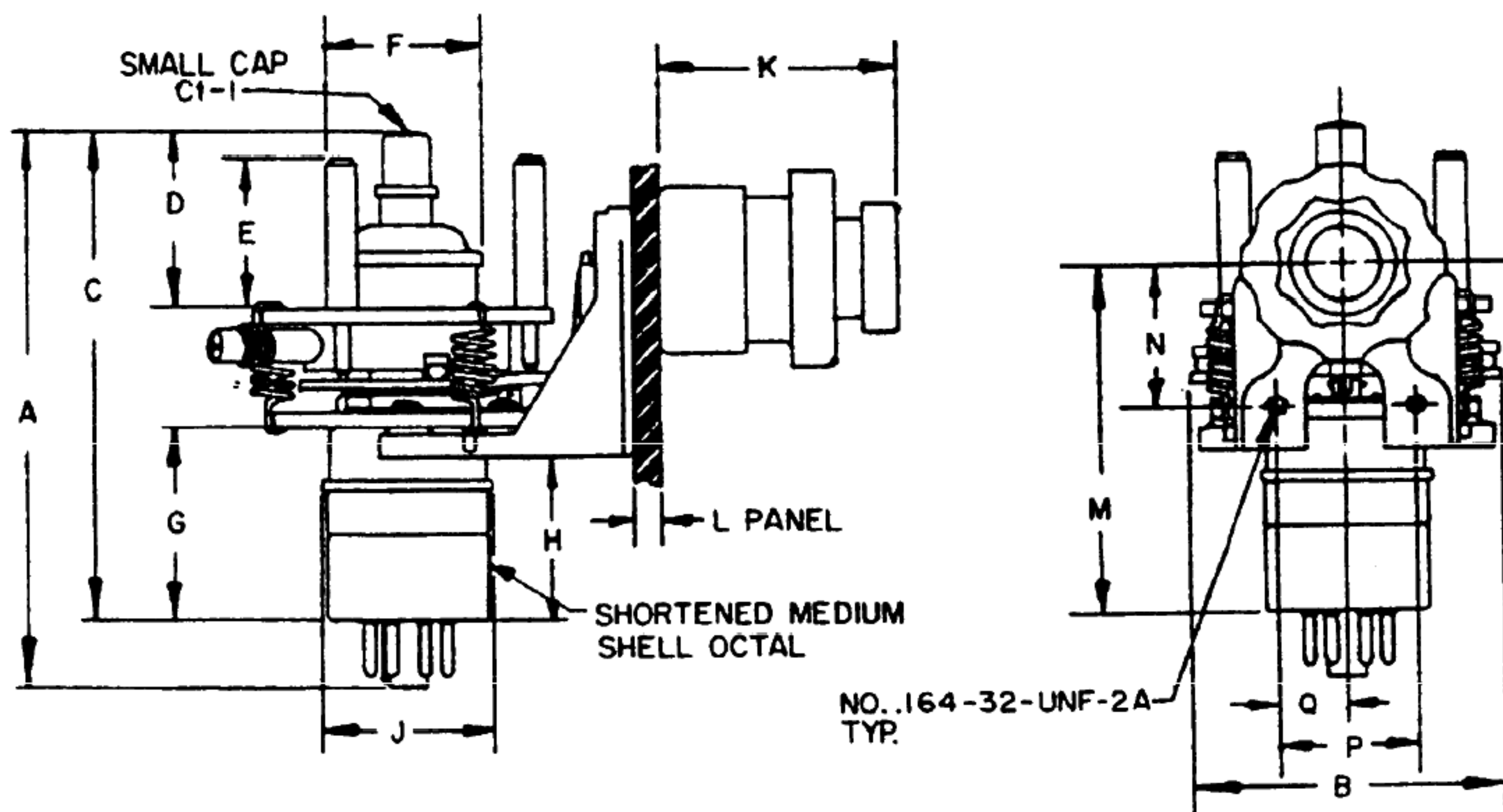
Preparing activity:

Navy - EC

Agent:

DSA - ES

(Project 5960-3028)



PIN CONNECTIONS	
PIN NO.	ELEMENT
1	int con
2	h
3	int con
4	int con
5	g
6	int con
7	h
8	k
SHELL	Resonator
CAP	Reflector

FIGURE 1. Outline drawing of tube type 2K41.

Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 2		
A		4.688 (119.08)
B		2.625 (66.68)
K		2.125 (53.98)
N	1.156 (29.36)	1.219 (30.96)
P	1.109 (28.17)	1.141 (28.98)
U		.031 (.79)
AB	20° 30'	24° 30'
Quality conformance inspection, part 3 (See note 9)		
C		4.125 (104.78)
D		1.625 (41.28)
E		1.188 (30.18)
F		1.250 (31.75) Dia.
G		1.750 (44.45)
H		1.500 (38.10)
J		1.500 (38.10)
L		.250 (6.35)
R	.048 (1.22)	.052 (1.32)
T	.277 (7.04)	.283 (7.19)
Y	.469 (11.91) Dia	
AA	.230 (5.84)	.270 (6.86)
Reference dimensions		
M	2.906 (73.81)	
Q	.563 (14.30)	
S	.230 (5.84)	
V	1.750 (44.45)	
W	1.781 (45.24)	
X	1.625 (41.28) Dia.	

FIGURE 1. Outline drawing of tube type 2K41 - Continued.