[redacted]

NOV 2 1960

File No: MC-1262, 3-2
T-No. 23458
Project No. 13.877.62
Completed: 9-30-60

9/29/98
RB Crane
10/06/98
W Layne

OK for Openmet

TO: DISTRIBUTION TCG-NNT-1, TCG-SAFF-1,

Re: Vibration Testing of Prototype XMC-1262 Thermal Batteries, Manufactured by Eagle Picher

Object of Test

This test was performed as part of the development program. The effects of unactivated and activated vibration on electrical performance were to be studied.

Authorization for Test

This test was requested by 1323 in a Work Order Authorization, dated 6-13-60. Mr. P. T. Boling was the consultant. The material for test was received 6-15-60.

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NOV - 4 196
CENTRAL RECORD FILE

Summary

Six XMC-1262 thermal batteries, numbered 420-EO, 422-EO, 416-EO, 426-EO, 427-EO, and 421-EO, were subjected to unactivated and activated vibration tests. The tests were conducted with the applied constant acceleration or double amplitude maintained at a value double the TR specification. This over-test condition was requested by the consultant. The functional test results met specifications. None of the monitor circuits functioned in this group of batteries.

A second group of six units, numbered 5011, 408-EO, 423-EO, 402-EO, 429-EO, and 413-EO, were subjected to activated vibration. At the consultant's request, each battery was vibrated at 500 cps with 30g input acceleration. All batteries met performance requirements. Again, none of the monitor circuits functioned.

The final group of four units, numbered 5022, 5021, 5023, and 5020, were subjected to unactivated and activated vibration. Unit No. 5020 did not meet the minimum requirement for activated life in the 28 volt section. The other functional results were within specified tolerances. Two monitor circuits functioned properly in this group of batteries.

W C Layne
99SN0051
10/06/98

Functional Measurements and Methods

The equipment and instrumentation used in this test are listed in Tables I and II.

The MC-1262 Test Console was used to perform the functional testing. Output voltages were monitored visually and recorded automatically by a Brush Two-Channel Recorder, incorporated in the tester. The VOM was used to check monitor circuit resistance.

CLASSIFICATION
Emilda Selph 10/08/98
PERSON CRA
W C Layne 10/12/98

MC-1262
3-2

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A controlled current of 10 milliamperes, supplied by the Match Resistance Bridge, was used to measure Match Resistance. This test was conducted in accordance with para. 2.1.3. Match Resistances were to be 4.50 ± 0.50 ohms.

Procedure and Results

Six YMC-1262 Thermal Batteries, numbered 420-EO, 422-EO, 416-EO, 426-EO, 427-EO, and 421-EO, were received for vibration tests. These units were first subjected to Unactivated Vibration (para. 2.2.5.1). The constant acceleration or double amplitude, applied to each battery was doubled in each of the frequency ranges shown in Table I of paragraph 2.2.5.1.1, TR 311058, Issue 2. This over-test condition was requested by the consultant. Other test conditions were maintained as specified. The Resonance Survey Curves, plotted from resonance search data, are shown in Fig. 1, pages 1 through 7. The major axes of vibration were maintained as described in TR-311058, Issue 2, Fig. 1.

Upon completion of unactivated vibration tests, the match resistances of each unit were measured. Results were as follows:

Unit No.	E-F (Match 1)	D-E (Match 2)
420-EO	4.26 ohms	4.14 ohms
422-EO	4.42	5.0
416-EO	4.16	4.36
426-EO	4.6	4.09
427-EO	4.27	4.61
421-EO	4.59	4.28

Each of the six test components was then subjected to Activated Vibration (para. 2.2.5.2). Electrical performance results met specifications. All functional and environmental test data are recorded on Table III, page 1. None of the monitor circuits functioned in this group of batteries.

A second group of 6 test components, numbered 5011, 408-EO, 423-EO, 402-EO, 429-EO, and 413-EO, were activated during vibration. At the consultant's request, each unit was vibrated at 500 cps with 30g (or max. table) input acceleration. Two units were vibrated along each of the three mutually perpendicular axes. All batteries met performance requirements, as shown on page 1 of Table III. Again, none of the monitor circuits functioned.

The final group of four YMC-1262 batteries were subjected to unactivated and activated vibration. Tests were conducted as previously described. Three units, numbered 5122, 5021, and 5023, were vibrated at their resonant frequency with 10g input acceleration during activation. Each component was vibrated along one of the three major axes (as noted on Table III). The remaining battery, numbered 5020, was activated during vibration at 500 cps and 29g. Unit No. 5020 did not meet the minimum requirement for activated life in the 28 Volt Section (para. 2.3.3.2). All other discharge results met specifications. The monitor circuits in units numbered 5022

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and 5013 functioned properly. The other two monitor circuits did not function.

Upon completion of testing, the units were returned to Division 1323 for disposal and/or post mortem study.

Encs: TABLES I,II,III
Fig. 1

ROBERT B. FRANTZ - 7321-3

RBF:7321-3:mh

Distribution:
R. D. Wehrle, 1323
Attn: P. T. Boling
J. M. Wiesen, 1642
E. H. Copeland, 7321
J. R. Harrison, 7323
R. K. Smeltzer, 3421-3

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Fig. 1, Page 1
T-23488

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AN-1262 RESONANT SURVEY

CODE

DIRECTION	SYMBOL
Lateral - - - - - - - -	○
Longitudinal- - - - - -	□
Vertical- - - - - - - -	△

NOTE:

1. No curves have been plotted from 10-500 cps. Output level did not exceed approximately 2 g above input throughout frequency range.

2. Values not plotted are below 15 g.

3. Response ratios at frequencies which do not have an input of 10 g cannot be read on the scales provided.

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MC-1262 Resonant Survey
Serial No. 427, 50[illegible]000Cps.

NOV 2 19[illegible] F*FG Fig. 1 Page 2

571

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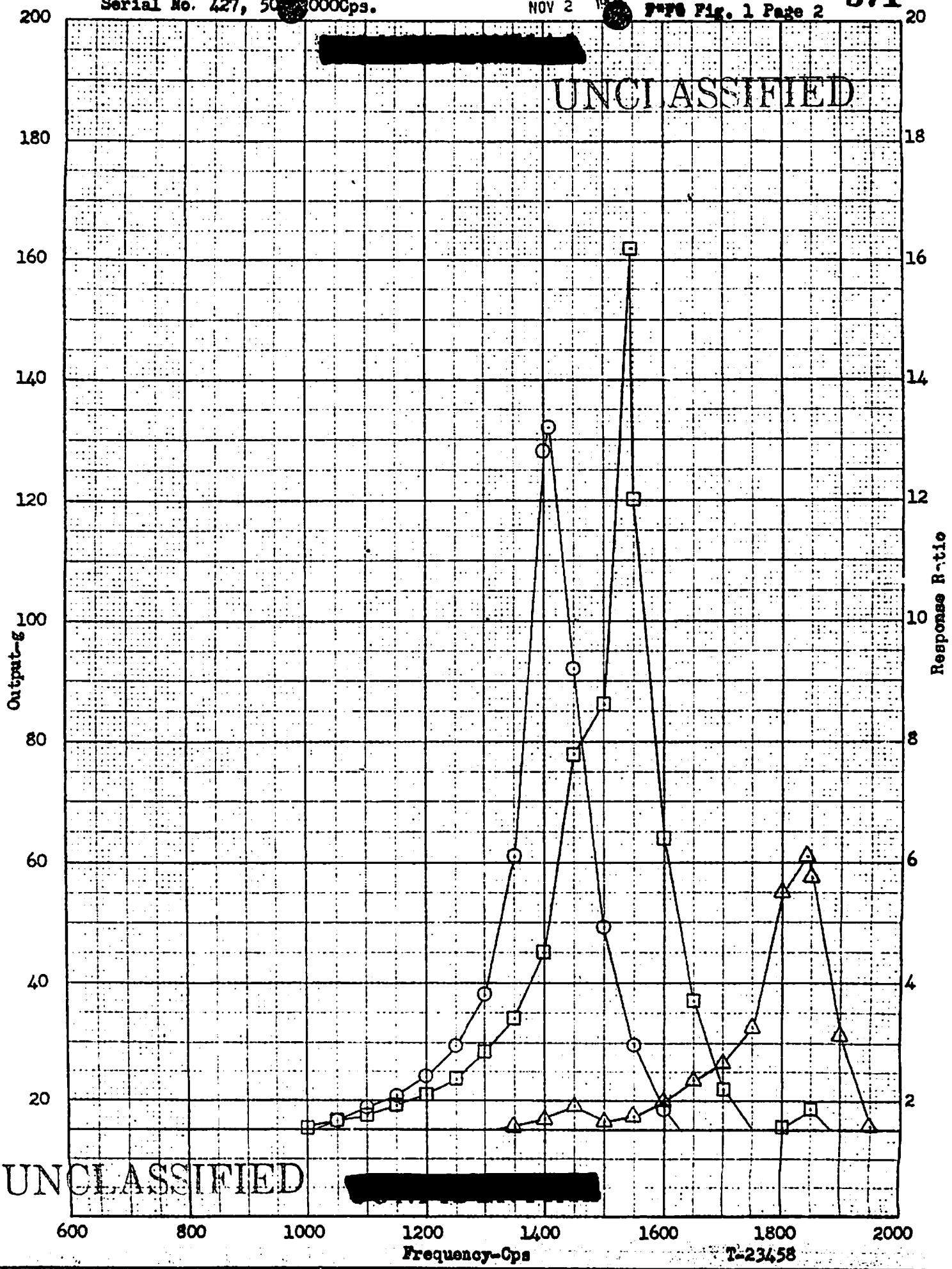

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T-23458

EUGENE DIETZGEN CO.
NO. 1408-20 DIETZGEN GRAPH PAPER
20 X 20 PER INCH

MC-1262 Resonant Survey
Serial No. 422, 50[illegible]2000 Cps.

[illegible]g. 1 Page 3

NOV 2 1960 572

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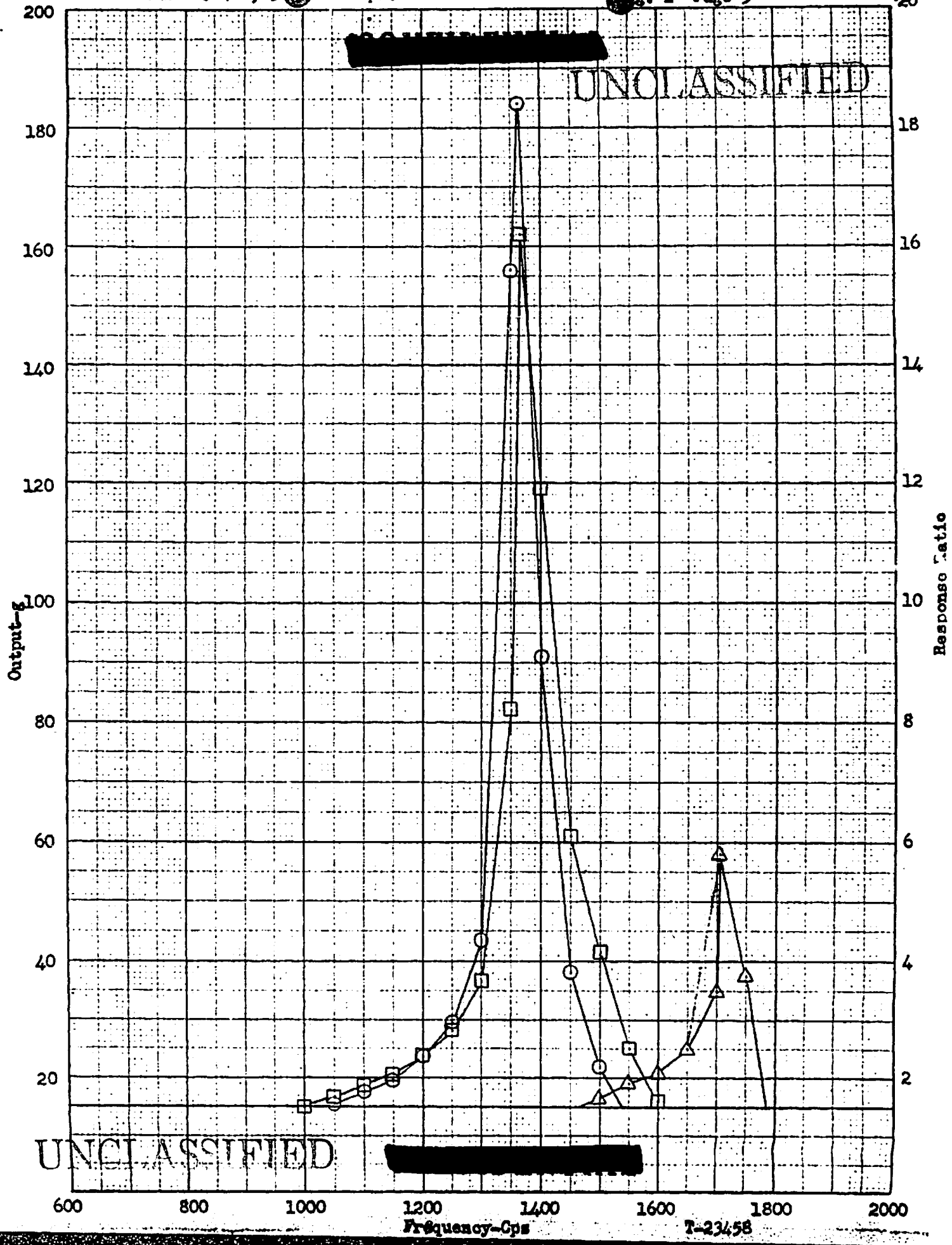

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MC-1262 Resonant Survey
Serial No. 416, 500[illegible]00 Cps.

NOV 2 1960

573

Fig. [illegible]age 4

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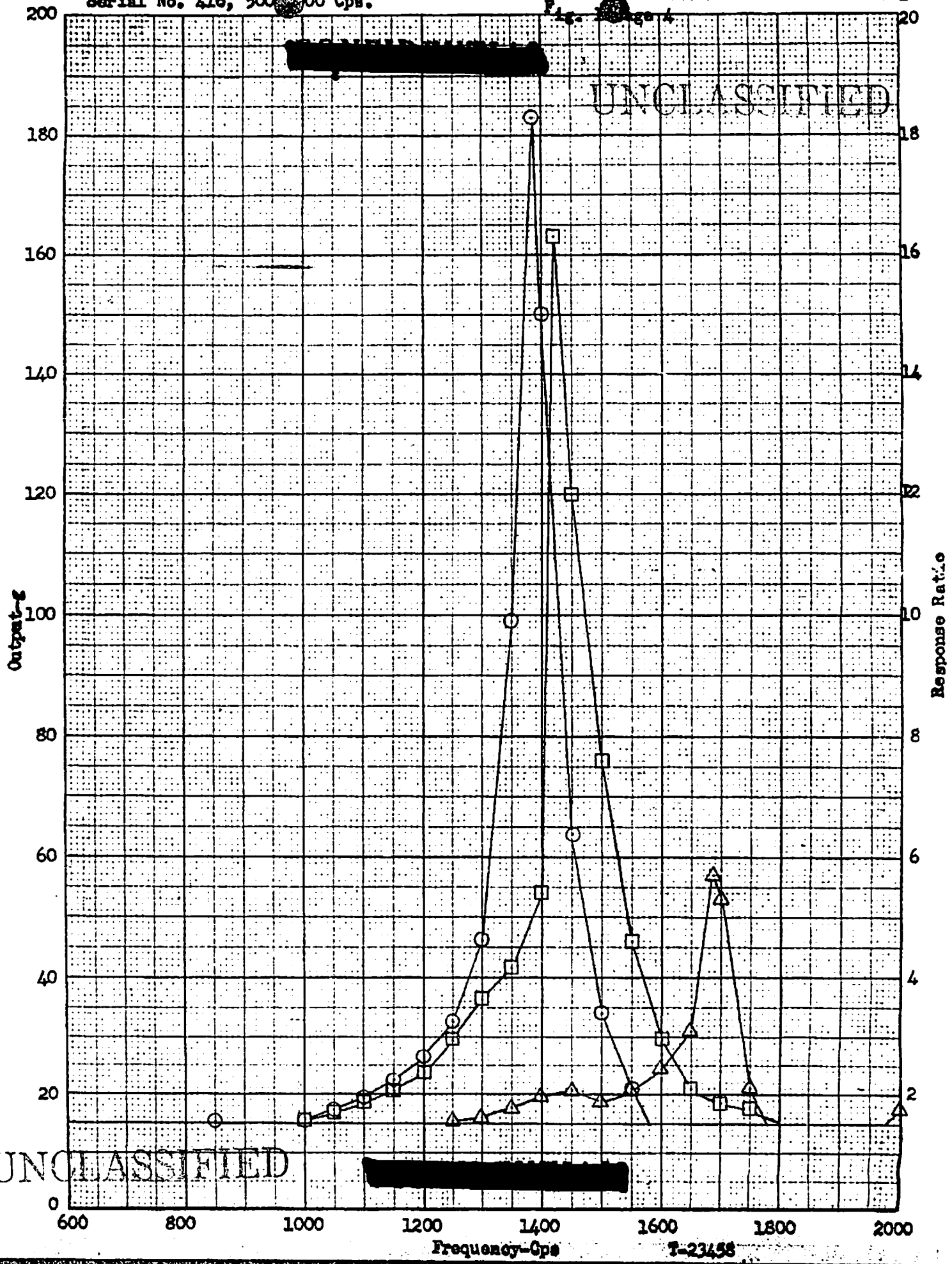

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T-23458

EUGENE DIETZGEN CO. MADE IN U.S.A.
NO. 340R-20 DIETZGEN GRAPH PAPER 20 X 20 PER INCH

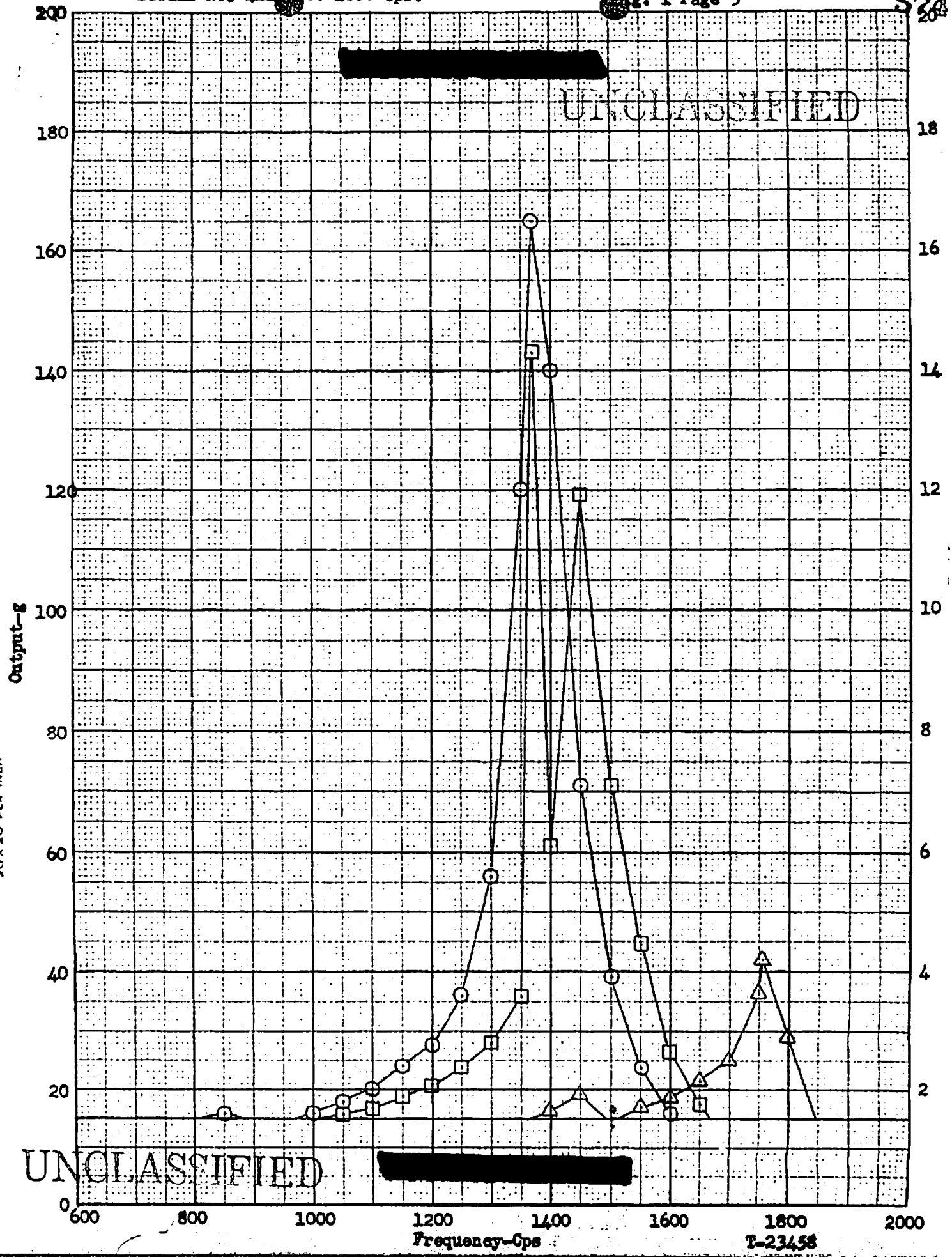
MC-1252 Resonant Survey
Serial No. 421[redacted]00-2000 Cps.

[redacted]g. 1 Page 5

NOV 2 1960

574

[redacted]



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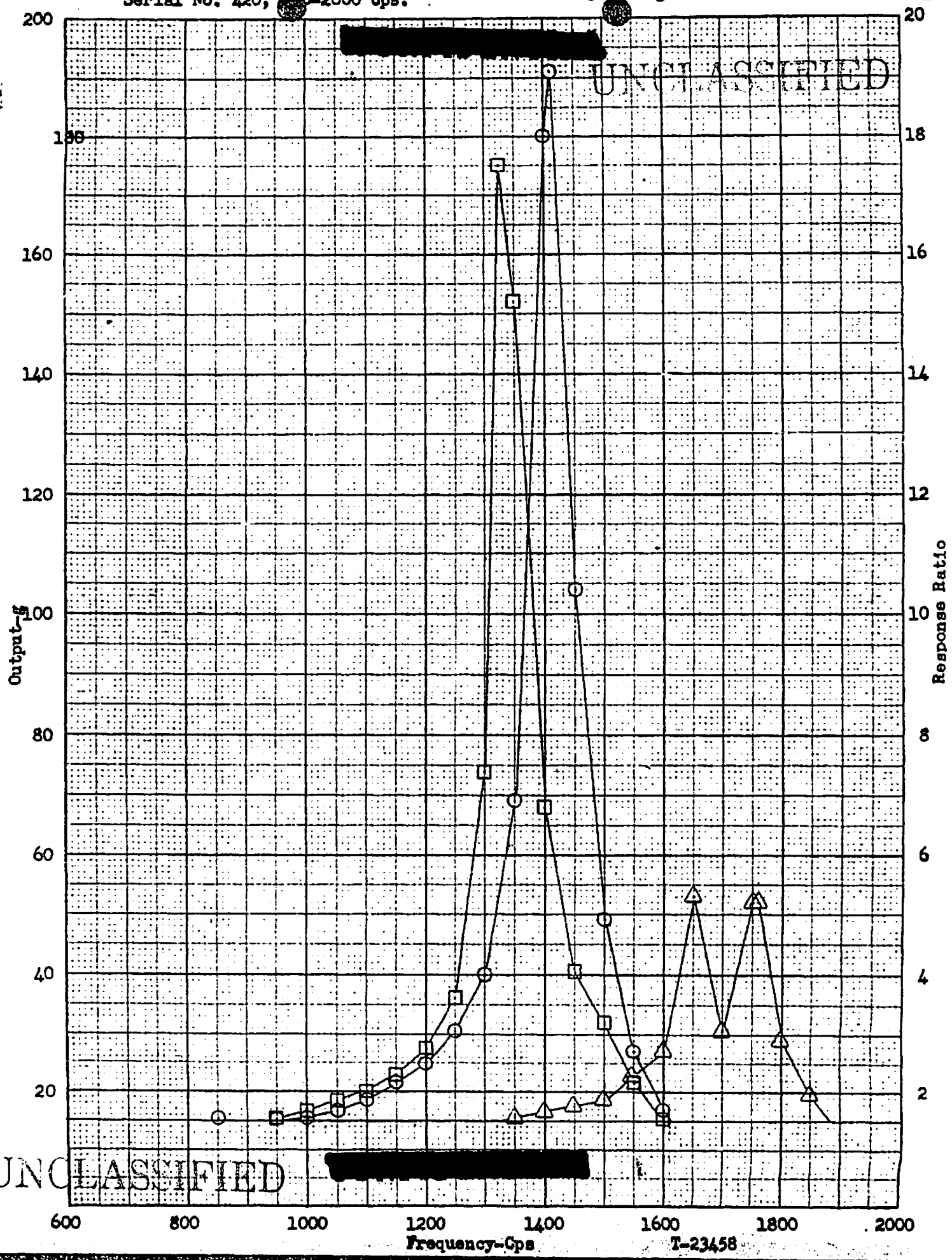
EUGENE DIETZGEN CO.

NO. 340R-20 DIETZGEN GRAPH PAPER 20 X 20 PER INCH



EUGENE DIETZGEN CO.
NO. 340R-20 DIETZGEN GRAPH PAPER
20 X 20 PER INCH

MC-1262 Resonant Survey
Serial No. 426, 600-2000 Cps.

Fig. 1 Page 7 NOV 2 1950

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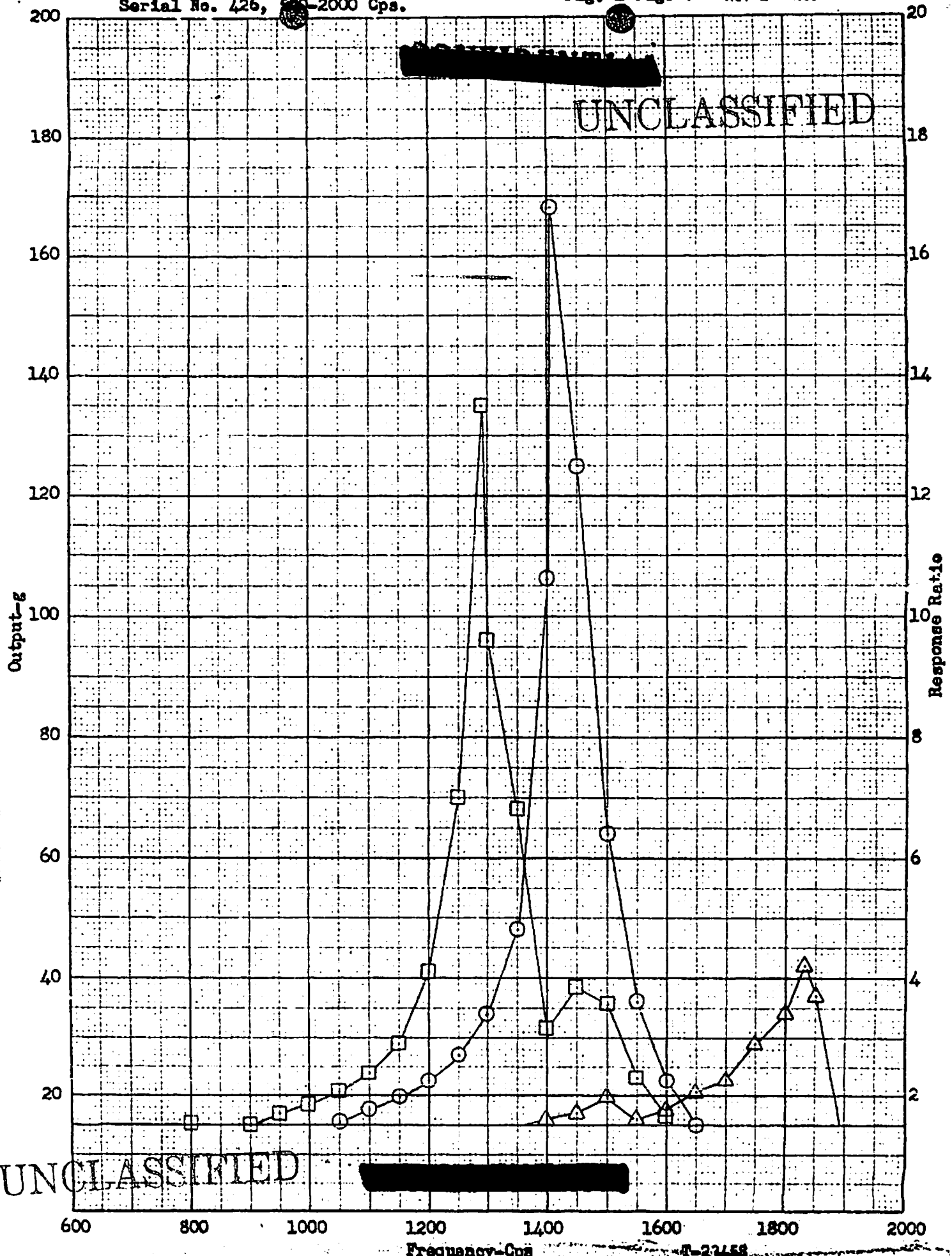

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T - 23458

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NOV 2 1960

TABLE I
ENVIRONMENTAL
EQUIPMENT LIST

[redacted]

Pg. 1 of 2

ITEM NO.	NAME	MFG. & MODEL	S-NO./ SER. NO.	DATE OF LAST CAL.	CAL. PER.	ACCURACY	RANGE	REMARKS
1	* VIBRATION TABLE	MB	No. II	PRIOR TO TEST	TEST	OVER ALL VIBRATION SYSTEM ± 10%	5-2000 CPS	* USED FOR ALL VIBRATION TESTS
2	** INPUT CONTROL VOLTMETER	BALLANTINE MOD. 320	S-No. 93101	7-5-60	WEEKLY		6.4 μV TO 640 V.	
3	** INPUT ACCELEROMETER	ENDEVCO MOD. 2213	S-No. 2589	PRIOR TO TEST	TEST		5-2500 CPS	* USED FOR INACT. VIBRATION TESTS (FIRST 6 UNITS)
4	** OUTPUT ACCELEROMETERS	ENDEVCO MOD. 2213	S-Nos. 6453 6674 6694	PRIOR TO TEST	TEST		5-2500 CPS	
5	* INPUT CONTROL VOLTMETER	BALLANTINE MOD 320	S-No. 98615	8-8-60	WEEKLY		6.4 μV TO 640 V.	* USED FOR ACT. VIBRATION. (12 UNITS)
6	* INPUT ACCELEROMETER	ENDEVCO MOD 2213	S-No. 4687	PRIOR TO TEST	TEST		5-2500 CPS	

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UNCLASSIFIED T - 23458

NOV 2 1960

TABLE I
ENVIRONMENTAL
EQUIPMENT LIST

[redacted]

ITEM NO.	NAME	MFG. & MODEL	S-NO./ SER. NO.	DATE OF LAST CAL.	CAL. PER.	ACCURACY	RANGE	REMARKS	
7	** INPUT CONTROL VOLTMETER	BALLANTINE MOD. 320	S-No. 98615	PRIOR TO TEST	WEEKLY	OVERALL SYSTEM ± 10%	6.4 μV. TO 640 V.		
8	** INPUT ACCELEROMETER	ENDEVCO MOD. 2213	S-No. 4688	PRIOR TO TEST	TEST		5-2500 CPS	** USED FOR ALL VIBRATION TESTS (4 UNITS)	
9	** OUTPUT VOLTMETER	BALLANTINE MOD. 320	S-No. 98613	PRIOR TO TEST	TEST		6.4 μV. TO 640 V.		
10	** OUTPUT ACCELEROMETERS	ENDEVCO MOD. 2213	S-Nos. 6487 4694 2562	PRIOR TO TEST	TEST		5-2500 CPS		

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TABLE II
FUNCTIONAL
EQUIPMENT LIST

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T - 23453

NOV 2 1960

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ITEM NO.	NAME	MFG. & MODEL	S-NO./ SER. NO.	DATE OF LAST CAL.	CAL. PER.	ACCURACY	RANGE	REMARKS	
1	MC-1262 TEST CONSOLE	SANDIA (DIV 1323)	SER. No. 1	PRIOR TO TEST	TEST	* 1/2 %	0-50 V. 0.25 V.	* PANEL	VOLTMETERS
2	VOM	SIMPSON MOD. 260	S-No. 111-96	8-60	6 MONTHS	—	0-∞ Ω		
3	MATCH RESISTANCE BRIDGE	SANDIA	SER No. 1	PRIOR TO TEST	TEST	±.01 Ω	0-15 Ω		
			[redacted]						

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579

TABLE III XMC-1242 ELECTRICAL PERFORMANCE NOV 2 1960 T-2345-8

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Pg. 1 of 2

UNIT No:	421-EO	416-EO	426-EO	420-EO	422-EO	427-EO	5011	408-EO	423-EO	402-EO	429-EO	413-EO
RISE TIME TO 10 V.	.25 SEC	.29 SEC	.26 SEC	.28 SEC	.30 SEC	.25 SEC	.32 SEC	.27 SEC	.38 SEC	.24 SEC	.26 SEC	.28 SEC
TIME 24 V.	.85 SEC	.76 SEC	.85 SEC	.81 SEC	.77 SEC	.87 SEC	.84 SEC	.81 SEC	.85 SEC	1.32 SEC	.84 SEC	.78 SEC
PEAK 12 V. SECTION	19.1 V.	19.1 V.	19.1 V.	19.1 V.	19.1 V.	19.1 V.	18.5 V.	19.0 V.	19.2 V.	18.9 V.	19.1 V.	19.1 V.
VOLTAGE 28 V. SECTION	29.6 V.	29.4 V.	29.7 V.	29.6 V.	29.5 V.	29.8 V.	29.5 V.	29.8 V.	29.6 V.	29.1 V.	29.8 V.	29.7 V.
ACTIVATED 12 V. SECTION	124 SEC	129 SEC	180 SEC	133 SEC	117 SEC	116 SEC	78 SEC	94 SEC	133 SEC	115 SEC	121 SEC	107 SEC
LIFE 28 V. SECTION	231 SEC	274 SEC	282 SEC	280 SEC	305 SEC	235 SEC	186 SEC	285 SEC	109 SEC	217 SEC	225 SEC	262 SEC
TIME (SEC) 5	29.0 V.	29.0 V.	29.2 V.	29.2 V.	29.1 V.	29.1 V.	29.8 V.	29.2 V.	29.0 V.	29.0 V.	29.1 V.	29.2 V.
15	29.6	29.4	29.7	29.6	29.5	29.8	29.5	29.8	29.6	29.1	29.8	29.7
28 V. 30	29.3	29.2	29.6	29.4	29.5	29.8	29.2	29.2	29.3	29.0	29.6	29.2
SECTION 45	29.1	29.0	29.1	29.1	29.2	29.3	29.0	29.0	29.0	28.9	29.2	29.1
READINGS 60	28.9	29.0	29.0	29.0	29.0	29.0	28.9	28.9	26.9	28.9	29.0	29.0
75	28.1	28.2	28.1	28.5	28.5	28.2	—	28.1	26.0	28.0	28.2	29.4
90	28.1	28.1	28.0	28.5	28.3	29.1	27.8	28.0	26.0	27.9	28.1	28.2
120	27.8	28.0	27.5	28.2	28.1	27.9	26.9	27.6	23.1	27.1	27.8	28.0
150	27.0	27.6	26.9	28.0	28.0	27.2	25.9	27.0	21.0	26.9	27.0	27.6
180	26.4	27.0	26.0	27.6	27.9	26.8	24.2	26.2		26.0	26.0	27.0
210	25.5	26.5	24.9	26.6	27.0	25.4		24.9		24.3	24.8	26.2
240		25.8	23.2	25.9	26.4	23.6					23.3	25.0
PULSE VOLTAGES 1.1 SEC	11.5 V.	11.7 V.	11.5 V.	11.5 V.	11.6 V.	11.4 V.	10.5 V.	10.7 V.	11.7 V.	11.4 V.	11.5 V.	11.5 V.
18 SEC	14.1 V.	13.8 V.	13.9 V.	14.0 V.	13.5 V.	13.8 V.	12.9 V.	13.0 V.	13.3 V.	14.0 V.	13.6 V.	13.4 V.
70 SEC	24.4 V.	24.7 V.	24.0 V.	24.9 V.	24.9 V.	24.6 V.	24.5 V.	24.8 V.	23.4 V.	24.5 V.	24.4 V.	24.9 V.
MATCH No:	1	2	1	2	1	2	1	2	1	2	1	2
MONITOR	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT	DID NOT
CIRCUIT	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION	FUNCTION
ENVIRONMENTAL	LONG. AXIS	LONG. AXIS	LAT. AXIS	LAT. AXIS	VERT. AXIS	VERT. AXIS	LONG. AXIS	LONG. AXIS	LAT. AXIS	LAT. AXIS	VERT. AXIS	VERT. AXIS
CONDITIONS	10g	10g	10g	10g	10g	10g	*29g	30g	30g	30g	30g	30g
	1395 CPS	1420 CPS	1405 CPS	1411 CPS	1704 CPS	1843 CPS	500 CPS	500 CPS	500 CPS	510 CPS	500 CPS	500 CPS

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*MAX. TABLE

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TABLE III XMC-1262 ELECTRICAL PERFORMANCE T-23458

UNCLASSIFIED [redacted] NOV 2 1960 A. 2 of 2

UNIT No:		5022	5021	5023	5020
RISE TIME TO	10 V.	.28 SEC	.28 SEC	.31 SEC	.29 SEC
	24 V.	.83 SEC	.81 SEC	.91 SEC	.79 SEC
PEAK VOLTAGE	12 V. SECTION	18.6 V.	19.6 V.	19.0 V.	18.6 V.
	28 V. SECTION	29.8 V.	29.4 V.	29.8 V.	29.1 V.
ACTIVATED LIFE	12 V. SECTION	45 SEC	88 SEC	93 SEC	92 SEC
	28 V. SECTION	150 SEC	212 SEC	191 SEC	70 SEC
TIME (SEC)	5	29.1 V.	29.0 V.	29.4 V.	29.0 V.
	15	29.8	29.4	29.8	29.1
28 V.	30	29.3	29.2	29.5	28.8
SECTION	45	29.0	29.0	29.1	26.9
READINGS	60	28.8	28.9	28.9	24.0
	75	27.8	28.0	27.9	23.2
	90	26.1	27.9	27.2	21.2
	120	24.0	27.1	26.2	
	150	22.1	26.5	25.8	
	180		25.6	24.6	
	210		24.0	22.5	
	240		22.0		
PULSE VOLTAGES	1.1 SEC	10.5 V.	10.9 V.	11.3 V.	10.7 V.
	18 SEC	10.9 V.	13.1 V.	13.3 V.	12.8 V.
	70 SEC	23.0 V.	23.5 V.	23.6 V.	22.4 V.
MATCH No.		1	2	1	2
MONITOR CIRCUIT		OK	DID NOT FUNCTION	OK	DID NOT FUNCTION
ENVIRONMENTAL CONDITIONS		VERT. AXIS	LONG. AXIS	LAT. AXIS	VERT. AXIS
		10 g	10 g	10 g	*29 g
		1785 CPS	1330 CPS	1349 CPS	500 CPS

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* MAX. TABLE [redacted]

581