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SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
Review Date: 6/22/98
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Name: W Layne
Classification Changed to: UNCL
Contains No DOE Classified Information
Contains UCNI?
Comments:

SEP 21 1959
XW-54, 3-2
Project Nos. T-16121
T-16325
Case No. 856.00
Ref. Sym: 1613(61)

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW
DOWNGRADING OR DECLASSIFICATION STAMP
CLASSIFICATION CHANGED TO: U
AUTHORITY: W C Layne
Emelda Selph 7/15/98
PERSON CHANGING MARKING & DATE
RECORD ID: 98SN2860
W C Layne 7/16/98
PERSON VERIFYING MARKING & DATE
DATED: 8/09/98

TO: DISTRIBUTION

Re: Vibration Tests of the XW-54/Gar-11

Summary of Test

The XW-54 was subjected to two vibration tests to determine the structural adequacy and compatability of components when assembled in the missile skin. The only deleterious damage occurred during the second test. Eight of the twelve No. 8 screws in the missile mounting ring were found to be broken upon disassembly after the test. The clearance holes in the missile mounting ring were made for No. 10 screws.

Authorization for Test

This test was requested in a Work Order Authorization from J. H. Tenbrink, 1225, to A. W. Reger, 1613, dated 3-31-59. Mr. [illegible], 1225, was the consultant.

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Procedure and Results

Test #1

The XW-54 warhead was mounted on the vibration table, as shown in the sketch of Fig. 1. Unit #1 was made up as follows: wooden ball as H.E. simulation, dummy firing set with screw joint, and a bonded warhead case joint. Unit #2 had a wooden ball dummy firing set with riveted joint and a screw type warhead case joint. Unit #2 was used as a counterweight only. A resonance survey was conducted with input accelerations of 1 g (o-p) from 10 to 23 cps, 0.036 inch double amplitude from 23 to 77 cps and 10 g (o-p) from 77 to 500 cps. The resonance survey was then extended to 2000 cps with an input acceleration of 1 g (o-p) from 500 to 2000 cps. Accelerometers were located as shown in Figures 1 and 2.

Two resonance points were located, 70 cps and 468 cps and vibration was conducted at each point for 15 minutes. The accelerations recorded during this test are tabulated in Table I.

XW-54/Falcon
3-2

Test #2

The XW-54 warhead was mounted on the vibration table, first as shown in the sketch of Fig. 3 and then as shown in Fig. 4 for vibration in the longitudinal, lateral and vertical axes respectively. These axes are shown in Figs. 3 and 4.

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A resonance survey was conducted for each axis of vibration with input accelerations as follows: 1 g (0-peak) 5 to 44 cps, .010 inch double amplitude from 44 to 100 cps, and 5 g (0-peak) 100 to 500 cps. The accelerometers were located in the same positions as for Test #1.

The following resonance points were located for each axis of vibration: longitudinal - 376 cps, vibrated for 30 minutes; lateral - 150 cps and 295 cps, vibrated for 15 minutes at each point; vertical - 151 cps and 400 cps, vibrated for 15 minutes at each point. The accelerations recorded during this test are tabulated in Table II.

The operable MC-1191 firing set, used during Test #2, was functionally checked following the test and showed no deleterious damage.

The results of these tests indicate that the XW-54 warhead, as tested, is structurally adequate to withstand this vibration environment.

1613 Project Engineers: R. F. HARLAN - 1613-3

Approved by: R. S. HOOPER - 1613-3

RFH:1613-3:ec

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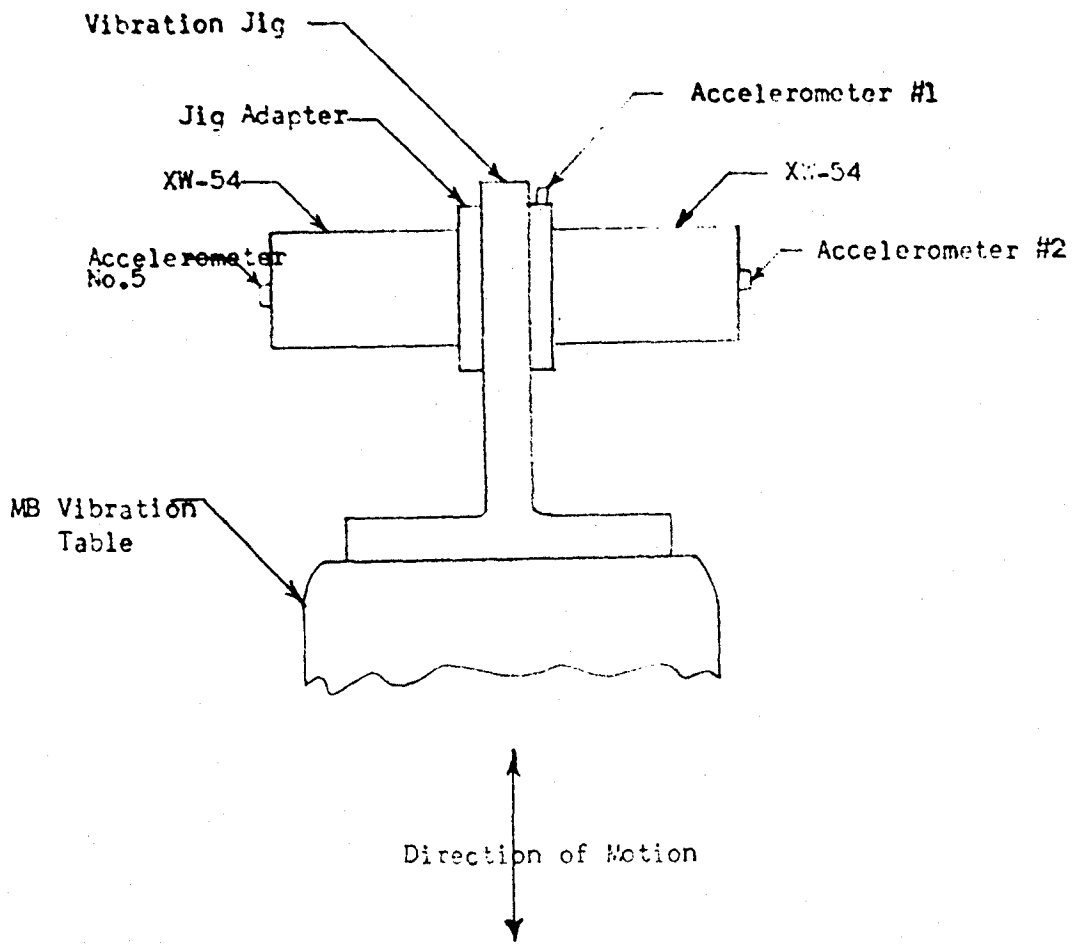
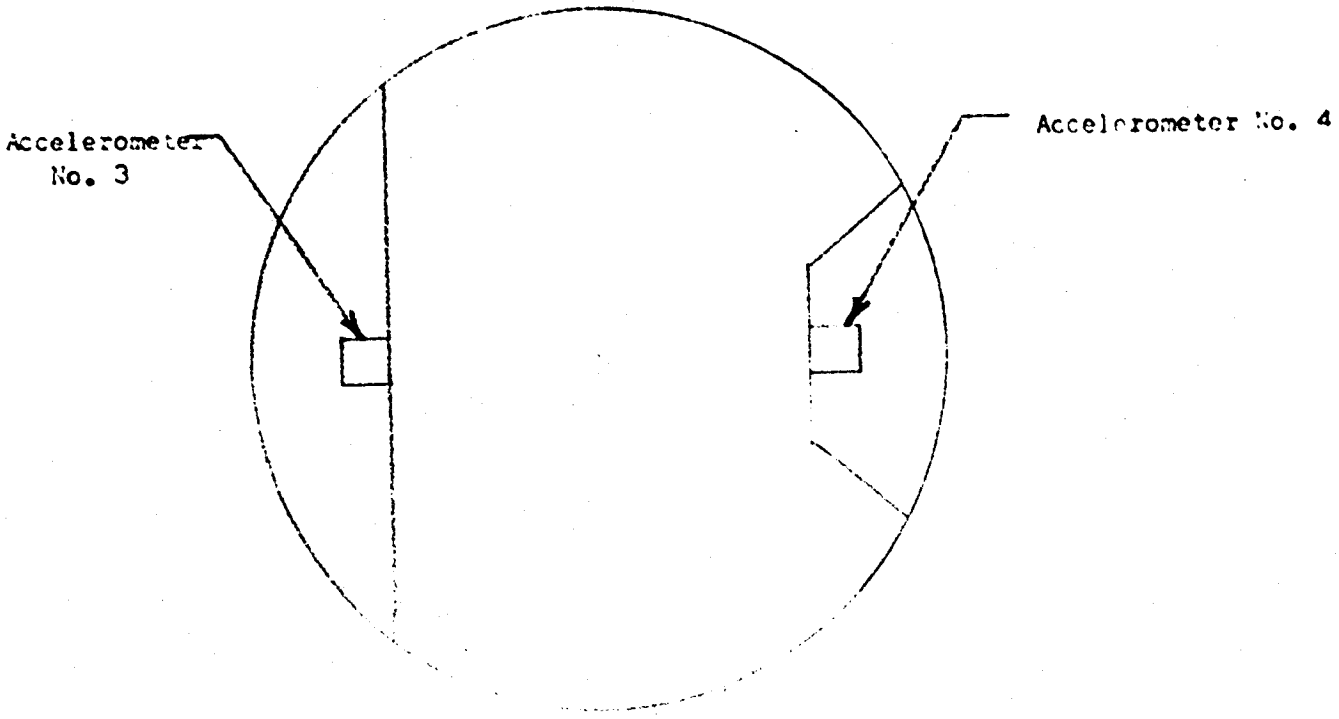


FIGURE 1 - SKETCH SHOWING SETUP FOR VIBRATION OF THE XW-54 WARHEAD



MC-1191 FIRING SET

FIGURE 2 - ACCELEROMETER LOCATIONS ON THE MC-1191 FIRING SET - FOR VIBRATION OF THE XW-54 WARHEAD

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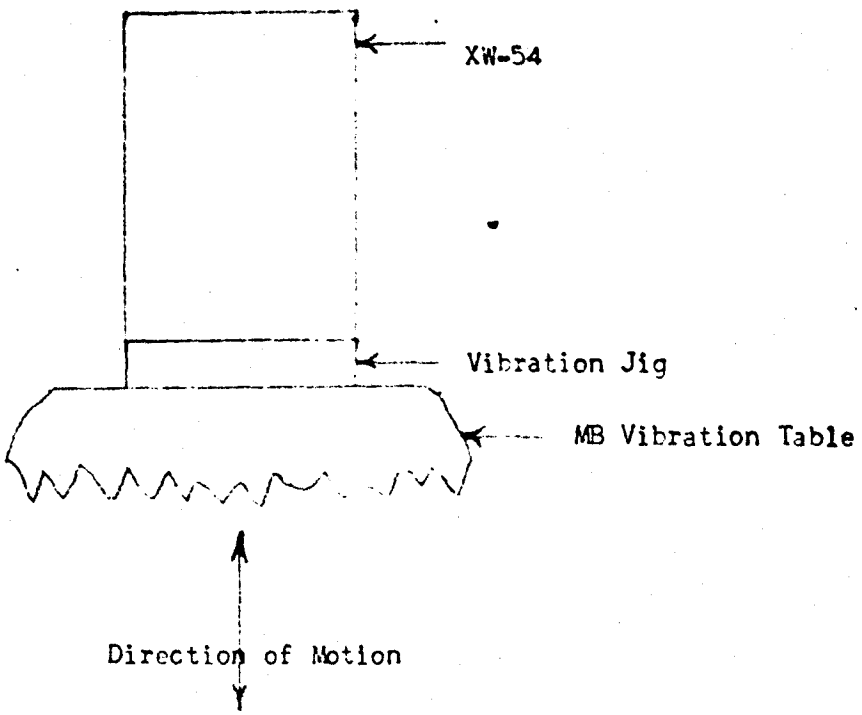

FIGURE 3 - SETUP FOR VIBRATION IN THE LONGITUDINAL DIRECTION - VIBRATION TEST OF THE XW-54 WARHEAD

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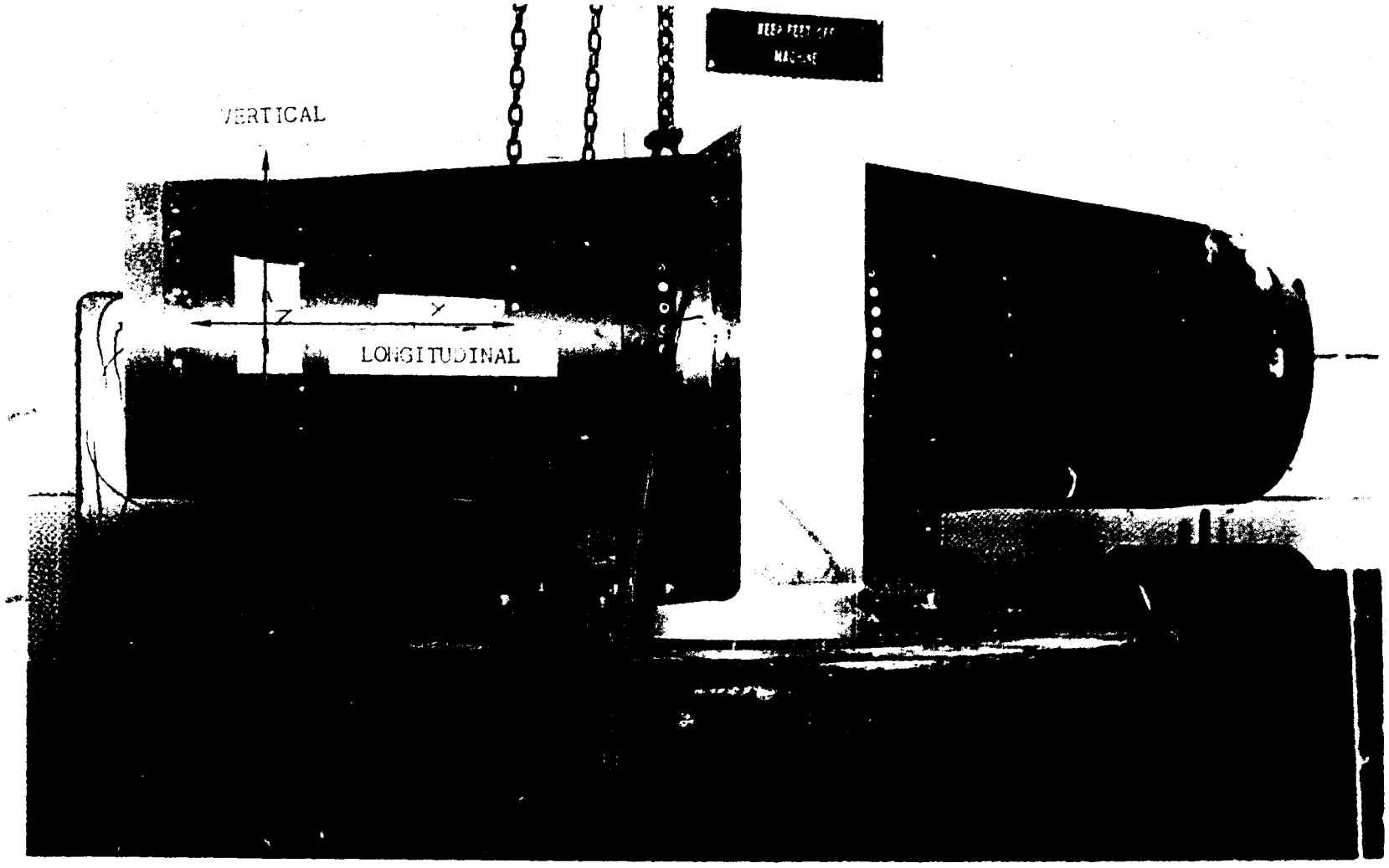

FIGURE 4 - SETUP FOR VIBRATION IN THE VERTICAL DIRECTION. VIBRATION IN THE LATERAL DIRECTION WAS ACCOMPLISHED BY ROTATING THE WARHEAD 90 ABOUT ITS LONGITUDINAL AXIS AND LOOKS THE SAME AS THIS PICTURE - VIBRATION TEST OF THE XW-54 WARHEAD

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	VIBRATION AT RESONANCE (20 CPS)				VIBRATION AT RESONANCE (468 CPS)			
	0 MIN	5 MIN	10 MIN	15 MIN	0 MIN	5 MIN	10 MIN	15 MIN
#1 Input	12.8	11.4	11.4	11.2	10.1	10.0	10.0	10.1
#2 Nose of Unit #1	62.0	64.0	62.0	56.0	29.0	29.0	29.2	29.0
#3 MC-1191 Firing Set	52.0	56.0	48.0	38.0	104	98.0	98.5	102
#4 MC-1191 Firing Set	NR	NR	NR	NR	104	97.8	99.5	103
#5 Nose of Unit #2	18.0	17.5	17.3	16.3	16.2	15.2	13.7	14.1

* Endevco accelerometers with the following Serial Nos: #1 - 6612, #2 - 4689, #3 - 4680, #4 - 4687, #5 - 7444

** The accelerations recorded from 1200 to 2000 cps are not reported due to inaccuracies in the readout equipment.

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TABLE II - PEAK-TO-PEAK ACCELERATIONS RECORDED DURING VIBRATION TEST #2
OF THE XM-54 WARHEAD
LONGITUDINAL VIBRATION

ACCELEROMETER * LOCATION	FREQUENCY (CPS) 10	20	40	60	80	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
#1 Table Input	[illegible]	[illegible]	1.8	3.5	5.0	5.0	5.0	5.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.2	5.1	5.0	5.0	5.1	5.1
#2 Long on Nose of Warhead	0.96	1.1	2.1	4.2	5.1	4.4	16.4	5.9	8.6	16.5	17.2	11.1	12.1	12.4	11.7	21.0	48.5	52.0	37.0	18.5	15.5
#3 Lat. on Nose of Warhead	0.11	0.14	0.46	5.2	4.6	6.3	8.4	8.2	6.0	6.6	7.8	10.8	3.7	4.8	11.9	24.5	21.5	56.5	33.5	22.5	39.5
#4 Vert. on Nose of Warhead	-	0.03	0.1	4.2	4.0	4.2	3.4	2.6	3.4	4.4	9.9	9.6	7.4	18.9	18.1	19.5	13.7	21.5	38.5	21.5	22.5
#5 Long on MC-1191 Firing Set	0.91	0.96	1.8	3.7	3.3	4.9	4.6	7.0	10.4	9.1	8.6	6.2	5.9	8.1	18.3	19.0	16.5	18.5	19.5	17.0	14.0
#6 Lat. on MC-1191 Firing Set	0.05	0.06	0.5	5.4	4.4	4.9	8.0	11.8	11.2	2.5	3.8	1.6	1.6	2.6	4.3	5.5	5.3	4.5	4.2	3.4	2.4
#7 Vert. on MC-1191 Firing Set	0.06	0.06	0.06	0.06	6.0	8.6	6.4	4.6	10.9	4.6	4.0	2.2	2.0	3.6	6.4	8.7	7.0	5.2	4.7	3.7	2.6

* Endevco accelerometers were used with the following Serial Numbers:

#1 - 6673
#2 - 3503
#3 - 8416
#4 - 5686
#5 - 7488
#6 - 4680
#7 - 838

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TABLE II (CONTINUED)

ACCELEROMETER * LOCATION	LATERAL VIBRATION FREQUENCY (CPS) 10	20	40	60	80	100	125	[illegible]	[illegible]	200	225	250	275	300	325	350	375	400	425	450	475	500
#1 Table Input	[illegible]	[illegible]	[illegible]	2.2	3.5	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
#2 Long. on Nose of W/H	0.02	–	0.02	0.08	0.06	0.1	0.3	5.5	7.3	2.9	2.1	2.8	3.4	7.2	8.1	9.3	7.7	6.6	3.3	2.0	2.5	3.3
#3 Lat. on Nose of W/H	0.75	0.77	0.83	2.1	4.1	7.5	11.1	40.0	33.3	22.8	16.8	16.8	17.2	25.5	17.5	12.7	9.5	6.4	5.1	1.0	4.4	8.5
#4 Vert. on Nose of W/H	0.07	0.06	0.06	0.08	0.36	0.81	1.2	6.6	8.1	5.5	7.2	2.5	1.1	4.1	7.2	6.5	2.2	0.86	4.8	1.4	9.6	2.2
#5 Long. on MC-1191 F/S	0.04	0.04	0.05	0.06	0.16	0.50	0.88	25.2	17.5	10.7	5.6	6.1	2.8	10.9	13.7	23.0	22.2	29.8	19.2	22.0	23.5	12.2
#6 Lat. on MC-1191 F/S	0.74	0.73	0.78	1.8	3.3	5.1	5.7	15.2	12.6	15.4	10.9	13.0	17.9	39.0	38.0	38.0	30.5	19.2	30.5	31.8	30.5	29.5
#7 Vert. on MC-1191 F/S	0.04	0.04	0.05	0.1	0.04	0.54	0.64	6.3	5.0	13.8	3.1	2.9	1.2	7.9	13.8	10.0	6.0	4.2	8.8	7.5	11.5	10.0

* Endevco accelerometers were used with the following Serial Numbers:

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#3 - 8416
#4 - 5686
#5 - 7488
#6 - 4680
#7 - 838

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[illegible]

* Endevco accelerometers were used with the following Serial Numbers:

#1 - 5673
#2 - 3503
#3 - [illegible]6
#4 - [illegible]6
#5 - 7488
#6 - 4580
#7 - 838

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