

1ST REVIEW-DATE: 3-11-76	DETERMINATION (CIRCLE NUMBER(S))
AUTHORITY: <input type="checkbox"/> AOC <input type="checkbox"/> ADC <input type="checkbox"/> ADD	<input checked="" type="radio"/> 1 CLASSIFICATION RETAINED
NAME: <i>John C. Tine</i>	<input type="radio"/> 2 CLASSIFICATION CHANGED TO:
2ND REVIEW-DATE: 3-20-76	<input type="radio"/> 3 CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: ADD	<input type="radio"/> 4 COORDINATE WITH:
NAME: <i>DC/ADD</i>	<input type="radio"/> 5 CLASSIFICATION CANCELLED
	<input type="radio"/> 6 CLASSIFIED INFO BRACKETED
	<input type="radio"/> 7 OTHER (SPECIFY):

7704-017 41-11 Capt. Staley

3 August 1945 UNCLASSIFIED

TO: J. R. Zacharias

FROM: L. Fussell, Jr.

SUBJECT: Informers and Test results

*[REDACTED]* (S)

*[REDACTED]*

*[REDACTED]*

*[REDACTED]*

PREVIOUS DOCUMENT # SAB200086650000

An informal meeting was held on 3 August, attended by E. W. Titterton and W. Higinbotham (G-4), Capt. Staley and Ens. Judd (O-3), K. Groisen (X-7), J. E. Thomas, D. F. Hornig, B. T. Wright, N. H. Godbold and myself (X-5), and J. R. Zacharias. The meeting discussed the methods of informing now in use, as well as those which have been proposed from time to time. It is felt that a careful study must be made to determine how we can get the greatest quantity of useful information from each test, consistent with simplicity and reliability of the informing equipment. The equipment must in any event distinguish between failures of the informer and actual failures of the equipment under test.

The information obtained by O-3 narrow band informers at present includes:

1. Time of operation of clocks.
2. Time of operation of barometric switches.
3. Operation of A-units.
4. Operation of A-relay.
5. Time arming signal is sent to X-unit.
6. Operation of X-unit arming switch.
7. Time firing signal is sent to X-unit.
8. Operation of X-unit firing switch.
9. Operation of two Wright/Blake switches.
10. Time of hitting ground.



In addition to these jobs O-3 has obtained information during special drops concerning vibration of dummy equipment and of pressure build-up within the sealed gadget. Additional information now obtained during the standard drop is a check on the operation of a Wright/Blake switch, as indicated by smoke puffs.

Further information, not now obtained, was felt highly desirable, and includes in varying degrees of desirability:

- A. Do all four X-unit quadrants fire?
  - a) Yes - No
  - b) Yes - No within given time internal.
  - c) Time spread first to last - normally too small to measure.

B.

*[REDACTED]*

GOE b(3)

- C. Vibration during drop using actual equipment instead of mock-ups.

- D. Operation of impact fuses

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 9/13/75

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This document contains information which is exempt from automatic downgrading and declassification.

059A10R000260

To: J. R. Zacharias

8/3/45

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-2-

It is felt that a section should be established for the purpose of handling test information. This section would provide and operate the informer equipment, and would analyze and report the test results.

This represents a departure from the current system in which each group is responsible for its own results unless it can persuade another group to do the job. Group O-3, being the first in the field, has carried the ball admirably for a number of other groups, but has not been given the overall responsibility for the obtaining of test information. The work has been well done, but on an informal and insufficiently considered basis. It is quite possible for example that the information now obtained by O-3 for the operation of its own equipment could be curtailed somewhat to allow added information on equipment not yet proven.

It is expected that this scheme will meet both support and opposition, and in both cases should be taken up with you.

L. Fussell, Jr.

IF/vt

cc: Zacharias	Hornig
Kistiakowsky	Godbold
Bacher	Wright
Oppenheimer	Blake
Brode	Thomas
Staley	Fowler
Judd	Larkin
Greisen	Bradbury
Higginbotham	Iofgren
Titterton	Fussell

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H-84-017  
67-7

Classification changed to:

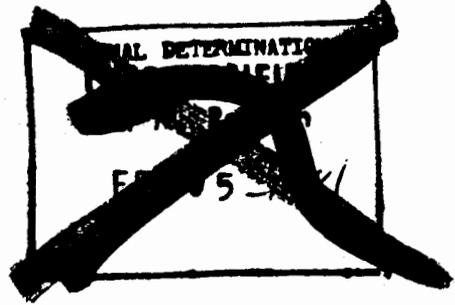
*B. P. DeLeon* TSM F576 9/1/75 ADI/ADD

1st reviewer signature/title/org./date/authority

*N/A* ADD  
2nd reviewer signature/title/org./date/authority

23 June 1945

*RECEIVED*



To: W. S. Parsons  
From: Elisha D. P. Irons  
Subject: July Kingman Schedule

UNIQUE DOCUMENT #5AB20008660000

1. Due to the uncertainty of delivery schedules from outside suppliers, the schedule for July as it now stands is a partial one with regard to schedule dates. At present, units have not been specifically scheduled beyond 7 July. The total number of units to be tested are listed in Table I and will be scheduled realistically as delivery occurs or is known to be certain. It should be noted that the first four (4) FL's and seven (7) LB's are to be tested at Kingman.

2. Table I lists the units in numerical order with a description of each test.

3. Table II is in effect a calendar. In Table II, the units are listed by date giving the test number and place dropped. Space is provided for pencil revision or pertinent personal notes by the reader.

4. Revisions will be reported as briefly as possible each week in an effort to keep the schedule as up to date as possible.

5. Table III with preliminary results of the tests will be added as the tests occur.

D. P. IRONS

- cc: Ramsey ✓ Warner Lauritsen, T. Snields
- Simmons Bainbridge Birch Larina
- Ashworth Henderson Fussell Kuster
- Eastick Doon Reynolds Hedlin
- DeSabitino Cornog Stevenson Tibbotts
- Corry Calloway McCord Hoek Kohl
- S. Dike Davis Caughy
- Bolstad Machen Waldman
- Brin Brode Alvarez
- Lauritsen Doll Shapiro
- Oppenheimer Sillbee Polish
- Lockridge Dick Delloffman
- Allison Staley DeSol
- Higinbotham Colby
- Kistiakowsky Anderson
- Bradbury

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW

1ST REVIEW DATE: 5-11-76

ADDITIONAL COMMENTS: *James O. Holt 5-20-76*

DEFERRED REVIEW DATE: \_\_\_\_\_

CLASSIFICATION: \_\_\_\_\_

2. THIS DOCUMENT IS TO BE CLASSIFIED "TOP SECRET" UNLESS INDICATED OTHERWISE.

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TABLE I

Serial Number	Date Scheduled	Nature of Unit and Test
T-46	-	FM, box of X-unit switches with clock or barc unit trigger-through Brode's delay network, 4 Brode informers, plaster blocks, no O-3 fuses or complete X-unit, mild steel ellipsoid, three to six hours fly around test prior to release.
T-47	-	FM, Same as T-46
T-101	-	FM, live unit with unarmed fuse and 1773's, no X-unit, no O-3 fuse and no informers, this unit will have an expendable pit handled similarly as possible to conditions planned for Destination 9,000 ± .003  Unit to be dropped in the ocean from 5,000 ft to determine whether it detonates.
T-102	-	FM, X-unit, 3 A's, mild steel ellipsoids, impact fuses
T-103	-	FM, Same as T-102
T-126	2 July	FM, _____ 1773's with tetryl pellets removed, 48 bare bridge wires, 8 Blake MK II switches, X-unit Model II, Brode Informers on detonation, MK III plaster blocks, mild steel ellipsoids, 3 A's, O-3 informers on O-3 fuses, normal ballistic data, four impact fuses with complete fuse trains should be used, 3 to 6 hours fly around prior to release to test X-Unit.
T-127	4 July	FM, Same as T-126
T-128	6 July	FM, _____ X-UNIT Model II, Brode informers on detonation, MK III plaster blocks, mild steel ellipsoids, 3A's, O-3 informers on O-3 fuses normal ballistic data, four impact fuses with complete fuse trains should be used, 3 to 6 hours fly around prior to release.
T-129	7 July	FM, Same as T-128
T-130	-	FM, Same as T-128
T-131	-	FM, Same as T-128

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Table I (Continued)

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Serial Number	Date	Nature of Unit and Test
T-142		FL, 3 to 6 Hour Fly Around test of X-unit to be used in T-132.
T-143	-	FL, 3 to 6 hour fly around test of X-unit to be used in T-133.
T-152	6 July	1792, unit will have no primer, charge or fusing. It will include C-3 impact switch and smoke puff, OI-370 projectile, OI-353 insert, and decelerometers. It will be dropped from approximately 500 ft. at low velocity and is to be recovered.
T-153	-	1792, Tests to be determined.
T-154	2 July	1850, Unit will have a 9# charge, 3 AR's, 4 IN's, OI-322 projectile, OI-353 insert and will be recovered.
T-155	3 July	1850, Same as T-154
T-156	3 July	1850, Same as T-154
T-157	4 July	1852, otherwise same as T-154
T-158	5 July	1852, otherwise same as T-154
T-159	5 July	1852, otherwise same as T-154
T-160	-	1792, Tests to be determined
T-161	-	FL, Same as T-128
T-162	-	FL, Same as T-128
T-163	-	FL, Same as T-128
T-164	-	FL, Same as T-128
T-165	-	FL, Same as T-128
T-166	-	FL, Same as T-128
T-167	-	FL, Same as T-128
T-168	-	FM, Same as T-128
T-169	-	FL, Same as T-128
T-170	-	FL, Same as T-128
T-171	-	FL, Same as T-128
T-172	-	FL, Same as T-128
T-173	-	FL, This unit will have MK III H3 Test to be determined.

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TABLE 1

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PLACE  
INFORM

DATE	FM TESTS	SPACE TESTS	LE TESTS	PLACE INFORM
JULY 1	<del>_____</del>			
JULY 2	T-126 X-Unit 8 partial 1773's	K	T-156 Normal operation 1850 Unit	K
JULY 3			T-165 Normal operation 1850 unit T-166 Normal operation 1850 unit	K K
JULY 4	T-127 X-Unit 3 partial 1773's	K	T-157 Normal operation 1852	K
JULY 5			T-158 Normal operation 1852 units T-159 Normal operation 1852 units	K K
JULY 6	T-128 X-Unit	K	T-162 Low altitude, for recovery	K
JULY 7	T-129 X-Unit	K		<b>DOE</b> 6(3)
JULY 8	FOR INFORMATION REGARDING REMAINDER OF SCHEDULE SEE PAGE 1, PARAGRAPH 1			
JULY 9				
JULY 10				
JULY 11				
JULY 12				
JULY 13				
JULY 14				
JULY 15				

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1473

UNCLASSIFIED

INTER-OFFICE MEMORANDUM

Copied From Los Alamos National Laboratory Archives

DATE 30 April 1945

TO: C. S. Smith

FROM: J. R. Oppenheimer

SUBJECT: 25 Purity Specifications

61 [Redacted]

A-84-019  
70-24

[Handwritten signature]

UNIQUE DOCUMENT # SAB200086670000

This will confirm the agreements reached at a meeting on 25 purity specifications held on the afternoon of April 28, 1945.

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1ST REVIEW DATE: 3-11-76	DETERMINATION (CIRCLE NUMBER):
AUTHORITY: EAC/EO/EAAD/EAAD	1 CLASSIFICATION RETAINED
NAME: James C. Foster	2 CLASSIFICATION CHANGED TO: UNCLASSIFIED
2ND REVIEW DATE: 3-20-76	3 CONTAINS HQ DOE CLASSIFIED INFO
AUTHORITY: ADD: [Redacted]	4 COORDINATE WITH: [Redacted]
NAME: [Redacted]	5 CLASSIFICATION CANCELLED
	6 OTHER (SPECIFY): [Redacted]

1st reviewer signature/title/org./date/authority  
2nd reviewer signature/title/org./date/authority  
ADD

I. The basis for the agreement lies in the following facts:

A. When sufficient care is taken, and in the first casting of 25 metal from the tetrafluoride, there is every evidence that the neutron emission from the  $\alpha, n$  neutrons is less than required by the tolerance specifications of my memorandum of 3 February 1945.

B. After repeated recasting, samples of material have been prepared which almost certainly do not meet the tolerances indicated above.

C. The corrections for multiplication which must be applied when measurements are carried out in actual geometry, and using actual components for the gun assembly, are fairly large and fairly uncertain, making absolute neutron counting problematical.

Also, although chemical analysis certainly can be carried out to see whether the tolerances above mentioned have been met, this cannot be done in a significant way without the partial destruction of the units in question.

II. On the basis of these facts the following recommendations have been made:

B. Neutron counts will be made on all other units and to be acceptable, the neutron count of the unit, suitably corrected for isotopic constitution, must lie within twenty percent of the standard.

C. Only if units appear which fail to meet the above specifications will there be need for more detailed consideration of chemical analyses and neutron assay.

III. This may be a good place to mention that provision should be made for the isotopic analysis of an aliquot of each of the fundamental units involved in the gun assembly.

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[Redacted signature] J. R. Oppenheimer

cc: Segre, Allison, Kennedy, Dodson, Birch, Parsons.

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In connection with these shots a list of voltage thresholds of some representative lots follows:

DOE  
b(3)

The azide spark detonators, while still quite scarce, have given some very good times.

DOE  
b(3)

It is probably slightly worse than the previous shot

- cc: T. Lauritsen
- Roach
- Fowler
- McMillan
- Welton
- Eacher
- Russel
- Yost
- Lofgren-Bradner
- Buchanan
- Fisher
- Johnston
- Knudsen
- McDonald
- See
- Vogel

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National Laboratory Argonne, Bainbridge

~~CONFIDENTIAL~~  
A-84-019  
41-11  
15 February 1945

D. F. Hornig

Performance of Electrical Detonators

Classification changed to:

~~CONFIDENTIAL~~  
E. F. Plateau TSM, FS-16, 9/7/95 ADD/ADD

1st reviewer signature/title/org./date/authority

N/A ADD

2nd reviewer signature/title/org./date/authority

UNIQUE DOCUMENT # SAB200086700000

The program for determining the effect of external circuit characteristics on the new detonators has been completed.

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DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW  
1ST REVIEW-DATE: 2-11-97  
AUTHORITY: EACD EADC DADD  
NAME: [Signature]

DETERMINATION (CIRCLE NUMBER(S))  
1. CLASSIFICATION RETAINED TO:  
2. CLASSIFICATION CHANGED TO:  
3. CONTAINS NO DOE CLASSIFIED INFO  
4. COORDINATE WITH:

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2nd reviewer sig  
ADD

A distribution curve was obtained by plotting the deviation of each detonator of a set fired under identical conditions from the mean of that set. This tends to give a slightly optimistic distribution since the sample in each set ranged from four to six. Only 4 kv., 5 kv., and 6 kv. points were used for this purpose. The resulting distribution curve is enclosed. The dotted curve is the closest fitting Gaussian (normal error) curve. As can be seen, the data are fitted by a Gaussian curve as well as it could be by any of the proposed distribution curves.

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2ND REVIEW-DATE: 3-16-97  
AUTHORITY: ACD  
NAME: [Signature]

5. CLASSIFICATION CANCELLED  
6. CLASSIFIED INFO BRACKETED  
7. OTHER (SPECIFY):

UNCLASSIFIED

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4. Unauthorised disclosure of subject information is prohibited.

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K. I. Bainbridge

D. F. Hornig

15 February 1945

Performance of Electrical Detonators (Page 2)

It is fairly evident by now that the new detonators live up to what was claimed for them in respect to simultaneity.

T. F. Hornig

TFH:om

cc: Bacher  
Alvarez  
Kistiakowsky  
Parsons  
Feynman

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A-84-019  
67-7

23 February 1945

H. B. Brode

E. B. Doll

Field Test Program for March 1945

Classification changed to

*D. J. ... TSM, F-5-16, 4/13/95* ADD/ADD

1st reviewer signature/title/org./date/authority

*N/A*  
2nd reviewer signature/title/org./date/authority

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1/22/88  
B  
29/1/82

#SAB200086710000

UNIQUE DOCUMENT

1. This memorandum presents a field test program as arranged during conferences with Fussell, Bainbridge, and Birch. Since the basic test program, as outlined by Mastick's memo to Parsons of 10 February, is not altered it may be presumed that this is a satisfactory program if it is satisfactory with the persons directly concerned with the material discussed below.

2. The basic program, mentioned above, calls for 11 - 1560's and 9 - 1491 1791's. The 1560's may be discussed first. The 11 - 1560's may be subdivided into five groups:

- Group I - #15 in Mastick's memo.
- Group II - #16, #17, #18 in Mastick's memo.
- Group III - #24, #26, #28 in Mastick's Memo.
- Group IV - #30, #32, #33 in Mastick's memo.
- Group V - #34 in Mastick's memo.

3. Group I: This consists of one H. E. 1560 with only impact fuses and detonators. Although the type of fusing comes under O-3, the details and application of the system are being handled by Lauritsen. O-3 will be on hand to observe all of the operations.

4. Group II: This group consists of three concrete loaded 1560's which were prepared for test in January. All of our equipment has been prepared for these units, and the clock boxes, which determine the overall circuit to be used, have been armed and sealed. These units will be dropped as planned in January, each unit to carry 4 Informers, 3 Archies, one extra clock bank of 18 clocks, and the usual clocks and barometric switches. In addition two parallel puffs are to be fired when the firing line is excited by any two Archies through the relay network. No changes will be made in the connections of the barometric switches in these units. No detonating etc. equipment will be included in these drops. Clock Box Model 8F1.

5. Group III: This group consists of three concrete loaded 1560's, which are to be equipped identically as follows:

Equipment:

- Clock Box, Model 10F1
- 6 or 9 clocks in Clock Box for arming and informing.
- 6 Barometric Switches - distributed as follows:
  - 2 Switches in parallel for auxiliary arming of main firing line.
  - 2 Switches in parallel for delayed R. F. arming of Archies and Anoses.
  - 2 Switches, one in each of two Informer circuits.

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~~REVIEW~~

CLASSIFICATION RETAINED  
 1. CLASSIFICATION CHANGED TO:  
 2. CONTAINS NO DOE CLASSIFIED INFO  
 3. COORDINATE WITH:  
 4. CLASSIFICATION CANCELLED  
 5. CLASSIFIED INFO BRACKETED  
 6. OTHER (SPECIFY):

AUTHORITY: DAOC EADC EADD  
 NAME: *Kenneth C. ...*  
 2ND REVIEW DATE: 3-20-76  
 AUTHORITY: ADD  
 NAME: *M. C. ...*

~~RESTRICTED DATA~~  
~~CONFIDENTIAL~~  
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~~TOP SECRET~~  
~~UNCLASSIFIED~~

FINAL DETERMINATION  
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FF-181

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23 February 1945

R. B. Brode

E. B. Doll

Field Test Program for March 1945

- 2 Archies (set for approximately 1250 ft.)
- 2 Amoses (Set for approximately 500 ft.)
- 1 Firing Line activated through relay network when first two A units operate and armed by clocks and barometric switches, firing two parallel puffs in addition to supplying X2.  
Hold down on the two Archies when firing line output is activated.
- 1 Safety plug in series with signal to A-2 equipment.
- 4 Informers - one for each A unit and associated apparatus. Miscellaneous battery boxes, cables, antennas, etc. for the proper operation of the above equipment. Barometric switches connected according to latest "pressurizing" specifications, if at all possible.

A-2 Equipment:

- 1 Titterton Informer - complete with circuit to give two pulses properly spaced, with power supply, pull out plugs, etc.

Arrangements between O-3 and A-2:

The O-3 firing line is to supply a 30 v. signal to activate the A-2 equipment when O-3 fusing operates. This signal will be available at the safety plug mounted in the nose of the bomb.

O-3 will supply a single pole pull out switch which may be connected to A-2 to turn on the special informer when released. This switch will be connected to a 5 conductor receptacle on the clock box and O-3 will provide the required plug.

Titterton Informer and Antenna: The informer and antenna should not be mounted on the rear plate. If this is not feasible, they may be mounted at the center of the rear plate if the antenna does not interfere with the other four informer antennas. With this mounting the O-3 informer battery box will be mounted on the rear of the armor bulkhead in the tail.

O-3 will supply no power for A-2 equipment, other than the 30 volt initiating circuit.

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23 February 1945

R. B. Brode

A. B. Doll

Field Test Program for March 1945

X-2 equipment will cause no damage to the bomb such that O-3 equipment cannot continue to operate after operation of X-2 equipment.

X-2 can use relay No. 6 in the bomb bay to operate the special informer on its internal power supply prior to release.

No test circuit will be provided in the airplane for the X-2 equipment.

The O-3 technical observer in the airplane will turn on the X-2 equipment upon instructions from the ground.

These drops must take place from the old airplane, since the old model of airplane test equipment will be used.

6. Group IV: This group consists of three concrete loaded 1560's, which are to be equipped identically as follows:

O-3 Equipment:

Clock Box (Model 11L2)

6 or 9 clocks for arming and informing.

6 Barometric Switches:

2 Switches in parallel for auxiliary arming of firing line.

2 Switches in parallel for delayed R. F. arming of Archies and Amoses.

2 Switches, one in each of two informers.

2 Archies (set for approximately 1250 ft.)

2 Amoses (set for approximately 500 ft.)

1 Fuse line activated by relay network when first two A units operate, and armed by clocks and barometric switches.

1 set of two puffs excited by fuse above.

1 Arming line receptacle (plug furnished by O-3) to arm X-2 equipment directly from the fuse line.

1 Delay relay combination to deliver delayed firing signal to X-2 from fuse line. This delay to be sufficient to allow the Amoses to operate prior to destruction of equipment by X-2 detonators and boosters.

1 Safety plug in series with firing signal to X-2

1 Set of two puffs excited by firing line.

Hold down on the two Archies when fuse line is activated.

1 Informers - one for each A unit and associated apparatus.

Upon excitation of the firing lines the A1 and A2 Informers will be transferred to X-2 apparatus for measurement purposes.

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~~REPRODUCTION CANCELLED~~  
~~SEP 20 1970~~

ORIGINAL DETERMINATION  
~~UNCLASSIFIED~~  
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F. [unclear] 681

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23 February 1945

R. B. Brode

E. B. Doll

Field Test Program for March 1945.

Miscellaneous battery box, cables, antennas, etc. for the proper operation of the above equipment. Barometric switches connected according to latest "pressurizing" specifications if at all possible.

**X-2 Equipment:**

- 1 Titterton Informer for determining simultaneity of detonators and/or boosters.
- 1 Model 1 Raytheon detonator supply complete, and connected to detonators and boosters, which are expected to destroy the 1560 as far as O-3 apparatus is concerned. This section lacks in detail. However Fussell has stated that he intends to install a system as nearly complete as possible, with auxiliary informing contacts on his arming and firing switches, etc.

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**Arrangements between O-3 and X-2:**

- O-3 is to supply a continuous 30 volt arming signal to X-2 which is initiated after O-3 arming and upon functioning of the O-3 fuse circuit. This signal to be available at a receptacle on the O-3 clock box (plug furnished by O-3.)
- O-3 is to supply a continuous 30 volt firing signal to X-2 which is initiated by a delay relay which is started by the above signal. (Maximum delay to be 1 sec.) This signal will be available at the safety plug in the nose of the bomb.
- O-3 will supply a single pole pull out switch to X-2. This switch will appear across 2 terminals of a 5 conductor plug on the O-3 clock box. (Plug to be furnished by O-3.)
- O-3 will transfer the A1 informer to X-2 immediately upon excitation of the fuse line. It is expected that the X-2 arming switch will have auxiliary contacts which supply 110 v., 400 cps. to the O-3 clock box for connection to the informer when the arming switch operates. This will give an informer check of the operation of the X-2 arming switch.

FINAL DETERMINATION  
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M. J. [unclear]  
-1981

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~~CONFIDENTIAL~~

23 February 1945

R. B. Brode

E. B. Doll

Field Test Program for March 1945

O-3 will transfer the A2 informer to X-2 immediately upon operation of the delay relay, simultaneously indicating excitation of the firing line. The X-2 firing switch will have auxiliary contacts which supply 110 v., 400 c.p.s. to the O-3 clock box for connection to the informer when the firing switch operates. This will give an informer check of the operation of the X-2 firing switch in case of a dud detonating system.

The above two circuits are to enter the O-3 clock box by three pins of the 5 conductor plug supplying the pull out switch to X-2.

The Titterton informer and antenna may be installed at the center of the rear plate provided there is no antenna interference, and provided that O-3 is given the choice of space on the rear of the armor bulkhead in the tail for mounting the informer battery box.

Upon completion of new airplane test equipment, complete facilities will be provided for testing both O-3 and X-2 equipment in the airplane. Arrangements for this have been made by Doll & Russell, and the test boxes will be supplied by O-3. With these test boxes, these units may be dropped by either the old or the new airplane.

Relay No. 6 in the bomb bay may be used for X-2 equipment if desired.

7. Group V:

This is a H. E. 1560.

Since the H. E. target is remote from the normal test target, and since it is impractical to move the observation equipment for one drop, no informer measurements will be made on this unit. A complete gadget proximity fuse will be installed, using 4 A'S, and all the associated apparatus. This fuse will be the contemporary version of what the final gadget fuse is to be, except that the operation may be a little higher than desired since four archies will be used. The use of Amoses for this application is not practical in this case, since they are not developed to the point where four units may be used simultaneously, and since they will not be available in sufficient quantities to justify such an application at this time. It would perhaps be wise to add two sets of puffs on this bomb, the first puffs to go when the arming signal is given to the detonator with the second puff going when the firing signal is given to X-2. In case of a dud this would give information on the fuse operation.

~~CONFIDENTIAL~~  
REVIEW JAN 1973

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23 February 1945

R. B. Brode

E. D. Doll

## Field Test Program for March 1945

8. Little Boys: A total of 9 of these units are listed in Mastick's schedule. Although all of these are listed as 1491-1791, it is possible that a sufficient number of these units may not be available. For reasons made obvious by the discussion below, it is suggested that this program be divided into two groups at this time.

Group VI - 2 1418's

Group VII - 7 1491-1791's (No live gun charges, and equipped with 1721 fixtures for O-3 equipment.)

9. Group VI: This group consists of 2 - 1418's previously prepared for the January tests. These units will be dropped with equipment exactly as planned in January. This equipment includes: 3 Archies, exciting a firing line when any 2 Archies operate; clocks for arming the firing line, and for informing; barometric switches for informing; 4 informers, and associated apparatus. These must be dropped from the old airplane unless new airplane test equipment becomes available in time. The firing line will fire two puffs in parallel. Clock box Model 8L1.

10. Group VII: This group consists of 7 - 1491-1791's. These units are to be assembled at Y and fitted with 1721 hardware at Y. No live guns will be used. In the event that a sufficient number of these units are not available, 1418's will be used for fuse testing. These seven units will include the following O-3 equipment.

Clock box suitably connected (Model 8L4)

6 - 9 clocks for arming firing line and for informing

3 Archies

Relay net to fire when two Archies operate.

6 Barometric switches:

2 Switches in parallel to arm firing line

2 Switches in parallel for R. F. arming of Archies

2 Switches for connection to informers

Two parallel puffs fired by firing line through safety plug.

One safety plug

11. All except the H. L. drops scheduled above are to be made at Sandy Beach. Some of the Little Boys may be dropped on a secondary dry target at Sandy Beach for recovery if a suitable target may be located which will not require movement of the O-3 field observation station.

12. Serious consideration should be given to the use of puffs in any or all of the units discussed above. It is believed that the puffs

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23 February 1945

R. B. Brode

E. B. Doll

Field Test Program for March 1945

are a security hazard, and that they should be eliminated. Except in the second H. A. drop of a 1560 mentioned above, puffs are not necessary in the gathering of O-3 fuse data, since far more accurate data of firing line excitation is obtained from the informer records.

13. The one point in favor of puffs should be mentioned. Puffs give a rather harmless method of becoming familiar with the fusing of explosives. In particular, if it is thought that fusing prematures are at all likely in or near the airplane, the puffs are a relatively innocuous method of illustrating such prematures. Without puffs, it is rather unlikely that knowledge of such prematures would be obtained.

14. Since the transit observation of puff height adds very little to the O-3 data, and since to obtain transit puff height requires two additional O-3 observers, O-3 will no longer provide observers to spot puff operation and impact splash. The follow camera, however, should still be used to give puff operation time when possible.

15. It is not expected that this memorandum is to furnish a sequence of drops in March. However, because of the obvious advantages of experiences gained to be applied later, and because of the availability of material, it is strongly urged that the 1560's be dropped in the sequence discussed above, and that the Little Boys be dropped in the sequence discussed above. It is quite proper, however, to intermix the Fat Men and Little Boys, since a considerable improvement of test efficiency should result from this.

E. B. Doll

*E.B.D.*

EBD:mk

cc: Parsons

→ Kamsey

Bainbridge

Fussell

Birch

ashworth.

Dick

3 - O-3 File

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FINAL DETERMINATION  
CLASSIFIED  
11 Feb  
W.S.P.  
Ramsey  
February 8, 1945  
A-84-019  
67-7

Mr. R. W. Henderson  
K. T. Bainbridge

Units for the Kingman Test with the Raytheon Unit and Titterton Informer

UNIQUE DOCUMENT # SAB200086720000

The latest information from Ramsey gives a schedule for Kingman tests which would involve the use of 11 special units in March and one standard unit. The first three units which will be dropped are mainly to check the behaviour of the informer and to provide practice in the reception and recording of the informer information.

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cc - You and Rice are familiar with the agreements reached in our discussions with Titterton. There is a lot of new design and procurement involved, as the concrete blocks are new. Special coax, terminating explosion switches and plugs are needed. Two single coax cables must go from the pit to the rear section of the cone.

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In addition, Titterton has agreed to supply his pulse timing network, and that must be mounted within the pit.

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The enclosing case of the 1560 requires two types of alterations. One is provision for clamping the RG54/AU cable to the case, which should be as close to the final design as possible, and the other is provision of two additional holes through the case to take the signal output coax from the pit and to lead in the voltage supply from the rear cone space to the network within the pit.

Ramsey's schedule considers that eight drops will be made with the

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AUTHORITY: DAOC (AD) C/AD	1. CLASSIFICATION RETAINED TO:
NAME: Wm C. Ford	2. CONTAINS NO DOE CLASSIFIED INFO
2ND REVIEW-DATE: 3-20-76	3. COORDINATE WITH:
AUTHORITY: ADD	4. CLASSIFICATION CANCELLED
NAME: K.C. Hill	5. CLASSIFIED INFO BRACKETED
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Raytheon unit and Titterton informer, starting not earlier than the 18th of March, but assembly would have to begin one week prior to that time. Your schedule is very difficult, and Titterton is in hot water too. At present he hopes to have a suitable unit available for ground tests on February 15, and two weeks work with this on the ground will be required prior to any Kingman tests.

The final unit of the 12 would use the Raytheon unit and H.E. without any informer, and it will not be used unless the eight prior tests show that the Raytheon unit has functioned properly with no danger of pre-ignition.

RTB/bea

K. T. BAINBRIDGE

cc - L. Fussell

N. F. Ramsey

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*Handwritten signature*

28 June 1945

Comdr. N. E. Bradbury

D. F. Hornig

Schedule of Firing Team at TR

UNIQUE DOCUMENT # 5AB200086730000

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1. Saturday, 30 June: Ship one (1) transfer dolly, two (2) cones and 100 D'Autriche plates to TR.
  2. Sunday morning, 1 July: D. F. Hornig, T/4 Brown (X-5) and T/3 Vogel (G-7) leave for TR in pickup. Vogel carries all equipment for D'Autriche tests, 2064's, etc.; Brown carries all equipment for repairing X-unit. Vogel brings one tarpaulin under which to work. Equipment includes inverter and equipment necessary to fire in event McKibben's system is not working. Will bring 10 sets of cables, including three (3) made up in event 2064's are used on dry run and hot shot.
  3. Monday morning, 2 July: All McKibben's equipment relating to X-unit should be operating. Titterton's equipment for supplying firing pulse should be operating.
- ment.
- D'Autriche test is fired.
4. Monday afternoon, 2 July: Second D'Autriche fired if any difficulty on first. X-unit mounted on dolly. Unit covered with tarpaulin.
  5. Tuesday morning, 3 July: Experiment with McKibben's set up, firing as many sets of bare bridge wires as necessary to show relay system and Titterton operating.
- Tuesday afternoon, 3 July: X-unit raised to tower. Second D'Autriche fired from our own firing equipment.
6. Until late Wednesday afternoon, 4 July: Free time during raising of inert sphere. Make up cables for rehearsals.
  7. Late Wednesday afternoon, 4 July: Bring up X-unit and cone on dolly to side of sphere and attach. Note that fine adjustment of relative height can be made with jack on dolly.
  8. Remove dolly.
  9. X-unit wired by H.E. people.
  10. Detonators staked to previously prepared cables by Caleca of detonator group.
  11. X-unit safed - verified by Hornig.

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Ephraim TM F55-16 9/13/79 SMOGNOO

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NAME: <i>Mark C. ...</i>	3. CONTAINS NO DOE CLASSIFIED INFO
2ND REVIEW-DATE: 3-20-96	4. COORDINATE WITH:
AUTHORITY: ADD	5. CLASSIFICATION CANCELLED
NAME: <i>...</i>	6. CLASSIFIED INFO BRACKETED
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-2-

To: Comdr. N. E. Bradbury

12. X-unit dolly attached.

13. X-unit detached and removed to SW corner on dolly.

14. Hornig leaves for "Y".

15. Friday and Saturday, 6 and 7 July: Free time for any further work on McKibben's and Titterton's equipment. Bare bridge wires on hand for tests. Also firing for Greisen's tests. Brown and Vogel under Greisen's direction during this time.

16. Saturday afternoon, 7 July, Hornig and Lofgren leave for TR.

17. Sunday, 8 July: First inert rehearsal. Use cables from dry run if 1773's or 2064's used. Two sets of cables on hand if 1E3's used.

18. Confusion.

DFH/vt



D. F. Hornig

cc: G. E. Kistiakowsky  
K. T. Bainbridge  
F. Oppenheimer  
K. Greisen  
E. Lofgren

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7-07-71  
55-9

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[REDACTED]

To: Commander N. E. Bradbury

From: R. W. Williams

Subject: X-7 Responsibilities at TR

June 28, 1945

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A. Site Y Preparation

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Before July 4, the following must be prepared (principally by Caleca and Irwin):

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- 5 spare switches-and-cables, for each length of cable used;
- 15 additional switches-and-cables, connectors not installed, with longest length of cable used;
- 15 10 ft. cables with Raytheon connectors on one end, the other end prepared to be staked to LE5's for informer tests;
- H.E. kit containing LE5's, tetryl pellets, and lucite adapters for 15 such tests;
- tool kit containing detonator stakon tools, LE5 stakon tool, wire strippers, Simpson meter, extra switch parts, etc.

Caleca obtains from R. A. Bice complete sets, with spares, of switch retainers, switch retainer plates, and mounting brackets for informer delay-line boxes (Machen takes leaf springs down). (Note: whoever fastens X-unit to sphere must get special stand-off bushings from Bice and be responsible for them. (Is this Machen?) Caleca obtains two delay-line boxes and one spare delay line from Titterton on June 29. Caleca obtains three sets of Raytheon-terminated cables of proper length from Hornig, and prepared the ends for 1773's on at least one set. Caleca obtains 70 inert 1773's, with bridge-wires and copper caps, from Kauzmann.

On June 30, Caleca, with Machen, goes over wiring and installations on dry-run sphere, which at that time is in Delta. Any errors in location of holes will be corrected at that time. When the hot run sphere is finished in the shop, it will be carefully checked for all hole location and skin thickness by a member of X-7. This is extremely important, since a shop error here would hold up the final shot several days.

Titterton ships all electronic equipment.

B. The Dry Run

(Changes entailed by the use of 2064's will be obvious, since Lofgren then has detonator responsibility.)

Greisen, Anderson, and Caleca leave Y for TR at 8:00 A.M., July 4. Starting at 8:00 A.M. July 5, they (and Machen) wire the sphere, install inert detonators, install switches and delay-line boxes. Titterton will have, at TR, the battery box and the requisite leads connecting the informer to the outside world. At this point these leads will have been removed, but the battery box is connected to the informer. To test the informer at this point, short the "input" terminals of the battery box. 180 volts should appear on the delay lines. Greisen makes final check on

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NAME: <i>William C. Jones</i>	2 CLASSIFICATION CHANGED TO: INFO
2ND REVIEW DATE: 3-20-76	3 CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: ADD	4 COORDINATE WITH:
NAME: <i>W. Williams</i>	5 CLASSIFICATION CANCELLED
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informers and detonators.

At the end of the Dry Run, Greisen and Co. remove the detonators and informers, leaving the detonators attached to the cables.

C. Interim Period, Rehearsals and Tests

On June 6, our jumbino (which Harry Allen will have delivered to the base of the tower) is hauled up, and Greisen et al, with cooperation of Hornig and Titterton, make informer tests (delay-line calibrations) by firing one set of switches in jumbino, with special 1E5 set-up. Greisen returns to Y in P.M.

On July 7, Caleca and Anderson make more informer tests if necessary. They prepare cable ends on auxiliary sets of cables. Williams leaves Y for TR.

On July 8, A.M., they help prepare for first rehearsal, hooking up one live detonator to a switch in jumbino, as in tests above. They help Hornig and Lofgren install these. July 9 and 10, same as July 8, but on last rehearsal, use inert 1773's left over from Dry Run. Greisen returns to TR on July 10.

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On July 11, 75 highest quality detonators materialize.

On July 12, Greisen, Williams, Caleca, Anderson put detonators and switches on hot sphere, test as described in Dry Run, and hope for the best.

RW: jr

R. Williams

- cc. K. Bainbridge
- G. B. Kistiakowsky
- V. Caleca
- J. Anderson
- E. W. Titterton
- R. A. Bice
- D. F. Hornig
- E. J. Lofgren
- K. Greisen
- E. Williams
- E. Machen
- file

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JAN 09 1981

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INTER-OFFICE MEMORANDUM  
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DATE 23 June 1945

TO: J. R. Oppenheimer, W. S. Parsons and Norris Bradbury  
FROM: H. F. Ramsey  
SUBJECT: Unsatisfactory Features of Weapons Program

SPECIAL RE-REVIEW  
FINAL DETERMINATION

77786

A. Introduction ~~SECRET DOCUMENT~~ #SAB 200086900000

1. In view of my imminent retirement as chairman of the Site Y Weapons Committee I am writing this memo to summarize my views as to the more unsatisfactory features of the Weapons Program at the present moment. I should like to emphasize however that this listing represents my own personal views and not necessarily those of the Weapons Committee or Captain Parsons. This list is also not necessarily complete in that new unsatisfactory features not now considered important will undoubtedly arise.

B. Fat Man Design and Test

1. X-Unit - As concerns combat use, this component of the fat man appears at present to be by far the most critical. Its unsatisfactory features are:

a. The present switch is very marginal in quality. The highest priority should be placed behind the developing of a satisfactory switch. Additional man power and facilities should be used extravagantly but effectively to push this.

b. The delivery of complete units has been so badly delayed that X-Units are almost completely untested at Kingman. Past experience with G-3 fuses and other components has shown that marked improvements in design and reliability result from extended tests at Kingman. Tests of these units in the next two months should be given a very high priority.

c. A bottleneck of much less importance on the X-Unit is the greatly delayed request for the installation of an external pump as an emergency measure to keep the unit pressurized in case a leak in the seal develops.

d. In view of the great importance of the entire detonator system to any implosion model of gadget, I think it would be appropriate for a complete redesign of the entire detonator system to be undertaken as soon as is possible without interfering with the primary task of successfully debugging the present system.

2. Detonator-boosters

a. These need to be greatly improved to increase their reliability, to improve their marginal electrical characteristics, to simplify and improve their method of installation, and to increase the overall reliability of the detonator system by using more suitable explosives.

b. A study should be made of the impact fuses to determine if they are sufficiently useful to justify their continued use on units with active materials. It may be that the active materials are not more effectively destroyed in units with impact fuses than by in units without.

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SUBJECT: Unsatisfactory Features of Weapons Program

Page Two

2. Detonator-Boosters - Continued

B. If so they should be omitted since unnecessary complications necessarily reduce the reliability of the gadget.

3. General Design - The present design is the result of a number of compromises and guesses at a time when our ignorance was much greater than even now. I believe that as soon as possible an integrated design based on current knowledge and with no commitments to past production should be started. This should not, however, be allowed to interfere with the primary job of debugging the present model. Some features which I think should be seriously considered for inclusion in the new design and where possible for incorporation in present design as well are:

a. Reduction of assembly complication. The present design is more in the nature of a laboratory apparatus requiring a highly skilled scientific crew to supervise the assembly than of a weapon. Assembly tools and fixtures should be redesigned concurrently with the design of the unit.

b. Complete pressurization unless it can be completely proved the pressurization is unnecessary. It is my own conviction that pressurization is necessary although a number of key personnel at this site disagree. The present partial pressurization system is not very satisfactory at best and has the unfortunate characteristic of having been just around the corner for months but of never having satisfactorily arrived.

d. Reduction in complications introduced as a result of unfounded fears. I am convinced that as we learn which design factors are pertinent and which are not that the design of the bomb will become much simpler.

natively the detonator and assembly problems would be simplified by a reduction in the number of detonation points.

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Page Three

3. General Design - continued

- e. More information on cold, vibration, etc. conditions should be obtained so that the design may be based on more realistic requirements in this respect.
- f. Better means for holding the blocks in place in the preassembled model are required.
- g. Improved designs to decrease the air drag of the bomb in flight will increase the bombing accuracy especially in high winds that vary markedly as a function of altitude. A reduction in the area of the present drag plates is an immediate step to help this somewhat.

4. High Explosives

- a. Full scale blocks and lenses have become available too late for all the engineering tests on these to have been conducted at a sufficiently early date. Also shipping rehearsals with lenses have for the same reason been delayed so long that components for an active unit will be shipped prior to information as to the success or failure of the rehearsal.

5. Complete Tamper

- a. The necessity for inspection of the active material and initiator shortly before combat use is a very undesirable feature of the gadget as a combat weapon. Time should cure this.

6. Fuses - Although compared to the X-Unit the fuses are in a highly developed state, some additional developments are needed. These include:

- a. Reduction in possibility of successful enemy jamming. The use of microwaves should help in this respect.
- b. Simplification.
- c. Development of a lower altitude fuse for use against heavy fortifications, underground factories, etc. Such a use may require increased bombing accuracy such as through the use of rason or an alternative.
- d. There may be some shortages of clock boxes and special wiring in July which may interfere with Kingman tests and batch shipments.

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Page Four

7. Jettisoning

a. Too little is still known concerning the feasibility of jettisoning the unit and subsequently recovering it. The recovery will certainly be an unpleasant divers operation.

C. Little Boy Design and Test

1. From a design and development point of view the Little Boy is so far ahead of the Fat Man that little need be said concerning it.

2. However, from a more fundamental point of view the Little Boy has two very serious objections as a weapon:

a. The frequency of availability of active units will be sufficiently low for some time that their military effectiveness will probably be relatively small.

b. The first unit will be completely untested as a nuclear bomb.

3. It is my own personal opinion that complete pressurization of the unit would be desirable.

4. The same comments on fusing and jettisoning given under the Fat Man discussion apply here.

D. Aircraft

1. Although the British F-G mechanism is working with admirable success at present, the basic design in several respects is sufficiently unpromising that I and a number of others are constantly expecting to hear of failures. For this reason I think that an improved release should be worked on as a long range improvement. A contract with the Douglas Company for such a development is now under consideration.

2. As soon as the following radar attachments become available, I believe that they should be installed in the attrition aircraft and perhaps in the earlier aircraft by a field modification. Sims McGrath of the M.I.T. Radiation Lab, who is now assigned to Colonel Tibbets, should be able to advise on this. The devices are:

a. Broader dish to give a sharper beam and less aircraft drag.

b. Better fit in between the radar equipment and the Norden bomb sight, preferably with provision for offset bombing provided the latter feature can be obtained without undue delay or serious reduction in operating

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Page Five

3. We should be prepared for requests for further aircraft modifications to arise from the combat operations. These modifications will probably be in both our own equipment and in the aircraft itself, such as the reinstallation of some of the stripped armor and armament.

E. Ballistics

1. I believe at the present time that incompleteness of our ballistic information will contribute much less to the unreliability of final delivery than most other factors. (Bombing accuracy as opposed to ballistic reliability is discussed in section H.) However, to prevent the inclusion of errors which can be eliminated I believe that it is justified to continue the following work:

- a. Attempt to develop a Fat Man design with a higher ballistic coefficient.
- b. Produce ballistic tables corrected to make the point of burst above the target instead of the extrapolated point of impact on the target.
- c. Prepare ballistic tables most suitable for use with radar equipment.
- d. Collect data from units more nearly standard than many of the past ones have been.
- e. Develop means to correct for large differential ballistic winds provided these can be sufficiently simple that the bombardier is not confused into making other errors more gross than the ones corrected for.

F. Kingman Operations

1. A move to Albuquerque would greatly improve and simplify all Kingman operations including the supply of Destination. The value of such a move can scarcely be overemphasized. It should, however, be made with care and should not take place until Albuquerque is fully established for our operations.

2. The new supervisors for the Kingman tests will be at the great disadvantage of having had very little overlapping with the previous ones.

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Page Six

F. Kingman Operations - continued

3. If Kingman is to remain a modification center for batch shipments it should be more completely equipped with machine tools. A move to Albuquerque would not eliminate this need but it would markedly reduce it since the Site Y shops would be used for special jobs.

4. Unavailability of X-Units and full scale H.E. castings has reduced the tests on these components to practically nothing so far. This is particularly true in the case of X-Units.

G. Destination Preparations

1. Establishment of a distant base for our operations and for unknown contingencies will certainly be very hectic in the early stages. Due to the long time required for procurement and shipment many groups were not very familiar with their operations at the time equipment had to be ordered. It had been hoped that the Destination rehearsal operations could be started sufficiently early to locate shortages in equipment and to provide reasonably extensive practice operations. However, present schedules are such that important needs will probably have to be filled by frantic air shipments and the rehearsal period will be reduced to a minimum. The delays in establishing Destination operations are due chiefly to:

a. Personnel shortages making it undesirable for the teams to be spared from preparations here, and

b. The failure of several groups to meet the deadline dates on their kit materials whereby key equipment will arrive in batch 2 and some cases batch 3. This delay will probably postpone the start of Brode's operations sufficiently to reduce his period for practice operations prior to the first live Little Boy below a satisfactory minimum. It is also serious for Fussell's and Morrison's and Holloway's groups for the Fat Man.

c. The shipment of the organizational equipment (including some of our kit materials) of the First Ordnance Squadron, Special, was badly delayed.

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Page Seven

G. Destination Preparations - continued

2. Many key components such as H.E. lenses, trap door units, X-Units, etc. were not available sufficiently early for rehearsal shipments to be made at an early enough date for faults to be located and corrected in shipments to make up active units.

3. No well equipped central technical stock room will be established by the time of the present readiness dates. It is hoped that the present kits will be adequate for this period.

4. Some wastage of material and shipping space has occurred in the establishment of Destination for the following reasons:

a. Urgent need for speed in the ordering of the kits and buildings.

b. Lack of knowledge of our problems and of conditions at Destination at the time the material had to be ordered.

c. The fact that the blockbuster rehearsal program was at its peak at the time the materials were ordered.

H. Air Forces Operations

1. Although I agree with Colonel Tibbets that his squadron is probably the best trained one to leave the United States, I am afraid it is still enough geared to the normal Air Forces standards that it may not yield the high reliability desired. This is particularly true in bombing accuracy and in the use of radar.

2. It is quite probable that the most reliable method of delivering the first active units would be by selecting from the entire 20th Air Force the crews which had shown the greatest reliability and accuracy in normal missions and by giving them special training in our gadgets so that they could drop the hot units instead of the normal squadron personnel. It is almost certain, however, that Colonel Tibbets for morale and other understandable reasons would object violently to such a procedure. It is possible, however, that a few experienced and particularly skilled crews could be transferred into Colonel Tibbets' organization.

3. The radar crews suffer from several important deficiencies common to the period during which they were selected and trained:

a. The radar observers are enlisted men whereas combat experience has indicated the need for officers in order that they may be given sufficient authority and respect. Colonel Tibbets has agreed to try to correct this by some transfers in the theater.

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Page Eight

H. Air Forces Operations - continued

b. Most of the radar practice has been over small isolated islands which are easy instead of over difficult industrial areas. If Colonel Tibbets and Sims McGrath handle the substitutions in the preceding paragraph correctly this fault may be corrected. It cannot be cured by training in the theater since there are no urban friendly targets in which an SCR-584 can be located for training purposes.

c. There has not been much practice in the use of the radar in conjunction with visual bombing. Since Colonel Tibbets has practically made McGrath his radar operations officer, McGrath should be able to help out in this a lot.

d. The broad dish radar and tie in with the Norden sight are urgently needed.

4. There is a considerable danger that our stripped aircraft will be unsafe over enemy territory despite present predictions.

5. Dennison and White disagree on the practicality of our planned visual mission and I do not have enough data adequately to judge between them.

6. Even though I hope that the probability of an accidental nuclear explosion at the home base is very small, its seriousness is so very great to the war effort that the danger should not be disregarded.

7. Even though the operational analysis section have been briefed on our project, there is serious danger of uninformed planning taking place at Destination. I believe that actual planning of operations is not done by the operational analysis sections but by the Bomber Command and the Wing Plans Officers. I, therefore, believe that it is important that some responsible officer in each of these Plans organizations be properly briefed on our problems.

8. The feasibility of jettisoning and subsequently recovering active units in cases of emergency has not yet been fully worked out.

9. Information as to the maximum possible rate of turn immediately after releasing a unit is still conflicting. Real tests can only occur after actually releasing a heavy bomb since part of the time is lost in trimming the ship. The time might be even as great as one minute.

CLASSIFIED BY: [unclear]  
DATE: [unclear] 1978

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INTER-OFFICE MEMORANDUM

UNCLASSIFIED

DATE

TO:

FROM:

SUBJECT: Unsatisfactory Features of Weapons Program

Page Nine

H. Air Forces Operations - continued

10. There may be some difficulties to overcome in the matter of cooperation between our personnel and personnel of the 509th Bombardment Group and the First Ordnance Squadron. Most of our work so far has been with the test crews with whom by now we work very well. In the case of the squadron crews there has been less opportunity for the position of the Site Y personnel in the project to be understood. I suspect that they will initially be reasonably suspicious of outside help even though it is essential. In the case of the Ordnance personnel, the difficulties will be increased by the existence of the trap door assembly which eliminates what was to have been the principal contribution of the Ordnance Squadron to the active gadget. I am also told that the Army in the Pacific Theater in general is less experienced with and hence less sympathetic than in the European Theater to technical specialists.

I. General Problems of Use

1. Although it is not my responsibility, I am rather worried as to whether it will be wise to use active units in combat just as soon as they become available. I think it would probably be more effective if they were accumulated for a reasonable period and if then several were dropped at short intervals prior to the enemy being able to prepare himself against them psychologically and otherwise. The intervening time in the case of the Fat Man could be advantageously used to improve and test the X-Units.

2. Although I believe strongly that we were wise to concentrate initially on one method of delivery in the period prior to the proof of the device and although I think we were wise in selecting an air blast bomb as the first method since it is probably the simplest of the effective means of use, intensive work on alternative means of delivery should start as soon as a nuclear bomb is proved either at Trinity or in combat. Uses against heavy fortifications and underground factories that cannot be reached by other methods are probably particularly important. Some of the alternatives are:

a. Use with a very low altitude fuse for increased earth shock against fortifications. Unfortunately the radius of major damage will be sufficiently reduced in this case that there is a great likelihood that with ordinary bombing accuracy the installation will be outside the radius of effective damage.

b. The use of a guided missile should help overcome the effects of bad aim in uses against heavy fortifications. Ason and Razon seemed to be fairly effective at present. They unfortunately require good visibility from the target.

c. Use as a demolition charge perhaps mounted in a remotely controlled tank.

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INTER-OFFICE MEMORANDUM

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TO:

FROM:

SUBJECT: Unsatisfactory Features of Weapons Program

Page Ten

I. General Problems of Use - continued

d. Of the means which have occurred to me for using the gadget against heavy enemy fortifications, by far the most effective and practical seems to be the use in a suicide glide plane such as used by the Japanese. The effectiveness of this method is so great compared to others that it should be given serious considerations despite its being so contrary to American philosophy and practice.

e. Use in conjunction with weapons similar to V-1's and V-2's or eventually in even something like a 16" shell.

3. Further study of the biological effects of the gadget as affects close support operations should be made.

4. Serious thought should be given to the use of suitable propaganda to increase the effectiveness of the early combat uses.

J. Summary

1. My summary of the above is the following:

a. First priority should be placed on debugging the present planned use. The I-Unit, the boosters, and the Air Forces operations are the features from which the greatest improvements can be expected.

b. Design of an improved and well engineered version of the bomb should be initiated very soon.

c. Alternative means of use should be in the early planning stage now with active work starting as soon as a nuclear bomb is proved.

HFR:dc

*N. F. Ramsey*

N. F. Ramsey

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10/18

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~~CONFIDENTIAL~~

25 March 1945.

370-4402  
A-84-019  
82-25 (In security)

INTIME DOCUMENT # SAB200086910000

Memorandum For: Weapons Committee  
C. C. Lauritsen

CLASSIFICATION CONTROL

CLASSIFIED

~~CONFIDENTIAL~~  
WNR 7/18/79

7/7/83  
CRD

From: W. S. Parsons

Subject: Condenser Detonating Equipment; Design and Test

Reference: (a) Derry's memorandum of 19 March, 1945 concerning visit to Raytheon on 16 March, 1945.

1. Major Derry's memorandum presents a picture of the state of progress at Raytheon on our Model 1 and Model 2 Raytheon units.

2. In view of the fact that the condenser firing unit is now a bottleneck in our FM development for battle delivery, and as such is a focus of effort in each of two crash programs, it is desirable to outline the steps by which this unit, from condensers to boosters, was accepted as a component of a military weapon. This formulation is made desirable also by the changes of organization at Y which have taken place since the basic design crystallized, and the fact that one of the crash programs is being carried out by CIT with field tests at NOTS Inyokern.

3. Condenser Firing Unit. Broad design considerations.

DOE  
b(3)

(a)

(b) Dependability. The condenser-firing unit is given overriding electrical authority in our FM design.

DOE  
b(3)

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
DETERMINATION (CIRCLE NUMBER(S))	
0	CLASSIFICATION RETAINED
1	CLASSIFICATION CHANGED TO:
2	CONTAINS NO DOE CLASSIFIED INFO
3	COORDINATE WITH:
4	CLASSIFICATION CANCELLED
5	CLASSIFIED INFO BRACKETED
6	OTHER (SPECIFY):
1ST REVIEW DATE: 3-11-76	
AUTHORITY: DAOC/ADDC/ADD	
NAME: James C. I.	
2ND REVIEW DATE: 3-20-76	
AUTHORITY: ADD	
NAME: [Signature]	

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DOE  
b(3)

It was also argued that: 1) FM is much safer than fulminate of mercury or lead azide against heat or mechanical shock.

DOE  
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4. The design background of the condenser-detonator unit is sketched above. To this it should be added that since this unit is only three months from the bread-board stage, and since it is recognized to be less developed than other key FM components, there is an understandable tendency to rush ahead and get something. Accelerated development is imperative - it is also imperative to guard against a tendency to let down the bars each time a failure occurs. Each failure or surprise in a development test is a godsend and should be treated as such - in every case the last thing to be blamed is the test.

5. Test policy.

(a) The effect of a premature detonation of an HE loaded FM in a B-29 airplane during development tests would be so serious on the morale of both the Air Forces and our own people, that we have set a policy which forbids charging the condensers before release of an HE loaded FM, in a development test. In this case, development test includes every flight up to (but not including) initial battle delivery.

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- 3 -

(a) Continued.

It is possible that ground tests in April, 1945 will indicate that detonation of the tetryl boosters in a FM should not cause serious damage to the airplanes. If this is the case, then charging the condensers before release will be permitted, using boosters against concrete blocks - if boosters alone can cause damage, then inert boosters must be used.

It is believed that adequate development tests of FM loaded FM with all electrical components can be conducted, using the high-voltage generator carried in the bomb, to charge the condensers after release.

(b) Every effort should be made to measure the acceleration and vibration conditions which obtain in the condenser unit as mounted in the FM in all expected flight conditions of the B-29, and particularly during the critical minute of bomb flight after release (a whip of the bomb may take place when it encounters the slip stream, depending on the attitude of the plane at release). Acceptance test of design (prototype) should exceed in duration and severity the single accelerations and vibrations for both conditions given above, and should be carried to destruction. On these results should be based criteria for design, and inspection during manufacture. It is believed that each unit should be required to pass mechanical acceleration and vibration tests exceeding by 50% the severity expected in a typical bomb delivery. If units fail under these tests, then the unit must be ruggedized.

WSP/ng

  
W. S. Parsons

cc: Oppenheimer  
Kistiakowsky  
Major Derry (for showing to General Groves and Mr. Rowe)

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Copied From Los Alamos National Laboratory Archives

INTER-OFFICE MEMORANDUM

~~CONFIDENTIAL~~  
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DATE July 20, 1945

TO: J. R. Oppenheimer

FROM E. J. Lofgren

SUBJECT: Detonator program as agreed upon by Greisen, Lauritsen, Lofgren, F. Oppenheimer

A-84-019  
82-16

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w/Redman  
NOV - 4 1980

Current data on Aside bridge-wire, PETN bridge-wire, and Aside spark gap detonators were reviewed and the above order is one of increasing excellence of timing!

DOE  
b(3)

With these facts and with the good progress being made on the 1773, we agreed on the following as the immediate program:

Continue with the PETN bridge-wire detonator and with the same type of X unit. Proceed with the 1 E 13 as a PETN detonator. It offers the advantages of a connector and better manufacturability as compared to the 1773. It is a molded design and it is obvious that our commitment to C. I. T. to go ahead with it hinges upon the success of the molding.

Reduction in the number of gaps will make a small improvement in timing and removal of 1/2 the condensers will permit that change without over loading the remaining gaps. It will also make the set lighter and roomier. We also believe that sturdier spark plugs, input connectors, and meter resistors should be provided. Provisions for testing should be improved.

DOE  
b(3)

Work on Aside detonators should be reduced to a long range status.

DOE  
b(3)

An entirely new firing set should be designed for it.

DOE  
b(3)

X-5 representatives were not available for these discussions; in their stead, G. B. Kistiakowsky was consulted and concurred in the program.

- cc: C. C. Lauritsen
- T. Lauritsen
- Fowler
- F. Oppenheimer
- Bacher
- Fussel
- Greisen
- Kistiakowsky
- Parsons

*E. J. Lofgren*

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Notes on Discussions with Greisen, Hornig, Marley, Johnston and Lofgren about 1773 test program

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b(3)

Classification changed to UNCLASSIFIED  
1st reviewer signature/title/org./date/authority  
2nd reviewer signature/title/org./date/authority

Present firing will be done on Raytheon prototype for which Hornig will supply matched gaps and coils.

Cable length will be - 7 ± 1 feet.

For the present, lot size will be 15 detonators.

F. J. Martin will be asked to examine the wave form of about 4 detonators fired under each condition: -

- (1) Simultaneous detonation of both bridge wires.
- (2) One bridge wire fired.

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Lofgren will find length of cable corresponding to 1/10 delay.

G-7 will make up 2 each of 1773's with 0, 1, 2, 4 Al 1 mil foils and 1, 2, 4 cellophane 1 mil foils to be fired for timing by Greisen.

- cc:
- Greisen
  - Hornig
  - Marley
  - Lofgren
  - Bradbury
  - Knudsen
  - Cherry
  - Martin

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AUTHORITY: DAOC DAOC DAADD  
 NAME: *James E. ...*  
 2ND REVIEW DATE: 3-20-76  
 AUTHORITY: ADP  
 NAME: *ADP*

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Kennedy  
A-84-019  
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July 26 1945

[REDACTED]  
UNCLASSIFIED  
L. M. Keenan  
[REDACTED]

To: Mr. Oppenheimer  
From: C. S. Smith and I. C. Schoonover  
Subject: Gun Fabrication Plan - Target  
Supplement to Document Dated July 5, 1945.

UNIQUE DOCUMENT # SAB200086920000

On July 5, we wrote outlining specifications and a schedule for casting the rings and bolt for the target assembly. **DOE**

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PER DOE REVIEW JAN. 1978  
UNCLASSIFIED

W. Keenan  
9 Jan 79

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DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1ST REVIEW-DATE: 3-11-76	DETERMINATION (CIRCLE NUMBER(S))
AUTHORITY: <input type="checkbox"/> AOC <input checked="" type="checkbox"/> ADC <input type="checkbox"/> ADD	<input checked="" type="radio"/> 1. CLASSIFICATION RETAINED
NAME: <u>James C. [unclear]</u>	<input type="radio"/> 2. CLASSIFICATION CHANGED TO:
2ND REVIEW-DATE: 3-20-76	<input type="radio"/> 3. CONTAINS NO DOE CLASSIFIED INFO
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NAME: <u>[unclear]</u>	<input type="radio"/> 5. CLASSIFICATION CANCELLED
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