PICATINNY ARSENAL

TECHNICAL GROUP

MECHANICAL DEPARTMENT

P.g. 471.8273/7-13

TECHNICAL REPORT

SERIAL NO. 1083

DATE April 15, 1941.

SUBJECT: Development of M108 (T21) Nose Bomb Fuze.

First and Final Report.

PROBLEM NO.

SYNOPSIS

During the development of a 30-lb. thin-case Chemical Bomb, originally planned to be used without fuze or burster, a change in military tactics led to the necessity for a simple superquick nose fuze to be used with this bomb. The T21 Fuze was designed to meet this need. Satisfactory tests of this fuze in 30-lb. M46 and 100-lb. M47 Chemical Bombs led to the standardization of the fuze (designated "M108 Nose Bomb Fuze") for use in both bombs.

Since accidental functioning of the M108 Fuze may occur if a fuzed 100-lb. bomb is dropped as little as 6 inches on its nose, consideration should be given to the use of a removable safety fork to secure greater safety in handling.

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(14) PA-TR-1083

Technical Report No. 1083,
Picatinny Arsenal, Dover, N. J.,
(11) 15 April 1941

TECHNICAL GROUP
MECHANICAL DEPARTMENT
BOMB AND PYROTECHNIC DIVISION (12) 10p.

FIRST AND FINAL REPORT

(6) Development of M108 (T21) Nose Bomb Fuze.

INTRODUCTION: (9) Rept. nr 1 (Final)

1. Military characteristics and design specifications for a thin-case chemical bomb weighing twenty-five or thirty pounds were set up by Reference A. This bomb was to be unfuzed and unstabilized with the intention that it would break on impact and scatter its contents by ricochet. The maximum altitude from which such a bomb would be dropped was set at 300 feet. Before the design of a bomb meeting these requirements had been perfected, an impending change in Air Corps tactics led to the conclusion that it would be necessary to employ this bomb from altitudes considerably higher than originally intended. Anticipating a corresponding change in the military characteristics of the 30-lb. Chemical Bomb, the Chief of Ordnance issued instructions (References B and C) to design a simple nose fuze, designated T21, for use in the 30-lb. thin-case Chemical Bomb. Drawing GA-1741, dated June 24, 1939, print attached, was prepared in the Office of the Chief of Ordnance to show the proposed general arrangement of the T21 Fuze in the 30-lb. T2E1 Chemical Bomb.

2. Although no specific characteristics were set up for the T21 Fuze, the following features were considered necessary or desirable:

a. Simplicity - For economy.

b. Superquick functioning - For optimum distribution of the bomb filler.

c. Sensitivity - To insure functioning when dropped from low altitudes against comparatively non-resistant targets, such as vegetation.

d. Safety - Required only during handling since the 30-lb. thin-case Chemical Bomb is not intended to withstand "safe dropping".

e. Attachment to bomb - Preferably a "snap" fastening rather than by means of threads.

OBJECT:

3. To develop an impact nose bomb fuze for use in the 30-lb. T2E1 Chemical Bomb.

RESULTS:

4. The T21 Fuze was standardized for use in the 30-lb. M46 Chemical Bomb and designated "M108 Nose Bomb Fuze" (References D and E). This fuze

282 700 mk

was also later standardized for use in the 100-lb. M47 Chemical Bomb (References F and G). The M108 Nose Bomb Fuze is shown on Drawings 73-8-44 and 73-8-45, prints of which are attached.

DISCUSSION OF RESULTS:

5. As a result of the comparative simplicity of the requirements and features of the T21 Fuze, no design changes were found necessary during the development and testing of this fuze. One hundred and twenty-four fuzes have been tested at Aberdeen Proving Ground, forty-four in 30-lb. Chemical Bombs and eighty in 100-lb. Chemical Bombs, without a fuze failure (References H through N).

6. The superquick action of the T21 Fuze is evidenced by the comparative results of 100-lb. Chemical Bombs tested statically and of similar bombs tested by dropping from 8,000 feet (Reference I). There was little, if any, apparent difference in the filler distribution and craters produced in the two types of test.

7. The sensitivity of the T21 Fuze is evidenced by the results of the tests in 30-lb. T2E1 Chemical Bombs (Reference H). Nine of these bombs were dropped from an altitude of 100 feet on sod. Two other bombs were dropped 5,000 feet on water (inadvertently). Owing to the relatively poor ballistic stability of the T2E1 Bomb, several of the forty-four bombs tested with armed fuzes struck the ground almost flat on their sides; in spite of this, all forty-four fuzes functioned on impact (one apparently on the first bounce).

8. Handling safety is obtained in the T21 Fuze by means of a .2-inch diameter steel arming pin. The presence of this arming pin was sufficient to prevent functioning of two fuzes which were accidentally dropped "safe" in 30-lb. Chemical Bombs from an altitude of 3,000 feet on water (Reference H); however, static handling tests with inert loaded 100-lb. Chemical Bombs indicate that a 6-inch drop on concrete is the maximum that the bomb can withstand without shearing of the fuze arming pin.

9. The method of attaching the fuze to the bomb is by means of two spring-loaded balls in the body of the fuze which fit in an undercut groove in the adapter of the bomb (see Drawing 82-3-273, print of which is attached). The construction of the adapter is such that a relatively light push is sufficient to insert the fuze in the adapter, while a pull of at least eight pounds is necessary to remove the fuze from the adapter.

10. The M16 Detonator used in the T21 Fuze has proved powerful enough to cause reliable functioning of all bursters (including those loaded with granular black powder) with which the fuze has been tested, except one type of burster used in the first tests with the 100-lb. Chemical Bomb. These bursters, in which 30 per cent low order functionings resulted, were loaded with .77-inch and .99-inch diameter tetryl pellets separated from the fuze by a small air gap and a thin steel disc. The substitution of a small-diameter tetryl lead, housed in a thick steel plug, for the thin steel disc eliminated

low order functionings with this type of burster. Results of explosive train tests indicate that reliable functioning of the burster with tetryl lead will be obtained even with a 3/4-inch air gap between the T21 Fuze and the burster.

CONCLUSIONS:

11. The M108 (T21) Nose Bomb Fuze is satisfactory for use in the 30-lb. M46 and the 100-lb. M47 Chemical Bombs, provided a degree of hazard in handlin is not objectionable.

RECOMMENDATIONS:

12. It is recommended that consideration be given to the use of a removable safety fork to fit between the striker plate and body of the M10[illegible] Fuze. Such a fork could be removed after bombs are attached to bomb racks, and would prevent functioning of the fuze if a bomb were dropped accidentally while being loaded on an airplane.

EXPERIMENTAL PROCEDURE:

13. The experimental procedure is described under "Discussion of Result

REFERENCES:

A - O.C.M. Item 13427 -- Sets up military characteristics for an unfuzed 25-lb. thin case Chemical Bomb.

B - O.O. 471.62/4140, P.A. 471.62/208 -- Proposes modifying the 30-lb. T2 Chemical Bomb to a stabilized type with fuze and burster.

C - 4th Indorsement, O.O. 471.62/4184, P.A. 471.62/219 -- Contains instructions for development of T21 Nose Bomb Fuze.

D - O.C.M. Item 15601 -- Recommends standardization of M108 (T21) Fuze.

E - O.C.M. Item 15656 -- Approves standardization of M108 (T21) Fuze.

F - O.C.M. Item 16059 -- Recommends standardization of 100-lb. M47 Chemical Bomb utilizing M108 Fuze.

G - O.C.M. Item 16142 -- Approves standardization of 100-lb. M47 Chemical Bomb utilizing M108 Fuze.

H - 5th A.P.G. Report on O.P. 3390 -- Test results of sixty 30-lb. Chemical Bombs and forty-seven T21 Fuzes.

I - 6th A.P.G. Report on O.P. 3390 -- Test results of ten 100-lb. Chemical Bombs and six T21 Fuzes.

J - 8th A.P.G. Report on O.P. 3390 -- Test results of thirty 100-lb. Chemical Bombs and M108 Fuzes.

K - 10th A.P.G. Report on O.P. 3390 -- Test results of ten 100-lb. Chemical Bombs and M108 Fuzes.

L - 11th A.P.G. Report on O.P. 3390 -- Test results of ten 100-lb. Chemical Bombs and M108 Fuzes.

M - 12th A.P.G. Report on O.P. 3390 -- Test results of fourteen 100-lb. Chemical Bombs and M108 Fuzes.

N - 6th A.P.G. Report on O.P. 3452 -- Test results of ten 30-lb. Chemical Bombs and M108 Fuzes.

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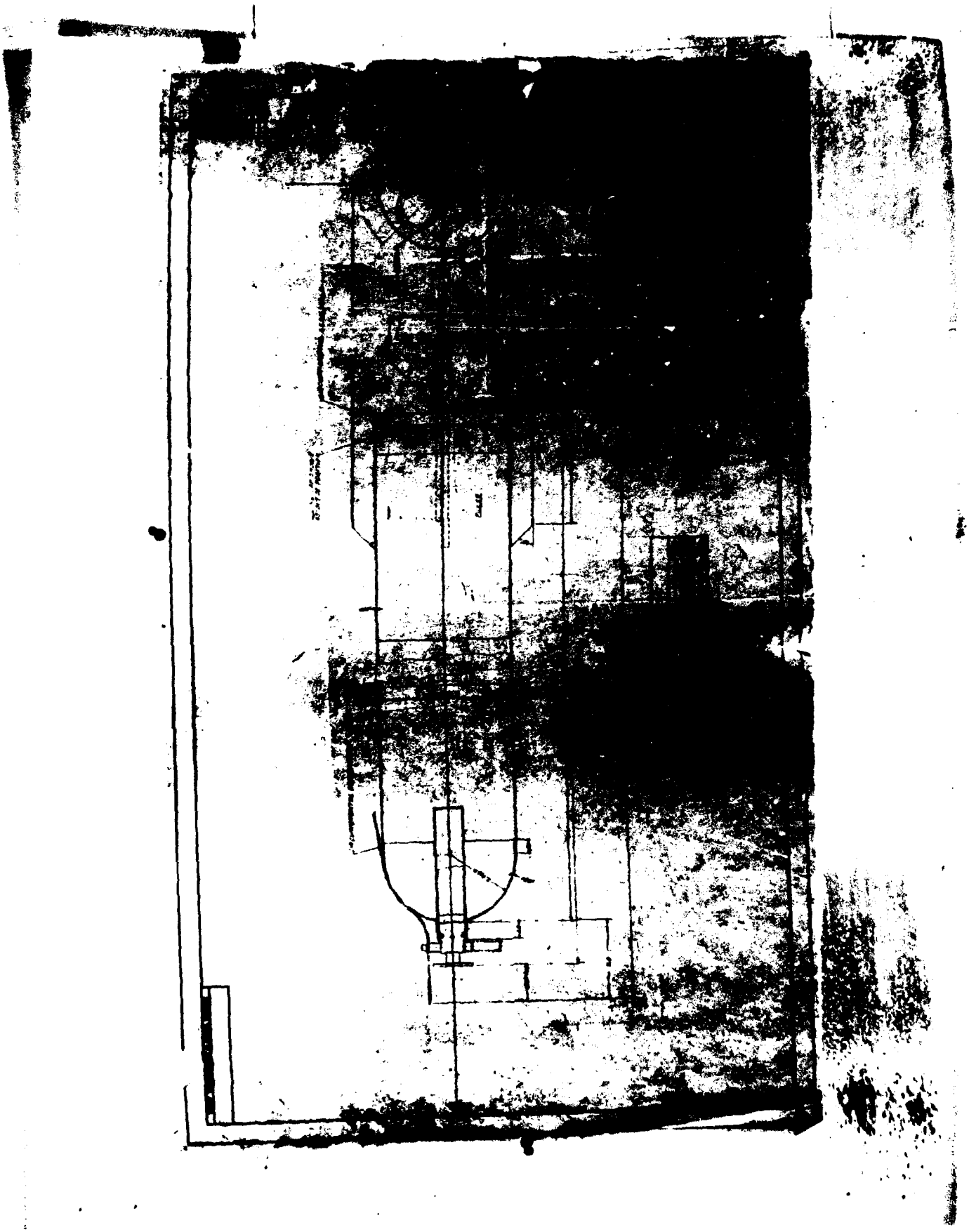
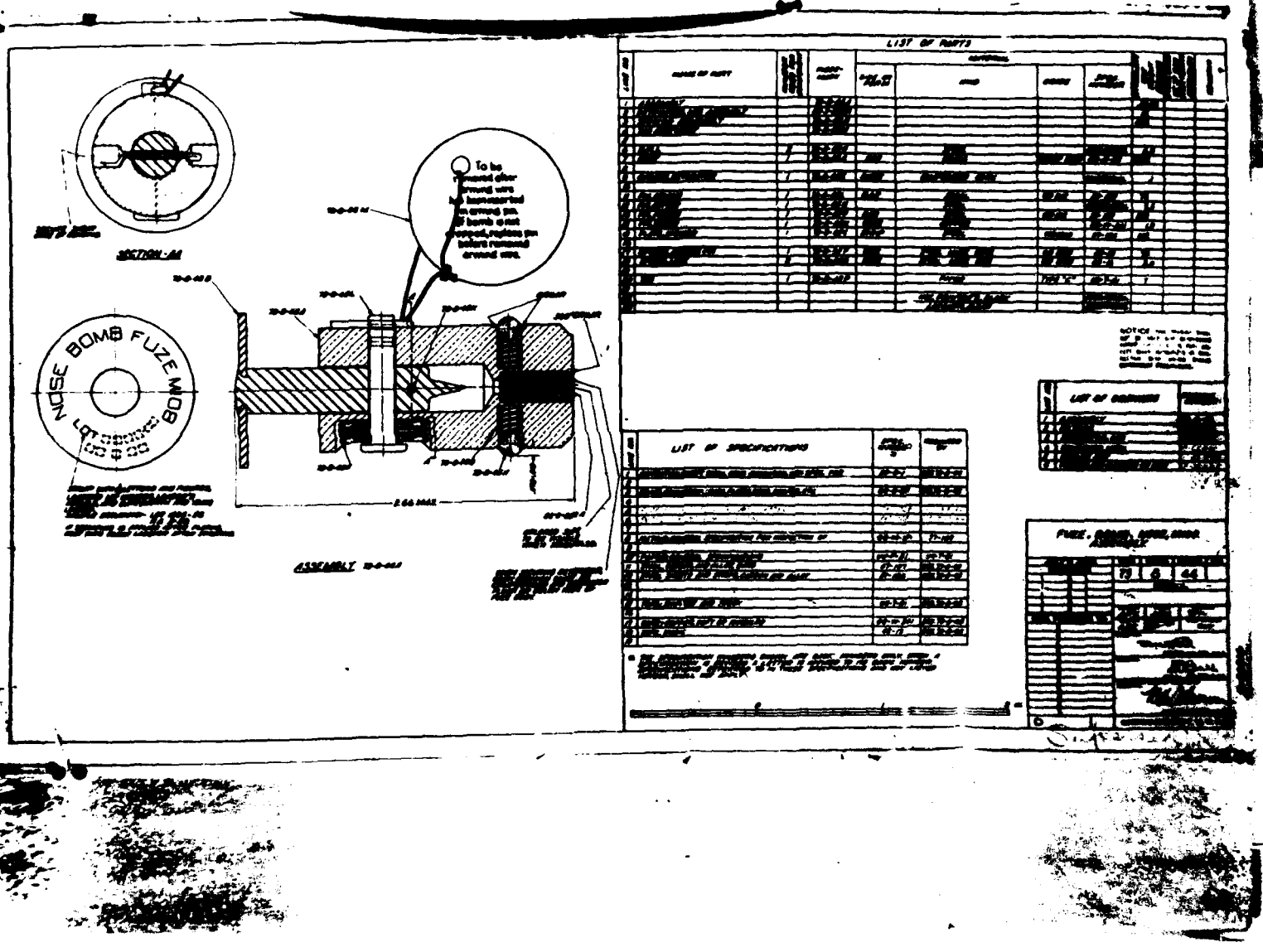
4. Incls
Incl 1 - Drg. CA 1741 (dated 6-24-39)
Incl 2 - Drg. 73-8-44 (dated 7-8-40)
Incl 3 - Drg. 73-8-45 (dated 7-9-40)
Incl 4 - 33-3-273 (dated 6-28-40).




NOSE BOMB FUZE MOB
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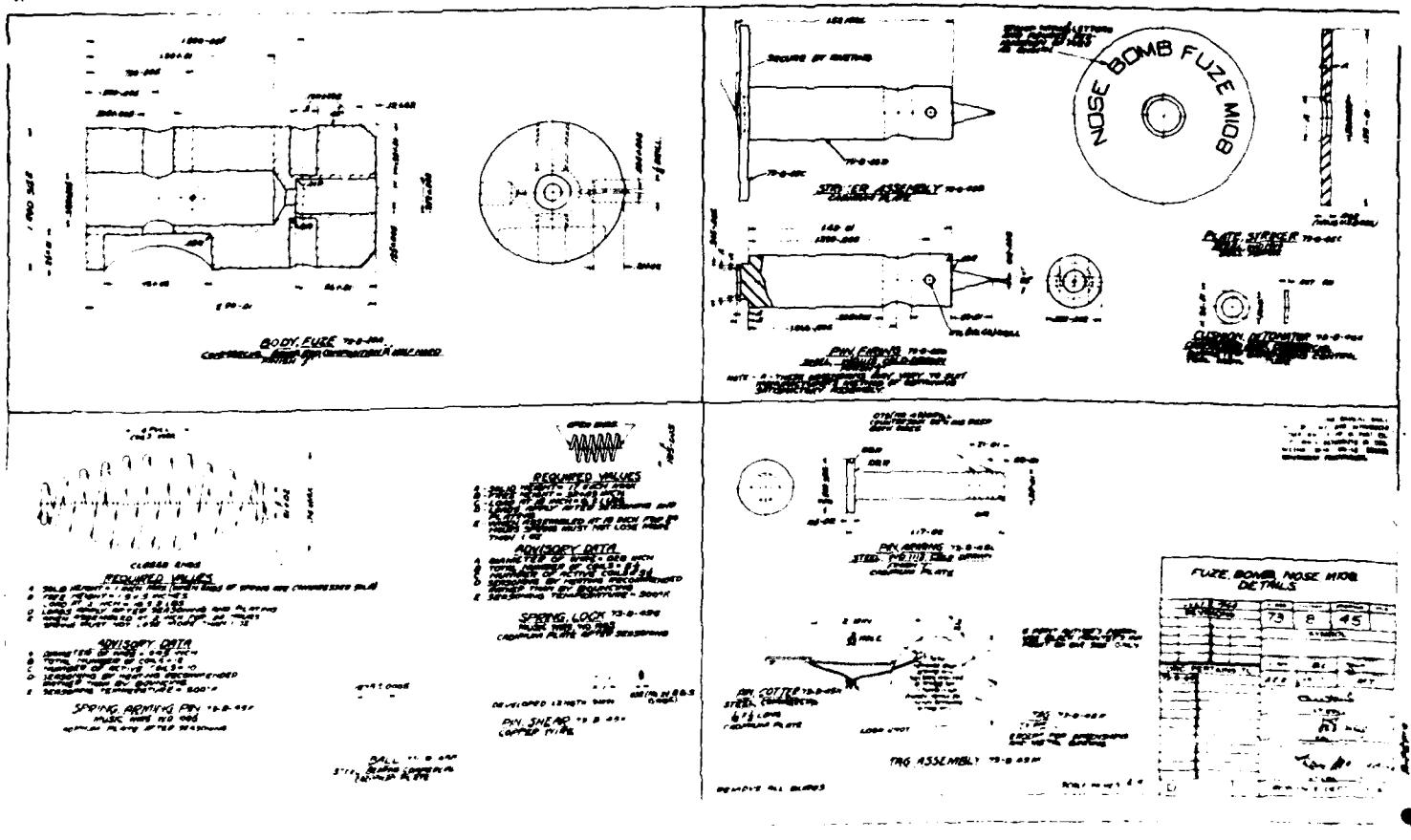
LIST OF SPECIFICATIONS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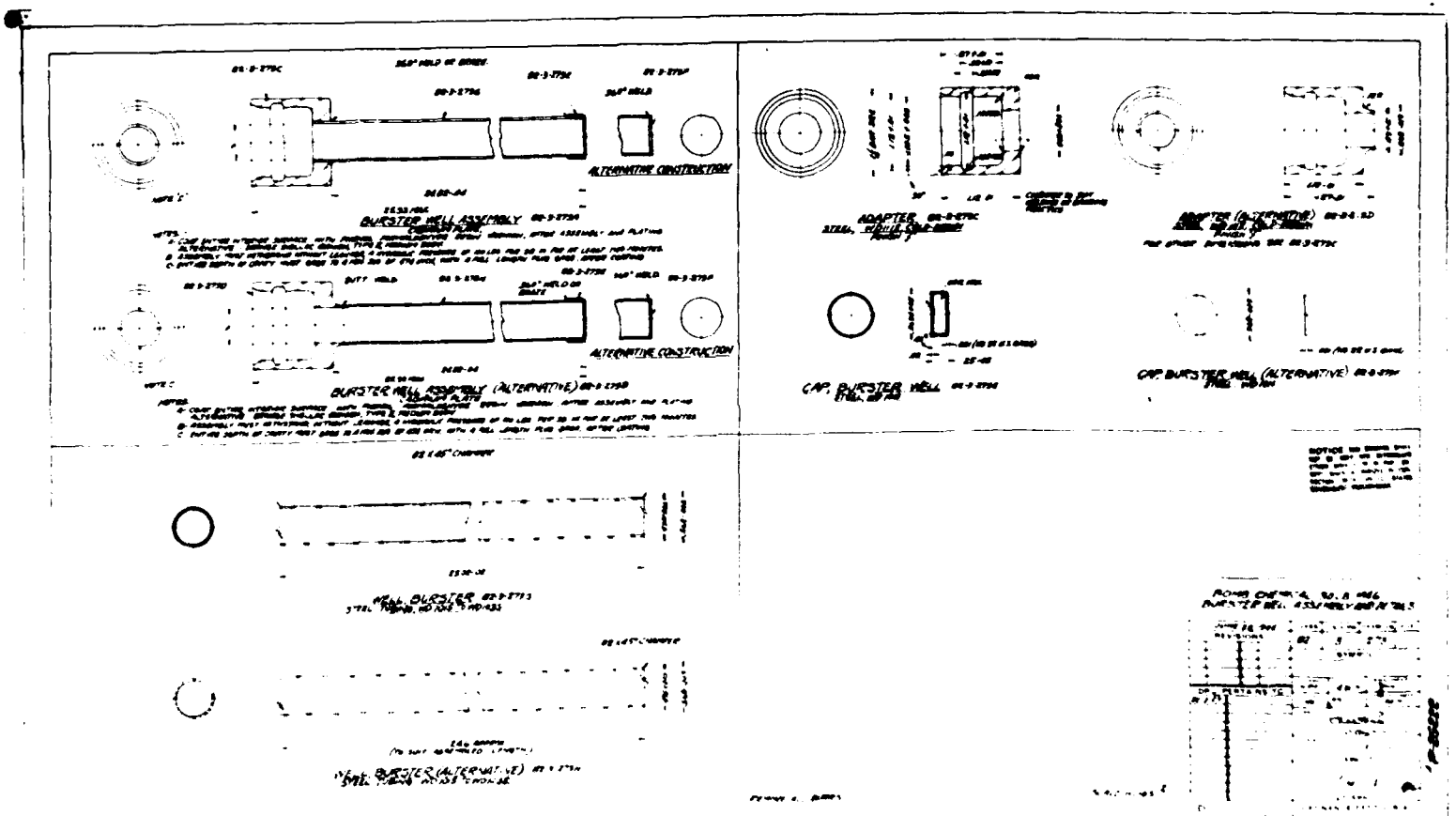
REQUIRED VALUES
ADVISORY DATA
FUZE, BOMB, NOSE M108
DETAILS


ALTERNATIVE CONSTRUCTION
BURSTER WELL ASSEMBLY
BURSTER WELL ASSEMBLY (ALTERNATIVE)
ADAPTER
ADAPTER (ALTERNATIVE)
CAP, BURSTER WELL
CAP, BURSTER WELL (ALTERNATIVE)
WELL BURSTER
WELL BURSTER (ALTERNATIVE)