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HIGHLIGHTS OF 1943

1943 saw the completion of the M26 Flare program.

The Army had an over supply with a resultant cut back of 58,506 pieces on Contract No. W478-Ord-1896 and an additional 16,150 pieces on Contract No. W19-059-Ord-43 involving over 3-1/4 million dollars.

It was our first experience in terminations.

This caused our 2nd reconversion and we became essentially Firing Device manufacturers.

On July 14, 1943 we received the joint Army and Navy "E" Award for conspicuous achievement.

THE ENGINEER BOARD

FORT BELVOIR, VA.

T3 RELEASE TYPE FIRING DEVICE

T3 Release type was an experimental model similar to the British Release Switch. It was inserted into a narrow opening or under a door or under some object such as a camera or pistol and when this object was moved the device would function and detonate the charge.

Order Received 1/9/43

PRODUCTION

1943 1000 pcs.

CONTRACT

1/9/43 P.O. 22370 - 1000 pcs.

WAR DEPARTMENT
 SPRINGFIELD ORD. DIST.
 95 STATE ST.
 SPRINGFIELD, MASS.

FUZE FOR MINE ANTI-PERSONNEL M2

This was formerly known as the M1 Combination Firing Device. This mine ejects a shell about six or eight feet into the air and then explodes, throwing fragments in all directions. The device worked by trip wire or by pressure, and the head swiveled so that trip wires in several directions could be used.

1st. order received 1/20/43

<u>PRODUCTION</u>			<u>CONTRACTS</u>		
1943	1,660,000	pcs.	1/20/43	W478 Ord.	3174 400,000
			5/31/43	" "	3858 600,000
1944	<u>637,500</u>	"	8/4/43	" "	3887 1,060,000
			9/1/43	#19-059 Ord.	54 <u>237,500</u>
Total	2,297,500	pcs.			2,297,500

M. B. MANUFACTURING CO.

NEW HAVEN, CONN.

MANUFACTURERS OF AIRCRAFT PARTS

In January 1943 we were asked by M. B. to manufacture for them screws to be used in airplane engine mount assemblies, as they were unable to find a manufacturer willing to take on this job as it involved a great deal of precision work for illustration the part has to be roll threaded after heat treat to obtain a #3 fit after plating.

1st order rec'd 1/20/43

PRODUCTION

SCREWS

1943 -----	342,812
1944 -----	<u>118,854</u>
	461,666

CONTRACTS

1/20/43	D10721	250,000
5/26/43	E3174	18,910
5/25/43	E3243	<u>192,756</u>
	Total	461,666

ESSEX CORPORATION
CHARLOTTESVILLE, VIRGINIA

When all manufacturers of the M2 Fuse Mine were under great pressure for deliveries by the services, the above Company appealed to us to help them by supplying various parts for this mine. Our Diecast Dept. was in a 24 hr. working schedule but somehow we jammed their production requirements in along with our own and supplied them with the following.

PRODUCTION

1/26/43	346,500	Head	73-9-7B
	246,970	Base	73-9-7U
	240,400	Cap.	73-9-7D
1944	115,000	Head	73-9-7B
	360,060	Base	73-9-7U
	211,200	Cap.	73-9-7D

ORDERS

<u>Date</u>	<u>Order #</u>	<u>Item</u>	<u>Quantity</u>	<u>Totals</u>
1/26/43	1865	Head	218,595	461,500
10/12/43	2745	Head	127,905	
1/5/44	2826	Head	20,000	
2/14/44	2931	Head	95,000	
1/26/43	1865	Base	206,000	607,030
10/12/43	2745	Base	151,000	
1/5/44	2826	Base	150,030	
2/14/44	2931	Base	100,000	
1/26/43	1865	Pres.Cap.	200,000	451,600
10/12/43	2745	Pres.Cap.	146,600	
1/5/44	2826	Pres.Cap.	10,000	
2/14/44	2931	Pres.Cap.	95,000	

GEOMETRIC STAMPING CO.

1111 E 200 St.

CLEVELAND, OHIO

PARTS FOR FUZE MINE ANTI-PERSONNEL M2

We took an order for bases used on the above mine to help this company meet its production quotas. Although our Diecast department was working day and night, somehow we managed to produce our own requirements, plus what they needed and on schedule.

Rec'd order 2/8/43

Production

1943 ----- 857,475 pcs. Base

<u>Order</u>	<u>Pcs.</u>
2/8/43 5672-1	787,365
7/20/43 "	<u>70,110</u>
	857,475

UNION PARTS MANUFACTURING COMPANY

125 ASHLAND PLACE

BROOKLYN, N. Y.

For the above firm we manufactured bolts used in engine mounts on air-planes. This was a job which called for high precision manufacturing as the bolt has to be roll-threaded after heat treat to obtain a #3 fit after plating.

PRODUCTION

1st order 2/17/43

1943	62538	Bolt
1944	<u>167050</u>	
	229588	
2/17/43	A06464	229588

THE ENGINEER BOARD
FORT BELVOIR, VIRGINIA

T2 PRESSURE FIRING DEVICE
OR
FOOTSHOOTER

The T2 Pressure Device is known as a footshooter and is composed of a hollow spike driven into the ground which contained a firing mechanism topped by a .30 caliber cartridge. An unwary enemy stepping or crawling on this device would exert sufficient pressure on the nose of the bullet to fire it through some part of his body making him a casualty.

Order received 2/23/43

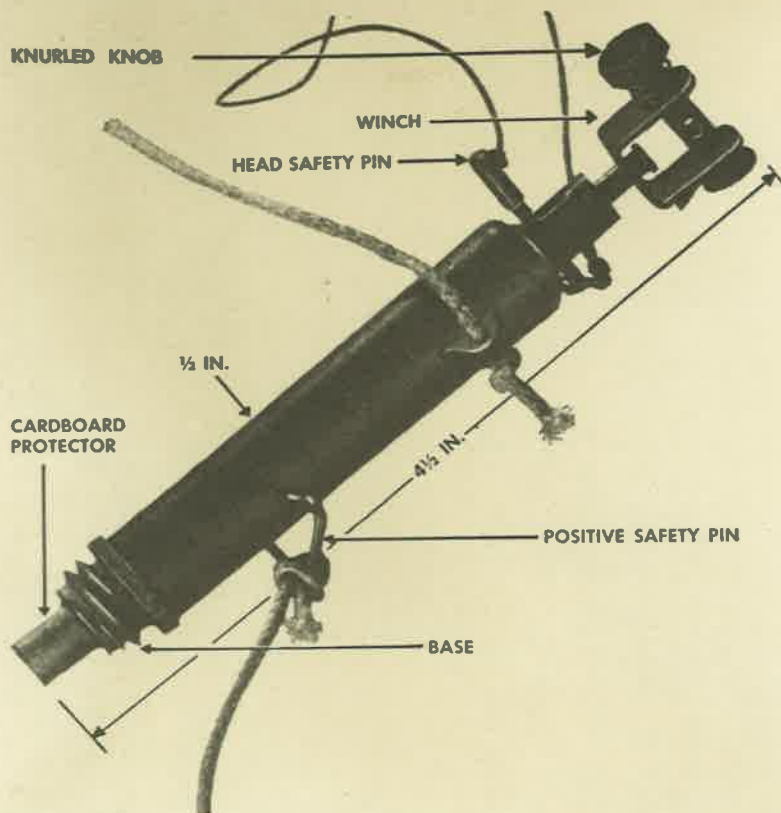
PRODUCTION

1943 1000 pcs.

CONTRACT

2/23/43 23447 - 1000 pcs.

U. S. PULL-RELEASE FUZE M3



TYPE. Pull and pull-release fuze.

COLOR. Olive drab.

CASE. Zinc alloy.

EMPLOYMENT. In antipersonnel mines and booby traps.

PACKING AND TRANSPORTING. Five fuses complete with percussion caps in their bases and two 80-foot spools of trip wire are packed in a 1 3/8- by 4 3/4- by 5-inch box. Packed box weighs 1.15 pounds.

RE-USE. Fuzes may be re-used any number of times if tests show they are not defective. If percussion cap has been fired and fuse is to be used again, remove the cap and press new No. 3 cap tightly into place. Clean and lubricate before re-use.

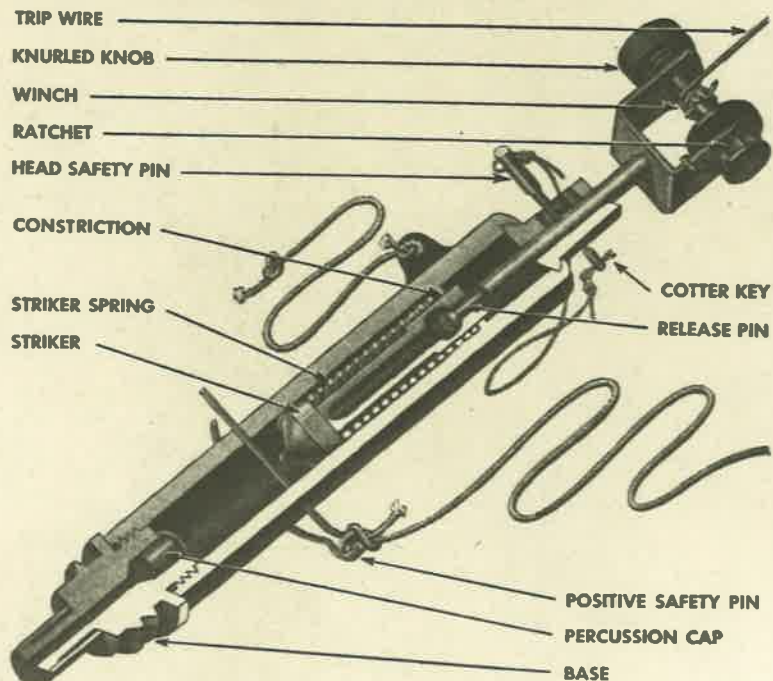
FM 5-31

8 FEB 1944

53.06-a

RESTRICTED

U. S. PULL-RELEASE FUZE M3



FUNCTIONING.

a. Pull operation.

1. With pull of 6 to 10 pounds on trip wire, release-pin assembly is pulled backward until shoulder on striker passes constriction in barrel.
2. Four jaws of striker are forced open and release pin pulls out of striker.
3. Jaws of striker spring back together enabling end of striker to pass through constriction.
4. Released striker, driven by spring, sets off percussion cap.

b. Tension-release operation.

1. Release of tension, such as detaching wire or cord at anchor end permits release-pin assembly to move forward under influence of striker spring until striker clears constriction in barrel and release pin is stopped by head of fuze.
2. As spring continues to force striker forward its four jaws are spread and pulled free of the release-pin knob.
3. Released striker, driven by striker spring, sets off percussion cap.

53.06-b

8 FEB 1944

FM 5-31

RESTRICTED

80

THE ENGINEER BOARD
FORT BELVOIR, VIRGINIA

T3 PULL & RELEASE TYPE FIRING DEVICE

The T3 Pull and Release firing device is used with anti-personnel mines and booby traps. It has a taut trip wire attached which works the same as the M1 Pull type but if disarming is attempted by cutting the wire as is customary with the M1 Pull, the device will also fire. In other words, pulling or cutting the wire will detonate the charge.

First order received 3/8/43

PRODUCTION

1943 1000 pcs.

CONTRACT

3/8/43 W145 Eng 667 1000 pcs.

BOSTON CHEMICAL WARFARE PROC. DIST.

75 FEDERAL STREET

BOSTON, MASS.

IGNITER FUSE FOR INCENDIARY POCKET M1

The igniter fuse for pocket incendiary is a time delay device similar to a Signal Relay but with an igniting element instead of a primer. This was attached to a small incendiary device. It was to be placed inconspicuously near some inflammable material which at the termination of the time delay would burst into flame.

Order rec'd 3/8/43

PRODUCTION

1943

400,000 pcs.

CONTRACT

3/8/43

W1302 - CWS 1339

Proc 410652-43 400,000

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

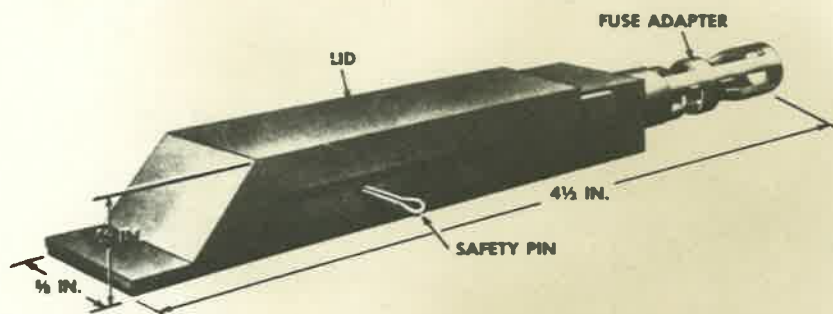
NEW YORK, N. Y.

A2 PULL TYPE FIRING DEVICE

The A2 Pull type is the same as the M1 Pull but has an O.S.S. spring snout in place of the Corps of Engineers Base. The Engineers base screws into a charge. The O.S.S. spring snout takes a piece of Bickford fuse which is attached to the charge. This device is used with anti-personnel mines and booby traps. It is screwed into an explosive charge and a trip wire is attached. Tripping over this wire or moving the object to which the wire is attached will detonate the charge

Order received 3/15/43

<u>PRODUCTION</u>		<u>CONTRACT</u>	
1943	10,100 pcs.	3/15/43	NY-6707-Req-Ex 87030
		O.S.S. 366	10,100



TYPE. Release fuze

COLOR. Matt khaki

CASE. Alloy metal

EMPLOYMENT

- Inserted into narrow opening, as under door or behind drawer. Will withstand heavy weight, such as packing case.

INSTALLING AND ARMING

1. Connect fuse to detonator by adapter.
2. Install fuze in desired position.
3. Connect charge.
4. Withdraw safety pin, which should come out easily.

DISARMING

Insert safety pin through safety-pin hole. Disconnect cap holder.

PACKING AND TRANSPORTING

Two per cardboard carton. Five cartons per tin. Twenty tins per case about 22 by 10½ by 6 inches. Weight, 60 pounds.

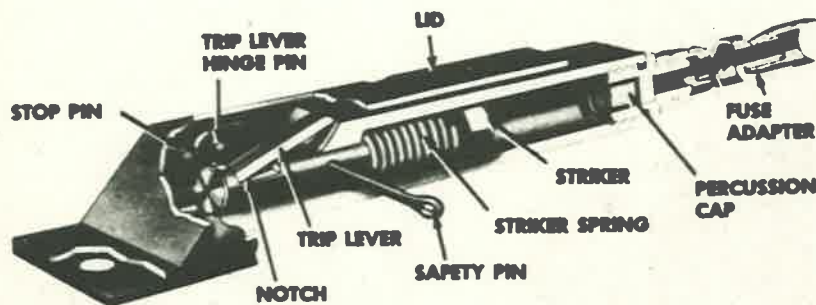
FM 5-31

1 NOV 1943

63.07-a

RESTRICTED

84 QSS. A2 TYPE 6 RELEASE MECHANISM



FUNCTIONING

1. When load on lid is removed, pressure of trip lever forces lid upward.
2. Pressure of cocked striker swings trip lever counterclockwise and disengages notch.
3. Pressure of compressed spring drives striker against percussion cap.

RE-USE

TO RECOCK—

1. Unscrew cap holder and fuse adapter.
2. Withdraw striker and spring.
3. Throw trip lever over until it rests on stop pin.
4. Insert spring and striker, notch uppermost.
5. Push back striker with pencil or rod, and insert safety pin.
6. Throw trip lever forward.
7. Close lid.
8. Screw in new fuse adapter with cap.

63.07-b

1 NOV 1943

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RESTRICTED

OSS A2 TYPE 6 RELEASE MECHANISM 85

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y.

A2 TYPE 6 RELEASE MECHANISM

The A2 Type 6 Release Mechanism is a firing device used generally with a booby trap. It was inserted into a narrow opening or under a door or under some object such as a camera or pistol and when this object was moved the device would function and detonate the charge.

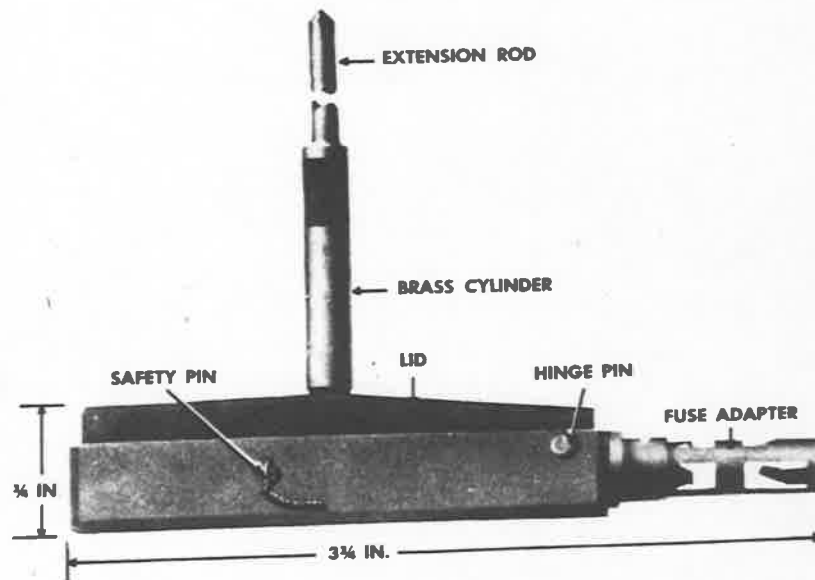
First order 3/17/43

PRODUCTION

1943 15,000 pcs.
1944 81,600 pcs.
96,660

CONTRACTS

3/17/43 W1097-Eng 3852 NY6840 10,000 pcs.
6/15/43 W1098-Eng 4386NAD2170 86,600 "
96,600 pcs.



TYPE. Pressure fuze

COLOR. Dull khaki

CASE. Alloy metal

EMPLOYMENT

To explode booby-trap charge by pressure. Adjustable extension rod enables mechanism to be used under railway track.

PACKING AND TRANSPORTING

Two devices, complete with extension rods and adapters, per cardboard carton. Five cartons per tin. Twenty tins per wooden box, 22½ by 11½ by 8¼ inches. Weight, 90 pounds.

RE-USE

TO RECOCK

1. Unscrew fuze adapter.
2. Withdraw striker.
3. Reinsert striker and striker spring, notch facing downward.
4. Push back striker with wooden rod until lips of trip lever engage notch.
5. Insert safety pin.

FM 5-31

1 NOV 1943

63.02-a

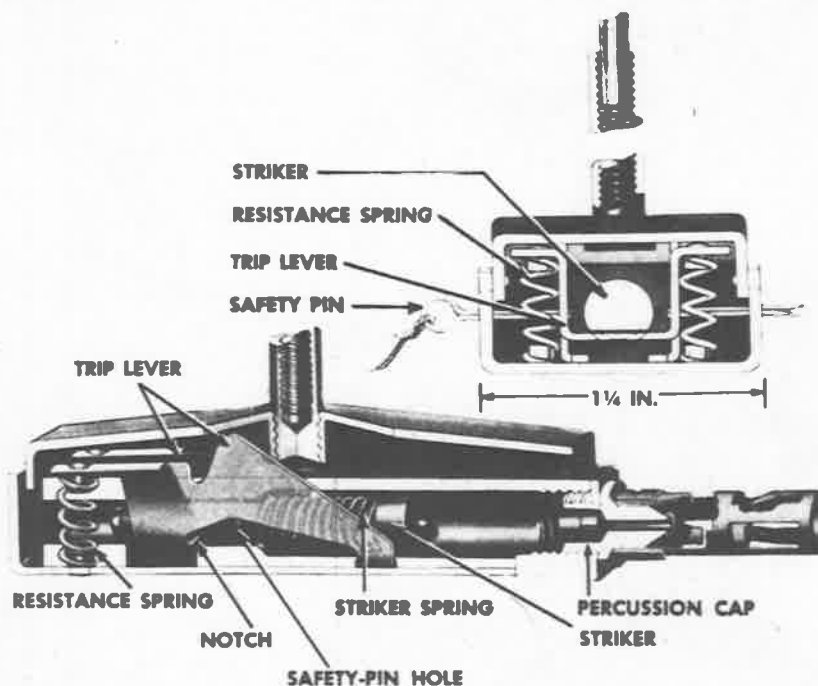
RESTRICTED

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055

AZ TYPE 6 PRESSURE

SWITCH
~~MECHANISM~~



FUNCTIONING

1. Pressure required to operate varies with position on lid on which it acts. At end farthest from hinges 21 pounds, and at center of lid 50 to 60 pounds are required to force lid down.
2. Double trip lever is depressed against resistance of spring.
3. Trip lever clears notch, freeing striker.
4. Striker spring drives striker against percussion cap.

INSTALLING AND ARMING WITHOUT EXTENSION ROD

1. Set device in desired position.
2. Connect charge.
3. Withdraw safety pin.

WITH EXTENSION ROD

1. Screw brass cylinder tightly into lid, and screw extension rod to its lowest limit in cylinder.
2. Set device in position.
3. Unscrew rod until contact is made with rail or other object.
4. Connect charge.
5. Withdraw safety pin.

DISARMING

Insert safety pin in safety-pin hole. Remove fuze adapter.

43.02-b

1 NOV 1943

FM 5-31

RESTRICTED

O.S.S. A 2 TYPE 6 PRESSURE ~~MECHANISM~~ SWITCH 88

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y.

A2 TYPE 6 PRESSURE SWITCH

This is a firing device for use with booby traps and particularly for use in destroying railway track. A pressure exerted on this firing device would detonate the charge. An adjustable extension rod was used in connection with this firing device when placed under railway track.

1st order rec'd 3/17/43

PRODUCTION

1943 9,100 pcs.

CONTRACT

3/17/43 W1097 Eng 3852 NY6840 9,100 pcs.

THESE INSTRUCTIONS MUST NOT BE TAKEN TO PLACES WHERE THEY MAY FALL INTO ENEMY HANDS. DO NOT SHOW THEM TO UNAUTHORIZED PERSONNEL. DESTROY THEM AFTER THEY HAVE SERVED THEIR PURPOSE.

TB 5-25-4

WAR DEPARTMENT TECHNICAL BULLETIN

INSTRUCTIONS FOR USE OF DETONATOR, CONCUSSION, TYPE T-1

Ref.: FM 5-25, Explosives and Demolitions

War Department, Washington 25, D. C., 25 May 1944

	Paragraph
Description.....	1
Use of Concussion Detonator in Water.....	2
Use of Concussion Detonator in Air.....	3
To Disarm Device.....	4

1. DESCRIPTION.—a. The Concussion Detonator T-1 (see fig. 1), is a mechanical firing device which is actuated by the concussion wave of a blast. It is used to fire several charges simultaneously without interconnecting the charges with wires or detonating cord. A single charge, fired in any desirable way, will fire all charges equipped with concussion detonators provided that they are within range of the main charge or within range of each other. The device can be used to fire demolition charges either in air or in water, and a table showing the ranges at which the concussion detonators will reliably function in either medium is shown below:

RESTRICTED

Operating range of concussion detonators

Initiating charge (pounds)	In water		In air—Recom- mended range (feet)
	Depth of water (feet)	Recommended range (feet)	
0.5	2	10	-----
0.5	4	50	-----
0.5	6	80	-----
0.5	8	80	-----
2.5	-----	-----	15
2.5	2	20	-----
2.5	4	80	-----
2.5	6	80	-----
2.5	8	150	-----
5	-----	-----	20
10	-----	-----	35
15	-----	-----	35
20	-----	-----	35
20	2	20	-----
20	4	80	-----
20	6	180	-----
20	8	260	-----

b. The concussion detonator is supplied with a protective shipping plug in place and with a base and blasting cap assembly and base gasket contained in the package. In preparing the detonator for use the plug should be discarded and replaced by the base and blasting cap assembly. In this replacement it should be carefully observed that the joint is tight and that the gasket is properly seated to form a water-tight seal. The base is constructed with a thread to fit the threaded cap wells of Corps of Engineers explosives. If the detonator is used with some other type charge than one of those equipped with the standard cap well, a short length of detonating cord should be taped to the blasting cap and its other end, containing a Corps of Engineers Special Nonelectric Cap, connected to the charge. In any case it is advisable to wire or tie the detonator to its associated charge, using the holes in the detonator provided for this purpose.

2. USE OF CONCUSSION DETONATOR IN WATER.—a. To provide safety during the arming of the device in water, the detonator is supplied with two time delay tablets of a water-soluble nature. A blue normal delay tablet of approximately 3½ minutes' dissolving time is installed within the device, and a yellow long-delay tablet of approximately 7 minutes' dissolving time is packaged with the device for alternate installation in the field. One or the other of these delay tablets should be used for underwater installations.

b. Since surf conditions and water temperatures influence the dissolving time of salt tablets, it is advisable to expend one detonator to measure its arming time. The same device can be used to test either

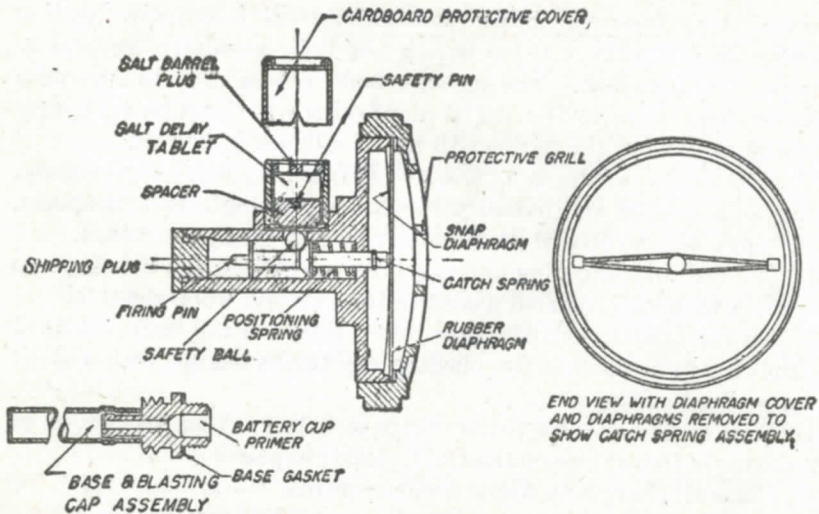


Figure 1.—Detonator, Concussion, Type T-1

or both delay elements. This detonator, when equipped with the type of tablet that will be used, should be tested under conditions similar to those contemplated in the actual operation. This test should be made by submerging the device to the proper depth under simulated operating conditions, with the shipping plug in place and the cardboard protective cover and the safety pin removed, and observing the time required for the salt tablet to dissolve.

c. The dissolving or arming time observed in the foregoing test is the proper interval that should elapse before the main initiating charge is fired under the proposed conditions of use. Since the tablets become soft during solution before they completely dissolve, and since this softening takes place within approximately one-half of the dissolving time, the detonators should be considered dangerous after one-half of the arming time has elapsed. Personnel should be withdrawn from the danger area within half the dissolving or arming time, since a nearby concussion from enemy bombs or shells could fire the detonators.

d. A major function of the cardboard protective cover with which the device is equipped is the protection of the water-soluble tablet during the preliminary phase of its underwater installation. This cover should be undisturbed and should remain in place, if possible, during placing of the charge under water. It should be removed at the last possible moment prior to the removal of the safety pin.

e. When using concussion detonators in water, the charges with which they are connected should be spaced within the recommended ranges, predicated on the anticipated minimum depth of water, as

shown in the foregoing table. Detonators will frequently function at greater ranges than those shown but their reliability at greater ranges is not assured. The device should not be used in surf of a greater depth than 15 feet. The diaphragm will function by hydrostatic pressure and the device will fire at a depth of 25 feet.

f. Installation of device in water.—(1) If long delay is necessary, remove blue tablet and install yellow tablet, taking care that spacer, safety pin, and cardboard protective cap are properly assembled.

(2) Discard shipping plug and carefully insert base and blasting cap assembly with its associated gasket to form a tight waterproof fit.

(3) Fit the blasting cap and base into a threaded cap well contained in the charge or connect the blasting cap to the charge with a short length of detonating cord.

(4) Wire or tie detonator to the charge and observe that diaphragm of detonator is free of obstructions and clearly exposed.

(5) Place all charges in water where required.

(6) Remove cardboard protective covers and pull safety pins.

(7) Evacuate the danger area within one-half of the arming time of the delay tablets in use.

(8) Wait the full interval of the arming time of the delay tablet in use before firing the initiating charge.

3. USE OF CONCUSSION DETONATOR IN AIR.—*a.* When the device is used in air the salt delay tablet installed within the device during manufacture must be removed and discarded. All devices to be used in air should also be checked to insure that the catch spring properly restrains the firing pin when the safety pin is withdrawn and the spacer is released. Removal of salt tablets and checking of firing pin restraint should be accomplished before the base and blasting cap assembly is fitted to the device. In checking the restraint of the firing pin it will be observed that the pin moves forward approximately $\frac{1}{16}$ inch. This movement is proper but the firing pin should neither fall nor fly out of the barrel of the device. In either case the device should be discarded. After checking the firing pin restraint, the spacer and safety pin should be replaced and the base and blasting cap assembly should be firmly fitted into the threaded barrel in place of the shipping plug.

b. When used in air it is advisable that all charges equipped with concussion detonators be placed reasonably equidistant from the main or initiating charge and that they be placed a minimum distance of approximately 15 feet from the main charge. When placed too close to another charge in air the concussion wave frequently causes the firing pin to pierce the diaphragm and be impaled thereon with a resultant probability of a misfire.

- c. Installation of the device in air.*—(1) Remove salt delay tablets.
 (2) Check the restraint of all firing pins by removing safety pins and observing that firing pin is held in place by catch spring.
 (3) Replace spacer and safety pin.
 (4) Discard shipping plug and carefully insert base and blasting cap assembly with its associated gasket to form a firm fit.
 (5) Fit the blasting cap and base into a threaded cap well contained in the charge or connect the blasting cap to the charge with a short length of detonating cord.
 (6) Wire or tie the detonator to the charge and observe that diaphragm of detonator is free of obstructions and clearly exposed.
 (7) Place all charges with diaphragms of detonators facing the initiating charge.
 (8) Withdraw safety pins and evacuate the area—**THE DEVICES ARE IMMEDIATELY ARMED.**
 (9) Fire initiating charge when personnel are clear of the danger zone.
- 4. TO DISARM DEVICE.**—*a.* Depress spacer and force safety ball against shoulder of firing pin.
b. Insert tenpenny nail through holes in salt barrel.
c. Remove base and blasting cap assembly from device.

[A. G. 300.5 (19 May 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
*Major General,
 The Adjutant General.*

DISTRIBUTION:

Engr O of Armies (10); Corps (10); Base Comds (10); Sv C (10); Overseas Def Comds (10); IR 5 (5); I Bn 5 (5); IC 5 (5).

IR 5: T/O 5-21, Engr Gen Sv Regt; 5-52, Engr Port Cons & Rep Gp; 5-192, Engr Comb Gp.

I Bn 5: T/O 5-15, Engr Comb Bn; 5-215, Armd Engr Bn; 5-275, Engr Hv Pon Bn.

IC 5: T/O 5-627, Engr Treadway Bridge Co.

THE ENGINEER BOARD
FORT BELVOIR, VIRGINIA

CONCUSSION DETONATOR

The function of this device is to detonate an explosive charge under water when activated by a pressure wave transmitted by the water from another explosion. An example of its use would be for the clearing of obstructions in the water just prior to establishing a beach-head.

A number of charges with these detonating devices attached would be placed at intervals along the obstruction. At the proper moment an explosion would be set off, which would discharge the series of explosive charges.

1st order rec'd 4/27/43 10 pcs. for experimental

<u>PRODUCTION</u>		<u>CONTRACT</u>	
1943	68 pcs.	4/26/43	Ord. - 24430 10
1944	<u>1020 pcs.</u>	6/22/43	W145 Eng. 725 1068
		5/17/43	25679 <u>10</u>
Total	1088 pcs.		1088 pcs.

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y. .

IGNITER FUSE FOR INCENDIARY POCKET M1

The Igniter fuse for pocket incendiary is a time delay device similar to a Signal Relay but with an igniting element instead of a primer. This was attached to a small incendiary device. It was to be placed inconspicuously near some inflammable material which at the termination of the time delay would burst into flame.

Order rec'd 5/6/43

PRODUCTION

CONTRACT

1943 92,258 pcs.

5/6/43 - W1302-CWS-1339 612,500

1944 520,242 pcs.

612,500

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y.

M1 DELAY FIRING DEVICE (MODIFIED)

This device is the same as the OSS Signal Relay which is a time delay firing device which is attached to a charge and an ampule of chemical incorporated in the device. When the ampule is broken, it causes the chemical to corrode through the retaining wire detonating the explosive. They were used principally to drop behind enemy lines for use by saboteurs or partisans in destroying enemy installations.

Order received 6/15/43

PRODUCTION

1943 367,950 pcs.

CONTRACT

6/15/43 W1098 Eng. 4387

Nad 2168

367,950

OFFICE OF STRATEGIC SERVICES

630 FIFTH AVENUE

NEW YORK, N. Y.

M1 PULL FIRING DEVICE

This device is used with anti-personnel mines and booby traps. It is screwed into an explosive charge and a trip wire is attached. Tripping over this wire or moving the object to which the wire is attached will detonate the charge.

1st. order rec'd 6/16/43

PRODUCTION

CONTRACT

1944

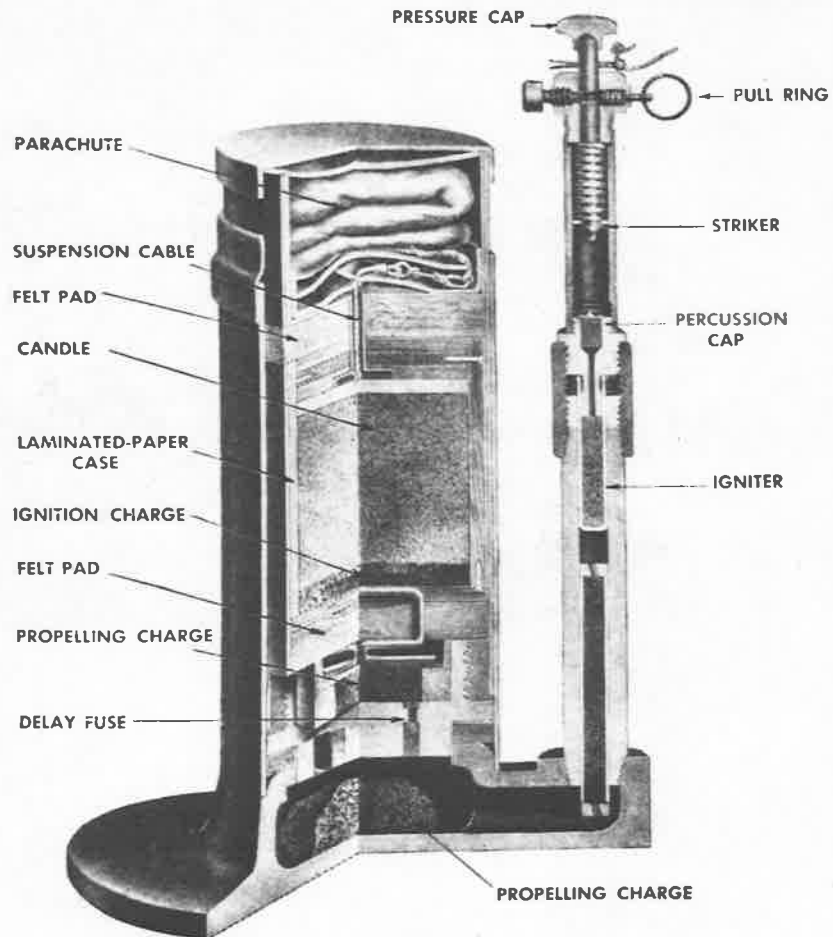
52,600 pcs.

6/16/43 W1098 Eng 4388

Nad 2169

52600

U. S. TRIP FLARE M48



TYPE. Mortar type parachute flare.

COLOR. Olive drab.

CASE. Metal.

WEIGHT. 5 pounds.

EFFECT. Bursts at height of 300 to 500 feet releasing a white parachute flare which burns 20 seconds. It illuminates effectively a circle of 300 yards radius.

EMPLOYMENT. Used as warning device in forward edges of mine fields. Can replace or supplement antipersonnel mines in deliberate mine fields. Employed particularly in hasty mine fields. Warns of enemy patrols or breaching parties entering the mine field and at night illuminates the area so effective fire can be placed on the intruders.

FM 5-31

8 JAN 1944

54.01-a

RESTRICTED

U. S. FLARE CORPORATION
12300 MONTAGUE STREET
SAN FERNANDO, CALIFORNIA

PARTS FOR FUZE MINE ANTI-PERSONNEL M2

For U. S. Flare we supplied parts for the above fuze, but instead of using these parts in an anti-personnel mine, they were used in a M48 Trip Flare. This Trip Flare device was planted in the forward edges of mine fields and when tripped it shot a parachute flare 300 to 500 feet in the air and illuminated a circle of 300 yards exposing the enemy patrol to effective fire.

PRODUCTION

1st order - 7/6/43

1943	55,000	pcs.	Parts for Fuze Mine M2
1944	<u>102,000</u>	"	" " " " "
	157,000	"	

CONTRACT

7/6/43	Ord. 1802	-	55,000
2/8/44	Ord. 3563	-	<u>102,000</u>
			157,000

OCEAN CITY MANUFACTURING COMPANY

1341-47 NOBLE STREET

PHILADELPHIA, PA.

PARTS FOR FUZE MINE ANTI-PERSONNEL M2

We helped the above firm to produce the above item by supplying them with parts which they badly needed to meet their production quotas.

Below are listed parts we shipped to them.

PRODUCTION

	Base		Totals
1943	122,790	Base	
1944	404,430	Base	527,220
1943	231,350	Head	
1944	283,460	Head	514,810
1943	234,680	Pressure Cap.	
1944	418,020	Pressure Cap.	652,700
1943	610,700	Steel Washer	
1944	139,500	Steel Washer	750,200

Orders

Base 73-9-TU2	8/3/43	05363	527,220	pcs.
Head 73-9-TB1	8/3/43	05364	514,810	pcs.
Pres. Cap.	8/3/43	05365	652,700	pcs.
Steel Washer	8/11/43	05333	750,200	pcs.

U. S. TIME CORPORATION

WATERBURY, CONNECTICUT

SPUR GEARS

We helped this company while they developed their own tools. These parts were used by Lehr Aviation in a motor reduction unit for aircraft.

	<u>Order</u>	<u>Pcs.</u>	<u>Item</u>	<u>Shipped</u>
8/9/43	12859-21	2440	560501 Spur Gear	1943
"	" 20	2090	561602 Worm Gear	"
"	" 21	1247	560901 Spur Gear	"
"	" "	2149	560702 " "	"
"	" "	194	580602 Gears	"
"	" 12	29	580400 "	"
"	" 21	22	580500 "	"

RESTRICTED

ORDNANCE PAMPHLET NO. 1081

COMPUTER MARK 12, MOD. 1 OPERATOR'S MANUAL



A BUREAU OF ORDNANCE PUBLICATION

30 SEPTEMBER 1943

RESTRICTED

ORDNANCE PAMPHLET NO. 1081

COMPUTER MARK 12, MOD. 1 OPERATOR'S MANUAL



30 SEPTEMBER 1943

*This publication is RESTRICTED and will be handled in accordance with
Article 76, United States Navy Regulations, 1920*

NAVY DEPARTMENT
BUREAU OF ORDNANCE
WASHINGTON 25, D. C.

RESTRICTED

30 SEPTEMBER 1943

ORDNANCE PAMPHLET NO. 1081

COMPUTER MARK 12, MOD. 1, OPERATOR'S MANUAL

1. Ordnance Pamphlet No. 1081 contains a description of the Computer Mark 12, Mod. 1 as well as instructions for its use. This computer is to be mounted directly on the sight yoke of all 3"/50 caliber guns, and is designed to furnish the sight setter of the gun with the proper values of sight angle to maintain a line of sight barrage on a horizontal or glide bomber that is attacking the ship on which the gun is mounted. This computer is considered stand-by equipment for those guns having directors.

2. This pamphlet should be used by all gun crews and others interested in the use of the 3"/50 caliber gun as a defense against bombing.

3. This pamphlet does not supersede any existing publication.

4. This publication is *RESTRICTED* and should be handled in accordance with the provisions of Article 76, U. S. Navy Regulations, 1920.

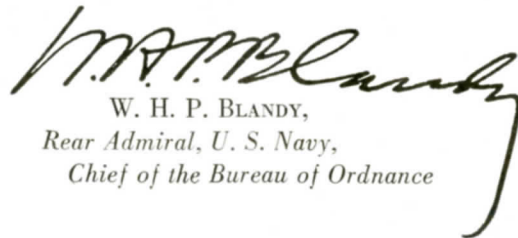

W. H. P. BLANDY,
Rear Admiral, U. S. Navy,
Chief of the Bureau of Ordnance

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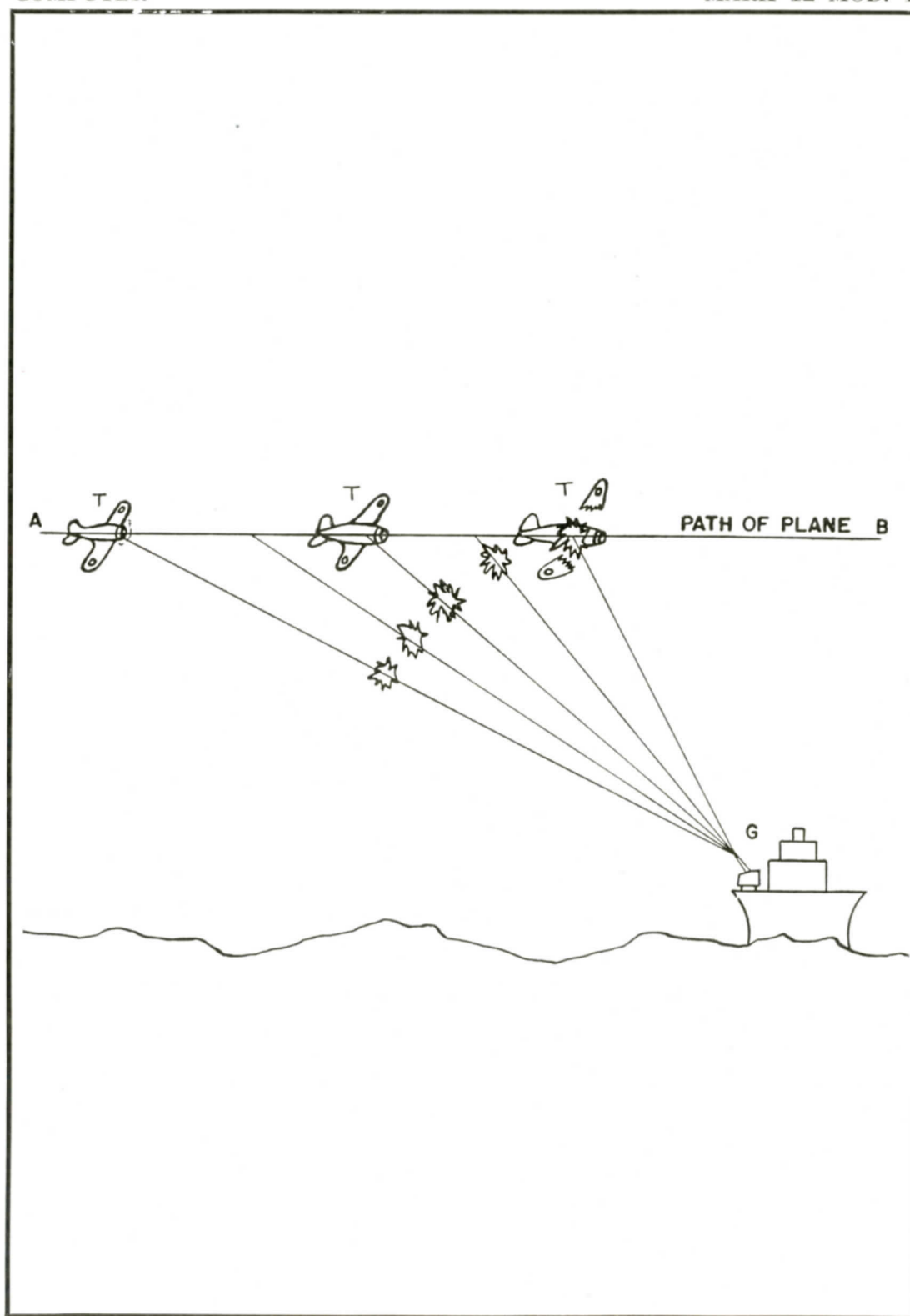


Figure 1

INTRODUCTION

The computer, Mark 12, Mod. 1, is a device which is mounted directly on the sight yoke of a 3 inch/50 caliber gun, and which furnishes the sight-setter of the gun with the proper values of sight angle to maintain a line of sight barrage on a horizontal or glide bomber that is attacking the ship on which the gun is mounted.

The computer is designed to furnish sight angle only, for either a glide or horizontal bomber which is attacking your own ship. It will *not* furnish data for a glide or horizontal bomber which is attacking any other ship. It

will *not* furnish data (except in a very approximate form) for a dive bomber or a torpedo plane which is attacking any ship. The computer does not furnish any data for deflection. Deflection must be computed or estimated separately, and then the bursts spotted on in deflection.

The use of this computer requires no communication between the gun and any other point. Therefore it is suitable as a standby means of control on ships having directors and as a primary means of control on ships having no directors.

LINE OF SIGHT BARRAGE

Before finding out just how the computer works, it is necessary to have clearly in mind just what is meant by a line of sight barrage, and how such a barrage is fired.

A line of sight barrage is a series of rounds fired as quickly as possible from a gun, all of them with the same fuze setting, and all of them properly aimed so that they burst directly along the line of sight from gun to target. Since the computer will only solve the problem for a horizontal or glide bomber attacking your own ship, we shall consider that type of target only.

Consider Figure 1. The target, T, is making a horizontal bombing run on the ship, moving along the line AB. As it moves along line AB the line of sight from the gun, G, to the target, changes as shown by the series of lines from the gun to the line AB. If a large number of shells are fired, each with the same fuze setting, and each with the correct sight angle to burst in the line of sight, the bursts will move upward as shown, forming a curve which is almost a circle. At some point in the plane's flight, the range to the plane will equal the range of the burst; that is, the curve described by the bursts will intersect the plane's path, and the plane will be hit. Now it is relatively simple for the

pointer to keep following the target as it follows the line AB, so that the line of sight to the target is established. The problem then is to know the correct sight angle at each instant so that the sights may be set correctly to make the bursts lie in the line of sight. It is the duty of the computer to inform the sight setter of this correct sight angle so that he may set it into the sights.

In order to understand how the computer does this, let's look at another drawing, (Fig. 2), similar to the first. The target is again attacking along the line AB. Now whenever we fire at a target the projectile takes a certain time to get to the point at which it bursts. During this time the target is moving. Thus if we fire while the target is at T the burst (A) will not occur until the target has moved to T1 and if we fire when the target is at T1 the burst (B) will not occur until the target is at T2. So in order to cause the burst to occur in the line of sight we must not fire the gun at the plane but at some point ahead of the plane. The angle ahead of the plane at which we must fire is called "lead" angle. Of course to cause the burst to occur at a definite point we must elevate the gun an additional amount to compensate for

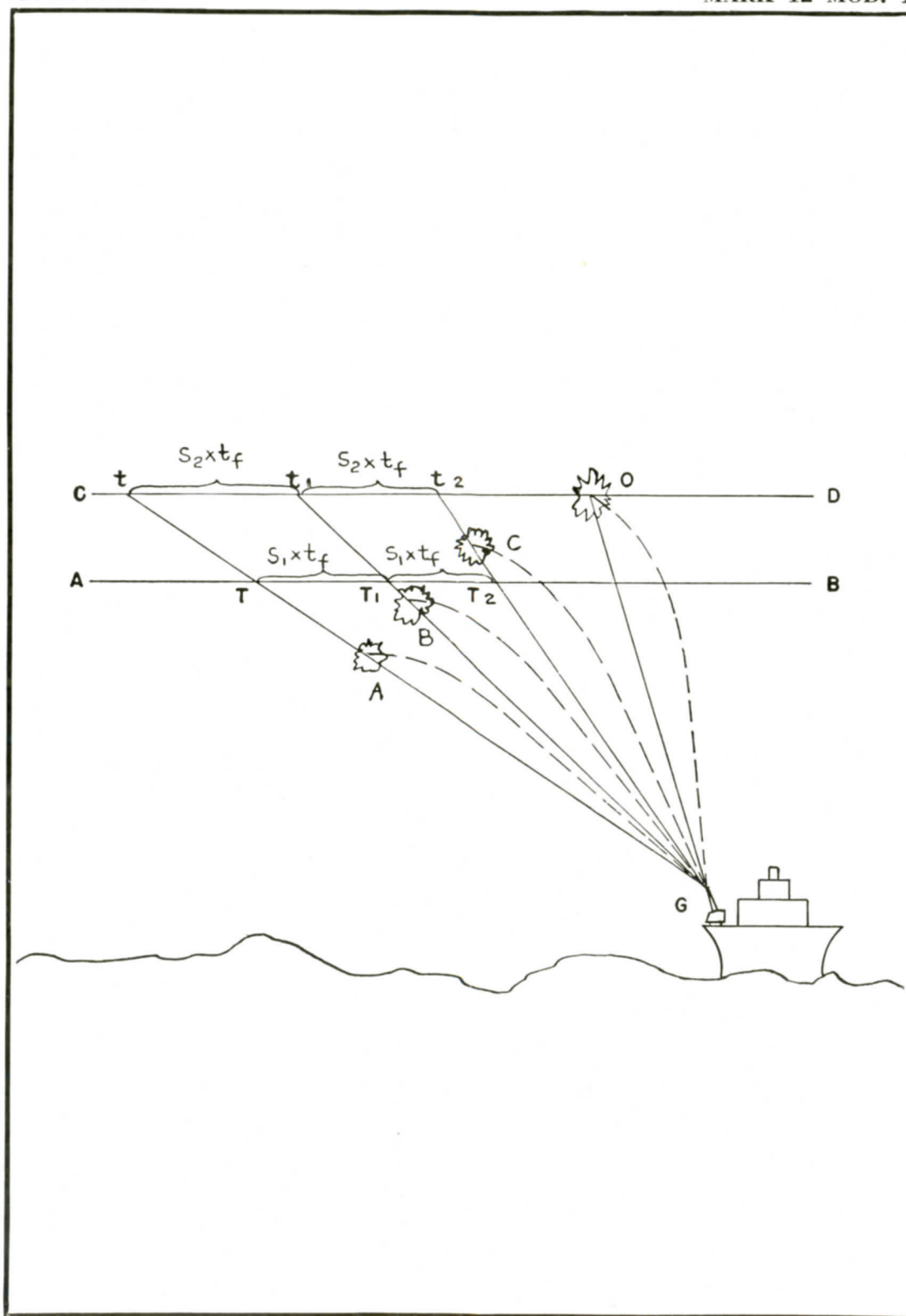


Figure 2

the pull of gravity on the projectile. This additional elevation is called "superelevation." Then the total amount which the gun must be elevated above the line of sight to the target is the sum of the lead angle and the superelevation, and is known as sight angle.

Now consider that another plane (Fig. 2) is making a bombing run along the line CD, and moving faster than the first target, so that the line of sight will elevate at the same rate as before. If we fire while it is at t the burst will occur when it has reached t_1 , which is directly in line with the point at which the first plane was when the burst occurred. Obviously then, we want to fire the burst (B), when either of the two targets is at T or t , and the sight angle necessary to fire the round is the same for both targets. Thus it is the speed with which the line

of sight is changing that determines the proper sight angle. Therefore to fire a correct barrage, we do not need to know the plane's altitude or its speed, but merely how fast it is causing the line of sight to elevate.

The design of the computer assumes several different conditions of target motion, that is, several different speeds at which the line of sight is elevating. To each of these speeds is assigned a class letter, as A, B, etc. Then the proper sight angles are computed for each of these classes for different position angles, and for different fuze times. It is these sight angles which the sight setter obtains from the computer and cranks into the sight.

It is now possible to study the computer itself and see how it furnishes the proper sight angle.

DESCRIPTION OF THE COMPUTER

The computer consists essentially of a plate, in the shape of a quadrant, mounted on the sight yoke of the gun. Figure 3 shows a front view of the computer, as the sightsetter sees it. Pivoted at the point of the quadrant is an arm with three small windows along its edge. The arm can move along the quadrant, and the data printed on the plate may be viewed through the windows of the arm. A thumb screw is provided at

the left of the plate to lock the arm when not in use.

The plate itself is mounted on a backing plate, and can be moved relative to the backing plate. This relative movement is used to set into the computer the value of glide angle of the target. A slot and scale along the bottom of the plate are used for this setting, and a thumb screw at the right holds the plate in any desired position.

DESCRIPTION OF THE DATA PLATE

The data plate itself varies according to the gun and fuze for which the computer was designed. The only difference however is in the actual values of sight angle and fuze time, the principle remains the same.

The chief portion of the data plate is the sight angle scale for the various types of bombing run and fuze time. These are arranged in parallel rows along the quadrant. Each row is designated by a number and a letter, the number representing the fuze time in seconds, and

the letter being the class letter previously mentioned. Along the bottom of the sight angle scales is a scale of position angles.

Above the sight angle scales, are approximate data for dive bomber and torpedo bomber targets. For each of these types of target the data consists merely of one arbitrary value of sight angle which is set into the sights and used during the entire barrage.

At the bottom of the quadrant is a scale for setting in glide angle of the target.

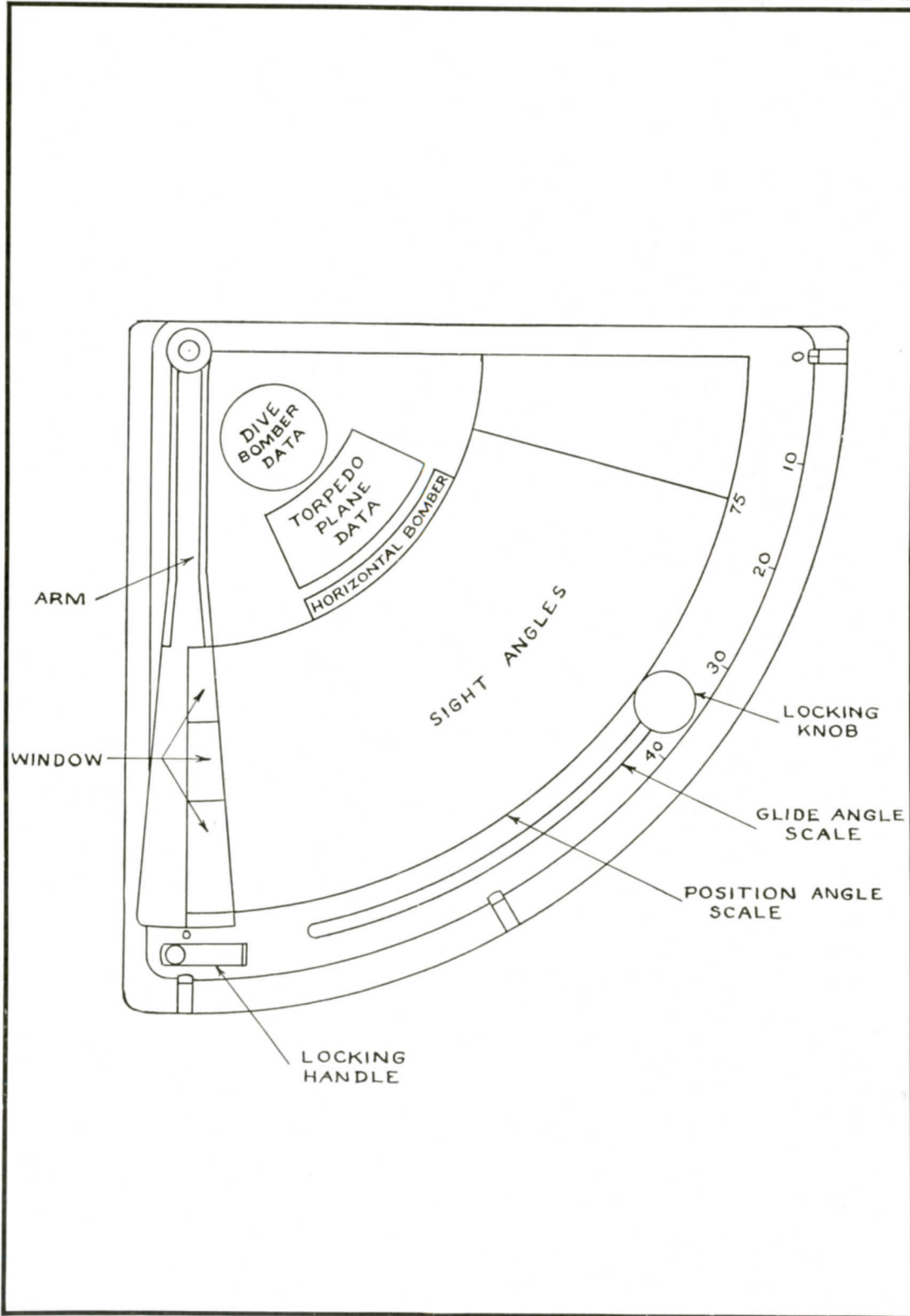


Figure 3

OPERATION

The operation of the computer is extremely simple. The control officer, or gun captain, observes the target and determines what fuze and class letter to use. Methods of determining these will be given in a later section of this pamphlet. He calls out a number and letter representing these two quantities. The pointer gets on the target and elevates the gun so as to keep his horizontal cross-wire on the target as it approaches. The sight setter observes the position of the arm on the computer and reads through the window of the arm the sight angle on the data plate which is opposite the proper letter and number on the arm. Thereafter, as the pointer keeps on the target and the gun elevates, he keeps changing the sight angle to agree with that shown on the plate opposite the proper point of the arm. The arm of course stands still, and the data plate moves under it as the sights elevate. Therefore the arm is always opposite the proper value of sight angle corresponding to the target elevation. The sight setter must constantly change the sight angle, cranking slowly so as to agree with the value on the plate as soon as he gets to the value. This is the only difficult part for the sight setter.

As long as the pointer tracks the target properly and the sight setter keeps the sights set to the proper value as shown on the quadrant the problem is theoretically solved and every burst should obscure the target; that is, should burst in the line of sight.

If the arm swings violently due to shock of gun fire or lurching the ship it must be steadied by hand.

If the bursts do not lie in the line of sight, the original determination of the class letter was wrong and the control officer should order a new letter. If the burst was low, order a new letter earlier in the alphabet. If the burst was high, order a new letter further along in the alphabet. As soon as one burst obscures the target the problem is theoretically solved and all bursts should thereafter lie in the line of sight.

The computer does not furnish any data for deflection. The deflection must be figured separately and put into the sights before firing. Then the bursts should be spotted directly onto the target in deflection.

DETERMINATION OF THE PROPER CLASS LETTER

Two methods are possible for determining the proper class letter. They are the tracking method and the spotting method. The tracking method is the most accurate and should solve the problem with the least number of rounds fired, but it can be used only when there is sufficient time to track the target for some time before opening fire. The spotting method must be used when there is not sufficient time to track the target before opening fire. The methods of performing the two methods are as follows:

Tracking Method. Have the pointer and trainer track the target. While tracking, measure the position angle of the target at any moment and then measure how long it takes for

the position angle to increase ten degrees. Position angle may be read off the position angle scale below the sight angle scales of the computer.

Each gun captain or control officer is furnished with a table, a copy of which appears as Table 1 in this pamphlet. Enter the table with the position angle at the beginning of the measurement and with the number of seconds required for position angle to increase 10 degrees, and take out the class letter from the top of the table. Commence firing with this class letter.

Spotting Method. Commence firing imme-

diately when the target is sighted, using class letter H, which is the central class. Then spot

the bursts onto the target by a change in class letter as explained above.

DETERMINATION OF THE PROPER FUZE SETTING

The computer supplies data for firing barrages with either of three different fuze settings. For the three inch gun these are 4, 6, and 8 seconds. It is necessary to determine just which barrage to use before opening fire.

The proper fuze setting depends on the range of the target. The range corresponding to each fuze setting is given in Table 2.

If some means of obtaining range is available the fuze setting can be easily obtained from the range. Each control officer should know the range corresponding to each of the three fuze settings. As soon as he finds out the range he knows to begin firing at that fuze setting which gives a range lower than the target range. Thus if on a 3 inch/50 caliber gun, he finds out that the range is 4000 yards he commences firing with a fuze 6 seconds

because the range is between the two ranges of 6 and 8 second fuzes.

In the majority of cases, however, no means of determining range will be available. Then the first barrage should be fired with the longest fuze setting, which it is estimated will produce bursts short of the target. If, while firing, it becomes apparent that the target has penetrated the barrage, the fuze setting should be changed to the next lower setting and firing continued. When changing to the next lower setting it is not necessary to change the class letter, merely change the fuze setting. Thus if you are firing a barrage of 8H and it is evident that the target has penetrated the barrage, the correct order is "6H. Resume firing," or "4H. Resume firing." Do not hold up fire while the fuze setting is being changed but continue to fire as fast as possible.

GLIDE BOMBERS

All of the above data is given for horizontal bombing targets. The engraved plate should be set at zero angle of dive under such conditions. However, the data shown on the plate is approximately correct for glide bombers. If the angle of glide is estimated at approxi-

mately 20°, set the engraved plate at 20° angle of dive and use as before. The important thing is to make all bursts cover the target. If using Tracking Method, to find the class letter, enter Table 1 with first position angle minus the angle of glide which is set into the computer.

DIVE BOMBERS AND TORPEDO PLANES

In firing a line of sight barrage at either a dive bomber or a torpedo plane, the problem is somewhat different from firing at a level or glide bomber. In the case of either the dive or torpedo plane, the target is attacking along the line of sight, so the line of sight remains fixed instead of moving as in the level bomber. Therefore the sight angle need not be changed as the target approaches, but may remain fixed. An approximate sight angle for each of these

two types of planes has been computed and engraved on the face of the computer.

If the target is diving at you, use the data shown in the small engraved circle in the upper left corner of the predictor. If the target is making a torpedo run, set data as indicated in the engraved square. This data is not exact and should be corrected by spotting when bursts appear. Never check fire to spot.

MOUNTING

The computer is mounted on the sight yoke of the gun by means of a mounting bracket which is behind the backing plate of the computer. This bracket cannot be seen in Figure 3. Two adjusting holes are provided so that the plate may be adjusted with respect to the bracket and hence with respect to the sight yoke. Minor adjustments should be made with shims.

The computer may be easily mounted by the ship's force. The mounting, particularly the two final steps, should be done while the ship is in very calm water, preferably anchored.

Figure 4 shows the computer properly mounted on a 3 inch/50 caliber gun. The process of mounting is as follows:

1. Adjust computer on sight yoke for most convenient position for sightsetter.
2. Make sure that no interference exists between the computer Mark 12 and the gun mount.

3. Using the computer mounting bracket as a template, drill the three mounting holes in the sight yoke. Care should be taken to have the long edge of the mounting bracket parallel to the axis of the gun.

4. Mount the computer on the sight yoke with the mounting bolts provided.

5. Boresight the gun.

6. With the sights kept on the horizon by the pointer, adjust the computer by means of the two mounting holes in the backing plate or shims under the mounting bracket until the pointer on the arm is at zero on the position angle scale.

The computer should now be ready for use. The only care it needs is an occasional oiling of the arm to keep it swinging freely. The arm should be kept in the locked position at the left side of the data plate when not in use.

DISCUSSION

Regardless of whether the Tracking Method or the Spotting Method is used it must be borne in mind that the objective is to establish a line of sight barrage in which every burst is intended to obscure the target. In any solution (assuming perfect pointing, sightsetting and fuze operation) wherein the first burst appears low all subsequent bursts will appear low, and they will continue to draw lower. The solution is to spot up to a higher line on the data plate. When one burst obscures the target, every succeeding burst should obscure the target if the target maintains course and speed. Any maneuvers of the target must be countered with an appropriate change of class letter. Thus it appears that either method will ultimately depend upon spotting.

In case it becomes impossible to get on the

target because the engraved data is all too high or too low, this situation may be corrected by altering the angle of dive on the computer to an arbitrary setting which will produce the desired results. This should be done with very small and cautious changes of angle of dive.

The computer is suitable only against a bomber target which is actually attacking your own ship. It has limited application only and should never be considered as a cure all for all the problems of gunnery. It will not solve the problem against bombers attacking some other ship. It will not solve deflection against a bomber target attacking your own ship. Deflection must be spotted separately and must be spotted directly to the target. Spotting drill is necessary for any gun's crew whether they use this predictor or not. All types of gun drill are

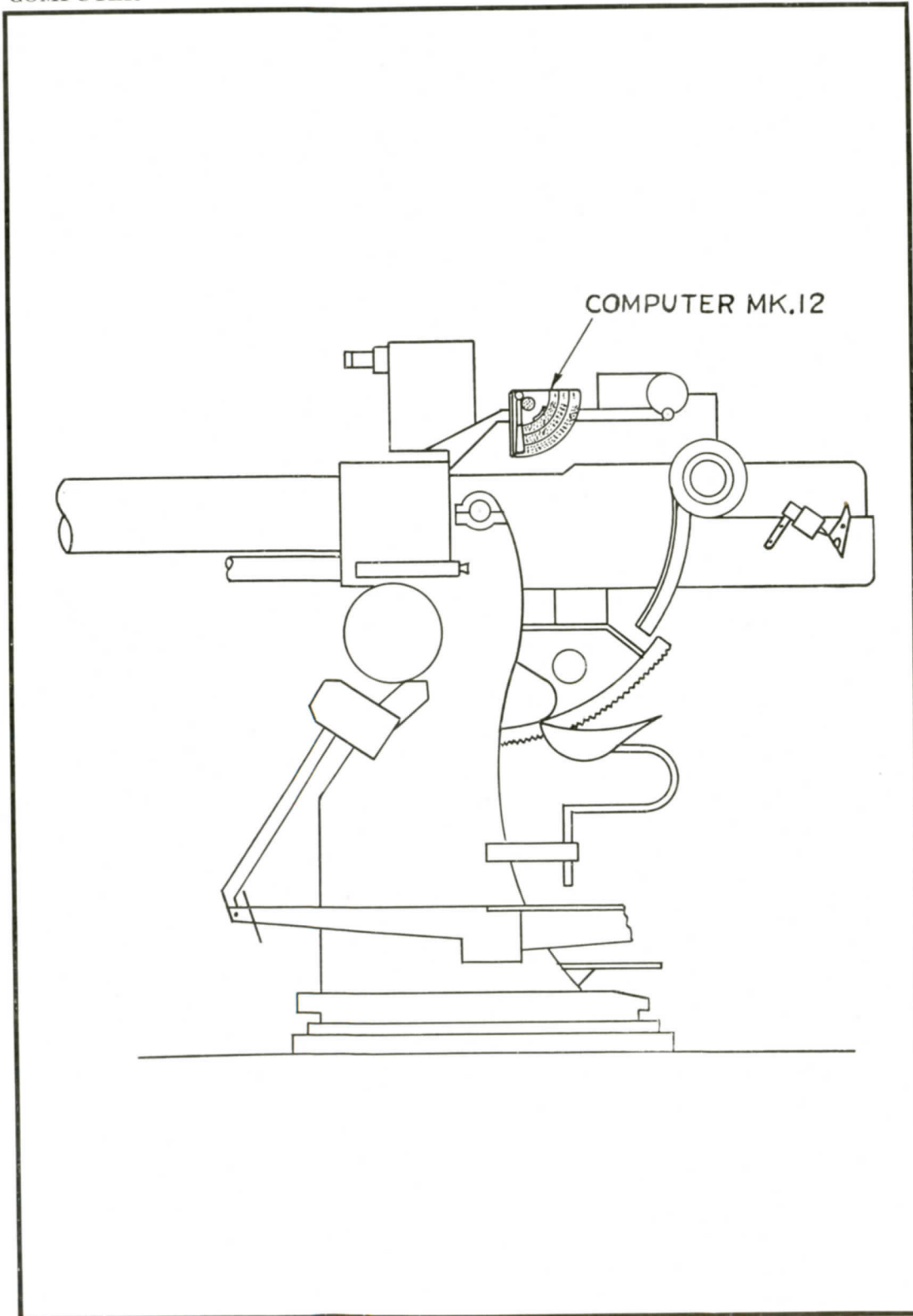


Figure 4

just as necessary as without the use of this unit. It will not solve the problem against a torpedo plane. It will not be of any value unless the sightsetter receives a great deal of drill in its use.

The computer solves the problem for targets having relatively high elevation rates. The rates chosen were values which it was believed might be met in battle against planes of modern design. In some cases the computer may not achieve a rate sufficiently low to effectively control fire against a very slow-moving high-flying target, for example a towed sleeve making 80 knots at 6000 ft. However, it will generally take care of plane speeds in excess of 100 knots. A burst target, now in popular use by auxiliaries of the fleet, has an elevation rate of approximately zero. The computer positively will not solve this type of fire. If used, it should cause the shots to go radically above the burst target. The autogyro and the balloon are about the only types of aircraft which can remain stationary in the sky. Military targets will normally have high elevation rates, and it therefore seems desirable to point out that the gun's crew which has spent all of its time firing on stationary targets is very likely to be baffled in action. Practice firing against towed sleeves

or towed flares is recommended at every opportunity.

Attention is invited to the following which should be stressed once more: When a target passes through one barrage, the proper procedure is to shift to a closer barrage, that is use ammunition with lower fuze settings. If you were firing successfully using an 8-H barrage with the bursts actually appearing on the line of sight to the target and possibly silhouetting the target and you decide to shift to a 4-second barrage, the proper procedure is to order 4-H resume firing. That is, the same class letter will apply in any of the three barrages. The class is a characteristic of the type of run which that particular target is making. It should be further noted that ships not mounting stereo antiaircraft rangefinders may experience considerable difficulty in determining when a target has transmitted the barrage. If you are positive that you can see bursts actually obscuring the target from your view, then the barrage is perfect and you should let it ride that way. If you are positive that you can see bursts silhouetting the target then the target is inside and your barrage has now become worthless. Bursts must be short in order to produce hits. If in doubt, come all the way in to the 4-second barrage.

DRILL PROCEDURE

The gun captain conducts the drill. He directs the pointer to follow some specific target or to elevate the gun at some suitable rate. He then orders a class letter and number. After ten or fifteen seconds he commands "Stop." Upon this command the pointer is required to stop elevating and the sightsetter is required to stop setting sights. The barrage sight angle data showing through the window of the pendulum is read and recorded. The existing sight angle set on the sights is also read and recorded. If the two figures agree within ten minutes the sightsetter is considered to have performed well. Continual practice will enable the sight-

setter to sense the proper rate at which to crank his dial to get a high score using any class letter. This drill should be held quite frequently, preferably three times weekly or oftener. It should be pointed out that the sightsetter can not be expected to have his eyes on the computer data plate and on his sights simultaneously. He must sense a certain rate at which to crank the sights in order to keep them matched against the data plate. His eyes should continually rove back and forth from sights to computer and he must continually check the two in order to insure that his hand is cranking the sight angle at the proper rate. Drill over a long

period of time on various ships of the fleet has established the fact that this procedure is practicable. Any sightsetter who continually exhibits an incapacity to solve the problem by arriving at a proper rate at which to crank his sight-angle hand wheel should be replaced by a person with quicker reflexes. It is doubtful that

there is any value in stationing one person to read and call off the sight angles, while a second person sets them. In fact, this procedure defeats one of the objectives sought in the design of the predictor, namely, extreme simplicity.

TABLE 1

3"/50 cal. AA Gun

TIME IN SECONDS TO INCREASE POSITION ANGLE 10°

First Pos. Ang.	Class Letter										
	A	B	C	D	E	F	G	H	I	J	K
10°	29	32	37	42	49	53	58	65	73	84	97
11°	25	28	32	36	42	46	51	57	64	73	85
12°	22	25	28	32	37	41	45	50	56	64	74
13°	20	22	25	28	33	36	40	44	49	57	66
14°	18	20	22	25	29	32	35	39	44	50	59
15°	16	18	20	23	26	29	32	35	40	45	53
16°	14	16	18	21	24	26	29	32	36	41	48
17°	13	14	16	18	22	24	26	29	32	37	43
18°	12	13	15	17	20	22	24	26	30	34	40
19°	11	12	14	15	18	20	22	24	27	31	36
20°	10	11	12	14	17	18	20	22	25	29	34
21°	9	10	12	13	15	17	19	21	23	27	31
22°	9	10	11	12	14	16	17	19	22	25	29
23°	8	9	10	11	13	15	16	18	20	23	27
24°	7	8	9	11	12	14	15	17	19	22	25
25°	7	8	9	10	12	13	14½	16	18	20	24
26°	6	7	8	9	11	12	13	15	17	19	22
27°	6	7	8	9	10	11	12	14	16	18	21
28°	6	7	8	9	10	11	12	13	15	17	20
29°	5½	6½	7	8	9	10	11½	12	14	16	19
30°	5½	6	6½	7½	9	10	11	12	13	15	18
31°	5	5½	6½	7½	8	9	10	11	13	14	17
32°	5	5½	7	7	8	9	10	11	12	14	16
33°	4½	5	6	6½	8	8½	9	10	11	13	15
34°	4½	5	5½	6½	7	8	9	10	11	13	15
35°	4½	5	5½	6	7	8	9	10	11	13	14
36°	4	4½	5	6	7	7½	8	9	10	11	13
37°	4	4½	5	5½	6	7	8	9	10	11	13

TABLE 2
Ranges Corresponding to Fuze Settings
3 INCH 50 CALIBER GUN

Fuze	Range
8 sec.	4650 yards
6	3800
4	2800

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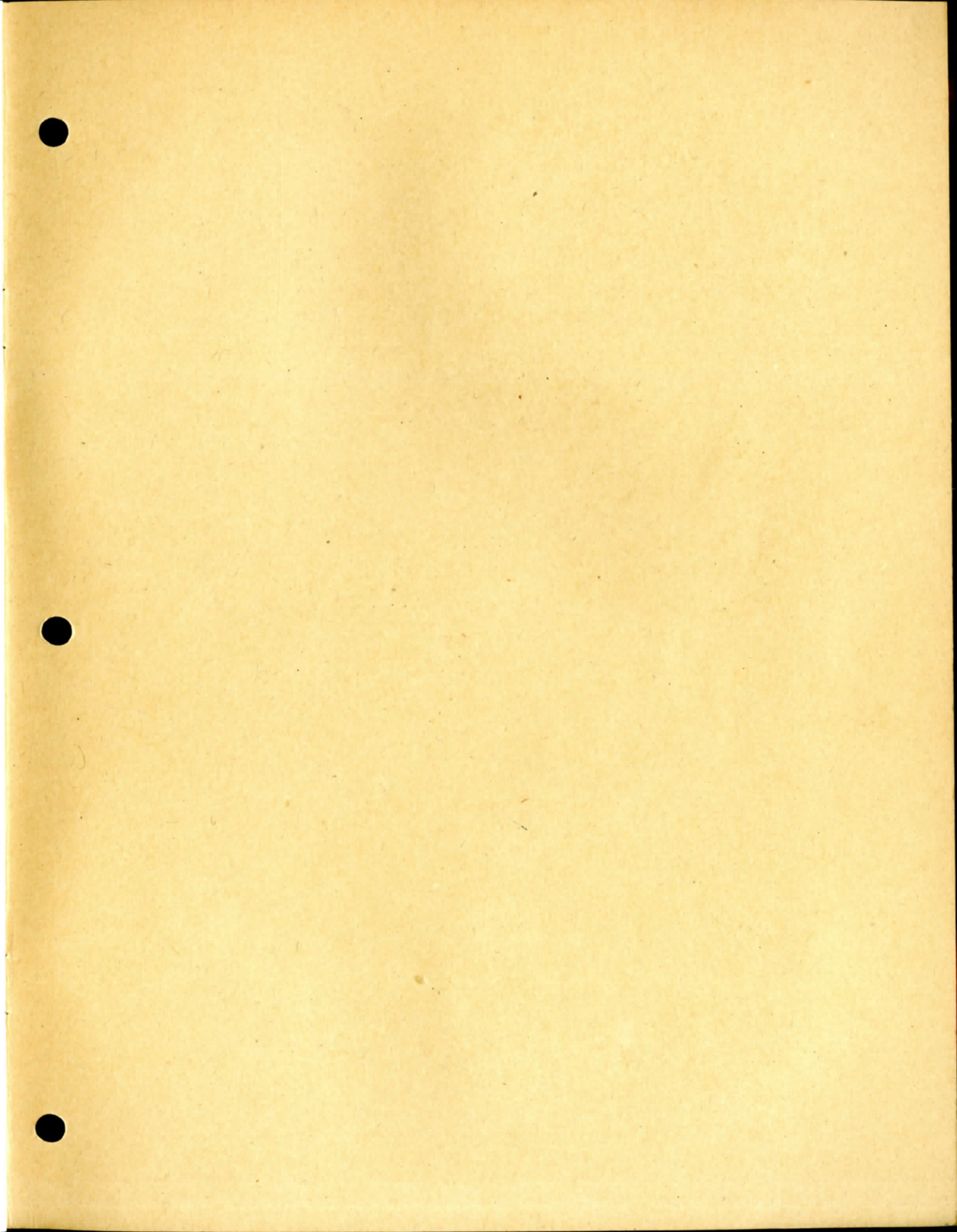
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NAVY DEPARTMENT
BUREAU OF SUPPLIES & ACCTS.
WASHINGTON, D. C.

COMPUTER MARK 12 MOD. 1

The Computer, Mark 12, Mod. 1 is a device which is mounted directly on the sight yoke of a 3 inch 50 caliber gun, and which furnishes the sight-setter of the gun with the proper values of sight angle to maintain a line of sight barrage on a horizontal or glide bomber that is attacking the ship on which the gun is mounted.

The Computer is designed to furnish sight angle only, for either a glide or horizontal bomber which is attacking your own ship. It will not furnish data for a glide or horizontal bomber which is attacking any other ship. It will not furnish data (except in a very approximate form) for a dive bomber or a torpedo plane which is attacking any ship. The Computer does not furnish any data for deflection. Deflection must be computed or estimated separately, and then the bursts spotted on in deflection.

The use of this computer requires no communication between the gun and any other point. Therefore it is suitable as a standby means of control on ships having directors, and as a primary means of control on ships having no directors.

1st order rec'd 8/25/43

<u>PRODUCTION</u>		<u>CONTRACT</u>	
1943	184 pcs.	8/25/43	Nord 4246 10,045
1944	<u>9,861</u> pcs.		
	10,045 "		

5 LIGHTERS, FUSE, WEATHERPROOF, M2

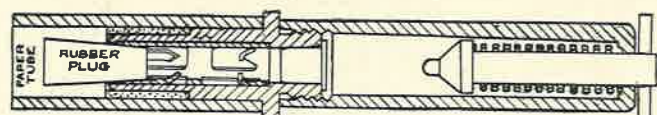


FIG. 1

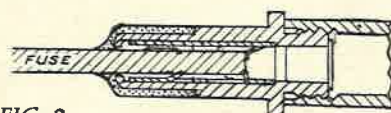
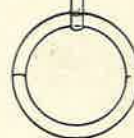


FIG. 2

FUSE MUST BE
PUSHED ALL THE
WAY IN OR ELSE
MISFIRES WILL
OCCUR



DIRECTIONS FOR USE

1. Remove paper tube.
2. Pull out rubber plug.
3. Cut off and discard 2 inches of fuse.
4. Insert freshly cut end of fuse in open end of Fuse Lighter (see Fig. 2).
5. Push fuse up hard and pull back with force of 3 to 5 lbs. to set prongs in fuse.
6. Work plastic sealing material into joint between fuse and fuse lighter.
7. Fuse Lighter is now ready to use. Pull ring to light fuse.

M2342

NOTE:—TO BE USED ONLY FOR FRONT LINE DEMOLITIONS OR UNDER ADVERSE WEATHER CONDITIONS.

THE ENGINEER BOARD

FORT BELVOIR, VA.

M2 FUSE LIGHTER

This is a firing mechanism for lighting a Bickford Fuse.
Being waterproof, it will ignite the fuse under water and it will
also light fuses at night without showing any flash or light. It
is generally used by demolition squads.

First order received 9/11/43

<u>PRODUCTION</u>		<u>CONTRACT</u>	
1943	- 5000 pcs.	9/11/43 - W44-009-Eng-17	5000
		5/8/44 P.O. 32677	1000
1944	- <u>8000</u> pcs.	6/5/44 P.O. 33146	2000
		10/18/44 P.O. 35733	<u>5000</u>
Total	13,000 "	Total	13,000

THE ENGINEER BOARD

FORT BELVOIR, VA.

M1A1 PRESSURE FIRING DEVICE

1st Order rec'd for 500 pcs. 10/25/43

This device is used in connection with the Anti-Personnel Mine or Booby Traps. It is the same as the M1 Pressure Firing Device but it has an extension attachment composed of three prongs in an adapter which permits better camouflage. This device is screwed into an explosive charge and concealed so that anybody stepping on it will detonate the charge.

PRODUCTION

1943

500 pcs.

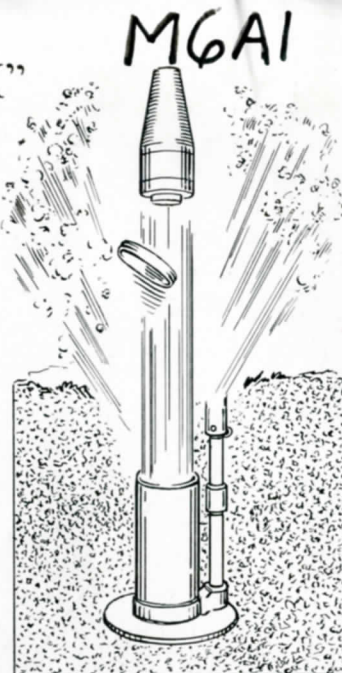
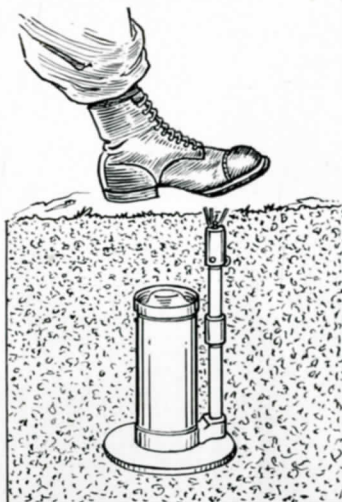
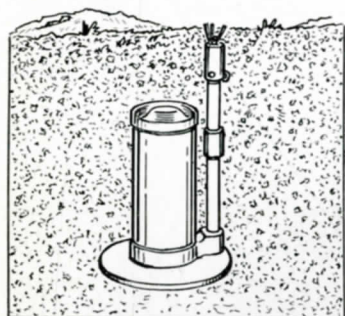
10/25/43

CONTRACT

28911

500 pcs.

THE G. I. CALLS IT A "JACK-IN-THE-BOX" —WE CALL IT "SUDDEN DEATH"

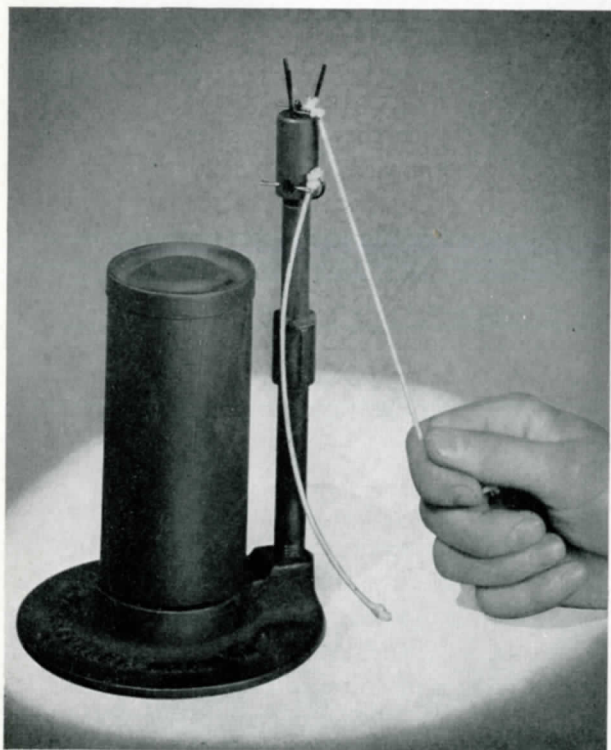


Pictured above is the action of an anti-personnel mine. This is just one of the many lethal devices developed by U. S. Army Ordnance experts to help our doughboys in their job of extermination. The fuse of this mine (see photo in lower right hand corner), like many shell fuses, is assembled with ZINC Alloy Die Castings.

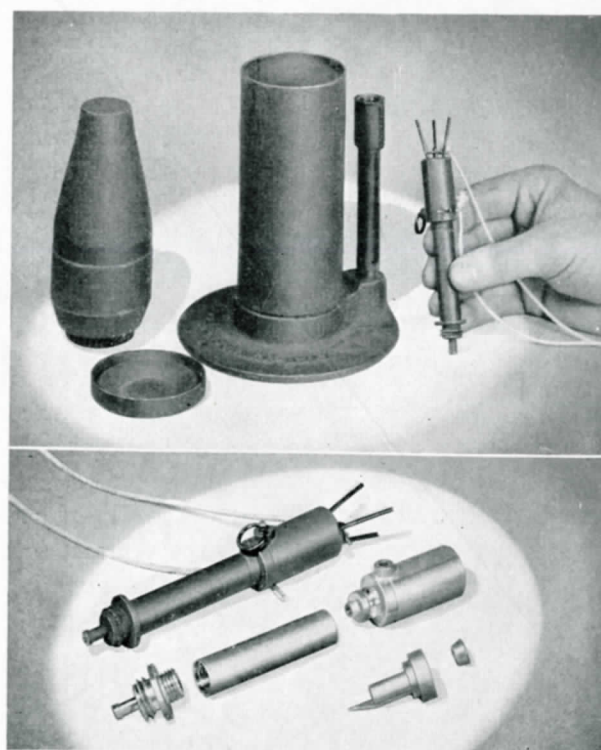
Actually, this is a combination land mine and booby trap, which accounts for the two cords shown in the photographs below. As a mine, it is detonated when any weight of over 15 pounds comes in contact with the prongs on the fuse which is buried

just below ground level. The fired projectile explodes about ten feet above ground, showering jagged steel fragments over a considerable area. As a booby trap, the device is concealed and is rigged up to detonate by contact with any object to which the fuse cord is attached.

Speed of production is the principal reason why ZINC Alloy Die Castings were specified for the fuse assembly of this mine. The complexity of design possible with die castings has reduced the required number of parts to a minimum—thereby eliminating many time-consuming machining and assembling



The complete anti-personnel mine



The mine and the fuse disassembled

M2



M6, M7

WAR DEPARTMENT
SPRINGFIELD ORDNANCE DIST.
95 STATE STREET
SPRINGFIELD, MASS.

M6 FIRING DEVICE

This device is used with the M2 Anti-Personnel mine. This mine ejects a shell about six or eight feet into the air and then explodes, throwing fragments in all directions. This firing device replaces Fuze Mine Anti-Persommel M2 and M3. During the course of M2 production a new design was developed which considerably improved the safety in handling this fuze and added prongs for better camouflage. The device worked by trip wire or by pressure, and the head swiveled so that trip wires in several directions could be used.

PRODUCTION

1944	2,007,400	pcs.
1945	1,667,400	pcs.
1945	<u>100,000</u>	pcs. unfilled
	3,774,800	

1st. order rec'd 11/2/44

11/2/43	W19-059 - Ord - 467 (was T12)	99,800
7/5/44	W19-059 - Ord - 1481	1,118,000
10/24/44	W19-059 - Ord - 2037(M6A1)	1,262,000
4/18/45	W19-059 - Ord - 2037	100,000
3/25/45	W19-059 - Ord - 1085	<u>1,195,000</u>
		3,774,800

WAR DEPARTMENT
SPRINGFIELD ORDNANCE DIST.
95 STATE STREET
SPRINGFIELD, MASS.

M7 FIRING DEVICE

This device is used in connection with the M3 Anti-personnel mine. This firing device replaces Fuze Mine Anti-Personnel M2 and M3. During the course of M2 production a new design was developed which considerably improved the safety in handling this fuze and added prongs for better camouflage. The device worked by trip wire or by pressure, and the head swiveled so that trip wires in several directions could be used.

<u>PRODUCTION</u>		<u>CONTRACT</u>			
1944	250,000 pcs.	11/2/43	W19-059	Ord 467	99,900 pcs.
1st order rec'd	11/2/43	3/25/45	"	"	1086 140,000
		7/5/44	"	"	1422 <u>10,100</u>
					250,000 "

WAR DEPARTMENT
SPRINGFIELD ORDNANCE DISTRICT
95 STATE STREET
SPRINGFIELD, MASS.

FUZE FOR MINE ANTI-PERSONNEL M3

This was formerly known as the M1 Combination Firing Device but later was changed to Fuze Mine Anti-Personnel M2 and M3. The device worked by trip wire or by pressure, and the head swiveled so that trip wires in several directions could be used.

Order received 11/23/43

	<u>PRODUCTION</u>		<u>CONTRACT</u>
1944	300,000 pcs.	11/23/43 W19-059-Ord-561	300,000 pcs.

Renovation of M3

	<u>PRODUCTION</u>		<u>CONTRACT</u>
1943	94,700	9/23/43 W19-059-Ord-378	131,900 pcs.
1944	<u>37,200</u>		
	131,900		

THE ENGINEER BOARD
FORT BELVOIR, VIRGINIA

T2A AND T2B PULL FIRING DEVICE

This was an experimental model slightly different from the T2 Pull. This device is used with anti-personnel mines and booby traps.

Order rec'd 12/6/43

PRODUCTION

1944 500 pcs. T2A
500 pcs. T2B

CONTRACT

12/6/43 29454 500 pcs. T2A
500 pcs. T2B

SAGINAW STEERING GEAR DIV.

SAGINAW, MICH.

For this firm we made hand guard liners used on the M1 Carbine.

(See description under Winchester)

PRODUCTION

1st order 12/8/43

1943	-----	31010	Hand Guard Liner
1944	-----	<u>121250</u>	" " "
		152260	

ORDER

PCS.

12/8/43	#241226	70296
2/7/44	#243118	56600
2/19/44	#243489	<u>25364</u>
		152260

SUMMARY OF
THE A. C. GILBERT COMPANY'S
ACCOMPLISHMENTS
IN 1943

In 1943 we manufactured and made shipments on the following war products on both prime and sub-contracts:

a. Army prime contracts

Firing Devices - Restricted and Confidential -
Mechanical and Anti-Personnel and Chemical -
about 15 different types.

Firing Pins

M26 Parachute Flares

b. Navy prime contracts

Computers - Restricted

Range Indicators - Restricted

Mk. 5 and Mk. 6 Parachute Flares - Confidential

c. Sub-contracts

1. Electric Trim Tab Motors for Airplanes for
Curtiss-Wright, Vultee and Grumman
2. Mechanical Trim Tab Motors for Airplanes for
Republic Aviation Corporation
3. Parts for Sperry Gyroscope for Waterbury Clock Co.

4. Gun parts for

High Standard Manufacturing Company
Colt's Patent Fire Arms Mfg. Co.
Winchester Repeating Arms Co.
Brown-Lipe Chapin Div. of General Motors
International Business Machines Co.

5. Firing Device parts for

Essex Corporation
Geometric Stamping Co.
U. S. Flare Corp.
Ocean City Mfg. Co.

6. Airplane parts for

The M. B. Manufacturing Company
Union Parts Mfg. Co.

- ///
~~4/2~~
3. Quality, Quantity, Achievement and Efficiency in production.
Inventiveness, Development and Cooperation.

FIRING DEVICES FOR ACTUATING LAND AND WATER MINES -

BOOBY TRAPS AND INCENDIARIES

These items are either secret, restricted, confidential
or classified

The A. C. Gilbert Company were the first in America to manufacture, in quantities, devices of these types for the U. S. Army, Engineers, and for Lend-Lease. Some of these devices were copies of British and 90% of them were redesigned and engineered by The A. C. Gilbert Company, while others were of our origin and design and all have met with critical military tests.

The features which are incorporated in these devices are:

- a. Safety in setting out by the Soldier with explosives.
- b. Simple construction but fool-proof.
- c. Elimination of critical materials.
- d. Reduction of weight where practical and reduction in cubic inches per item.
- e. Simple and fewer parts to increase man hour production.
- f. Construction and design to lend itself to our present set-up and machinery.

Out of over 16 million devices which we have manufactured up to January 31, 1944, there has not been one single piece rejected by any branch of the Government. This has taken skilled and trained personnel and engineers to develop. Our Engineering section is working on many other devices at this time which may or may not be accepted. Production obstacles have been overcome and the best proof is that we have not been shut down a single day since we started making Firing Devices. Whether the problem involved materials or labor, it is our policy to rush expeditors to any part of the United States where there is a bottleneck.

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PULL TYPE FIRING DEVICE M-1

PRESSURE TYPE FIRING DEVICE M-1

In the early part of 1942 we were invited to bid on 10,000 each of these devices thru Capt. Erhardt of the Engineer Board, Fort Belvoir, Va. The drawings from which we were to work were of British origin and the devices were to be made entirely of brass. We revamped both the Pressure and Pull type by changing the firing mechanism. This was submitted to the Engineer Board and the changes were accepted by them. These devices were delivered within the time limit set by the Engineer Board. We have since received orders and made deliveries in 1943 of approximately 5,000,000 pieces and on time. During the manufacture of the above devices, in order to save critical materials, we engineered and designed both the Pull and Pressure type Firing Devices to Zinc die castings instead of using brass. By re-designing, we saved material and many hours of production. We cut down the cubic content of the shipping cartons and the weight per piece.

Our first order for this die-cast device was for 685,000 each of the devices. Many special features have been added to these devices over the old type of Firing Device such as additional safety features, also the device has been engineered to fire under water by introducing the waterproofing of the base. At this particular time we are contemplating on doubling our production.

COMBINATION FIRING DEVICE M-1

Sketches of a Firing Device were submitted to us by the Engineer Board. This device was designed to be used only as a Pull Firing Device and it was to actuate an M-2 Personnel Mine. Thru our engineering efforts we made up a sample of a so called Combination Firing Device which could be fired either by a Trip Wire or by the pressure method of stepping on it or other means of pressure. This was submitted to the Engineer Board at Fort Belvoir and was accepted by them. This particular device was made entirely of brass. Our first order thru the Engineer Board was for 500 pieces which were sent to the Picatinny Arsenal for try-out with the M-2 Personnel Mine. This was followed by 150,000 more devices thru the Engineer Board. This entire quantity was delivered during the time that we were in production on this quantity we re-designed it so that it could be made out of zinc die cast alloy and steel, eliminating the use of brass. This reduced the price and also made it possible to increase production per man hour and subsequently, thru the Springfield Ordnance District, we were invited to bid and received orders for more than 5,000,000 of which more than 2,500,000 were delivered in 1943 and on time.

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PULL TYPE FIRING DEVICE T-2

(Now known as M2 Friction Pull)

We have engineered and designed, in collaboration with the Engineer Board, a T-2 Pull Type Firing Device which is made entirely from plastic and steel, eliminating many of the critical war materials. The other features are that it is an item small, compact and is very light in weight. Another feature is that this device cannot be picked out by detectors on the Mine Fields. A complete set of tools have been built for this device and we have received trial orders for about 20,000 of these units which have been built and the Engineer Board has carried out tests and experiments on these devices. This device does not use a regular primer cap but is actuated by pulling a wire coated with red phosphorus thru a powder pellet and igniting of same. We thought this Device was too dangerous to manufacture here but we aided the Engineers in locating a facility who has obtained an order and we are supplying some of the parts and lending Engineering assistance Free.

PRESSURE TYPE FIRING DEVICE T-2

The Engineer Board submitted samples of a British Firing Device and asked that we modify and refine and also build samples for them. The first nine samples were hand made by our model makers and were submitted to the Engineer Board at Fort Belvoir. In general, we re-designed the entire firing mechanism and designed the device so that they could be made at a lower price and also to eliminate man hours. The device was constructed of zinc die cast metal and steel. We have made a complete set of production tools, have delivered the first 1000 and tests and experiments at the Engineer Board, Fort Belvoir, Va. have been completed.

IMPULSE ACTUATED SELECTIVE DELAY FIRING DEVICE

We were asked by Major P. L. Christensen, Chief of Ordnance, Technical Division, Ammunition Branch, Pentagon Building, Washington, D. C. to build one 30 Impulse Firing Device. This sample has been engineered and produced by us and submitted to Major Christensen. He was very much pleased with this device and its operation and he has also taken it to Capt. Erhardt and several others for their criticism and extensive tests. A quantity has been made for the Office of Strategic Services.

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A 1 - No. 6 PRESSURE SWITCH
(Now known as A 2 - No. 6)

We have built production tools for this Device which has been modified from a British device. We have a production order for these Devices thru the Office of Strategic Services. A number of changes were made and have the approval and cooperation of Major Sam Lucy of the Office of Strategic Services.

A 1 - No. 6 RELEASE SWITCH

We have completed a large order for these Devices from the Office of Strategic Services and were on time with their schedule.

CONCUSSION DETONATOR

We were invited by Capt. F. L. Fritsche of the Engineer Board, Fort Belvoir, Va. to build a very confidential, secretive Firing Device which is to be actuated under water. This was engineered and designed by our Engineering Dept. in three days and we produced five sample Devices, all of which were shipped by Air Mail, Special Delivery to Fort Pierce, Fla. on Wednesday, April 28th, 1943. This, in itself, is an engineering feat, as other concerns had been working on this item for several weeks with no results. Since the first five samples were built, this job has been redesigned and we have manufactured 1000 Devices which have worked most satisfactory from a functioning standpoint.

CHEMICAL DELAY FIRING DEVICE M-1

We were asked by Capt. Erhardt of Fort Belvoir, Va. to build samples similar to the Signal Relay and convert them to the United States Engineering Standards. These samples were to have the standard base which holds a primer so they could be used on all standard explosives by the United States Army. Samples were submitted to Fort Belvoir, were accepted and we were invited to bid on 1,800,000 pieces. Since receiving and completing the 1,800,000 order, we have manufactured another million in 1943 and on time and currently in 1944 we are manufacturing another 2-3/4 million pieces.

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FUZE IGNITER FOR BOSTON CHEMICAL WARFARE

We were asked by Dr. Herschberg of the Chemical Laboratory, Harvard University to build samples of a Fuze Igniter, 600 pieces in all. This is a take-off on the O.S.S. Chemical Delay M-1. These 600 pieces were engineered and manufactured by us in three weeks. The devices were tested by Dr. Herschberg and turned over to the Chemical Warfare Service of Boston who in turn placed an order with The A. G. Gilbert Company for 400,000 pieces. On the first of March, 1943, Capt. John S. White of the Boston Chemical Warfare discussed with us the possibilities of producing 25,000 of the devices in March. By getting out of the warehouses in and around Connecticut and by borrowing some of our parts made for other devices and by improvising some of our tools we were able to meet these requirements. The entire contract has been completed and on time.

SPECIAL TIME DELAY UNIT

On April 13, 1943, Dr. Herschberg of Harvard discussed with us the possibilities of engineering and producing 16,000 special devices. This we agreed that we could do and have them ready for him by May 1st. The purpose of this device is to cut down the use of critical materials and lessen the weight yet to perform its so called duty. We have completed the necessary tools and have completed their requirements and on time. This device is of a very confidential nature.

PULL RELEASE TYPE FIRING DEVICE M-3

On October 23, 1942, we designed a Pull and Release type Firing Device in collaboration with Capt. Erhardt of Fort Belvoir. The first sample was submitted to the Engineer Board, Fort Belvoir, Va. on November 28, 1942, and on December 1, 1942, we were given the go-ahead to make up a set of drawings and also to start tools and make preparations to accept an order for 1,000 pieces which was to be a sample run. These devices were furnished in the early part of 1943 and now we have orders for 100,000 devices.

RELEASE TYPE FIRING DEVICE T-5

On June 23, 1943, we were asked to design a small release type Firing Device for the Engineer Board. This was engineered by us in collaboration with J. P. Roysdon of the Engineer Board, Fort Belvoir, Va. 500 samples were made up, drawings completed, and since that time it has been put in our hands to do more engineering on this device. It is classed as critical and we have completed all orders under the new specifications. This particular device was designed so that there would be a saving of material and to use Stamping Presses instead of Screw Machines which are difficult to find open capacity on.

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4 WAY FIRING DEVICE

This was engineered by us in collaboration with the Engineer Board, Fort Belvoir, Va. It was recommended by the Corps of Engineers, Technical Committee, whereas they had given the approval of development under sub-project #IM 296F Firing Device, M1 and Combination Pressure, Pull and Release Type. They had suggested here a 3 way Firing Device, but through our Engineering we actually developed a 4 way Firing Device, meaning Pressure, Release Pressure, Pull and Release Pull. Samples have been made of this device.

COMBINATION MINE FUZE T12, T13, T14

T12E2 - T13E2
Now M-6 - M-7

This device again was engineered by us in collaboration with Capt. Erhardt, the Engineer Board, Fort Belvoir. On July 29, 1943 samples were submitted to Picatinny Arsenal, Aberdeen Proving Grounds; and to the Engineer Board at Fort Belvoir. This later was adopted by the Ordnance Department and we were requested by them to make drawings on Ordnance forms and we were given an order to make 500,000 pieces and told to proceed with the tools. The tools have been finished and we are now starting on the half-million schedule and are on time altho many changes have occurred. In the meantime we have additional orders for well over 1,000,000 pieces and more to come.

M2 WEATHERPROOF FUZE LIGHTER

In August, 1943, we engineered and developed a Fuze Lighter in collaboration with Mr. J. P. Roysdon of the Engineer Board, Fort Belvoir, Va. The development in engineering took us 30 days and at the end of that time we were given an order for 5,000 pieces by the Engineer Board, Fort Belvoir. This was toolled up and the 5,000 pieces were completed inside of 6 weeks from the date of the order. This is the only weatherproof fuze lighter that has been made in this country. We now have orders for 6,250,000 of these devices.

M-1A1 PRESSURE TYPE FIRING DEVICE

This particular device is a take-off of the M1 Pressure Type Firing Device. Through our type of manufacture we were able to convert this into a M-1A1 Firing Device, or generally known as a prong type Firing Device, with very little tool cost and development work for the U. S. Engineers. We have an order at this time for 2,500,000 pieces.

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T-3 RELEASE TYPE FIRING DEVICE

In 1943, in collaboration with Mr. J. P. Boysdon of the Engineer Board, Fort Belvoir, Va., we engineered and designed and developed a new Release Type Firing Device made out of stamped metal which saved Screw Machine operations and reduced the cost. 500 samples were made and sent to Fort Belvoir. Results of tests not known.

We are also working on, experimentally, the Teller Mine Dummies in collaboration with the Engineer Board, Fort Belvoir, Va. and the Bugmaster for OSS.

All inventions or features made by The A. C. Gilbert Company in connection with Firing Devices that may be patentable, have been offered to the Government Free, without seeking patents.

I hope that the preceding description of some of our functions in the Development, Engineering, Designing, Planning and Production of critical and Highly Urgent and Restricted Firing Devices will emphasize our efficiency and inventive and developmental ability and cooperation to several governmental services as well as to other contractors and sub-contractors in lending technical assistance and in our having made a real contribution to the war effort.

We believe that we have designed or helped to design the major portion of the Firing Devices used by our Armed Forces as well as some of our Allies and that we are probably producing 80% to 90% of all the Firing Devices used in the war effort.

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1943 SUMMARY FIRING DEVICES

OPEN ORDERS and MADE and REJECTION RECORD

	<u>No. of Orders</u>	<u>QUANTITY Pieces Ordered</u>	<u>Quantity Delivered in 1943</u>	<u>Open as of Feb. 1, 1944</u>	<u>Rejects</u>
Engineers, Fort Belvoir, Va.	18	200737	200737	0	0
Engineers N.Y. & Boston	10	7,558,820	6,851,400	817,420	0
Springfield Ordnance District	7	<u>4,519,800</u>	<u>2,669,800</u>	<u>1,850,000</u>	<u>0</u>
		12,389,357	9,721,937	2,667,420	0

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VOLUNTARY PRICE REDUCTIONS
 BY THE A. C. GILBERT COMPANY
 Resulting in many thousands of dollars in
 Savings to the U. S. Government and the Taxpayer
 occasioned by increased efficiency and economical
 handling of materials, workers and general management.

		Item	Quantity pcs. Ordered	Price each	Savings Passed on to Government Voluntarily by The A.C.Gilbert Co.
10/19/42	W1128-eng-424-NY 4066	M-1 Pressure	685,350	.397	
2/25/43	W1097-eng-3641 NY 6336	"	685,350	.34	\$39,064.00
4/21/43	W1098-eng-3721 NAD 1080	"	583,000	.333	37,312.00
			1,953,700		
10/19/42	W1128-eng-424 NY 4066	M-1 Pull	685,350	.503	
2/25/43	W1097-eng-3641 NY 6336	"	685,350	.44	31,457.00
4/2/43	W1098-eng-3721 NAD 1080	"	707,000	.433	49,490.00
8/30/43	W30-082-eng-(MSP)-783	"	917,420	.40	94,494.00
			2,995,120		
10/26/42	W1128-eng-438 NY 4182	M1 Chemical Delay	1,600,000	.47	
1/28/43	W1097-eng-3453 NY 5665	M1 Delay	200,000	.46	2,000.00
4/21/43	W1098-eng-3721	" "	920,000	.39	73,600.00
			2,272,000		
	Totals				
			7,668,820		\$327,417.00

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VOLUNTARY PRICE REDUCTIONS (Cont'd).

<u>Springfield Ordnance District</u>		<u>Item</u>	<u>Quantity pieces Ordered</u>	<u>Price Each</u>	<u>Savings Passed on to Government Voluntarily by The A.C. Gilbert Co.</u>
7/31/42	W-478-Ord-2175	M-1 Comb. Firing Device	600,100	.63 on 1st 400,100) .648 on last 200,000 because) of design change)	
9/28/42	W-478-Ord-2410	M-1 Comb. Firing Device	500,000	.63 on 1st 435,000) .644 on last 65,000 because) of design change)	
1/20/43	W-478-Ord-3174	M-2 Fuze Anti-Personnel	400,000	.55-2/3	\$36,560.00
5/31/43	W-478-Ord-3858	M-1 " " "	600,000	.46	112,000.00
8/4/43	W-478-Ord-3887	M-2 " " "	1,060,000	.42	241,680.00
9/1/43	W-19-059-Ord-54	M-2 " " "	1,430,000	.42	326,040.00
11/23/43	W-19-059-Ord-561	M-3 " " "	300,000	.44	62,400.00
			4,890,100		\$778,680.00
Grand Total (Pages 13 and 14)			12,558,920		\$1,106,097.00

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FIRING PILES - for Boston Chemical Warfare Service

	<u>Orders</u>	<u>Delivered</u>	<u>Balance</u>
8/4/42 W1302-CWS-368	276,000	276,000	0
3/26/43 W1302-CWS-368	450,000	450,000	0
5/3/43 W1302-CWS-368	<u>445,000</u>	<u>445,000</u>	
	1,171,000	1,171,000	

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M-26 Parachute Flares

	<u>Ordered Pieces</u>	<u>Delivered Pieces</u>	<u>Open at end of 1943 but since Delivered</u>	<u>Price each</u>	<u>Voluntary Savings by The A.C. Gilbert Co. to the U. S. Government and Taxpayer</u>
Former price on Contract No. W-478-Ord-1376				\$ 54.47	
Contract No. W-478-Ord-1479					
Balance undelivered Feb. 1, 1943	1,116	1,116		48.92	\$ 6,194.00
Contract No. W-478-Ord-1896	11,463	11,463		46.83	87,517.00
Contract No. W-478-Ord-3731	10,960	10,960		37.96	180,949.00
Contract No. W-19-059-Ord-43	7,850	6,010	1,840	35.50	<u>148,914.00</u>
				Total	\$429,212.00

80 Flares rejected for Retest and Rework representing

29,449 Flares made and accepted.

Total Rejects - 1/4 of 1%

122

In part of 1942 and all of 1943 we were considered essentially Parachute Flare manufacturers and we purchased a large tract of land in Branford on account of the hazardous nature of the Flares. We erected a number of buildings and purchased various needed machines.

We were asked to produce in 1943

	<u>Value</u>
106,116 Parachute Flares	\$4,609,112.20
74,727 " " were cancelled	\$3,316,130.00

which indicates the hazards of expanding and indicates losses and risk that follows terminations.

This situation caused us to convert again. First we converted from Toys, Fans, Appliances, etc. to Flare manufacturing. Then we had to re-convert to a Firing Device manufacturer. The Land, Buildings and most of the machinery was of no value to us in producing Firing Devices.

The change over was made with a minimum of confusion which, I think, is a credit to the management.

MARK 12 - MOD. 1 - COMPUTER FOR NAVY

This device was an idea of an individual in the Navy who, thru the Bureau of Ordnance, presented the idea to The A. C. Gilbert Company and our Engineering Department designed, engineered and developed this Device within two weeks. The A. C. Gilbert Company made the drawings, specifications and the model all of which were accepted by the Navy. We have since received an order for 10,000 pieces and delivered same on time. Rejections - None.

ANTI-AIRCRAFT RANGE INDICATOR FOR NAVY Restricted

This device was never made in America previously. There was an English design. In collaboration with the Navy we designed a new Range Indicator, so that it was suitable for use in our Navy. In this re-designing we saved the United States Government approximately \$8.00 to \$10.00 per device as against what they expected to pay, or a total savings of \$785,825.00. These accomplishments can be checked with Lt. Comdr. Rose of the Navy Department in Washington.

Excerpt from report of our representative in Washington:

"The Officers of the Ordnance Section of the Navy as well as Engineers in the Technical Division, are most gratified and have commended us on the appearance, as well as the mechanism of the Range Indicators."

<u>RANGE INDICATORS</u>	<u>ORDERED</u>	<u>DELIVERED IN 1943</u>	<u>REJECTED</u>	<u>PRICE REDUCTIONS</u>
Contract No. NXo 16539	100,000	69,663	0	From \$2.98 to \$2.54
Contract No. NORD 4507	57,165	12,480	0	\$2.54

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-125-

SUMMARY OF PRICE SAVINGS
TO THE UNITED STATES GOVERNMENT
AND TAXPAYER

Due to Engineering, Design and being a low cost
Producer and increased efficiency - as outlined
in preceding pages

Engineers

Savings passed
on to the
Government
voluntarily
by The A.C.
Gilbert Co.

Contract No. W1097-eng-3641	NY 6336	\$ 39,064.00
W1098-eng-3721	NAD 1080	37,312.00
W1097-eng-3641	NY 6336	31,457.00
W1098-eng-3721	NAD 1080	49,490.00
W30-082-eng-(MSP)-783		94,494.00
W1097-eng-3463	NY 5665	2,000.00
W1098-eng-3721		73,600.00

SOD

Contract No. W478-Ord-3174	36,560.00
W478-Ord-3858	112,000.00
W478-Ord-3887	241,680.00
W-19-059-Ord-54	326,040.00
W-19-059-Ord-561	62,400.00
W478-Ord-1479	6,194.00
W478-Ord-1896	87,517.00
W478-Ord-3721	180,949.00
W-19-059-Ord-43	148,914.00

NAVY

Contract No. NXo 16539	44,000.00
NORD 4507	25,152.00

Total \$1,598,423.00

Being a low cost producer we are continuing to voluntarily reduce
prices to the benefit of the United States Government and the Taxpayer in our
pricing of war contracts for the year of 1944.

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When we took on the contract we assumed the Flares were properly designed but subsequently we found that the Flares required more experimental work and constant attention of one or more engineers and also necessitated the reworking of thousands of Flares which was not known or considered when we figured costs and we still have a risk evident for the completion of the contract.

<u>MARK V NAVY FLARES</u>	<u>ORDERED</u>	<u>DELIVERED</u>	<u>REJECTIONS FOR REWORK OR RETEST</u>
Contract 3111A	40,000	40,000	150 representing 40,000 Flares

<u>MARK VI NAVY FLARES</u>	<u>ORDERED</u>	<u>DELIVERED</u>	<u>REJECTIONS FOR REWORK OR RETEST</u>
Contract 3111A	40,000		450 representing
Cancelled	<u>21,627</u>		13,856 Flares
Total of Contract Now	18,373	13,856	

The cancellation of 21,627 pieces of Mark 6 Parachute Flares valued at \$1,311,461.28 by the Navy, because they are not needed in the war program, with resultant non-use of land and facilities built for the hazardous work of making Flares, indicates the financial risk involved in manufacturing Flares.

This fact, coupled with the long wait for tests through lack of adequate testing facilities by the Government increased the attendant risk way beyond anything The A. C. Gilbert Company expected or experienced in our civilian type of manufacturing.

ELECTRIC TRIM TAB MOTORS FOR AIRPLANES for Curtiss Wright

In early December 1941 we received a telephone call from Mr. Coleman of Curtiss Wright of Buffalo, asking us if we could make an electric motor to operate a trim tab on a P-40 Curtiss Wright Fighter. He had been experimenting with motors for a period of time and they did not function correctly. We immediately sent our Chief Engineer, Mr. Frisbie, by plane to Buffalo, who analyzed their problem and returned to the factory. Within 72 hours we designed and perfected, working day and night, a motor which Mr. Frisbie flew back to Buffalo with and, after putting the motor through vigorous tests, it was approved as being perfect for the job intended. Within five weeks we toolled up the job, our expeditors got the material in the plant, put the job into production and started deliveries.

Since then this motor has been adopted by Grumman, and Vultee and with slight changes a total of 28,081 have been manufactured to date; 41 have been rejected.

Prices have been voluntarily reduced from \$7.00 to \$5.94 by The A. C. Gilbert Company saving the Government and the Taxpayer several thousand dollars, reflecting our ability as a low cost producer.

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~~21~~

MECHANICAL TRIM TAB
for Republic Aviation Corp.
P47 Thunder bolt

After completing the dies and fixtures on this job, we submitted the first samples to Republic for approval. While these were built in exact accordance with the drawings and specifications, they did not meet their approval due to the fact that they had not allowed close enough tolerances on certain parts. It was, therefore, necessary for us to hand fit many of the pieces which we had planned to assemble directly from the machining. This hand fitting proved to be such a laborious job that it was impossible for us to meet the production requirements.

We then proceeded with an experimental model incorporating our own ideas which eliminated the hand work. This was very acceptable to them and the tool changes, due to the new design, were made at their expense.

Due to inherent troubles with the plane on which this unit was to be used, they required extremely accurate pointer calibration which was impossible to obtain with the tolerances allowed on the specifications. We again went to work and designed a spring take-up on this pointer which entirely eliminated the objectionable backlash. This change was accepted and put into effect.

This job has been an extremely difficult one due to the exacting requirements of Republic and the Air Corps and it was necessary for us to keep at least one of our top engineers constantly on this job, plus several expeditors.

ORDERED

8703

SHIPPED

6581

REJECTED

22

- Which may have
been the result
of misuse after
being received.

As a low cost producer we have been able to reduce prices 8% voluntarily.

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PARTS FOR SPERRY GYROSCOPE

(United States Time Corp.)

On these parts, they tried to get other concerns to do this work but without success. We eventually took the jobs over and made these parts successfully in large quantities and have met the schedules as outlined by them.

30 and 50 CALIBRE GUN PARTS.

for: High Standard Mfg. Co.
Colts Patent Fire Arms
Winchester Repeating Arms
Saginaw Steering Gear
Brown-Lipe-Chapin Div.
International Business Machines

Since 1940 we have been making Gun Parts for High Standard and others. We started to supply these parts prior to Pearl Harbor and have been, since that time, the only source of supply for High Standard Mfg. Co.

More than 10 million pieces have been ordered and shipped, with less than 1/2 of 1% rejections.

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4. Accomplishments which we believe qualify us for consideration as to obtainance of a reasonable profit.

(a) Price reductions and comparative prices. (See summary after each prime contract and sub-contract).

(b) Efficiency in Reducing Costs

- (1) Rewards to individuals for suggestions
- (2) Foremanship pay based on
 - (a) Indirect labor saving per dollar of direct labor
 - (b) Materials saved
 - (c) Percentage of operators on piece work
 - (d) Cost of tool and machinery repairs
 - (e) Savings in cost of new tools and repairs by reducing average hourly operating rate through bonus incentive
- (3) Supervisors' bonus pay based on volume of production
- (4) Individual and group bonuses
- (5) Mass production methods on conveyors, groups of machines and unit assemblies
- (6) Redesigning of firing devices, Flares, mechanical trim tabs and other units has meant not only a greater saving in materials, but man hours.
- (7) See description of each individual prime and sub-contract for results where determined.

(c) Economy in the use of raw materials. (Refer to description of prime and sub-contracts, where reference to material savings is made, but we do want you to know that on the following orders for M-1 Combination, M-1 Pull and M-1 Pressure Firing Devices, when we changed specifications, a saving of several million pounds of brass has been made to date.

(d) Efficiency in the use of facilities and in the conservation of manpower.

- (1) We have used most of our regular peace time machinery and equipment for our war work.
- (2) Some has been utilized only after somewhat costly changes.
- (3) Combination dies, ingenious assembly fixtures, special jigs and mass conveyor methods with incentives for every operator for greater production has brought down costs and manpower to the minimum.
- (4) I feel that the biggest achievement of The A. C. Gilbert Company has been in the training of women to take the place of men who have gone to war. We were farsighted enough to see the acute shortage of manpower, and very early in our conversion from civilian to war work, started an intensive program of teaching women to operate drill presses, lathes, power presses, large welding machines, screw machines, and do other mechanical work. Women are doing most of the trucking and handling of materials. We point with pride to the fact that there are now employed in this important war work approximately

1141 Female Productive Operators - 87%

174 Male " " 13%

Total 1315

Before the war - approximately

600 Females - 60%

400 Males - 40%

Total 1000

- (5) We were the first in our State to use women for Military Police.

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(e) Character and extent of sub-contracting.

Below is a list of the principal sub-contractors we have used for production on various war items including Flares, Firing Devices, Signal Relays, Range Indicators, etc.

<u>COMPANY</u>	<u>PART</u>	<u>CONTRACTUAL OBLIGATIONS</u>
Humason Mfg. Company Forestville, Conn.	Firing Device Springs	\$422,000.00
Nixon Nitration Works Nixon, N. J.	Flare Parts	52,000.00
McAleer Mfg. Company Rochester, Mich.	Flare Parts	88,000.00
Essex Specialty Co. Newark, N. J.	Flare Parts	12,500.00
H.P. & E. Day Co. Seymour, Conn.	Firing Device Parts	397,000.00
United Wallpaper Factories Chicago, Ill.	Flare Parts	35,000.00
Wallace Metal Products New Haven, Conn.	Firing Device Parts	260,000.00
Berger Brothers New Haven, Conn.	Flare Parts	257,000.00
Strouse Adler Company New Haven, Conn.	Flare Parts	5,000.00
Cheney Brothers Manchester, Conn.	Flare Parts	168,000.00
Real Silk Hosiery Co. Indianapolis, Ind.	Flare Parts	22,700.00
Mack Molding Co. Wayne, New Jersey	Flare Parts	47,000.00

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List of Sub-contractors -- Continued from Page 28

<u>COMPANY</u>	<u>PART</u>	<u>CONTRACTUAL OBLIGATIONS</u>
Ramsdell Tool & Mfg. Co. Worcester, Mass.	Range Indicator & Aircraft Parts	\$ 18,000.00
Perkins Gear & Machine Co. Springfield, Mass.	Aircraft Parts	18,000.00
Permold Co. Medina, Ohio	Aircraft Parts	24,000.00
Castalloy Company Cambridge, Mass.	Aircraft Parts	16,000.00
Bogert & Hopper New York	Shipping Containers	13,000.00
J. W. Dearborn Company Ansonia, Conn.	Flare Parts	6,000.00
Middlesex Paper Tube Co. Lowell, Mass.	Flare Parts	2,000.00
American Felt Company New York City	Flare Parts	500.00
Sonoco Products Co. Mystic, Conn.	Flare Parts	1,000.00
Triumph Explosives Elkton, Md.	Flare Parts	25,000.00
Beistle Company Shippensburg, Pa.	Flare Parts	40,000.00
Bishop & Watrous Chester, Conn.	Flare Parts	3,500.00
Charles Parker Company Meriden, Conn.	Flare Parts	1,500.00

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List of sub-contractors - continued from page 28a

<u>COMPANY</u>	<u>PART</u>	<u>CONTRACTUAL OBLIGATIONS</u>
Auburn Button Works Auburn, N. Y.	Range Indicator Parts	\$ 1,000.00
Plimpton Mfg. Co. Hartford, Conn.	Waterproofing Packaging	22,000.00
Newton-New Haven Co. New Haven, Conn.	Firing Device Parts	45,000.00
G.&S. Machine Co. New Haven, Conn.	Firing Device Parts	18,000.00
Froiland Mfg. Co. Hartford, Conn.	Range Indicator Parts	7,500.00
Diamond Chain & Mfg. Co. Indianapolis, Ind.	Aircraft Parts	22,000.00
Chandler Company Springfield, Mass.	Range Indicator and Component Parts	35,000.00
Carroll Dunham Smith Co. Newark, N. J.	Firing Devices	46,000.00
	Total	<hr/> \$2,131,200.00

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We point with pride that we have, thru the alertness of our Purchasing Department, our Expeditors and our Managerial Staff, located a number of manufacturers that we have succeeded in converting and training as manufacturers of component parts to fit into the type of manufacturing we do for the war effort to the advantage that we have helped to keep these manufacturers in business and at the same time expedite war materials to the Government at a fast rate of speed.

As an illustration, we discovered that the H. P. & E. Day Company of Seymour, Connecticut, who had been making Fountain Pens for approximately 50 years, was on the verge of closing down thru restrictions in obtaining materials. They had a trained organization of employees which we took advantage of by giving them orders on a sub-contracting basis for component parts for Firing Devices. This enabled them to keep their organization together and we have used them continuously for a period of years and at the same time aided us in getting out more war production for the war effort.

We use this example as a typical illustration as a number of other companies we have sub-contracted to has resulted in their remaining in business and giving the Government the advantage and knowledge and training of their employees. We re-educated and trained their organizations so they could function properly for the war effort. This has resulted in our fulfilling both the spirit and intent of our contracts with the United States Government as we have brought out the greatest utilization possible of smaller war plant facilities which would be consistent with efficient production of war materials.

As a further demonstration of our efficiency and ingenuity, we have taken advantage of the facilities available by contributing technical, engineering and other assistance to get the desired results.

(f) Quality of production.

Refer to footnotes on each individual prime and sub-contract giving quantity of production and rejections to determine quality of our production.

(g) Complexity of Manufacturing Technique.

On our Gyroscope parts, Center Arbors and Hand Center units for #208 Fuses and other delicate pieces of mechanism, we have had to work to tolerances not over half a thousandth. This has required the use of many special gauges, instruments and extreme accuracy in workmanship and inspection. Our fixtures and tools for this close work had to be expertly designed, accurately built and now carefully checked daily for any variance. Our whole manufacturing personnel had to train themselves from Toy and Electrical Appliance manufacturing tolerances to Government work of extreme accuracy.

(h) Rate of delivery.

We are up to delivery requirements on all except three contracts, one of which requires further engineering and the others - insufficient material.

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Partial list of Contracts and Orders delivered on time during 1943.

MECHANICAL FIRING DEVICES

Contract or Order No.

No. of Pieces

Engineer Board, Fort Belvoir, Va.

W-145-Eng-361	81,300
W-145-Eng-361	89,550
W-145B-Eng-540	10,100
#22370	1,000
#23477	1,000
W-145-Eng-667	1,000
#25906	500
#25906	500
#26956	500
#27119	200
#26912	2,000
#28097	300
W-44-009-Eng-17	5,000
#28436	200
#28819	5,000
#28911	500
#28836	500
#29454	1,000

New York Engineers Procurement District

W-1128-Eng-424	NY-4066	685,350
W-1128-Eng-424	NY-4066	685,350
W-1097-Eng-3641	NY-6336	685,350
W-1097-Eng-3641	NY-6336	685,350
W-1098-Eng-3721	NAD-1080	583,000
W-1098-Eng-3721	NAD-1080	707,000

Springfield Ordnance District

W-478-Ord-2175	386,300
W-478-Ord-2410	343,500
W-478-Ord-3174	400,000
W-478-Ord-3858	600,000
W-19-059-Ord-378	131,900

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Continued from page ¹³⁷~~29~~

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~~138~~
FIRING DEVICES

Contract or Order No.

No. of Pieces

Boston Chemical Warfare
Procurement District

W-1302-CWS-1339

400,000

CHEMICAL DEVICES

Engineer Board, Fort Belvoir, Va.

#23467
#24888
#27115
#28236

150
2,000
5,000
400

New York Eng. Procurement District

W-1128-Eng-438 NY-4182
W-1097-Eng-3453 NY-5665
W-1098-Eng-3721 NY-1080

1,683,762
200,000
920,000

Total

9,305,562

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~~296~~

TOLERANCES, DEGREE OF DIFFICULTY AND COMPLEXITY OF MANUFACTURING

Prior to the war the manufacturing experience of the A.C. Gilbert Company was limited to the manufacture of Gilbert Scientific and educational toys such as Erector, Chemistry and Microscopes etc. Polar Cub and Gilbert Electrical appliances, such as Mixers, Hairdryers, Vibrators and Fans and American Flyer Trains.

In order to produce quality items in these fields the manufacturing tolerances required did not exceed plus or minus .002. When we offered our services for the war effort and began to accept various products to make for the war effort we were obliged to train our help and set up our manufacturing facilities to meet difficult tolerances of .0002. The diameter of a human hair is .002. Some of the tolerances required on war work are one tenth of the diameter of a human hair.

EXHIBIT A

PRECISION PARTS MADE FOR SUBCONTRACTORS AND PRIME CONTRACTORS

A1

Striker Pin for 20 MM Gun
Drawing SK23, Greist Manufacturing Co.

These pins were made by the Greist Co. with much difficulty on center type grinding machines. They ran into much difficulty manufacturing these pins due to close tolerances.

They contacted us to grind them for them which we did very successfully on the centerless grinder. Grinding these pins on the centerless grinder produced a satisfactory piece and also we could meet the close tolerances required and saved many hours of machining time. This enabled them to meet their production schedule where previous they could not meet it. In fact, they were so well pleased with our method they purchased centerless grinders for their own plant and eventually ground them in their own plant using our methods and under our instruction.

Concentricity of firing point and body had to be very fine finish also concentricity was very important.

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~~-298-1~~
A2

A-73-9-7H Firing Pin for Fuze, Mine
Anti Personnel M2 & M3

A relatively inoffensive looking component, this firing pin offered unusual difficulties in several respects. First, the material specified is for cold heading or forming, and is generally considered too tough for any but the roughest machining. With this handicap it was required to produce an undercut, the working surface of which must have an angle whose size, shape, and smoothness should be equivalent to a ground surface.

With special tools and lubricant, carefully trained operators and close supervision, these pieces were properly made in tremendous quantities. The diameter of this undercut was also a dimension which required precision workmanship. The location of the safety pin hole was of vital importance to the safety of the troops using the device and since it is located upon an irregular surface, some ingenuity was required in designing the drill jig used for locating this hole. The pin had to be case hardened for proper functioning, and if too soft would imbed itself into the mating part, and if too hard would be brittle and break endangering the lives of the men who were to use the device. The hardening also introduced the problem of keeping the pin straight and a special operation was performed to accomplish this.

A3

A-73-9-7U Die Cast Base for Fuze,
Mine, Combination, M6

This base is representative of the seven different bases which are produced here, namely, the 5/8" standard base, M-7 base, T14 base, Fuze Lighter base, Delay type base, snout adapter and the M6 base. In order to produce these in sufficient quantities to maintain our schedule it was necessary to cast the threads on the bases. Holding major, pitch and minor diameters within the permissible tolerances of the specified thread fit required extreme accuracy in die work as did the matching of the two halves of the die to insure a continuous thread with no offset. The die which trimmed the parting line running thru the threads called for equal accuracy and special care by the operator to insert the bases in this die properly. The requirements on some of the bases were such that an operation of re-chasing the threads is necessary. On some, facing the flange for a water-tight fit is specified. The nozzle diameter is another closely held dimension in order to get a tight moisture proof fit with the blasting cap which will eventually be attached to it. The excentricity of the nozzle relative to the threads must be so slight that the attached blasting cap will fit freely into the mine when the device is being screwed to it. The taper and diameter of the primer cavity must be held within .002 to permit easy assembly and insure against the primer ever coming out, once assembled. The flash hole, particularly in the long base, requires drilling a long, small diameter hole in material which picks up on the drill and presents great possibilities of breaking the drill or ruining the hole. The performance of this job takes particular care on the part of the operator and in the design and set up of the holding fixtures.

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~~2052~~

A4

A-P7370 Firing Pin M3 Pull
Release Firing Device

The manner in which this device functions requires that a great many of the dimensions for the firing pin must be held within the slightest possible variation. The inside and outside diameter at the top end must be held within .002. An error of .001 in one direction would make it impossible for the device to function, in the other direction would permit premature firing. The concentricity of the axial hole must also be held within .002 or malfunction will occur. The body diameter and the width and length of the saw slots are vital in that variations beyond close limits makes the springing effect too strong or too weak which prevents functioning within the specified range. Finally, all drilling and sawing burrs must be meticulously removed.

In order to produce these pieces to the close tolerances required in sufficient quantities, an ingenious screw machine set up had to be devised and special machinery had to be designed and set up to properly produce the four slots in the body.

A-2325-1-5 Firing Pins for M1 Pull Type Firing Device requires practically the same operations and care in its production.

A5

A-73-9-7K Release Pin for Fuze, Mine
Anti Personnel M2 and M3

The Pin, originally a screw machine part, was practically impossible to produce and hold to the required angle, size, smoothness and concentricity necessary for proper functioning. It occurred to us that cold heading these parts would eliminate part of this problem, and a company who were experts at this work, was asked to make a die and produce some for us. After several attempts we found that they could not maintain the accuracy required so we made our own dies and proceeded to produce the pins ourselves. The life of the dies was so short before oversize pins occurred that hobs were made and a quantity of dies produced for replacement. A close inspection was constantly required on the size, shape, smoothness and angle of the point and dies were replaced as soon as the pieces approached an improper degree of accuracy. The point and shank were controlled by this method but the shoulder required additional operations of rough and finish grinding in centerless grinders to hold this diameter within .001 and produce the proper taper and smoothness. Finally this soft pin had to be case hardened to just the proper thickness and hardness to prevent the mating part, which subjected it to great pressure, from digging into or shearing off the point either of which would cause malfunction. At the same time the back end had to remain soft in order that the hole would not break out when a pull was applied to it. A special process had to be evolved for obtaining this combination of hard and soft parts in the same pin which would work for mass production.

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~~-290-3~~

A6

A-73-9-14G, Release Pin for Fuze,
Mino, Combination M6 and M7

This pin was originally designed to be made as a die casting and on completion of the die would have been a relatively simple job. However, the Ordnance Department insisted that it be made of steel which was most difficult. The initial screw machine operations must be held to an exceptional degree of concentricity for such a small piece made from the tough grade of steel specified. The body then had to be centerless ground to be held within .002 and produce an almost mirror like finish to reduce to a minimum the friction on the sliding surface. The milling operation must be performed with great exactitude as to location, depth and angle since slight variation would prevent functioning of the device within the specified limits. The location and size of the clearance hole must be held with unusual accuracy in order that the broaching operation can be performed properly. The broaching, because of the tough material and closeness required, has been a most difficult operation to master, but we are now producing these parts correctly, and in large quantities.

A7

Piston Pin Plug #A54305 for
Pratt & Whitney for Aircraft
Engine Use.

This is only one of a series of piston pin plugs for which we developed tools to manufacture them with and also produced production quantities. The nature of these tools had to be so perfect that it took many hundreds of hours to develop them. This is a case of draw and form and due to the accuracy required it is very difficult to produce tools to make these parts, however, we did produce them satisfactorily and last reports were that Pratt & Whitney have been well pleased and many thousands of these are being made by them for their airplanes daily.

To grind, shells with such thin walls to .001 tolerances, proper radius and superfine finish is something we feel proud to have so successfully developed.

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~~2984~~

48

Anvil - #184863
Bracket - #184884
Bracket - #184864
Nozzle - #184880B

The above parts are manufactured by The A. C. Gilbert Company for The United States Time Corporation (formerly Waterbury Clock Company) of Waterbury, Conn. and are used in connection with a very delicate instrument made for the Sperry Gyroscope Company.

Both Brackets and the Anvil are made of stainless steel which is very difficult to machine. Tolerances had to be held very close, as close as .003 on the Anvil. We found it difficult to manufacture to these close tolerances for the reason that equipment was not available for holding the parts securely while machining operations were performed. We took the initiative and developed special equipment which resulted in eventual satisfactory operations. The small size of the piece is responsible in a large way for the difficulties we encountered. We re-designed Drill fixtures several different times and finally arrived at a design which made satisfactory parts with a minimum of rejections.

The main difficulty was to drill a hole in the proper location. Due to the tough type of stainless steel required, Drills would break and wear out quickly. Even with the use of the proper lubricants it is almost an impossibility to drill straight holes.

The original requirements of the United States Time Corporation were small but the quantities required have increased and despite the difficulties of the operations we are able to keep pace with their requirements and deliver accurate pieces and on time.

The Nozzle also has very close tolerances, particularly on the shorter end of the piece which we grind to .0003.

The extreme accuracy required on the four above mentioned parts resulted in our setting aside a separate space in one of our Department so that all operations could be controlled to better advantage. In a period of time we have trained expert operators to accomplish excellent precision work.

143

144
~~298-5~~

A9

M-31J576 Inner Race and Gear for H & T McClusky Co.

This gear is made from a bronze composition with a Brinell hardness of 100 to 110. This gear blank is made by the McClusky Company for the GE company and is used in radar equipment.

This blank in itself is very expensive to make. We have cut the teeth on thousands of these gears for the McClusky Company without having one reject. Quoting the McClusky Company - they told us that they had three other concerns lined up to cut these teeth for them and all three people failed to meet the required accuracy. The gear in itself looks simple. The material from which it is made makes it difficult to maintain the tolerances required on the teeth.

A10

Part 334 T300 and Set 50 Bullet Punches
Ground for H & H Tool Company

This is one of the many punches we ground for various manufacturers and I believe I am correct when I say the A.C. Gilbert Company introduced centerless grinding method to making bullet punches. Previously these punches were machined, hand polished and lapped. The introducing of centerless grinding machines on these punches greatly speeded up production. Only because we have good machines and expert workmen we have accomplished the desired results in centerless grinding.

Question of concentricity and radiuses is quite a factor besides fine finish and accurate grinding to .0005 and in some cases .0003 and others to .0002.

A high lustrous finish had to be maintained to meet these bullet punch specifications.

144

145
~~206~~

A11

4-73-9-14A1 Head for Fuze
Mine Combination M6 and M7

The die for this casting is probably the most difficult we have ever made. Cores enter it from three directions and the axis of the holes produced must intersect each other exactly. Two of the holes must be reamed to very close tolerances, and be concentric within a few tenths of a thousandth. The depth and diameter of the release pin hole cannot vary appreciably without affecting the functioning of the device. The depth of the safety pin slot relative to this hole must be closely held or the device will be unsafe. The inside surfaces of each cavity must be especially smooth and free from the most minute burr or flash.

A12

Button for Main Impeller Drive Spring
#A5213625B for M B Manufacturing Co.

These parts are used on airplane unit manufactured and assembled by the M&B manufacturing company. This part was manufactured by the M&B for some time but with a lot of difficulty and a very large percentage of rejects after all operations had been completed.

They contacted us to grind the stem and underhead surface. After some experimenting we were able to grind these successfully for them. Difficulty arises not in grinding the stem but the underhead surface which must be flat and parallel to shaft within .002 of an inch. We were able to do this in one operation as, grind face, radius underhead stem, and large radius on end of stem. They were never able to get any other grinder to do these operations successfully particularly all in one operation. This is a steady job for us.

In addition they had a centerless grinding machine of their own which we put in operation for them and showed them how to grind these pieces in order to get the required production, so today their machine is running steadily. We also have a machine running over here, where previously their machine was idle because they did not know how to use it.

145

146
~~-298-7~~

A13

B.F.M. B21 - Center Arbor Assembly
Made for U.S. Time Corp. (Waterbury Clock)
Part for British Fuze.

Daily requirements as high as 30,000 per day. We were able to keep Waterbury Assembly line going without interruption for entire duration of contract. Total machinery tolerances were held very close. In many of these the tolerances were .001". Eccentricity of gears with center hole is very important.

Many of the operations required special tools and fixtures, developed and made by the A.C. Gilbert Company.

Dimensions and quality had to be checked at the machines continually in order to maintain the tolerances.

A14

B.F.M. 80 Hand Center Assembly

Same Company, same requirements. Same close tolerances.

A15

16672A Bullet Punches

A16

T300 Bullet Punches

This is one of the many punches we ground for various manufacturers and I believe I am correct when I say the A.C. Gilbert Company introduced centerless grinding method to making bullet punches. Previously these punches were machined, hand polished and lapped. The introducing of centerless grinding machines on these punches greatly speeded up production. Only because we have good machines and expert workmen we have accomplished the desired results in centerless grinding.

Question of concentricity and radiuses is quite a factor besides fine finish and accurate grinding to .0005 and in some cases .0003 and others to .0002.

147
~~2004~~

EXHIBIT D

REPUBLIC TRIM TAB UNIT FOR THE FAMOUS P-47 THUNDERBOLT

We were requested by Republic Aviation to submit bids for the manufacture of this unit. We were selected by Republic to manufacture this item and were furnished with a complete set of drawings and specifications. Insofar as we were concerned, this unit had been completely designed and engineered before we received our drawings. After we had manufactured and built the first unit, it was apparent that there would have to be a great amount of handfitting and selective assembly, therefore, we created and engineered several changes in the mechanical structure of this unit. All of the tools, jigs, and fixtures, of which there were several thousand hours of tool work, the tool design and drawings were created in our own Tool Design Department.

At the start of our manufacture, the box and knobs were made of aluminum. The materials now used are aircraft steel, aluminum, and magnesium. In the departments where magnesium is machined, we had to set up various safety factors in the methods of handling magnesium and train personnel, as we had never worked on magnesium previously. The assembling of these devices is done in one of the assembling departments which originally assembled electrical appliances. In this particular department we put on only the skilled and highly trained assemblers to assemble and test the trim tab unit.

In the handling of the raw materials, it was necessary for us to set up bonded warehouses to keep separate the different classes of stock and heats. This was to prevent the possibility of any one stock getting mixed with the other. At first we were forced to get our heat treating done by outside concerns until we were able to set up our own heat treating plant. We had many failures from outside concerns with the heat treating. Since we undertook the heat treating ourselves in our own plant, this has been overcome.

Many of the parts which go to make up the trim tab unit are machined on very expensive machines such as Warner & Swasey and similar types which in many instances are able only to produce 5 or 6 such parts per hour.

DI

Bearing Housing, Part No. 5-89F36182

This particular part is made from bar aluminum No. 17ST-QQ-A-351, and is a very difficult part to machine. The tolerances as set up on the drawing are very close. The center hole which is reamed is held to .005 of an inch. The threads are 1 $\frac{1}{2}$ -12-NT-3. The stresses for the threads after machining throw the center hole which has been reamed many times beyond its tolerance, therefore, it is necessary to re-ream the hole to hold the correct dimensions. The four side holes are held to very close tolerances, such as .0935". This indicates that these holes and their tolerances have a direct bearing upon the operation of the trim tab and its functioning correctly.

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148
~~290-10~~

D2

Spiral Bevel Gear, Part # 5-89F36181

This bevel gear is made from aircraft stock. The material is very hard to machine, especially in holding dimensions and obtaining a good finish at the same time. This part is finished all over and the tenon diameter is held on centerless grinding to dimensions of less than .0005" of a thousand. This part is under quality control for both type of material dimensional sizes and heat treating.

D3

Rudder Shaft # 5-89F36175

To start with, this shaft is made from steel that is extremely difficult to machine and very hard on machine tools and threading dies.

Piece machined has 10 different diameters.

A tripple thread #3 fit and 5/16 single thread #3 fit.

Three surfaces of different diameters are ground to .0005" tolerances and must be concentric with each other and also with threads.

Heat treating also is quite a factor. Outside heat treating firms had trouble controlling this. We did try to get these shafts made by sub-contractors, without success.

D4

Gear #5-89F36186
Spur Pinion Shaft #589F36187

These gears are made from the steel which is difficult to machine. The Pinion shaft is held to a .0005 tolerance and the hole and the larger gear is reamed also to .0005 tolerance. On the larger gear we have a problem of broaching. The tolerance of broaching is .0001 and with this type of material it is extremely hard to hold .0001 tolerance on broaching. It is a problem to get broaches made to hold to these close tolerances.

As for the accuracy required on the cutting of the teeth I don't believe it is necessary to say other than it requires good equipment plus expert workmanship on the part of the operator to obtain the desired results to cut teeth on these gears.

We also have a matter of wobble to consider. That, too, is in machining and requires precision workmanship.

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VERSATILITY IN MANUFACTURING

The A.C. Gilbert Company manufacture complete devices. We start with the raw material and end with the complete end use device. Our facilities include or have been expanded to include every type of manufacturing necessary to produce the items that we are currently concentrating on. The following department and mechanical equipment indicate the thoroughness of our facilities in making completed war devices. In addition to assembling these products we fabricate from raw materials. Our facilities include, the Slitting department, Press Room, Screw Machine Department, Headers and Threaders, Milling and Grinding, Spotwelding, Seam-welding, Electric Welding, Diecasting, Compression Moulding, Motor Winding and Machining.

We manufacture wooden boxes and paper boxes within our own plant. We print the labels and instruction sheets that go with the devices. We do our own finishing consisting of painting, spraying and enamel dipping. Many of these finishes are baked at high temperatures. We have our own heat treating department. We add finishes such as zinc, cadmium and many other industrial finishes. We have a complete tool room department for the making of dies, tools, jigs, fixtures and gauges of all types. Large assembly departments with speed up conveyor systems to get out more production. Our inspection department has increased twenty times against pre war inspection personnel. In addition to increasing the personnel of our inspection department we also enlarged it to include the most exacting measuring devices known.

We have a complete receiving department for handling carload lots and small lots of every type of material necessary in manufacturing. We have set up bonded rooms to segregate various materials for various branches of the services and for different types of tempers and heats. We have complete shipping facilities that have been stepped up so that daily production is delivered the same day it is produced with railway sidings and trucking facilities available.

We have increased our engineering facilities so that by starting with a suggestion or an idea, we then transform it into the development phase, then engineer it, make the tools and dies, fabricate the material, box it and ship it complete under one roof.

However, we also enlisted the aid of other facilities whom we have subcontracted to increase our production and we have supplied their facilities with engineering and producing knowledge and helped them set up and supervise their production so it is identical with the type of production we have developed in our own plant. This takes a large amount of our experimental and engineering facilities, brought to our outside subcontractors at no cost to them which in turn brings perfection of manufacturing to its highest point.

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~~-2962~~

COOPERATION WITH CONTEMPORARY MANUFACTURERS

In addition to teaching our own subcontractors how to produce component parts through required standards we have also received many visitors from various manufacturers who are being considered by the war department in manufacturing devices similar to our own. We have taken a great deal of time to bring these men through our plant and to show them how we manufacture and how to use the methods we do and give them every aid and help in starting them manufacturing similar devices to our own. This takes a large amount of time from our top management and in spite of this handicap we have always been cooperative in aiding them in making war devices.

The A.C.Gilbert Company accepted the request of the War Department that we set up headquarters for an integration committee on firing devices at New Haven and we have opened our plant facilities to the use of the members of this committee, so that they could obtain first hand information as to how firing devices are made. This has all been done without any cost to the government whatsoever. Our own Vice President, Mr.H.L.Trisch accepted the vice chairmanship of this committee despite the many duties he has to perform in handling the complex requirements of the A.C.Gilbert Co.

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TEAMWORK FOR PRODUCTION

RECREATIONAL POLICY OF THE A. C. GILBERT COMPANY

"WHAT IS INDUSTRIAL RECREATION AT THE A. C. GILBERT COMPANY"

- 1 - A change of pace (from work to play).
- 2 - Recuperate use of leisure time.
- 3 - Refreshing of strength and spirit during rest periods and after work.

All these definitions mean the same thing and are another way of stating that "all work and no play makes Jack a dull boy."

Specifically, Industrial Recreation at The A. C. Gilbert Company is an effort on the part of the management to encourage our men and women to play wholesomely in their leisure time. We feel that our successful recreational program now in operation has proven that wholesome play offers the men and women a balance of perspective which helps him or her to work more efficiently and live more enjoyably. As far as we can, we want to increase our facilities so that men and women of all ages will participate in their off-time in activities that refresh them physically and mentally and offer them a change of pace from the tedium and fatigue of routine work assignments. We all believe that it pays to encourage our people to play. We believe in high-speed production but in no sense do we want to treat our men and women as a mere cog in a machine.

Recreation can:

- 1 - Lift the worker in his own self-esteem and give him greater confidence.
- 2 - Give him a chance to excell individually and in groups.
- 3 - Bring him praise from his fellow employees.
- 4 - Provide him a chance at creative opportunity.
- 5 - Offer him a refuge from the tedium of the day - a relief from specialized routine which induces fatigue and boredom.
- 6 - Provide him with an opportunity to intermingle with his fellow workers on a common playground where good fellowship and friendliness prevail.
- 7 - Encourage greater understanding among Employer and Employees.
- 8 - It gives the employer an opportunity to encourage happier human relationship among all of us - to weld the Industrial Personnel into a more cooperative Gilbert Family.

As a business investment, it should bolster morale - reduce absenteeism - promote greater efficiency on the job - encourage safety and increase production. Industrial Recreation never should be considered by management as a charity. It allows management to draw a line between the machine and the human element. We believe that recreation helps to keep the human machine in running order by enhancing the physical, mental and emotional well being of our men and women.

Our Recreational Program is all-inclusive, in that it offers activities for both men and women of all age groups, and provides off-time pursuits for minority as well as majority groups.

RECREATIONAL AND PHYSICAL FITNESS

Our theory has been consistently that physical fitness among our employees means fewer accidents, greater efficiency and greater output. Physical Fitness to us means conditioning our people so they are not too tired to eat at the end of a day's work, but rather so they can produce 100%, live effectively in their leisure, and return the next morning completely recovered from the fatigue of the day before, and ready to produce 100%.

The program here at The A. C. Gilbert Company consists of:

<u>Physical</u>	<u>Outing</u>	<u>Social</u>	<u>Cultural</u>
Bowling	Picnics	Dancing	Music
Softball	Riding	Card Parties	
Basketball		Social Parties	
Baseball		Banquets	
Volley Ball		Smokers	
		Foremen's Club	

MUSIC AND LOUD SPEAKER SYSTEM

We are particularly proud of our music program in view of the fact we were one of the first concerns in the United States, some years back, to install a loud speaker system, first, so that we could talk to our employees; second, we could furnish inspirational music during working hours, and our conclusions, after a number of years, are that it is most effective and the results most gratifying. During this period of war, as different shifts come on, patriotic and martial music is played, also during rest periods and at noon hour, in all departments of the plant our workers are kept posted on the news of the day and particularly war news. This keeps them fully informed on the progress of the war and renews their interest in their jobs of producing materials for the war effort. We feel that we have increased our workers morale by rendering this service.

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~~29-8-5~~

ENTERTAINMENT

One of the most outstanding jobs on teamwork has been our pavilion, where employees can lunch and where the different departments can put on entertainment during their noon hour, and they have entered into the spirit of this program under our recreational activities, and have done a splendid job in breaking up the monotony of their day-in, day-out work

LEGAL ADVICE - MEDICAL ADVICE - INSURANCE ADVICE

Aside from our First Aid and Registered Nurse service that has been provided for many years, we now have three outstanding men giving advice to the men and women of The A. C. Gilbert Company which has been very effective in cutting down absenteeism, because this service is right in their lap, it saves them leaving the plant, and it has been a real contribution.

- 1 - Dr. Scarbrough, the Company's physician, has regular hours for appointments with all employees in The A. C. Gilbert Company, for medical advice.
- 2 - Mr. Cretella, an attorney, has regular hours for appointments with all employees in The A. C. Gilbert Company, for legal advice.
- 3 - Mr. Sasseen, an insurance expert, has regular hours for appointments with all employees in The A. C. Gilbert Company, for advice on insurance matters and to keep them informed on their status regarding Social Security and the Pension Plan the Company has for its employees.

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LETTERS OF COMMENDATION

On the following pages are copies of letters of commendation received unsolicited by The A.C.Gilbert Company which record accomplishments and performances. These are listed as follows:

Copy of memorandum to, Major H.C.C.Weinkauff by Lt. Col. Ellsworth I. Davis of the Engineer Board, Ft. Belvoir, Virginia, Demolition Branch, Dated February 13, 1943.

Photographic copy of the Republic Aviation Corporation letter dated May 11, 1943.

Copy of a letter written by the High Standard Manufacturing Co. Inc. New Haven, Conn. dated June 8, 1943.

Photographic copy of a letter by Mr. C.A.Newton, Manager of War Production Board, New Haven, Conn. dated July 5, 1943.

Photographic copy of letter written by Republic Aviation Corp. Farmingdale, L.I.N.Y. dated October 13, 1943.

Photographic copy of a letter written by Brig. Gen. G.H. Drewry Springfield Ordnance District, March 28, 1944.

Photographic copy of a letter written by Brig. Gen. G.H.Drewry Springfield Ordnance District, June 21, 1944.

Photographic copy of a letter written by Major William A.Bassett Jr. Springfield Ordnance District, June 27, 1944.

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THE ENGINEER BOARD
FORT BELVOIR, VIRGINIA
DEMOLITIONS BRANCH

February 13, 1943

Memorandum to: Major H.C.C. Weinkauff

Subject: Army-Navy Production Award

The A.C. Gilbert Company, New Haven, Connecticut, has converted their factory from 100% civilian type of manufacturing to better than 90% war manufacturing and less than 10% civilian manufacturing, over a period of approximately one year.

Chart below indicates the transition during 1942 from civilian type of manufacturing and shipping, to war type of manufacturing and shipping. January 1943, figures are not available but they indicate that civilian production will be less than 5% of total production, balance of production over 95% being entirely war. Monthly shipments are now averaging \$800,000.00 to \$1,000,000, as against peace time shipments averaging \$300,000 to \$350,000 per month.

<u>1942</u>	<u>Percent</u>
February war shipments were	.65
" civilian " "	99.35
June war shipments were	37.00
" civilian " "	63.00
July war shipments were	86.00
" civilian " "	14.00
December war shipments were	91.00
" civilian " "	9.00

The quantity of devices furnished The Engineer Board has been in accordance with our requirements, and the quality has been most satisfactory, as there have been no rejections.

The early part of 1942 the A.C. Gilbert Company was given their first opportunity to make a bid for 10,000 each of the M-1 pressure and M-1 pull type firing devices. They re-engineered these particular devices from standard British type devices, in collaboration with the Engineer Board. The first 10,000 devices were delivered to the Engineer Board within the time limit set and these were approved and accepted.

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~~291-2~~

The A.C.Gilbert Company then received a procurement from the Engineer Board for 660,000 of each of these M-1 pressure and M-1 pull type firing devices. This particular schedule was completed and on time.

The first procurements of 10,000 and 660,000 of each of the pressure and pull type, M-1, were made entirely of brass. In collaboration with the Engineer Board, they redesigned these two firing devices, in both appearance and in materials used, changing to zinc die cast alloy, saving many pounds of critical brass, and in addition to saving brass, also saved the amount of pounds necessary to construct these devices out of metal by many thousands of pounds.

After submitting samples of these die cast devices, M-1 pull and M-1 Pressure to the Engineer Board, they were awarded a contract for 685,000 of each by the New York Procurement District, and upon which they are now in full production. Special features have been added to the devices over the old type of firing device, such as additional safety features, which make them foolproof for soldiers setting them out. Also these devices have been engineered and designed to fire under water.

Combination Type Firing Device, M-1. Drawings of a firing device were submitted to the A.C.Gilbert Company by the Engineer Board to be used with the M-2 antipersonnel mine. This particular firing device was only designed to be used as a pull. Through their engineering department, they made up a sample of a combination type firing device, which would fire both by pull and by pressure. This was submitted to the Engineer Board. It was refined in collaboration with the Engineer Board and adopted. This particular firing device was made entirely of brass.

The first order through the Engineer Board was for 150,000 pieces of which the first 500 pieces were sent to Picatinny Arsenal to be tried out on the M-2 antipersonnel mine. The entire quantity was delivered. During the time that the A.C.Gilbert Company was in production on this quantity, they, in collaboration with the Engineer Board, redesigned the device so that it could be made out of zinc die cast alloy and steel, eliminating the use of brass. Subsequently, Springfield Ordnance District ordered 1,100,000 and approximately one-half of this order has been completed and on the schedule expected. At the run-out of these two contracts, an additional third contract for 400,000 pieces has been received from the Springfield Ordnance District, and there is every indication that these will be delivered on schedule.

After experimental orders had been completed for the Engineer Board, and larger quantity orders received for firing devices from the Engineer Procurement District, 120 Wall Street, New York City, or the Springfield Ordnance District, they have succeeded in greatly reducing cost to the government on these devices.

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Release Type Firing Device, T-3. The A.C.Gilbert Company was requested to make up a hand made sample of a release type firing device. They were shown several samples of British and German firing devices, which had certain objectionable features. It was suggested that they engineer and design, with the help of the Engineer Board, a release type firing device, leaving out all critical materials, such as brass, copper, etc. This was done; a sample was forwarded to the Engineer Board who made a pilot order of 1,000 pieces. This device is made almost entirely out of pressed steel, facilitating the use of power press equipment. This pilot lot of 1,000 will be delivered according to schedule.

Pull Type Firing Device, T-2. The A.C.Gilbert Company was requested to engineer and make, in collaboration with the Engineer Board, a plastic pull type firing device, eliminating the use of critical war materials. It was also desirable that this device be small and compact, and contain such a small amount of metal that they would not be detected by mine detectors. Samples of this device were submitted and they were ordered to proceed with dies necessary to produce 10,000 units, so that the Engineer Board could experiment and carry on future tests. This particular device was made in an entirely different manner than any of the other firing devices, insofar as it does not have a primer cap to set off the charge. 1,000 devices have already been shipped to Fort Belvoir.

The entire resources of their engineering department and manufacturing facilities have been available for use by the Engineer Board, and they now are in the process of designing and engineering, in collaboration with the Engineer Board, a number of other firing devices.

The A.C.Gilbert Company has been manufacturing Signal Relay devices for the Office of Strategic Services (British Lend Lease). The Engineer Board, upon directive from the Office, Chief of Engineers, approached their engineering department with the request that the device be redesigned to fit in with the needs of the American Army, to be used with the American type of mines, etc. This has been successfully accomplished and 1,600,000 delay type firing devices, M-1, are now being manufactured.

Conversion of British Devices to American. At the request of the Engineer Board, they accepted a shipment of British firing devices and converted them to the American Standards.

Regardless of production obstacles, the A.C. Gilbert Company has kept a constant flow daily of firing devices being made for the Engineer Board and other procuring agencies. Their average daily output on all firing devices, for all agencies, is approximately 35,000 to 40,000 or three-quarters of a million a month. This fact shows that they have converted from a civilian type of factory to a war factory. The assembly of firing devices is accomplished by almost 100% female help.

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~~2914~~

Production obstacles have been overcome and the best proof is that they have not been shut down a day since they started to make firing devices for the Engineer Board, whether the problem involved shortage of material or labor.

They have given out a considerable amount of sub-contracting work, and have spread the work out in several areas that have had the equipment and open capacity.

On the basis of the preceding, it is felt that the A.C.Gilbert Company is worthy of an Army-Navy Production Award. It is requested that the necessary action be taken to recommend the A.C.Gilbert Company to the Chief of Engineers as meriting such an award.

Ellsworth I. Davis
Lt. Col., Corps of Engineers
Chief, Demolitions Branch

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~~295~~



REPUBLIC AVIATION CORPORATION

FARMINGDALE, LONG ISLAND, NEW YORK

Telephone Farmingdale 1100

MAY 12 1943

May 11, 1943

Mr. A. C. Gilbert
A. C. Gilbert Co.
319 Peck Street
New Haven, Connecticut

Dear Sir:

I would like to take this opportunity to thank you and your organization for the splendid job that you have done for this company in the manufacture of the Trim Tab Control Boxes. It is indeed a pleasure to find your company constantly ahead of schedule.

Trusting that the pleasant relationship that we have had with your company will continue for many years to come, and thanking you again, we are

Very truly yours,

REPUBLIC AVIATION CORPORATION

A. K. Peck
Ass't. to Gen'l. Mgr.

AKP:moc

reg.

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~~OK~~

THE HIGH STANDARD MANUFACTURING CO. INC.

NEW HAVEN, CONNECTICUT

MACHINE GUN DIVISION

June 8, 1943

A.C.Gilbert Company
New Haven, Conn.

Gentlemen:

It has been our pleasure to have your good Company do sub-contracting work for the High Standard Manufacturing Company, Inc. for about two and a half years.

This is just a line to let you know that the workmanship has been high grade. It has been a help to us to know that parts made by your Company are finished as required by United States Army Inspectors and the parts function as they should.

Mr. Brown informs me that his contacts with your associates have been cooperative in every way.

Very truly yours,
THE HIGH STANDARD MANUFACTURING CO., INC.

George R. Willis, President

GRW:DFP

JUL 7 - 1943

WAR PRODUCTION BOARD

152 Temple Street
New Haven, Connecticut
July 5, 1943

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IN REPLY REFER TO:

Mr. A. C. Gilbert, President
A. C. Gilbert Company
New Haven, Connecticut

My dear Mr. Gilbert:

I have received the announcement of your Army-Navy production award this morning, with a great deal of pride. The pride is not for our own self-glorification, but rather that we have companies like yours who have played such a prominent part in producing the goods for our armed services, which make possible almost miraculous achievements on our battlefronts.

Your company, like many others in our District, have been faced with many difficulties in converting from a peace-time product, to material for war, and to you and others like you, must go the credit for doing next to the impossible.

This all calls for excellent management, with loyal employees, and this combination cannot be beaten. I realize fully the many records necessary to obtain this high distinction of the Army-Navy "E" award and I certainly want to congratulate you, and will plan to be with you on the day the award is made.

This also imposes a definite responsibility, and continued increased production, which I am sure your company is capable of doing.

With kindest regards, I am,

Very truly yours,



C. A. Newton, Manager
New Haven District Office
War Production Board

CAN:MHS



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~~2911~~

REPUBLIC AVIATION CORPORATION

FARMINGDALE, LONG ISLAND, NEW YORK

Telephone Farmingdale 1100

October 13, 1943

Put in
Gilbert
new

Mr. A.C. Gilbert
319 Peck St. & Blatchley Ave.
New Haven, Connecticut

Dear Mr. Gilbert,

As a contractor with your good company, I have come into possession of your brochure covering the presentation of the Army and Navy "E" Award.

The story unfolded covering your growth still seems a short span from the time when you were in there competing for "Old Eli." This "Will to Win" and enthusiasm is reflected in the pages relating to the award. I understand that it is typical of you to give credit to those who have helped you build as demonstrated by this book. I have always known you to be outstanding in your field, so much so, that you have been known as the Ford of the electrical appliance and toy business.

This spirit, originating with you, has made this conversion to the war effort a natural one, and, no doubt, accounts for the high morale and resulting good work that you and all your employees are doing for all departments of the Army and Navy.

We at Republic, as co-holders of this award, which we understand is held by only 2 1/4% of war plants (or about one out of every forty) makes your accomplishment a mutual honor. The success of our P-47 Thunderbolt Fighter, as the most outstanding pursuit plane of this war and now doing decisive work on all fronts, by increasing the effectiveness of the Flying Fortresses, must make you all thrill to know that you are supplying vital parts for this remarkable fighting machine.

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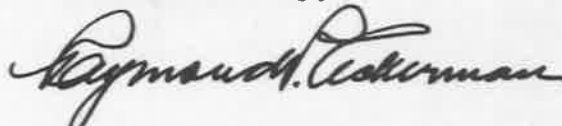
-2-

Let us both, as holders of the "E" Award, not relax a minute in our joint effort to build and assemble what may give our side the answer of overwhelming the enemy in attempting to break down and destroy institutions such as yours, which is so typical of America.

"Preparedness" is something you started personally only a few decades back, by inspiring the youth of America with your Erector and Chemistry sets, and in my own sphere I have been amazed at the number of embryo engineers and chemists you have started on the road to success. The world of good you have done, which has not been publicized enough, is now reflected in your comprehensive brochure and I sincerely feel it my duty to compliment you on telling the story so well.

In the near future I hope to be in New Haven and have the pleasure of personally meeting and knowing you better.

Yours, sincerely,



Raymond P. Ackerman

RPA:eb



ALL COMMUNICATIONS SHOULD BE ACCOMPANIED BY CARBON COPY AND ADDRESSED TO



TO INSURE PROMPT ATTENTION
IN REPLYING REFER TO

No. _____

ATTENTION OF _____

ARMY SERVICE FORCES
SPRINGFIELD ORDNANCE DISTRICT
95 State Street
Springfield 3, Mass.

MAR 28 1944

28 March 1944

Mr. A. C. Gilbert, President
The A. C. Gilbert Company
319 Peck Street
New Haven, Connecticut

Dear Mr. Gilbert:

Permit me to congratulate you on the excellent
production performance of The A. C. Gilbert Company to date.

At the same time I wish to point out to you the
extreme military urgency of the items you are currently
producing for the Ordnance Department. I am sure that you
and all members of your organization will endeavor individually
and collectively to add to your accomplishments during the
next few months.

Sincerely,

G. H. Drewry
G. H. DREWRY
Brig Gen, USA
District Chief

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ALL COMMUNICATIONS SHOULD BE ACCOMPANIED BY CARBON COPY AND ADDRESSED TO

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TO BRING PROMPT ATTENTION
TO REPLYING REFER TO

LHP 760/9203
ATTENTION BY

ARMY SERVICE FORCES
SPRINGFIELD ORDNANCE DISTRICT
95 State Street
Springfield 2, Mass.

21 June 1944

Mr. A. C. Gilbert, President
The A. C. Gilbert Company
New Haven, Connecticut

Dear Mr. Gilbert:

Recent events on the various battle fronts demand of all of us, engaged in the procurement and manufacture of vitally needed arms and ammunition, a supreme all out effort to get this materiel to the troops in the field NOW.

One item currently being produced by the A. C. Gilbert Company has within the past ten days been classified by the Army Ordnance Department as "HIGHLY URGENT". Surely, I need not say more in again asking the same splendid cooperation that you and your employees have always shown.

Sincerely,

G. E. Drenry
G. E. DRETRY
Brig Gen, USA
District Chief

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ALL COMMUNICATIONS SHOULD BE ACCOMPANIED BY GARBON COPY AND ADDRESSED TO

ARMY SERVICE FORCES
SPRINGFIELD ORDNANCE DISTRICT

95 State Street
Springfield 2, Mass. BASSETT:dew

TO INCLUDE PROMPT ATTENTION
IN REPLYING REFER TO

S.O.D. No. 230.433/1491

ATTENTION OF

Chief, Ammunition Branch

27 June 1944

The A. C. Gilbert Company
New Haven,
Connecticut


Attention: Mr. H. L. Trisch, Vice President

The Springfield Ordnance District commends the A. C. Gilbert Company employees on the splendid production which they made during the month of May in producing the Fuse Mine Combinations.

This excellent record was only obtained by the individual worker's devotion to his work, and by his foregoing personal desires on Memorial Day by remaining at work.

The "Highly Urgent" "Critical" items supplied by the A. C. Gilbert Company are aiding the Armed Forces in their current endeavors, and it is hoped that the A. C. Gilbert Company employees will equal or surpass the splendid record which they have attained during May and June during the month of July by showing the same keen interest in their work, and by celebrating the Fourth of July by producing additional Fuse Mine Combinations for use against the Axis.

For the District Chief:


WM. H. BASSETT, JR.,
Major, Ordnance Department
Assistant

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JUN 29 1944

(i) Inventive and developmental contribution with respect to important war contracts.

Refer to description of prime and sub-contracts for inventive and developmental contributions, and we particularly call attention to the fact that we have made no application for patents.

(j) Unusual risks incident to the performance of certain prime contracts.

We direct your attention to three important prime contracts - one for M26 Flare for the Army, one for Mark 5 and one for Mark 6 Flare for the Navy, which carry extraordinary financial hazards. The reason for this is, all other prime and sub-contracts we have, inspection can be completed in the factory, and if anything goes wrong, it can, in a reasonable period of time, be corrected without serious financial loss.

The three contracts referred to above, even though all the parts have been passed by our inspectors, Army and Navy Inspectors, and specifications are lived up to one hundred percent, they call for a spot test on the proving grounds - in the case of M26 at Jefferson Proving Grounds, Madison, Indiana, the Mark 5 and Mark 6 at the Naval Proving Grounds, at Dahlgren, Virginia. In view of the fact that these tests are subject to weather conditions, on account of the necessity of releasing flares from planes, they are sometimes held up for long periods of time, and we have had, in the past, some very unfortunate experiences.

For your convenience, so you can appreciate the problem, we are enclosing herewith a photostat of our chart showing the condition of Navy Flares, Mark 6, as of July 5, 1944. On that date there were 27 lots of Mark 6 Flares, representing a total of 2700 Flares valued at \$163,728.00 which will be held until the Navy can test them. Some of these were made in May. Some may pass, others may not. If they do not pass, we have to rebuild at our expense.

I don't believe it is necessary for us to accentuate the tremendous hazard and risk involved, due to the nature of this particular important contract. We could very easily simply lose an entire year's profit.

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NAVY FLARES-MARK VI					NAVY FLARES - MARK VI					NAVY FLARES MARK VI					NAVY FLARES MARK VI				
DATE	LOT	PCS	O.K.	N.G.	DATE	LOT	PCS	O.K.	N.G.	DATE	LOT	PCS	O.K.	N.G.	DATE	LOT	PCS	O.K.	N.G.
5/22	100	4			5/11	121	4	6/2		6/27	142	4			6/29	163	4		
8/20	101	4	7/30		5/12	122	4	6/2		6/1	143	4	6/24		6/30	164	4		
8/20	102	4	7/30		11/11	123	4	12/3		6/2	144	4	6/24		7/3	165	4		
6/27	103	4			11/11	124	4	12/3		6/2	145	4	6/24		7/5	166	4		
6/12	104	4			11/12	125	4	12/3		6/5	146	4	6/24			167			
6/27	105	4			11/12	126	4	12/3		6/6	147	4	6/24			168			
6/27	106	4			5/15	127	4	6/2		6/7	148	4	6/24			169			
6/28	107	4			11/16	128	4	12/13		6/8	149	4				170			
5/8	108	4	6/2		11/17	129	4	12/13		6/12	150	4				171			
6/12	109	4			5/16	130	4	6/16		6/13	151	4				172			
5/10	110	4	6/2		3/21	131	2	4/4		6/13	152	4				173			
11/3	111	4	11/26		5/17	132	4	6/16		6/14	153	4				174			
11/4	112	4	11/26		12/9	133	4	2/25		6/15	154	4				175			
11/4	113	4	11/26		12/10	134	4	2/25		6/16	155	4				176			
11/5	114	4	11/26		3/21	135	2	4/4		6/19	156	4				177			
11/5	115	4	11/26		12/13	136	4	2/25		6/20	157	4				178			
11/8	116	4	11/26		5/24	137	4	6/16		6/20	158	4				179			
11/8	117	4	11/26		6/27	138	4			6/21	159	4				180			
11/9	118	4	11/26		5/26	139	4	6/16		6/22	160	4				181			
11/9	119	4	11/26		5/29	140	4	6/16		6/23	161	4				182			
5/11	120	4	6/2		5/30	141	4	6/24		6/28	162	4				183			

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CONCLUSIONS AND SUMMARY

We are mindful of the wonderful job done, and the great contributions made by most of the manufacturers in our district, but we are egotistical enough to believe that with our own capital, using most of our own machinery, equipment and buildings, we have done a better job of ordnance than anyone else, for the following reasons:

- 1 - Because we do not believe that anyone can equal the spirit of teamwork we have built up among the men and women of this organization.
- 2 - Conservation in manpower by the replacement of women for men
- 3 - Because of our remarkable record of absenteeism.
- 4 - Review of our charts and our record of production leads us to the conclusion that no one can say we have produced "too little too late."
- 5 - The A. C. Gilbert Company delivered in 1943 -
9,721,937 Firing Devices, without a single rejection.
- 6 - Our record of tremendous savings in critical materials.
- 7 - Not only have we saved \$1,598,423.00 in voluntary price reductions, but our efficiency, volume and teamwork has resulted in a return to the United States Treasury of \$2,485,000.00.
- 8 - Our accomplishments have been performed without increase in personnel of top management.
- 9 - Our salaries have been modest.
- 10 - Our Engineering contributions are a record of outstanding achievement.
- 11 - We did more than any other manufacturer in the United States to develop that new arm of combat - Firing Devices for field mines.
- 12 - We have demonstrated conclusively that we are low-cost producers.
- 13 - We have accepted precision work that many manufacturers have refused to undertake, and we have trained our organization to manufacture these precision parts and meet these difficult tolerances. Some of these tolerances required on war work are one-tenth the diameter of a human hair. (see exhibit)
- 14 - The overall picture is pretty generally manufacturing from the raw material right through to the finished product.
- 15 - Rendering engineering and expediting assistance to other manufacturers (See Page ~~29-4-2~~ 150)
- 16 - Our Suggestion Award Program is considered a model by most manufacturers. (See Exhibit "Think-up" Book).
- 17 - We are one of the few companies who have made two conversions - the first from civilian to war; the second, from Flares to Firing Devices.

- 18 - Achievements and accomplishments in manufacturing technique
- 19 - In engineering and teaching and assisting sub-contractors
- 20 - Record of our Expediting Personnel (see charts)
- 21 - Civilian dies dismantled for critical steel - 57,865 lbs.
Civilian electrotypes salvaged for critical material - 9,511 lbs.
- 22 - Recreational Program