

MACHINE GUN TURRETS

(LOCAL CONTROL TYPES)

The primary function of a machine gun turret is to provide an automatic means for a gunner to track a target and operate the guns. All turrets consist of an enclosure, a turret control system, and means of mounting, sighting, feeding, and firing the guns.

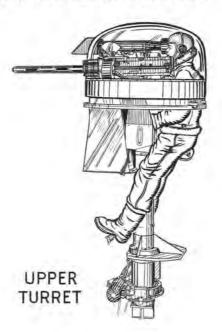
The locally-controlled turret is a rotatable structure in the form of a ball, dome, or rounded cylinder, in which one or more machine guns are mounted. The guns are sighted, controlled, and fired by a gunner within, above, or below the turret, depending upon its type and location in the airplane.

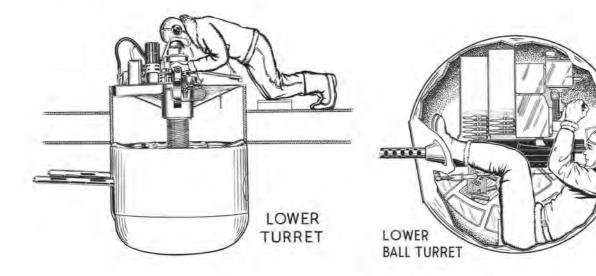
Turrets are designated according to their installation in the airplane, i.e.: upper turrets (on the upper deck), lower or belly turrets (under the fuselage), tail turrets, and nose turrets.

Upper turrets are non-retractable and have dome-like, transparent enclosures of plexiglas and metal under which the gunner sits or stands. The guns may be rotated through 360 degrees horizontally, through 90 degrees in elevation, or any simultaneous combination of the two movements.

Lower, or belly turrets can be either retractable or nonretractable. They may be spherical, with the gunner seated inside; or hemispherical, with the gunner kneeling inside the airplane above the turret. The enclosures are usually of metal and plexiglas. The guns may be rotated through 360 degrees horizontally, through 90 degrees in depression, or any simultaneous combination of the two movements.

Tail turrets are not retractable. The cylindrically-shaped enclosure includes steel armor plate protection, a cover of transparent plexiglas, and, in some installations, flat panes of bullet-proof glass. The gunner is seated completely inside the structure and controls the turret to move the guns through approximately 180 degrees horizontally, 90 degrees upward, and 90 degrees downward.



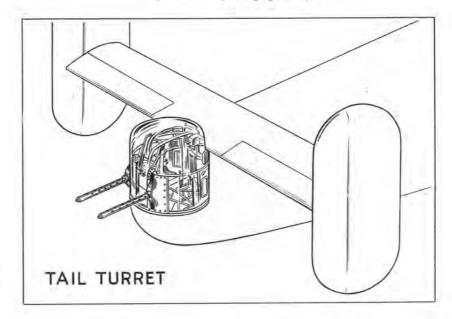


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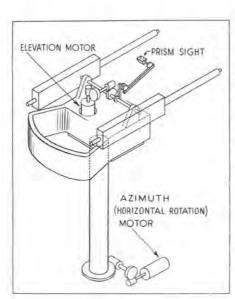
MACHINE GUN TURRETS

(Continued from page 130)



Nose turrets are not retractable; two models have exactly the same design as tail turrets, and a third model resembles the dome-type lower turret. This turret consists of a metal enclosure and is located below the fuselage nose. The gunner, seated above the turret and inside the plexiglas nose of the airplane, can control the guns through 360 degrees horizontally and 90 degrees downward.

Control of turrets may be either electric or hydraulic. Electrical installations operate on either a 12 or 24 volt system. Hydraulically-controlled turrets are operated by hydraulic motors.



Electrically-operated turrets are rotated horizontally by means of a reversible electric motor and a system of gears. The guns are elevated or depressed by a second reversible electric motor and gear system which move a gun carriage attached to the turret. Both of these actions may take place at the same time. The gun sight moves with the gun. Hand grips control the electric motors and regulate the speed and direction of turret movement. These controls also have an electric button or trigger mechanism to fire the guns.

Hydraulically-operated turrets use a system of control valves or levers which may be opened, closed, or moved by handgrips. In some turrets, the flow of oil from an electrically-driven pump operates two hydraulic motors, each of which moves a gear train. One system of gears rotates the turret in a horizontal plane and the other elevates or depresses the guns, both actions taking place simultaneously.

Ammunition, in link belts, is stored in containers inside the turrets, and is automatically conveyed to the individual guns. After being fired, ejected cartridge cases and links fall to the floor or into a canvas bag attached to an ejector chute.

Automatic fire cut-off mechanisms, used with all turrets to prevent the gunner from shooting away part of his own airplane, interrupt the firing of the guns when they come in range of airplane parts such as tail surfaces, etc.





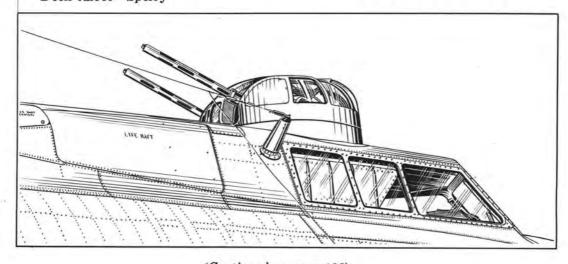
TURRET-UPPER GUN

ARMY TYPE A-1

NAVY-SEE BELOW

NAMES: Upper gun turret Sperry upper turret Deck turret—Sperry

Turret—upper local control Upper gun turret—Sperry



(Continued on page 133)



(Continued from page 132)

DESCRIPTION: The Army type A-1 turret, which mounts two .50 caliber M2 machine guns, is supported on a pivoted pedestal fastened to the floor of the airplane fuselage. It is operated by a Vickers electrohydraulic unit which rotates the turret and moves the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a canvas sling-type seat, is provided with foot rests which are attached to the turret support. He sights through an automatic compensating sight which is fixed to, and moves with the guns. The range adjustment for the sight is made with the thumbs, by twirling a notched wheel located between the control handles. The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the control handles. One handle also has a safety switch which makes the turret operable.

Slip rings on the pedestal bring electric power into the turret for operation of the Vickers unit, gunsight, interphone, trouble light, and other equipment. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit.

CHARACTERISTICS:

| Turret diameter | approximately 4013/16 inches. |
|---------------------|-------------------------------|
| Turret height | approximately 90 inches. |
| Weight | |
| Rotation in azimuth | 360 degrees. |
| Elevation of guns | 85 degrees above horizontal. |
| Operating voltage | 27.5 volts direct current. |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7600

TYPE DESIGNATION: A-1

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-1A upper turret, A. E. Reference Number 52-7625.

SHIPPING DATA: Shipped as a complete unit less guns, ammunition, and compensating sight.

NAVY

The Navy uses this turret on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation |
|----------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|
| Sperry Gyroscope Company | *A-1 | 644961 | A-B | 5400963150 | 11-45C-1 | 150A/3 | S-69809B |
| Steel Products Engineering | *A-1 | SG1 | A-B | 5400963165 | 11-45C-1 | 150A/3 | S-69809B |
| Corporation | *A-1A | SP-2475 | A-B | 5400963165 | 11-45C-1 | 150A/3 | SP-S-2475 |
| Emerson Electric Manufac- | *A-1 | 210860J | A-B | 5400963165 | 11-45C-1 | 150A/3 | S-69809B |
| turing Company | *A-1A | SP-2475 | A-B | 5400963165 | 11-45C-1 | 150A/3 | SP-S-2475 |

Note: *AAF type.





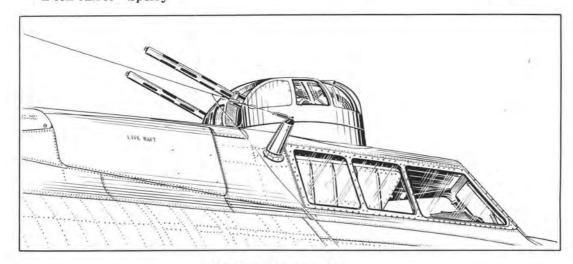
TURRET-UPPER GUN

ARMY TYPE A-1A

NAVY-SEE BELOW

NAMES: Upper gun turret Sperry upper turret Deck turret—Sperry

Turret—upper local control Upper gun turret—Sperry



(Continued on page 135)



(Continued from page 134)

DESCRIPTION: The Army type A-1A turret, which mounts two .50 caliber, M2 machine guns, is supported on a pivoted pedestal fastened to the floor of the airplane fuselage. It is operated by a Vickers electrohydraulic unit which rotates the turret and moves the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a canvas sling type seat with an attached cushion, is provided with adjustable foot rests fixed to the turret support. He sights through an automatic compensating sight which is fixed to, and moves with, the guns. A clear-vision glass sighting panel in the dome reduces visual distortion. The range adjustment for the sight is operated by a motorcycle-type grip located on the right hand control handle. The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handles. The handles also have a safety switch which makes the turret operable.

Slip rings on the pedestal bring electric power into the turret for operation of the Vickers unit, gunsight, interphone, trouble light, and other equipment. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated flying suit.

CHARACTERISTICS:

Turret height approximately 90 inches.

horizontal.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7625

TYPE DESIGNATION: A-1A

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less gun, ammunition, and compensating sight.

NAVY

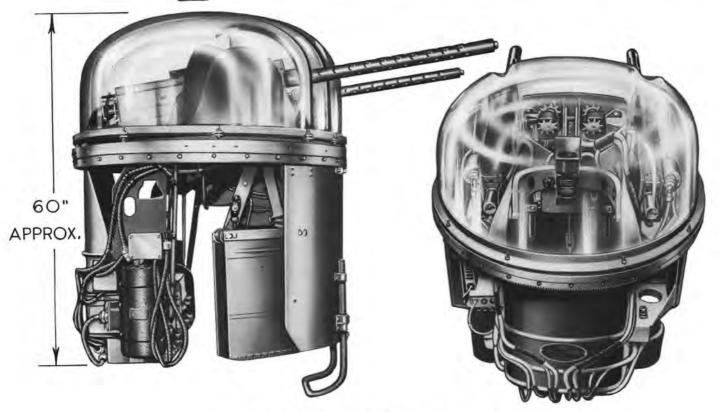
The Navy uses these turrets on airplanes procured from the Army.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation |
|----------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|
| Steel Products Engineering | *A-1A | SP-2475 | A-B | 5400963165 | 11-45C-1 | 150A/3 | SP-S-2475 |
| Corporation | *A-1 | SG1 | A-B | 5400963165 | 11-45C-1 | :50A/3 | S-69809B |
| Emerson Electric Manufac- | *A-1A | SP-2475 | A-B | 5400963165 | 11-45C-1 | 150A/3 | SP-S-2475 |
| turing Company | *A-1 | 210960J | A-B | 5400963165 | 11-45C-1 | 150A/3 | S-69809B |
| Sperry Gyroscope Company | *A-1 | 644961 | A-B | 5400963150 | 11-45C-1 | 150A/3 | S-69809B |

Note: *AAF type.

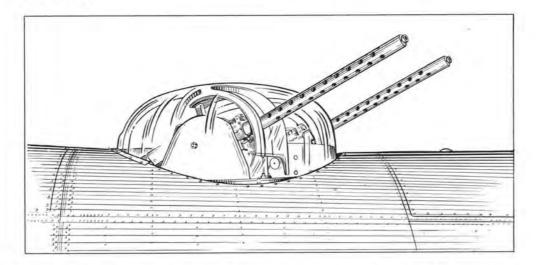




TURRET-UPPER GUN

ARMY TYPE A-3 NAVY—SEE BELOW

NAMES: Upper gun turret Martin upper gun turret Deck turret Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-3 turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring rigidly fastened to the airplane. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a bucket-type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection.

The target is sighted through a reflector type sight which moves with the guns. This sight is equipped with a sunshield, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

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GUN TURRET — UPPER

(Continued from page 136)

ARMY

A. E. REFERENCE NUMBER: 52-7400

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

approximately 463 pounds. 360 degrees. 85 degrees above horizontal. 27.5 volts direct current.

Elevation of guns..... Weight. Rotation in azimuth.

Turret height..... Furret diameter...

CHARACTERISTICS:

RELATIONSHIP OF PARTS:

Operating voltage

approximately 41 inches. approximately 60 inches.

TYPE DESIGNATION: A-3
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-3C upper turret, A. E. Reference Number 52-7475.
SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAV

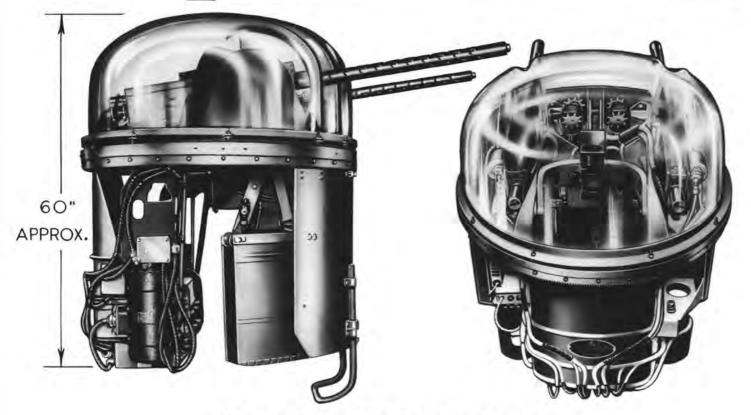
The Navy uses these turrets on airplanes procured from the Army.

Models are used in services as noted in column ALL MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Manufacturer's Model Drawing Identification Number | Used | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specification | Used on Airplanes | Агту Туре | Remarks |
|---------------------|---|---|------|--|-----------------------------------|--------------------------------|---------------------------------|-------------------------|--------------|--|
| The Glenn L. Martin | 250CE2 | R-312285 | A-B | 5400963142 | 11-458-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter. |
| Company | 250CE3 | R-312300 | A-B | 5400963142 | 11-458-1 | 150A/2 | 165 | B-24 | A-3 | Uses block type fire interrupter. |
| | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | Uses profile type fire interrupter. |
| | 250CE5 | 250CE50 | A-B | 5400963141-3 | 11-4588-1 | 150A/11 | 212 | B-24 series | A-3C | Uses profile type fire interrupter. |
| | 250CE2A | R-314560 | A-B | 5400963144 | 11-458-1 | 150A/7 | 165 | B-26B | A-3A | * |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 165B | B-26B-1 | A-3A | Uses profile type fire interrupter. |
| | 250CE3A | R-312310 | A-B | 5400963143-3 | 11-45B-1 | 150A/9 | 165B | B-24 series | A-3B | Uses block type fire interrupter. |
| | 250CE7 | 250CE70 | ٧ | 5400963149-3 | 11-4588-1 | | 212 | B-34; B-37 | A-3C | Uses profile type fire interrupter. |
| | 250CE11 | 250CE110 | ¥ | 5400963149-43 | 11-4588-1 | | 212 | B-40 | A-3C | Uses profile type fire interrupter. |
| | 250CE8 | R-371400 | A-B | 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| | 250CE8A | R-371400 | A-B | 5400963149-5 | 11-45BD-1 | 150A/24 | 264 | A-30 | A-11 | Uses block type fire interrupter. |
| | 250CE10 | 250CE100 | 4 | 5400963149-7 | | | 281 | A-20 | A-11 | Uses profile type fire interrupter. |
| | 250CE1 | R-266800 | A-B | 5400963145 | 11-458-2 | 150A/32 | 165A | B-26 | A-14 | A-14 Uses block type fire interrupter. |

*Some turrets use block type fire interrupters; others use profile type fire interrupters.



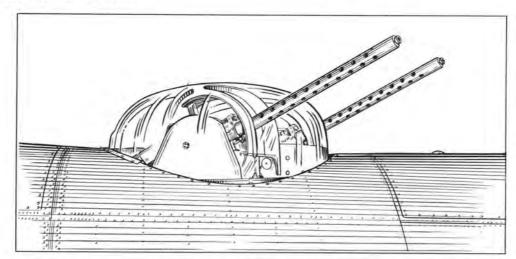


TURRET-UPPER GUN

ARMY TYPE A-3A NAVY—SEE BELOW

NAMES: Upper gun turret

Martin upper gun turret Deck turret—Martin Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-3A upper gun turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring rigidly fastened to the airplane. It is electrically operated by two amplidyne drives; one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a bucket-type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection. The target is sighted through a reflector type sight, which moves with the guns. This sight is equipped with a sunshield, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable. A swivel plug below the turret, on the floor of the airplane, is used for oxygen and interphone connections. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit. A slip ring fastened to the turret mounting ring transmits electric power for operation.

(Continued on page 139)



GUN TURRET-UPPER

(Continued from page 138)

RELATIONSHIP OF PARTS:

Rotation in azimuth. Elevation of guns.....

Turret height.... Turret diameter...

Weight...

CHARACTERISTICS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification. . 85 degrees above horizontal. 27.5 volts direct current. Operating voltage.....

approximately 465 pounds.

.....approximately 41 inches.

ARMY

A. E. REFERENCE NUMBER: 52-7425
TYPE DESIGNATION: A-3A
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-3C upper turret, A. E. Reference Number 52-7475.
SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

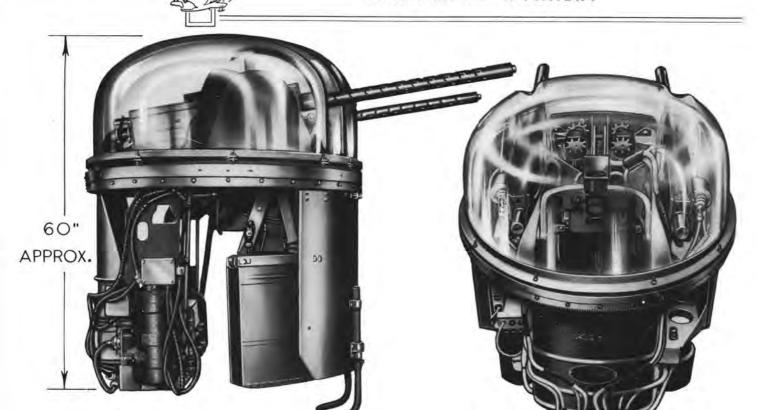
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NAN

The Navy uses these turrets on airplanes procured from the Army.

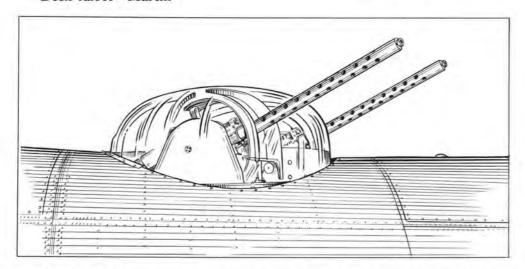
Models are used in services as noted in column 4 MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Manufacturer's Model Drawing Identification Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specification | Used on Airplanes | Army | Remarks |
|--------------------------------|---|---|------------|--|-----------------------------------|--------------------------------|---------------------------------|-------------------------|------|---|
| The Glenn L. Martin Company | 250CE2A | R-314560 | A-B | 5400963144 | 11-45B-1 | 150A/7 | 165 | B-26B | A-3A | Some turrets use block type fire interrupter: Others use profile. |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 1658 | B-26B-1 | A-3A | Uses profile type fire interrupter. |
| | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | Uses profile type fire interrupter. |
| | 250CE5 | 250CE50 | A-B | 5400963141-3 | 11-4588-1 | 150A/11 | 212 | B-24 series | | A-3C Uses profile type fire interrupter. |
| | 250CE2 | R-312285 | A-B | 5400963142 | 11-45B-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter |
| | 250CE3 | R-312300 | A-B | 5400963142 | 11-45B-1 | 150A/2 | 165 | 8-24 | A-3 | Uses block type fire interrupter |
| | 250CE3A | 1 | A-B | R-312310 A-B 5400963143-3 | 11-45B-1 | 150A/9 | 1658 | B-24 series | A-3B | Uses block type fire interrupter. |
| | 250CE7 | 250CE70 | ¥ | 5400963149-3 | 11-4588-1 | | 212 | B-34; B-37 | | A-3C Uses profile type fire interrupter. |
| | 250CE11 | 250CE110 | * | A 5400963149-43 | 11-4588-1 | | 212 | B-40 | A-3C | Uses profile type fire interrupter |
| | 250CE8 | R-371400 | A-B | 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| | 250CE8A | R-371400 A-B | A-B | 5400963149-5 11-45BD-1 | 11-45BD-1 | 150A/24 | 264 | A-30 | A-11 | A-11 Uses block type fire interrupter. |
| | 250CE10 | 250CE100 | ٧ | 5400963149-7 | | | 281 | A-20 | A-11 | Uses profile type fire interrupter. |
| | 250CE1 | R-266800 | A-B | 5400963145 | 11-45B-2 | 150A/32 | 165A | B-26 | A-14 | A-14 Uses block type fire interrupter. |



TURRET-UPPER GUN ARMY TYPE A-3B NAVY—SEE BELOW

NAMES: Upper gun turret Martin upper gun turret Deck turret—Martin Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-3B upper gun turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring rigidly fastened to the airplane. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a bucket-type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection.

The target is sighted through a reflector type sight, which moves with the guns. This sight is equipped with a sunshield, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

A swivel plug below the turret, on the floor of the airplane, is used for oxygen and interphone connections. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit. A slip ring fastened to the turret mounting ring transmits electric power for operation.

(Continued on page 141)



GUN TURRET — UPPER

(Continued from page 140)

the turret manufacturer's model specification.

Turret height.....

urret diameter....

CHARACTERISTICS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in Rotation of guns. 85 degrees above horizontal.
Onerating voltage. 27.5 volts direct current. approximately 41 inches.
approximately 60 inches.
approximately 466 pounds. Operating voltage RELATIONSHIP OF PARTS: Weight. Rotation in azimuth.

ARMY

A. E. REFERENCE NUMBER: 52-7450

TYPE DESIGNATION: A-3B
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-3C upper turret, A. E. Reference Number 52-7475.
SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

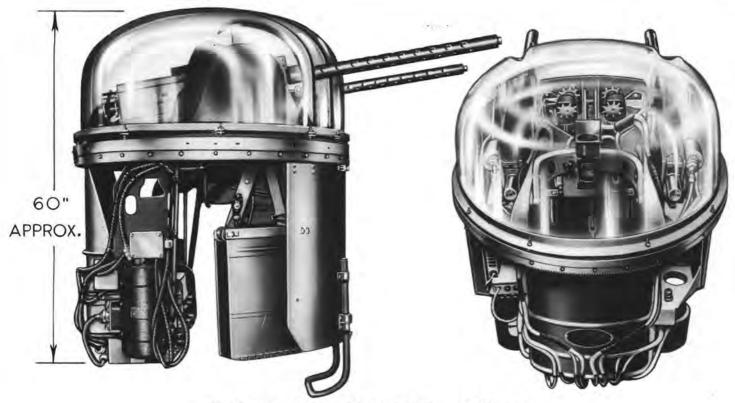
NAVY

The Navy uses these turrets on airplanes procured from the Army.

Models are used in services as noted in column 4 MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Manufacturer's Model Drawing Identification Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specification | Used on Airplanes | Army Type | Remarks |
|---------------------|---|---|------------|--|-----------------------------------|--------------------------------|---------------------------------|-------------------------|--------------|--|
| The Glenn L. Martin | 250CE3A | R-312310 | A-B | 5400963143-3 | 11-45B-1 | 150A/9 | 1658 | B-24 series | A-3B | Uses block type fire interrupter. |
| Company | 250CE2A | R-314560 | A-8 | 5400963144 | 11-45B-1 | 150A/7 | 165 | B-26B | A-3A | Some turrets use block type fire interrupter. Others use profile type. |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 1658 | B-26B-1 | A-3A | Uses profile type fire interrupter. |
| | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | 8-26 series A-3C Uses profile type fire interrupter. |
| | 250CE5 | 250CE50 | A-B | A-B 5400963141-3 | 11-4588-1 | 150A/11 | 212 | B-24 series | A-3C | 8-24 series A-3C Uses profile type fire interrupter. |
| | 250CE2 | R-312285 | A-B | 5400963142 | 11-458-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter, |
| | 250CE3 | R-312300 | A-B | 5400963142 | 11-458-1 | 150A/2 | 165 | B-24 | A-3 | Uses block type fire interrupter. |
| | 250CE7 | 250CE70 | 4 | 5400963149-3 | 11-4588-1 | | 212 | B-34; B-37 | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE11 | 250CE11 250CE110 | × | 5400963149-43 | 11-4588-1 | | 212 | B-40 | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE8 | R-371400 | A-B | 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| | 250CE8A | R-371400 | A-B | 5400963149-5 | 11-45BD-1 | 150A/24 | 264 | A-30 | A-11 | Uses block type fire interrupter. |
| | 250CE10 | 250CE100 | ¥ | 5400963149-7 | | | 281 | A-20 | A-11 | Uses profile type fire interrupter. |
| | 250CE1 | R-266800 | A-B | 5400963145 | 11-45B-2 | 150A/32 | 165A | B-26 | A-14 | A-14 Uses block type fire interrupter. |



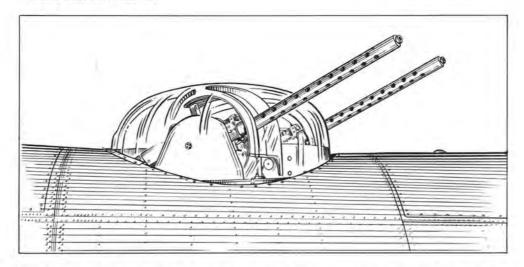


TURRET-UPPER GUN

ARMY TYPE A-3C

NAVY—SEE BELOW

NAMES: Upper gun turret Martin upper gun turret Deck turret—Martin Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-3C turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring rigidly fastened to the airplane. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a bucket-type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection. The target is sighted through a reflector type sight, which moves with the guns. This sight is equipped with a sunshield, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

A swivel plug below the turret, on the floor of the airplane, is used for oxygen and interphone connections. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit. A slip ring fastened to the turret mounting ring transmits electric power for operation.

(Continued on page 143)



TURRET — UPPER GUN

(Continued from page 142)

RELATIONSHIP OF PARTS

Turret height..... Weight... Rotation in azimuth

Furret diameter...

CHARACTERISTICS:

the turret manufacturer's model specification.

approximately 41 inches.
approximately 60 inches.
approximately 564 pounds.
360 degrees.
from 3 degrees below to 85 degrees above 27.5 volts direct current. horizontal Elevation of guns....

A complete list of all turret equipment, whether government or contractor furnished, will be found in Operating voltage....

ARMY

TYPE DESIGNATION: A-3C
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit, less guns and ammunition. E. REFERENCE NUMBER: 52-7475

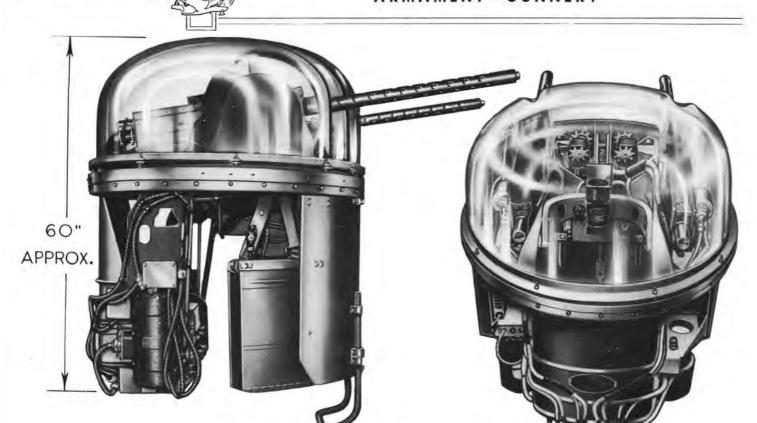
NAV

The Navy uses these turrets on airplanes procured from the Army.

Models are used in services as noted in column 4 MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Manufacturer's Model Drawing Identification Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specification | Used on Airplanes | Army | Remarks |
|----------------------------|---|---|------------|--|-----------------------------------|--------------------------------|---------------------------------|-------------------------|------|--|
| The Glenn L. Martin 250CE4 | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | Uses profile type fire interrupter. |
| Company | 250CE5 | 250CE50 | A-B | 5400963141-3 | 11-4588-1 | 150A/11 | 212 | B-24 series | A-3C | Uses profile type fire interrupter. |
| | 250CE7 | 250CE70 | 4 | 5400963149-3 | 11-4588-1 | | 212 | B-34; B-37 A-3C | A-3C | Uses profile type fire interrupter. |
| | 250CE11 | 250CE110 | ¥ | 5400963149-43 | 11-4588-1 | | 212 | B-40 | A-3C | Uses profile type fire interrupter. |
| | 250CE2 | R-312285 | A-B | 5400963142 | 11-458-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter. |
| | 250CE3 | R-312300 | A-B | 5400963142 | 11-45B-1 | 150A/2 | 165 | B-24 | A-3 | Uses block type fire interrupter. |
| | 250CE2A | 250CE2A R-314560 | A-B | 5400963144 | 11-458-1 | 150A/7 | 165 | B-26B | A-3A | * |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 1658 | B-26B-1 | A-3A | Uses profile type fire interrupter. |
| | 250CE3A | 250CE3A R-312310 | A-B | 5400963143-3 | 11-45B-1 | 150A/9 | 165B | B-24 series A-3B | A-3B | Uses block type fire interrupter. |
| | 250CE8 | R-371400 | A-B | 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| | 250CE8A | 250CE8A R-371400 | A-B | 5400963149-5 | 11-45BD-1 | 150A/24 | 264 | A-30 | A-11 | Uses block type fire interrupter. |
| | 250CE10 | 250CE100 | < | 5400963149-7 | | | 281 | A-20 | A-11 | Uses profile type fire interrupter. |
| | 250CE1 | R-266800 | A-B | 5400963145 11-45B-2 | 11-458-2 | 150A/32 | 165A | 8-26 | A-14 | A-14 Uses block type fire interrupter. |

*Some turrets use block type fire interrupters; others use profile type fire interrupters.

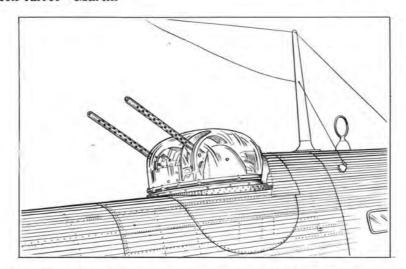


TURRET-UPPER GUN

ARMY TYPE A-11

NAVY—SEE BELOW

NAMES: Upper gun turret Martin upper gun turret Deck turret—Martin Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-11 upper turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring fastened to the airplane. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be manually operated by the gunner.

The gunner, seated in a bucket type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection. The target is sighted through a reflector sight, which moves with the guns. This sight is equipped with a sunshade, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret operable.

A swivel plug, below the turret, and on the floor of the airplane, is used for oxygen and interphone connections. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit. A slip ring fastened to the turret mounting ring transmits electric power for operation.

(Continued on page 145)

approximately 630 pounds. 360 degrees. from 5 degrees below to 75 degrees above

approximately 41 inches.



TURRET-UPPER GUN

(Continued from page 144)

RELATIONSHIP OF PARTS:

Weight....Rotation in azimuth....

Turret height.....

Furret diameter...

CHARACTERISTICS:

Elevation of guns. . .

A complete list of all turret equipment, whether government or contractor furnished, will be found in 27.5 volts direct curret. horizontal the turret manufacturer's model specification. Operating voltage...

ARMY

A. E. REFERENCE NUMBER: 52-8000
TYPE DESIGNATION: A-11
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

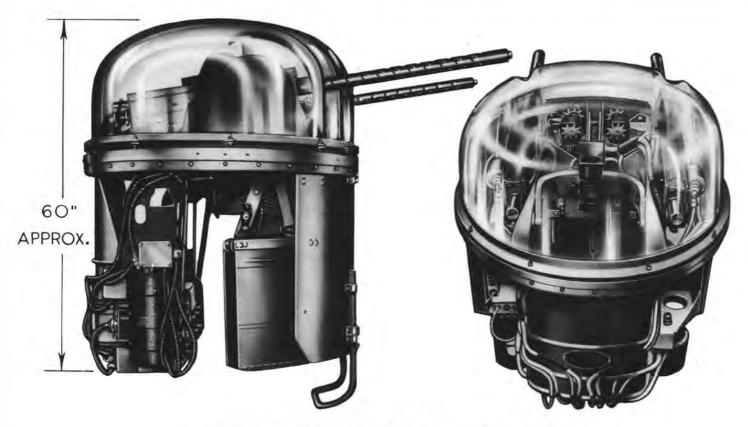
NAVY

The Navy uses these turrets on airplanes procured from the Army.

Models are used in services as noted in column 4 ALL MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Manufacturer's Model Drawing Identification Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specification | Used on Airplanes | Army | Remarks |
|----------------------------|---|---|------------|--|-----------------------------------|--------------------------------|---------------------------------|-------------------------|------|--|
| The Glenn L. Martin 250CE8 | 250CE8 | R-371400 | A-B | 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| Company | 250CE8A | 250CE8A R-371400 | A-B | 5400963149-5 | 11-45BD-1 | 150A/24 | 264 | A-30 | A-11 | Uses block type fire interrupter. |
| | 250CE10 | 250CE100 | 4 | 5400963149-7 | | | 281 | A-20 | A-11 | Uses profile type fire interrupter. |
| | 250CE2 | R-312285 | A-B | 5400963142 | 11-45B-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter. |
| | 250CE3 | R-312300 | A-B | 5400963142 | 11-458-1 | 150A/2 | 165 | B-24 | A-3 | Uses block type fire interrupter, |
| | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | Uses profile type fire interrupter. |
| | 250CE5 | 250CE50 | A-B | 5400963141-3 | 11-4588-1 | 150A/11 | 212 | B-24 | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE7 | 250CE70 | × | 5400963149-3 | 11-4588-1 | | 212 | B-34; B-37 | A-3C | Uses profile type fire interrupter. |
| | 250CE2A | R-314560 | A-B | 5400963144 | 11-458-1 | 150A/7 | 1658 | B-26B | A-3A | * |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 1658 | B-26B-1 | A-3A | Uses profile type fire interrupter. |
| | 250CE3A | R-312310 | A-8 | 5400963143-3 | 11-45B-1 | 150A/9 | 1658 | B-24 series | A-3B | Uses block type fire interrupter. |
| | 250CE11 | 250CE11 250CE110 | 4 | 5400963149-43 | 11-4588-1 | | 212 | B-40 | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE1 | R-266800 | A-8 | 5400963145 | 11-458-2 | 150A/32 | 165A | B-26 | A-14 | Uses block type fire interrupter. |



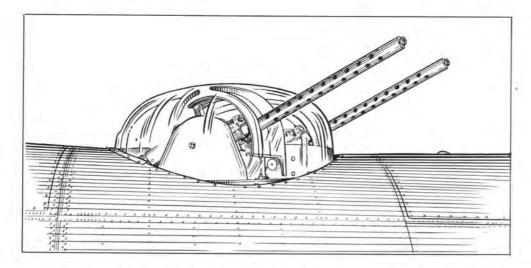


TURRET-UPPER GUN

ARMY TYPE A-14 NAVY—SEE BELOW

NAMES: Upper gun turret Martin upper gun turret Deck turret—Martin

Turret—upper gun—Martin Upper gun turret—local control (British)



DESCRIPTION: The Army type A-14 turret, which mounts two .50 caliber M2 machine guns, is supported on a mounting ring rigidly fastened to the airplane. It is electrically operated by two amplidyne drives; one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner.

The gunner, seated in a bucket-type seat with a hinged bottom, is provided with an adjustable foot rest. Armor plate provides for his protection. The target is sighted through a reflector type sight which moves with the guns. This sight is equipped with a sunshield, or glare eliminator, for sighting against the sun.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

(Continued on page 147)

approximately 41¼ inches. approximately 665% inches. approximately 450 pounds.

360 degrees.

Weight. Rotation in azimuth.

Turret height.....

Turret diameter...

CHARACTERISTICS:

Elevation of guns....



URRET-UPPER GUN

(Continued from page 146)

the turnet manufacturer's model specification.

A complete list of all turret equipment, whether government or contractor furnished, will be found in 86 degrees above horizontal. 12 volts direct current. Operating voltage..... RELATIONSHIP OF PARTS:

ARMY

A. E. REFERENCE NUMBER: 52-8100

TYPE DESIGNATION: A-14

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-3C upper turret, A. E. Reference Number 52-7475.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

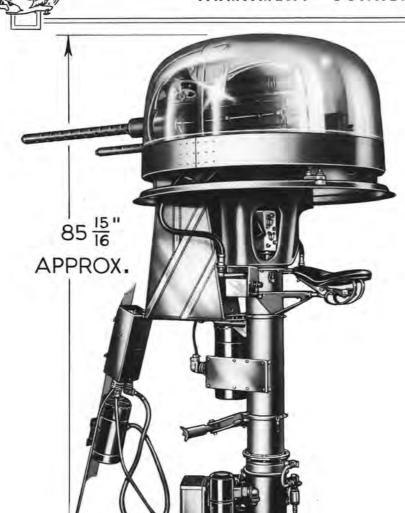
NAVY

The Navy uses these turrets on airplanes procured from the Army.

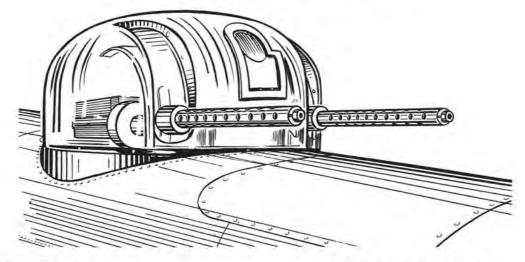
Models are used in services as noted in column 4 ALL MODELS BELOW ARE INTERCHANGEABLE A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model | Manufacturer's Manufacturer's Model Drawing | Used | Air Service Command | Army Technical | British | Manufacturer's | Pesq | Army | Remarks |
|----------------------------|-------------------------|--|------|--|-------------------|---------|----------------|-------------|------|--|
| | Identification | Number | Ву | Stock Number | Order Number | Number | Specification | Airplanes | Type | |
| The Glenn L. Martin 250CE1 | 250CE1 | R-266800 | A-B | 5400963145 | 11-458-2 | 150A/32 | 165A | B-26 | A-14 | Uses block type fire interrupter. |
| Сомралу | 250CE2 | R-312285 | A-B | 5400963142 | 11-45B-1 | 150A/1 | 165 | B-26A | A-3 | Uses block type fire interrupter. |
| | 250CE3 | R-312300 A-B | A-8 | 5400963142 | 11-45B-1 | 150A/2 | 165 | B-24 | A-3 | Uses block type fire interrupter. |
| | 250CE4 | 250CE40 | A-B | 5400963141 | 11-4588-1 | 150A/22 | 212 | B-26 series | A-3C | Uses profile type fire interrupter. |
| | 250CE5 | 250CE50 | A-B | A-B 5400963141-3 | 11-45BB-1 | 150A/11 | 212 | B-24 series | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE2A | 250CE2A R-314560 A-B | A-B | 5400963144 | 11-458-1 | 150A/7 | 165 | B-26B | A-3A | * |
| | 250CE6 | R-371300 | A-B | 5400963144 | 11-45BA-1 | 150A/23 | 165B | B-26B-1 | A-3A | A-3A Uses profile type fire interrupter. |
| | 250CE3A | R-312310 | A-8 | 250CE3A R-312310 A-B 5400963143-3 11-45B-1 | 11-458-1 | 150A/9 | 165B | B-24 series | A-3B | B-24 series A-3B Uses block type fire interrupter. |
| | 250CE7 | 250CE70 | 4 | 5400963149-3 | 11,4588-1 | | 212 | B-34; B-37 | | A-3C Uses profile type fire interrupter. |
| | 250CE11 | 250CE110 | 4 | 250CE11 250CE110 A 5400963149-43 11-45BB-1 | 11-4588-1 | | 212 | B-40 | A-3C | A-3C Uses profile type fire interrupter. |
| | 250CE8 | R-371400 | A-B | A-B 5400963149-5 | 11-45BC-1 | 150A/8 | 258 | A-30 | A-11 | Uses profile type fire interrupter. |
| | 250CE8A | 250CE8A R-371400 | A-8 | A-B 5400963149-5 | 11-45BD-1 150A/24 | 150A/24 | 264 | A-30 | A-11 | Uses block type fire interrupter. |
| | 250CE10 | 250CE10 250CE100 A | ¥ | 5400963149-7 | | | 281 | A-20 | A-11 | A-11 Uses profile type fire interrupter. |

*Some turrets use block type fire interrupters; others use profile type fire interrupters.



TURRET-UPPER GUN ARMY TYPE A-4 NAVY—SEE BELOW



NAMES: Upper gun turret
Deck turret—Bendix

Bendix upper gun turret Upper turret—local control (British)

DESCRIPTION: The Army type A-4 upper turret, which mounts two .50 caliber M2 machine guns, is supported on a central column fastened to the floor of the airplane fuselage. It is electrically operated by two drive motors; one for rotation of the turret, the other for movement of the guns in elevation

(Continued on page 149)





(Continued from page 148)

and depression. The power for the motors is supplied through two sets of relays, which interrupt the current flow and provide slow or fast operation. In the event of electrical failure, the turret can be moved by the gunner with a hand-crank.

The guns, charged simultaneously by individual hydraulic chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

The gunner is seated on a bicycle type seat within the turret, and sights the target through a non-fogging periscopic sight. The eyepiece of this sight remains fixed, while the periscope's prism moves with the guns.

Collector rings on the central column provide hydraulic, oxygen, and electrical connections to the turret.

CHARACTERISTICS:

| Turret diameter | approximately 3911/16 inches. |
|---------------------|-------------------------------|
| Turret height | approximately 8515/16 inches. |
| Weight | approximately 525 pounds. |
| Rotation in azimuth | |
| Elevation of guns | .87 degrees above horizontal. |
| Operating voltage | 27.5 volts direct current. |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7500

TYPE DESIGNATION: A-4

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-9A,

upper turret, A. E. Reference Number 52-7910.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

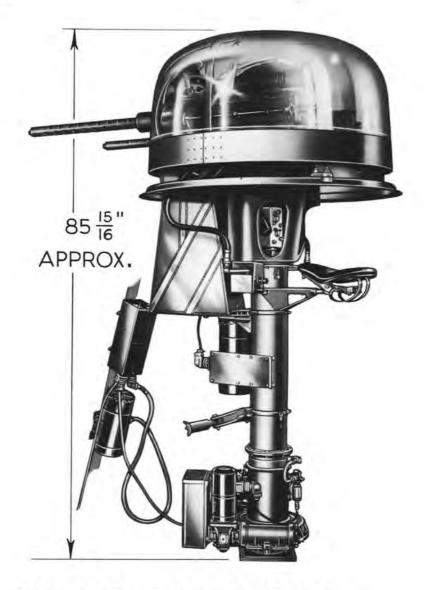
The Navy uses these turrets on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

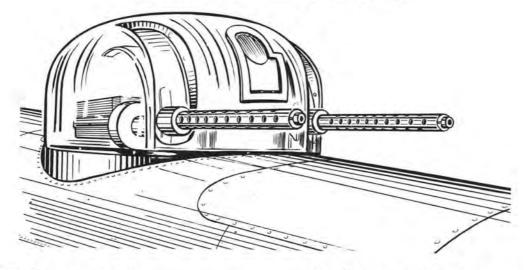
| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Army Type | Remarks |
|--------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|--------------|---------|
| Bendix Products Division | L | 78001 | A-B | 5400963140 | | 150A/5 | 78001A | A-4 | |
| | N | 80701 | A-B | 5400963035 | 11-45A-3 | 150A/20 | ES0386 | A-10 | * |

^{*}Operated by amplidynes.





ARMY TYPE A-9 NAVY—SEE BELOW



NAMES: Upper gun turret Deck turret—Bendix Bendix upper gun turret Upper turret—local control (British)

(Continued on page 151)



(Continued from page 150)

DESCRIPTION: The Army type A-9 turret, which mounts two .50 caliber M2 machine guns, is supported on a central column fastened to the floor of the airplane fuselage. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner with a hand-crank.

The guns, charged simultaneously by individual hydraulic chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret operable.

The gunner is seated on a bicycle-type seat within the turret and views the target through a non-fogging periscopic sight. The eyepiece of this sight remains fixed while the periscope's prism moves with the guns.

Collector rings on the central column provide hydraulic, oxygen, and electrical connections to the turret.

CHARACTERISTICS:

Turret diameterapproximately $39^{1}\frac{1}{16}$ inches.Turret heightapproximately $85^{1}\frac{5}{16}$ inches.Weightapproximately 525 pounds.Rotation in azimuth360 degrees.Elevation of guns84 degrees above horizontal.Operating voltage27.5 volts direct current.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7900

TYPE DESIGNATION: A-9

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-9A, upper turret, A. E. Reference Number 52-7910.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

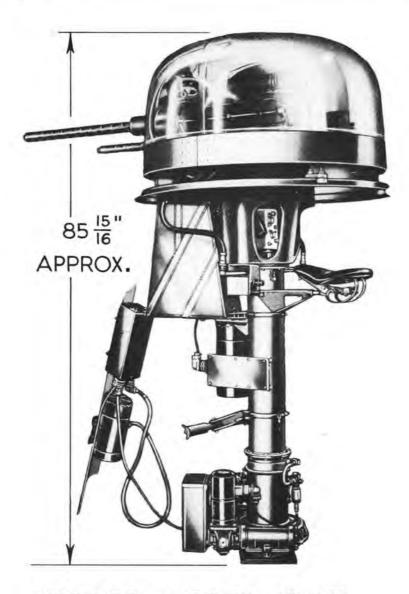
The Navy uses these turrets on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

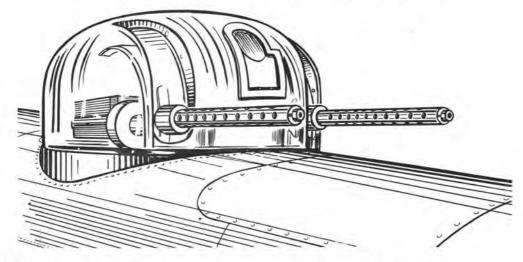
| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Army Type | Remarks |
|--------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|--------------|---------|
| Bendix Products Division | N | 80701 | A-B | 5400963035 | 11-45A-3 | 150A/20 | ES0386 | A-9 | |
| | A | 82000 | A-B | 5400963064 | 11-45A-3 | 150A/30 | | A-9A | |
| | L | 78001 | A-B | 5400963140 | 1 0 34 | 150A/5 | 78001A | A-4 | * |

^{*}No amplidynes; uses electric motors.





TURRET-UPPER GUN ARMY TYPE A-9A NAVY—SEE BELOW



NAMES: Upper gun turret Deck turret—Bendix Bendix upper gun turret Upper turret—local control (British)

(Continued on page 153)



(Continued from page 152)

DESCRIPTION—The Army type A-9A upper turret, which mounts two .50 caliber, M2 machine guns, is supported on a central column fastened to the floor of the airplane fuselage. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. In the event of power failure, the turret can be moved manually by the gunner with a hand-crank.

The guns, charged mechanically by individual foot-operated chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret electrically operable.

The gunner is seated on an adjustable, folding, bicycle-type seat, and views the target through a reflector sight. A clear-vision glass sighting panel in the dome prevents visual distortion.

Collector rings on the central column provide oxygen and electrical connections to the turret.

CHARACTERISTICS:

| Turret diameter | approximately 3911/16 inches. |
|---------------------|-------------------------------|
| Turret height | approximately 8515/6 inches. |
| Weight | approximately 525 pounds. |
| Rotation in azimuth | |
| Elevation of guns | .84 degrees above horizontal. |
| Operating voltage | |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7910

TYPE DESIGNATION: A-9A

A. S. C. STOCK NUMBER: Refer to chart. TECHNICAL ORDER NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

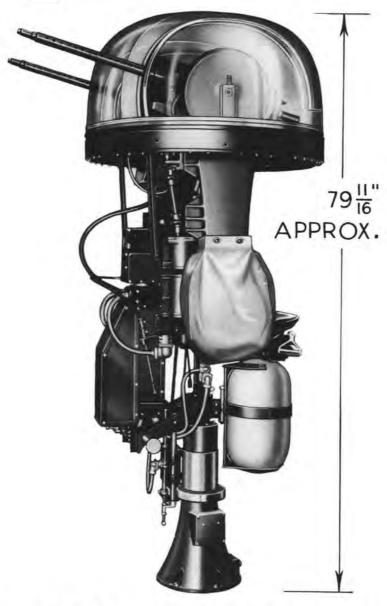
The Navy uses these turrets on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Army Type | Remarks |
|--------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|--------------|---------|
| Bendix Products Division | A | 82000 | A-B | 5400963175 | 11-45A-3 | 150A/30 | | A-9A | |
| | L | 78001 | A-B | 5400963140 | | 150A/5 | 78001A | A-4 | * |
| | N | 80701 | A-B | 5400963035 | 11-45A-3 | 150A/20 | ES0386 | A-9 | |

^{*}No amplidynes. Electric motor driven.



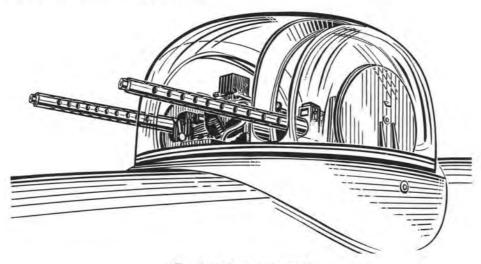


TRAINING TURRET-UPPER

ARMY TYPE A-8

NAMES: Upper training turret Crocker-Wheeler training turret

Training turret



(Continued on page 155)



TURRET-UPPER TRAINING

(Continued from page 154)

DESCRIPTION: The Army type A-8 turret, which mounts two .30 caliber M2 machine guns, is supported on a "T" structure fastened to the floor of the airplane fuselage. It is electrically operated by two Maxson electric drives, one for rotation of the turret, the other for the movement of the guns in elevation and depression.

The gunner, seated on an adjustable bicycle-type seat, has a fixed foot rest extending from the central column of the "T". He sights through a reflector type sight which is fixed to, and moves with, the guns.

The guns, charged individually by manual chargers, are fired by pressing a trigger switch on the turret control handle. This handle also has a safety switch to make the turret electrically operable.

Slip rings at the base of the "T" bring electric power into the turret for operation of the turret drives, gun sight, interphone, and other equipment. An outlet and controlling rheostat for the gunner's electrically-heated suit are located inside the turret.

This turret is used for training purposes only. When mounted in an airplane, only one gun is used, a camera being installed in the other gun position. The camera, operating from the same trigger as the gun, photographs the target to record the number of hits and the fire pattern.

CHARACTERISTICS:

| Turret diameter | approximately 35 inches. |
|---------------------|--------------------------------|
| Turret height | |
| Weight | approximately 335 pounds. |
| Rotation in azimuth | . 360 degrees. |
| Elevation of guns | . 90 degrees above horizontal. |
| Operating voltage | . 27.5 volts direct current. |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7700

TYPE DESIGNATION: A-8

A. S. C. STOCK NUMBER: Refer to chart. TECHNICAL ORDER NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

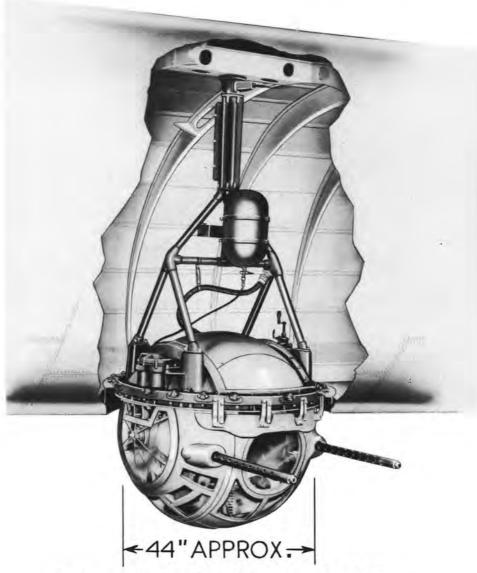
There is no Navy equivalent for the Army item.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | Manufacturer's Specifi- cation |
|--|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------------|
| Crocker-Wheeler Manufacturing Company Division of Joshua Hendy Iron Works | *A-8 | T-5500-N | A | 5400963200 | 11-45F-1 | EST-1002 |
| National Mineral Company | *A-8 | NMT-5500-N | A | 5400963200 | 11-45F-1 | EST-1002 |

Note: *AAF type.

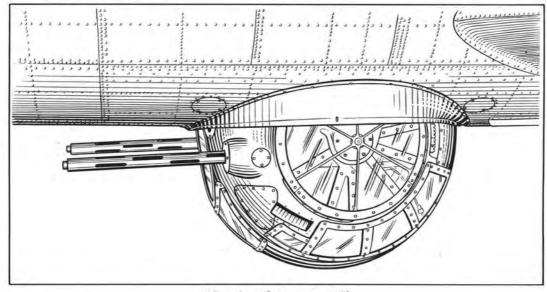




TURRET-LOWER GUN

ARMY TYPE A-2 NAVY—SEE BELOW

NAMES: Lower gun turret Lower ball turret_local control Belly turret_ball type Sperry lower ball turret Turret—lower local control Lower gun turret—local control (British)



(Continued on page 157)



TURRET-LOWER GUN

(Continued from page 156)

DESCRIPTION: The Army type A-2 lower gun turret, which mounts two .50 caliber, M2 machine guns, is supported by a framework suspended from a self-aligning bearing fastened inside the top of the fuselage. A Vickers electro-hydraulic unit enables the turret to rotate in any direction. In the event of power failure, the turret can be moved manually by the gunner.

The guns, which are fixed in relation to the turret, are charged individually by manual chargers, and are fired by pressing a button on the control handles.

The gunner is housed inside the spherical structure comprising the turret enclosure, and armor plate provides for his protection. He sights through an automatic compensating sight, and the turret, guns, sight, and gunner move as a unit while tracking the target.

Slip rings in the hangar assembly bring electrical power into the turret for operation of the Vickers unit, gun-sight, interphone, trouble-light, and other equipment. An outlet and controlling rheostat are provided inside the turret for the gunner's electrically heated suit.

CHARACTERISTICS:

Turret ring diameter approximately 46½ inches.

Turret height approximately 101 inches.

Weight approximately 850 pounds.

Rotation in azimuth 360 degrees.

Rotation in elevation 85 degrees from the vertical.

Operating voltage 27.5 volts direct current.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7200

TYPE DESIGNATION: A-2

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns, ammunition, and compensating sight.

NAVY

The Navy uses these turrets on airplanes procured from the Army.

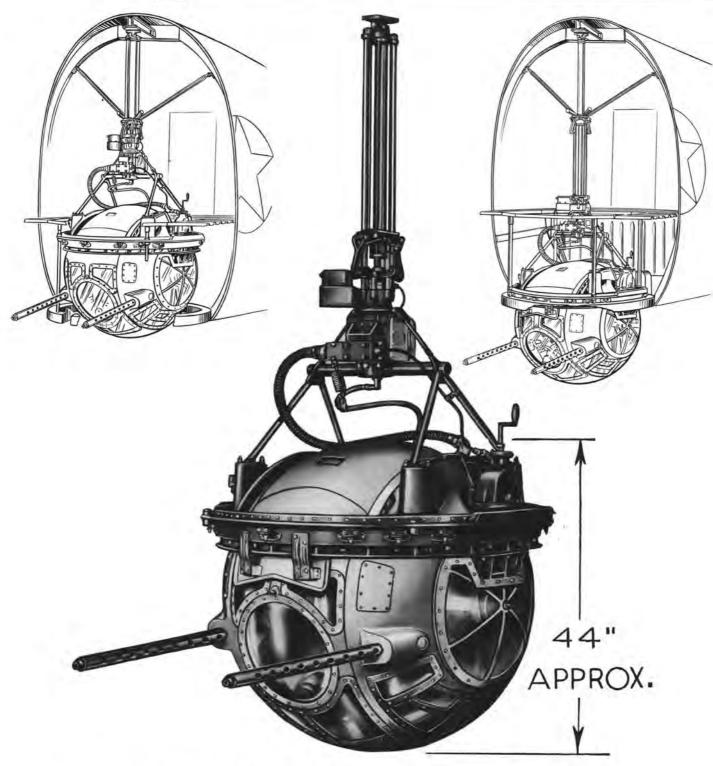
ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Remarks |
|---|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|---------|
| Sperry Gyroscope Company | *A-2 | 645796 | A-B | 5400963090 | 11-45C-1 | 150A/4 | S-69808 | |
| Emerson Electric Manufacturing Company | *A-2 | 205955M | A-B | 5400963065 | 11-45C-1 | 150A/4 | S-69808 | |
| Briggs Manufacturing Company | *A-2 | 1300 | A-B | 5400963065 | 11-45C-1 | 150A/4 | S-69808 | |
| | *A-13 | 30000 | A-B | 5400963110 | | 150A/31 | BR-BT-7R | § |

Retractable turret. The ball of this turret is identical with Army type A-2 ball, but a conversion kit is required to convert the hangar assembly. Uses different fire interrupter.

Note: *AAF type.





TURRET-RETRACTABLE LOWER GUN

ARMY TYPE A-13 NAVY—SEE BELOW

NAMES: Retractable lower gun turret
Turret—lower gun—retractable—44 inch ball
Briggs retractable ball turret

Lower gun turret—local control—retractable (British)

Lower ball local control turret—retractable

DESCRIPTION: The Army type A-13 turret, which mounts two .50 caliber M2 machine guns, is supported by a framework suspended from an hydraulic cylinder inside the top of the fuselage. The cylinder piston moves up and down through a 28-inch stroke to raise or lower the turret. In case of failure of the turret hydraulic system, two pins on the flange of the cylinder guide provide auxiliary means of

(Continued on page 159)



TURRET-RETRACTABLE LOWER GUN

(Continued from page 158)

retraction if fastened to the bomb hoist. A Vickers electro-hydraulic unit enables the turret to rotate in any direction. In the event of power failure, the turret can be moved manually by the gunner.

The guns, which are fixed in relation to the turret, are charged individually by manual chargers, and fired by pressing a button on the turret control handle.

The gunner is housed entirely inside the spherical structure comprising the turret enclosure, and armor plate provides for his protection. He sights through an automatic compensating sight and the turret, guns, sight, and gunner move as a unit while tracking the target.

Slip rings in the hangar assembly bring electrical power into the turret for operation of the Vickers unit, gunsight, interphone, trouble-light, and other equipment. An outlet and controlling rheostat inside the turret are provided for the gunner's electrically heated suit.

CHARACTERISTICS:

| Turret ring diameter | approximately 47¼ inches. |
|---|--|
| | approximately 1315/8 inches extended; 1041/8 |
| | inches retracted. |
| Weight | approximately 780 pounds. |
| Rotation in azimuth | 360 degrees. |
| Rotation in elevation | 85 degrees from vertical. |
| Operating voltage | 27.5 volts direct current. |
| 그리 이 적 이 그리아에게 주어 그림에서 어느래요 어떻게 그렇게 그리고 있는데 그리고 있는데 그리고 있는데 그리고 있다. | |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-8050

TYPE DESIGNATION: A-13

A. S. C. STOCK NUMBER: Refer to chart. TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns, ammunition, and compensating sight.

NAVY

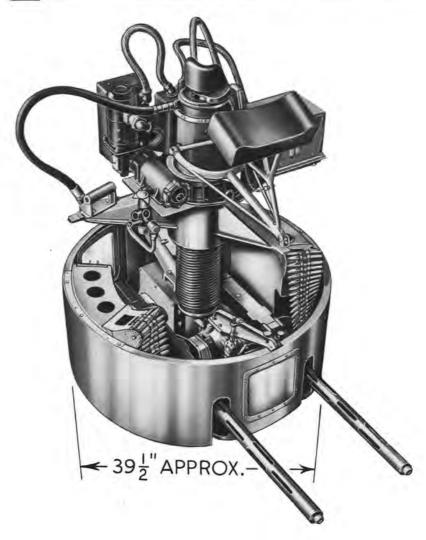
The Navy uses this turret on airplanes procured from the Army.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Remarks |
|---|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|---------|
| Briggs Manufacturing Company | A-13 | 30000 | A-B | 5400963110 | | 150A/31 | BR-BT-7R | |
| | A-2 | 1300 | A-B | 5400963065 | 11-45C-1 | 150A/4 | 5-69808 | § |
| Sperry Gyroscope Company | A-2 | 645796 | A-B | 5400963090 | 11-45C-1 | 150A/4 | S-69808 | § |
| Emerson Electric Manufacturing Company | A-2 | 205955M | A-B | 5400963065 | 11-45C-1 | 150A/4 | S-69808 | § |

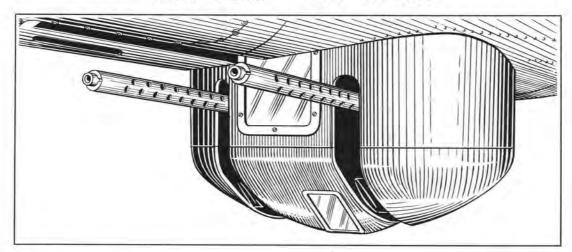
Note: §The ball of this turret is identical with Army type A-13 but a conversion kit is required to convert the hanger assembly. Uses a different fire interrupter. Note: *AAF type.





TURRET-LOWER GUN

ARMY TYPE A-5 NAVY—SEE BELOW



NAMES: Lower gun turret

Retractable lower gun turret—Bendix
Bendix lower gun turret

Power operated lower gun turret Turret—lower gun—retractable

DESCRIPTION: The Army type A-5 turret, a retractable structure mounting two .50 caliber M2 machine guns, is supported from a central column by four spider arms. This turret is located beneath the belly of the fuselage. It is electrically operated by two drive motors, one for rotation of the turret, the other

(Continued on page 161)



TURRET-LOWER GUN

(Continued from page 160)

for movement of the guns in elevation and depression. The power for the motors is supplied through two sets of interrupter relays, which interrupt the current flow and provide slow or fast operation. Provision is made for manual operation in the event of electrical power failure. The motor drive normally providing power for horizontal movement is used to retract the turret.

The gunner is in a kneeling position while sighting on the target, and his chest is supported by an adjustable pad. He sights through a non-fogging periscopic sight. The eyepiece of the sight remains fixed while the periscope's prism moves with the guns throughout their range of elevation.

The guns, charged simultaneously by individual hydraulic gun chargers, are fired by pressing a trigger switch on the control handle. A safety switch on the same handle makes the turret electrically operable.

Collector rings on the central column provide hydraulic and electrical connections to the turret.

CHARACTERISTICS:

Turret height approximately 59% inches (with chest pad in lower position and turret extended).

Weight approximately 497 pounds.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7100

TYPE DESIGNATION: A-5

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Not under procurement for initial installation. Superseded by Army type A-10

lower turret, A. E. Reference Number 52-7950.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

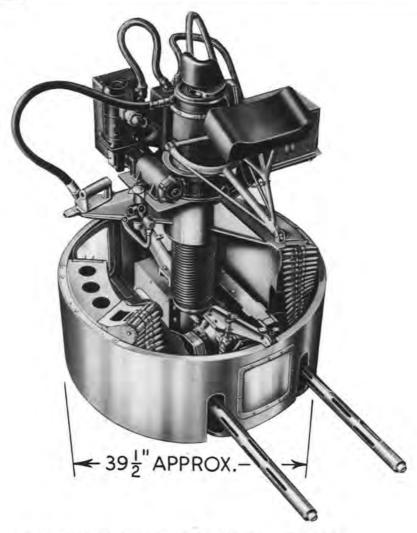
The Navy uses these turrets on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Army Type | Remarks |
|--------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|--------------|---------|
| Bendix Products Division | 1 | 76860 | A-B | 5400963070 | 11-45A-1 | 150A/6 | 76860-A | A-5 | |
| | K | 79800 | A-B | 5400963080 | 11-45A-1 | 150A/21 | ES0385 | A-10 | * |

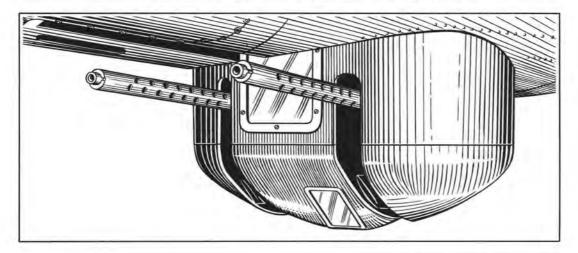
^{*}Operated by amplidynes.





TURRET-LOWER GUN

ARMY TYPE A-10 NAVY—SEE BELOW



NAMES: Lower gun turret
Lower turret—Bendix
Retractable lower gun turret

Bendix lower gun turret Power operated lower gun turret Turret—lower gun—retractable

DESCRIPTION: The Army type A-10 lower turret, a retractable structure mounting two .50 caliber, M2 machine guns, is supported from a central column by four spider arms. The turret is located beneath the belly of the fuselage. It is electrically operated by two amplidyne drives; one for rotation of the

(Continued on page 163)



TURRET-LOWER GUN

(Continued from page 162)

turret, the other for movement of the guns in elevation and depression. The motor drive normally providing power for horizontal movement is used to retract the turret.

The gunner is in a kneeling position while sighting the target, and his chest is supported by an adjustable pad. He aims through a non-fogging periscopic sight. The eyepiece of the sight remains fixed, while the periscope's prism moves with the guns throughout their range of elevation.

The guns, charged simultaneously by individual hydraulic gun chargers, are fired by pressing a trigger switch on the turret control handle. A safety switch on the same handle makes the turret operable.

Collector rings on the central column provide hydraulic and electrical connections to the turret.

CHARACTERISTICS:

Turret diameter.....approximately 39½ inches.

Turret height.....approximately 593/16 inches (with chest pad in lower position and turret extended).

Weight.....approximately 497 pounds.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7950

TYPE DESIGNATION: A-10

A. S. C. STOCK NUMBER: Refer to chart.

TECHNICAL ORDER NUMBER: Refer to chart.

PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

The Navy uses these turrets on airplanes procured from the Army.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

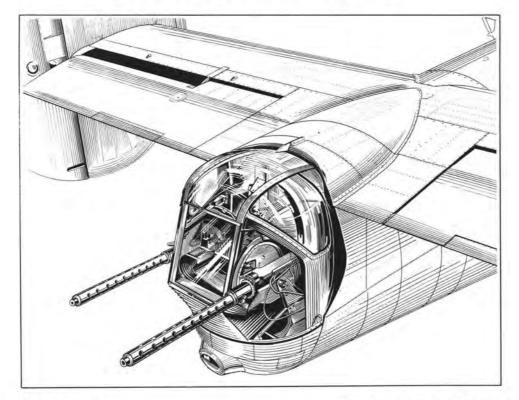
| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Army Type | Remarks |
|--------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|--------------|---------|
| Bendix Products Division | К | 79800 | A-B | 5400963080 | 11-45A-1 | 150A/21 | ES0385 | A-10 | |
| | J | 76860 | A-B | 5400963070 | 11-45A-1 | 150A/6 | 76860-A | A-5 | * |

No amplidynes. Electric motor driven,





TURRET-TAIL GUN
ARMY TYPE A-6 NAVY-SEE BELOW



NAMES: Tail gun turret Consolidated tail turret Turret_tail gun_Consolidated Motor Products turret

(Continued on page 165)



TURRET-TAIL GUN

(Continued from page 164)

DESCRIPTION: The Army type A-6 turret, which mounts two .50 caliber, M2 machine guns, is located at the extreme rear of the fuselage. It rests on a circular track fastened to the airplane structure, and is rotated by two cables from an hydraulic drum in the base of the turret. An hydraulic jack elevates and depresses the guns. A separate electrical system for the turret furnishes power for operation of the hydraulic pump, the gun trigger mechanism, and sight illumination. In the event of power failure, the turret may be moved manually by the gunner.

The gunner, after entering the turret through double doors which open toward the fuselage, sits entirely within the armor plated turret enclosure. Bullet proof glass protects him while he sights the target through a reflector type sight that moves with the guns. These guns, charged individually by manual chargers, are fired by pressing triggers on the turret control handles. A safety switch on one handle makes the turret operable.

All hydraulic hose and electrical connections to the turret are flexible.

CHARACTERISTICS:

| Turret diameter | |
|---------------------|--------------------------|
| Turret height | approximately 58 inches. |
| Weight | |
| Rotation in azimuth | |
| Elevation of guns | |
| Depression of guns | |
| Operating voltage | |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7800

TYPE DESIGNATION: A-6

A. S. C. STOCK NUMBER: Refer to chart. TECHNICAL ORDER NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

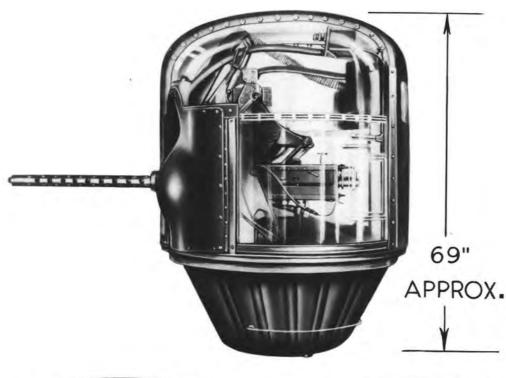
The Navy uses this turret on airplanes procured from the Army, and also procures them for installation on certain Navy aircraft. They are identified by the manufacturer's designation.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation |
|---|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|
| Motor Products Corporation | *A-6 | 32F5800-3 | A-B | 5400963033 | 11-45D-1 | 150A/10 | 32F5800 |
| Southern Aircraft Corporation | *A-6 | 32F5800-3 | A-B | 5400963033 | 11-45D-1 | 150A/10 | 32F5800 |
| 5-10-302-0-3-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0- | | 29F4824 | N | | | | |

Note: *AAF type.









TURRET-NOSE GUN

ARMY TYPE A-15

NAMES: Nose gun turret
Emerson nose turret
Turret—Emerson

(Continued on page 167)



TURRET-NOSE GUN

(Continued from page 166)

DESCRIPTION: The Army type A-15 turret, which mounts two .50 caliber, M2 machine guns, is located in the nose of the airplane fuselage by means of a ring type mounting at the turret's base. It is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression. Mechanical stops prevent turret rotation or movement of guns beyond predetermined limits.

The gunner, after entering the turret through double doors which open toward the fuselage, sits entirely within the armor plated turret enclosure. Bullet proof glass protects him while he sights the target through a reflector type sight. Both the bullet proof glass and the sight move with the guns. These guns, charged individually by manual chargers, are fired by pressing triggers on the turret control handles. A safety switch on one handle makes the turret electrically operable.

Flexible cables supply power and interphone connections to the turret, and an outlet and controlling rheostat are provided for the gunner's electrically heated suit.

CHARACTERISTICS:

Turret diameter approximately 42 inches.
Turret height approximately 69 inches.
Weight approximately 1006 pounds.
Rotation in azimuth 150 degrees.
Elevation of guns 60 degrees above horizontal.
Depression of guns 50 degrees below horizontal.
Operating voltage 27.5 volts direct current.

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.

ARMY

A. E. REFERENCE NUMBER: 52-7795

MANUFACTURER: Emerson Electric Manufacturing Company.

MANUFACTURER'S DRAWING NUMBER: 30500

MANUFACTURER'S SPECIFICATION NUMBER: AT-40N-127

TYPE DESIGNATION: A-15

A. S. C. STOCK NUMBER: 5400963103 TECHNICAL ORDER NUMBER: None PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns and ammunition.

NAVY

MACHINE GUN TURRETS ARMAMENT — GUNNERY



TURRET-NOSE GUN

ARMY TYPE A-16

NAMES: Nose gun turret

Chin turret

Bendix chin turret

Bendix nose gun turret

Turret_nose

DESCRIPTION: The Army type A-16 turret, a non-retractable structure mounting two .50 caliber, M2 machine guns, is supported from a central column by four spider arms. It is located below the nose of the airplane, and is electrically operated by two amplidyne drives, one for rotation of the turret, the other for movement of the guns in elevation and depression.

> The gunner, seated inside the airplane and above the turret, sights the target through a reflector type sight, which moves with the guns. This sight is placed on a rotatable arm which is driven by a flexible shaft from the turret. Movement of this arm corresponds with the movement of the turret and the

> The guns are charged simultaneously by individual hydraulic gun chargers, and are fired by pressing trigger switches on the

control handle. A safety switch on the same handle makes the turret electrically operable.

Collector rings on the central column provide hydraulic and electrical connections to the turret.

36

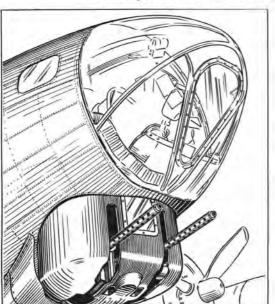
APPROX



| Turret diameter | approximately 391/2 inches. |
|---------------------|-------------------------------|
| Turret height | |
| Weight | approximately 412 pounds. |
| Rotation in azimuth | .180 degrees. |
| Elevation of guns | .30 degrees above horizontal. |
| Depression of guns | |
| Operating voltage | |

RELATIONSHIP OF PARTS:

A complete list of all turret equipment, whether government or contractor furnished, will be found in the turret manufacturer's model specification.



ARMY

A. E. REFERENCE NUMBER: 52-7350

MANUFACTURER: Bendix Products Division of Bendix Aviation Corporation.

MANUFACTURER'S MODEL IDENTIFICATION: D MANUFACTURER'S DRAWING NUMBER: 82500

MANUFACTURER'S SPECIFICATION

NUMBER: FI106

TYPE DESIGNATION: A-16

A. S. C. STOCK NUMBER: 5400963064 TECHNICAL ORDER NUMBER: 11-45AA-1 PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, less guns

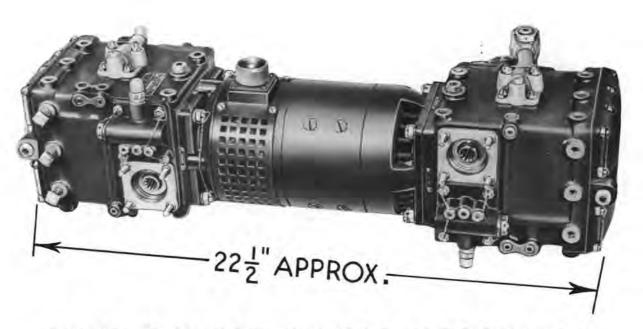
and ammunition.

There is no Navy equivalent for the Army item.

BRITISH

REFERENCE NUMBER: 150A/26





UNIT-DOUBLE POWER HYDRAULIC

VICKERS MODEL AA-16801

NAMES: Double power hydraulic unit Turret double power unit Power unit Vickers unit

DESCRIPTION: This unit supplies motive power to Army types A-1 and A-1A locally controlled upper machine gun turrets. The power is developed hydraulically by an electrically driven piston type pump exerting pressure against the piston of a similar pump; the second pump is known as an hydraulic motor.

The entire unit consists of two transmissions, bolted to opposite ends of an electric drive motor. Each transmission contains one variable pressure pump and one hydraulic motor. Control of the pump's pressure, obtained by changing the angle between the cylinder of the pump and the master piston shaft, varies the speed of the transmission. When no pressure comes from the pump (zero degrees between cylinder and shaft) there is no movement of the hydraulic motor, and consequently no power is transmitted. The electric motor rotates at a constant speed and the transmissions provide smooth variable speed operation of the turret. One transmission is used to provide turret rotation, the other elevation and depression.

CHARACTERISTICS:

Dimensions approximately 22½ by 7½ by 8 inches.

Weight approximately 53 pounds.

Electric motor:

RELATIONSHIP OF PARTS: Used with:

Army type A-1 and A-1A upper gun turrets, A. E. Reference Numbers 52-7600 and 52-7625.

ARMY

REFERENCE NUMBER: 52-8350

A. E. REFERENCE NUMBER: 52-8350
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

There is no Navy equivalent for the Army item.

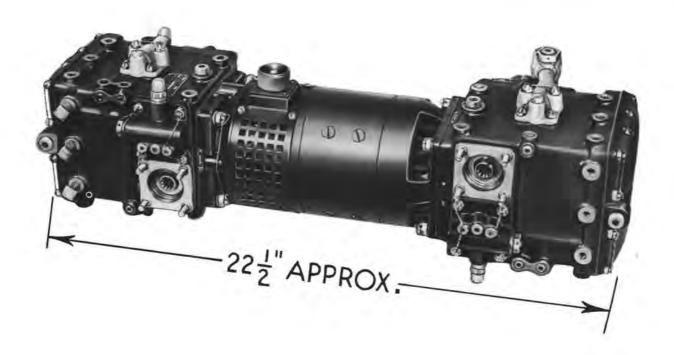
ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

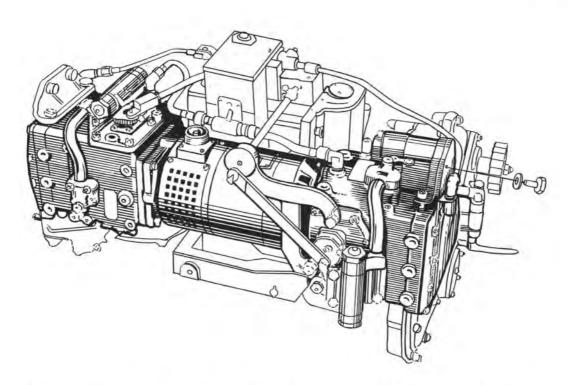
| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Remarks |
|------------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|---------|
| Vickers, Incorporated | AA-16801 | 56412 | A-B | 5400964512 | 11-45C-1 | 150C/2492 | | |
| | AA-16804 | 63404 | A-B | 5400964512 | 11-45C-1 | 150C/2353 | | * |
| Hobart Manufacturing Company | AA-16801 | 56412 | A-B | 5400964512 | 11-45C-1 | 150C/2492 | 4303 | |
| | AA-16804 | 63404 | A-B | 5400964512 | 11-45C-1 | 150C/2353 | 4348 | * |

^{*}Elevation transmission 90 degrees from that on model AA-16801. To effect interchangeability, unbolt and revolve 90 degrees.

MACHINE GUN TURRETS ARMAMENT-GUNNERY







UNIT-DOUBLE POWER HYDRAULIC

VICKERS MODEL AA-16804

NAMES: Double power hydraulic unit

Power unit Vickers unit

Double power unit

DESCRIPTION: This unit supplies motive power to the Army types A-2 and A-13 locally controlled lower machine gun turrets. Power is developed hydraulically by an electrically driven piston type pump exerting pressure against the piston of a similar pump; the second pump is known as an hydraulic motor.

(Continued on page 171)



UNIT-DOUBLE POWER HYDRAULIC

(Continued from page 170)

The entire unit consists of two transmissions, bolted to opposite ends of an electric drive motor. Each transmission contains one variable pressure pump and one hydraulic motor. Control of the pump's pressure, obtained by changing the angle between the cylinder of the pump and the master piston shaft, varies the speed of the transmission. When no pressure comes from the pump (zero degrees between cylinder and shaft) there is no movement of the hydraulic motor, and consequently no power is transmitted. The electric motor rotates at a constant speed and the transmissions provide smooth variable speed operation of the turret. One transmission is used to provide turret rotation, the other elevation and depression.

This unit differs from model AA-16801 by having one transmission 90 degrees from its original position.

CHARACTERISTICS:

Weight..... approximately 53 pounds.

Electric motor:

Current......90 amperes.

RELATIONSHIP OF PARTS: Used with:

Army types A-2 and A-13 lower ball turrets, A. E. Reference Numbers 52-7200 and 52-8050.

ARMY

A. E. REFERENCE NUMBER: 52:8375
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY

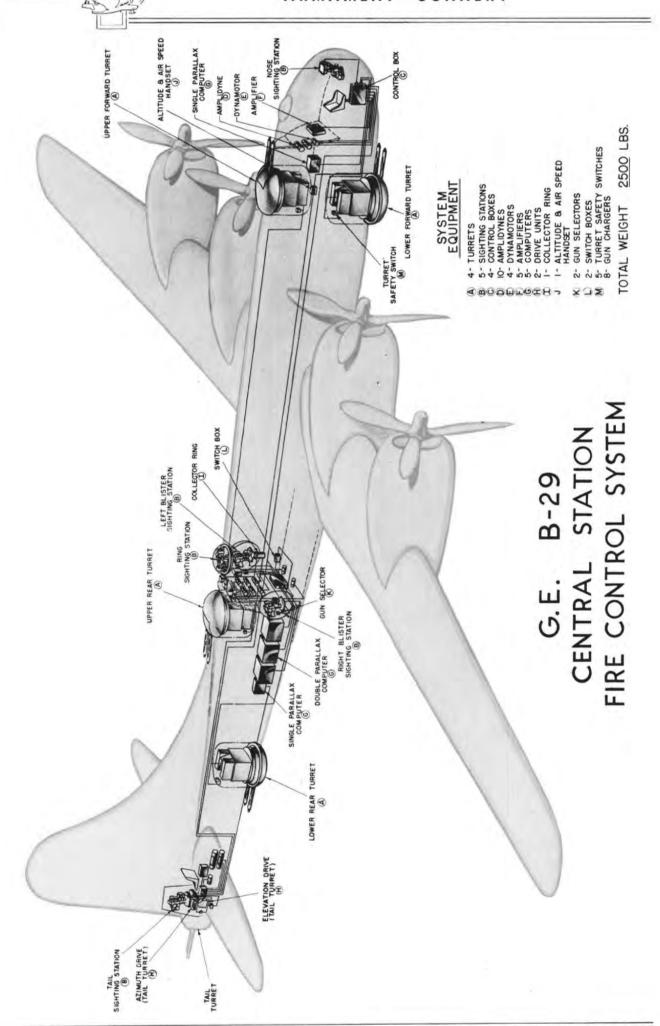
There is no Navy equivalent for the Army item.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Monufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Army Technical Order Number | British Reference Number | Manufacturer's Specifi- cation | Remarks |
|------------------------------|---|-------------------------------------|------------|--|-----------------------------------|--------------------------------|--------------------------------------|---------|
| Vickers, Incorporated | AA-16804 | 63404 | A-B | 5400964512 | 11-45C-1 | 105C/2353 | | |
| | AA-16801 | 56412 | A-B | 5400964512 | 11-45C-1 | 105C/2494 | | * |
| Hobart Manufacturing Company | AA-16804 | 63404 | A-B | 5400964512 | 11-45C-1 | 105C/2353 | 4348 | |
| | AA-16801 | 56412 | A-B | 5400964512 | 11-45C-1 | 105C/2494 | 4303 | * |

^{*}Elevation transmission 90 degrees from that on model AA-16804. To effect interchangeability, unbolt and revolve 90 degrees.

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





B-29 CENTRAL STATION FIRE CONTROL SYSTEM

The G. E. Model 2CFR55A1 central station fire control system is installed in the B-29 airplane. The armament used in this system consists of two upper and two lower turrets, each mounting two .50 caliber machine guns, and a tail mount carrying two .50 caliber machine guns and a 20-mm cannon. Each of these gun positions is controlled from one of five sighting stations. The sighting station located on the upper deck of the fuselage has control over both upper turrets, and the gunner in this station may fire either turret alone, or both at once. The gunner at the nose sighting station has control over the lower forward turret, and the gunner at the tail sighting station has control over the tail mount. There is a sighting station located in either side of the fuselage waist. The gunners at these positions decide between themselves which is to have primary control over the lower aft turret and secondary control over these other gun positions, but only when allowed by the gunner having primary control.

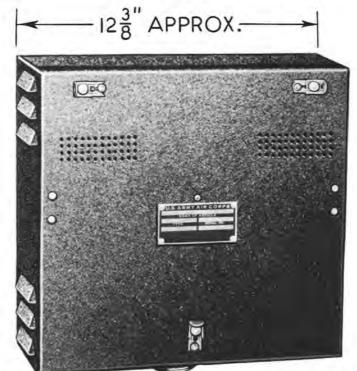
The gunner at any position is able to scan the sky through a plexiglas window, pick out the target, and track it by manually moving his sight. As the sight is moved the guns follow automatically and instantaneously.

The items of government furnished equipment which comprise this system are listed in the following pages:

| A. E. Reference Number | Item | A. E. Reference Number | Item |
|------------------------------|-------------------------------------|------------------------------|-------------------------------------|
| 52-6851 | Servo-amplifier | 52-6863 | Altitude and airspeed hand-set |
| 52-6852 | Left blister auxiliary control box | 52-3040 | Amplidyne motor-generator |
| 52-6853 | Nose system control box | 52-3045 | Amplidyne motor-generator |
| 52-6854 | Right blister auxiliary control box | 52-6864 | Upper sight collector ring assembly |
| 52-6855 | Side blister system control box | 52-6865 | Left blister sighting station |
| 52-6856 | Side blister selector switch box | 52-6866 | Nose sighting station |
| 52-6857 | Tail system control box | 52-6867 | Right blister sighting station |
| 52-6858 | Upper blister system control box | 52-6868 | Tail sighting station |
| 52-1720 | Gun charger | 52-6869 | Upper ring sighting station |
| 52-6859 | Double parallax computer | 52-6650 | Tail cannon selector switch |
| 52-6860 | Single parallax computer | 52-6870 | Lower aft gun turret |
| 52-6861 | Tail gun mount azimuth drive | 52-6871 | Lower forward gun turret |
| 52-6862 | Tail gun mount elevation drive | 52-6872 | Upper aft gun turret |
| 52-2580 | Dynamotor | 52-6873 | Upper forward gun turret |
| | | | |

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





SERVO — AMPLIFIER GENERAL ELECTRIC COMPANY MODEL 2CV1C1

DESCRIPTION: The servo-amplifier, which may be located at any convenient point in the airplane, is a rectangular box containing vacuum tubes, transformers, condensers, and resistors.

This device amplifies a signal voltage from a selsyn receiver, and then rectifies it from alternating current to pulsating direct current, thereby making it suitable for exciting the field of an amplidyne motor generator.

This signal only occurs when there is misalignment between the sight and the guns, resulting in a small voltage passing between transformer and receiver selsyns. The amount of this voltage is proportionate to the amount of the misalignment.

The servo-amplifier is constantly supplied with power from the dynamotor. In this way it is always in readiness to respond to a signal.

CHARACTERISTICS:

Weight.....approximately 18 pounds.

RELATIONSHIP OF PARTS: Used with:

B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6851

MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 2CV1C1

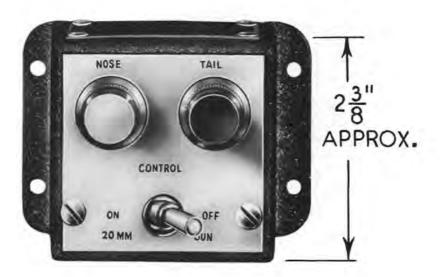
MANUFACTURER'S DRAWING NUMBER: T-8254157, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





BOX-LEFT BLISTER AUXILIARY CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER P-8242380, GROUP 2

NAME: Left blister auxiliary control box

DESCRIPTION: This auxiliary control box provides the gunner in the left side blister station with an ON-OFF switch for control over the 20-mm cannon in the tail mount. On the same panel are two indicator lights, to inform the gunner when he has primary control over the lower forward gun turret or the tail gun mount.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

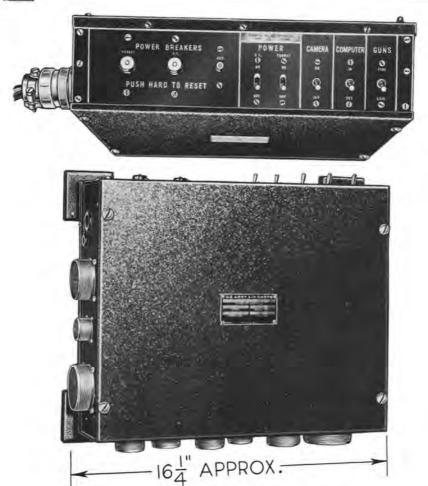
ARMY

A. E. REFERENCE NUMBER: 52-6852
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: P-8242380, Group 2
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY







BOX-NOSE SYSTEM CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER W-8258868, GROUP 1

NAME: Nose system control box

DESCRIPTION: This control box is used by the gunner at the nose sighting station of the B-29 central station fire control system. It consists of power breakers and switches, and the camera, computer and gun safety switches.

The power breakers prevent overloading the amplidynes and dynamotor for the lower forward two gun turret.

The power switches are of the single pole double throw ON-OFF type, and control alternating current from the dynamotor and power to the turret.

The computer switches are the same type as the power switches. They control input to the computer. The gun safety switches, also of the ON-OFF type, provide fire and safe positions for the guns in the lower forward turret.

CHARACTERISTICS:

Dimensions approximately $16\frac{1}{4}$ by $13\frac{13}{16}$ by $4\frac{7}{8}$ inches. Weight ... approximately 30 pounds.

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6853
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: W-8258868, Group 1.
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
A. S. C. STOCK NUMBER: None.
TECHNICAL ORDER NUMBER: None.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-RIGHT BLISTER AUXILIARY CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER P-8242380, GROUP 1

NAME: Right blister auxiliary control box

DESCRIPTION: This auxiliary control box provides the gunner in the left side blister station with an ON-OFF switch for control over the 20-mm cannon in the tail mount. On the same panel are two indicator lights, to inform the gunner when he has primary control over the lower forward gun turret or the tail gun mount.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

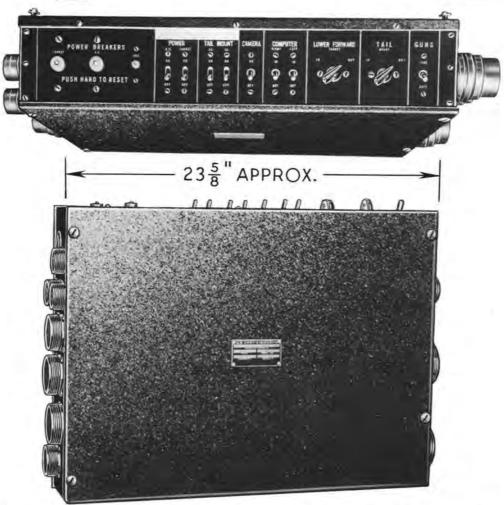
ARMY

A. E. REFERENCE NUMBER: 52-6854
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: P-8242380, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





BOX-SIDE BLISTER SYSTEM CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER W-8258874, GROUP 1

NAME: Side blister system control box

DESCRIPTION: This control box is accessible to either gunner at the side blister sighting stations of the B-29 central station fire control system. It consists of power breakers, switches, and the camera, computer and gun safety switches.

The power breakers prevent overloading the amplidynes and dynamotor for the lower rear turret. The power switches are of the single pole, double throw, ON-OFF type, and control alternating current from the dynamotor and power to the lower rear turret and tail gun mount.

The computer switches are the same type as the power switches. They control input to the right or left computer.

The gun safety switch, also of the ON-OFF type, provides fire and safe positions for guns in the lower rear turret.

CHARACTERISTICS:

Dimensions ... approximately $23\frac{5}{8}$ by $17\frac{7}{16}$ by $5\frac{1}{4}$ inches. Weight ... approximately 40 pounds.

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6855 MANUFACTURER: General Electric Company. MANUFACTURER'S DRAWING NUMBER: W-8258874, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-SIDE BLISTER SELECTOR SWITCH

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252890, GROUP 1

NAME: Side blister selector switch box

DESCRIPTION: The side blister selector switch box, used in the B-29 central station fire control system, is accessible to the gunners at both side blister sighting stations. This box contains three manual two-position selector switches for determining which side blister sighting station shall have primary control of the lower aft gun turret, secondary control of the lower forward gun turret, and secondary control of the tail gun mount. These switches are all marked LEFT and RIGHT; indicating which side blister has control.

CHARACTERISTICS:

Dimensions approximately $13\frac{1}{4}$ by $5\frac{7}{8}$ by $3\frac{7}{8}$ inches. Weight approximately 5 pounds.

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

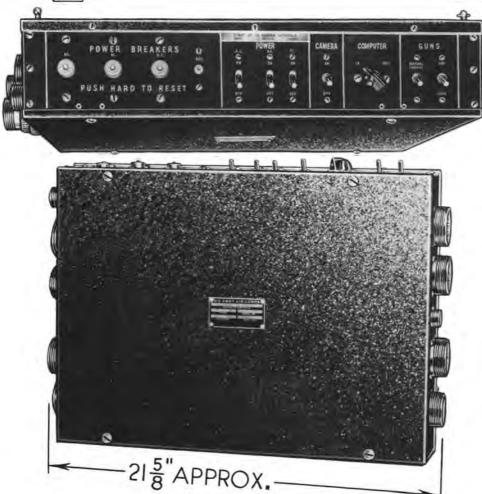
ARMY

A. E. REFERENCE NUMBER: 52-6856
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: T-8252890, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY







BOX-TAIL SYSTEM CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER W-8258881, GROUP 1

NAME: Tail system control box

DESCRIPTION: This control box is used by the gunner at the tail sighting station of the B-29 central station fire control system. It consists of power breakers and switches, and the camera, computer, and gun safety switches.

The power breakers prevent overloading the amplidynes and dynamotor for the tail gun mount.

The power switches are of the single pole double throw ON-OFF type, and control alternating current from the dynamotor and power to the tail gun mount.

The computer switches are the same type as the power switches. They control input to the computer.

The gun safety switches, also of the ON-OFF type provide fire, safe and manual charge positions for the guns in the tail gun mount.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

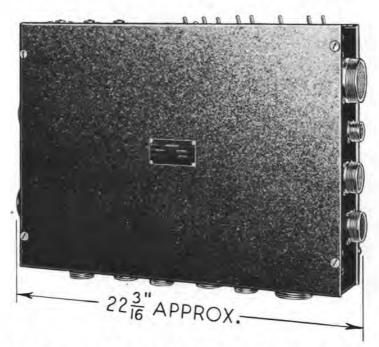
ARMY

A. E. REFERENCE NUMBER: 52-6857
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: W-8258881, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY







BOX-UPPER BLISTER SYSTEM CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER W-8258865, GROUP 1

NAME: Upper blister system control box

DESCRIPTION: This control box is installed near the gunner at the upper ring sighting station of the B-29 central station fire control system. It contains power breakers and switches, and the camera, computer, and gun safety switches.

The power breakers prevent overloading the amplidynes and dynamotors for the upper forward and rear turrets.

The power switches, of the single pole double throw ON-OFF type, control the alternating current from the dynamotor and the power supply to the upper forward and rear turrets.

The computer switches are the same type as the power switches. They control electrical input to the computer.

The gun safety switches, also of the ON-OFF type, provide FIRE and SAFE positions for the guns in the upper forward and rear turrets.

CHARACTERISTICS:

Dimensions approximately 22% by 16% by 4% inches. Weight approximately 35 pounds.

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

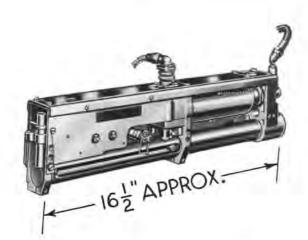
ARMY

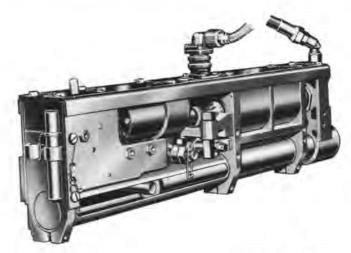
A. E. REFERENCE NUMBER: 52-6858
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: W-8258865, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

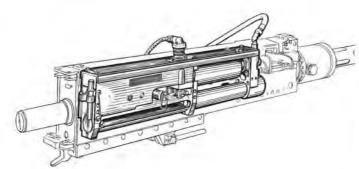
NAVY

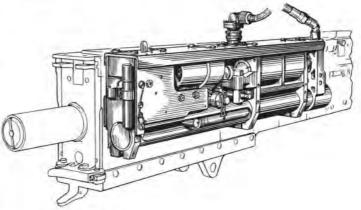












CHARGER-GUN

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252878, GROUP 1

NAMES: Gun charger Compressed air gun charger CO₂ charger Carbon Dioxide charger

DESCRIPTION: This gun charger is mounted on the side of a .50 caliber M2 machine gun used in the G. E. central station fire control systems. It is electrically controlled, so that when a firing key is closed, the gun fires. The charger automatically operates to cock or charge the gun in the event of a misfire. Five or six cocking operations are repeated in rapid succession, after which the charger will stop, indicating difficulty due to causes other than defective ammunition.

To actuate the gun bolt, a piston acts against a stud that extends outward from the side of the gun. This stud is carried by the gun bolt, and projects through a guide slot into a cylinder. To operate the cylinder piston, compressed air, or gas, under a pressure of 1000 pounds per square inch, is admitted to the cylinder. The admission of the gas is controlled by a valve mechanism, which in turn is operated by an electromagnet known as the charging solenoid.

CHARACTERISTICS:

Dimensions approximately $16\frac{1}{2}$ by $4\frac{3}{4}$ by $2\frac{3}{8}$ inches. Weight approximately $10\frac{1}{2}$ pounds.

RELATIONSHIP OF PARTS: Used with:

B-29 central station fire control system, P-61 central station fire control system, and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-1720
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: T-8252878, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1; GO-17400-B; and GO-17397-B.
A. S. C. STOCK NUMBER: 5900170000
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





COMPUTER-DOUBLE PARALLAX

GENERAL ELECTRIC COMPANY MODEL NUMBER 2CH1D1

NAME: Double parallax computer

DESCRIPTION: When a single sighting station controls two turrets, an additional parallax unit is required, to compensate for the fact that the two turrets are located at different points in the airplane.

This type of computer is used with each of the sighting stations for secondary control over an additional turret in the B-29 central station fire control system. It corrects for ballistics, parallax and lead, and permits an increase in both accuracy of fire and in the maximum range of accurate fire. This computer, attached to the left front side of a single parallax computer, changes the position of the second turret with respect to the position of the first turret, the first turret having been previously corrected by the single parallax computer with respect to the position of the sight by an angle equal to the correction necessary to cause the projective to hit the target at which it is aimed. These corrections are dependent upon the distance between the airplane and the target, the relative speeds of the two, and the altitude and air speed at which the airplane is flying.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

Single parallax computer, A. E. Reference Number 52-6860 in the B-29 central station fire control system.

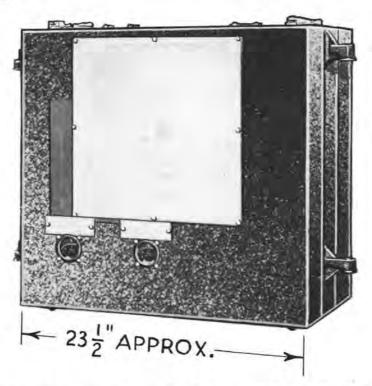
ARMY

A. E. REFERENCE NUMBER: 52-6859
MANUFACTURER: General Electric Company.
MANUFACTURER'S MODEL NUMBER: 2CH1D1
MANUFACTURER'S DRAWING NUMBER: WW-8009120, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





COMPUTER-SINGLE PARALLAX

GENERAL ELECTRIC COMPANY MODEL NUMBER 2CH1C1

NAME: Single parallax computer

DESCRIPTION: This type of computer is used with each of the sighting stations, for controlling one turret in the B-29 central station fire control system. It corrects for ballistics, parallax and lead and permits an increase in both the accuracy of fire and the maximum range of accurate fire. This computer, located at a distance from the sighting station, changes the position of the turret with respect to the sight, by an angle equal to the correction necessary to cause the projectile to hit the target at which it is aimed. This correction is dependent upon the distance between the airplane and target, the relative speeds of the two, and the altitude and air speed of the airplane.

CHARACTERISTICS:

 $\begin{array}{lll} \text{Dimensions.} & \text{approximately } 23\frac{1}{2} \text{ by } 18\frac{5}{6} \text{ by } 10\frac{3}{8} \text{ inches.} \\ \text{Weight.} & \text{approximately } 90 \text{ pounds.} \\ \text{Operating voltage.} & 28 \text{ volts direct current.} \end{array}$

RELATIONSHIP OF PARTS: Used with:

Altitude and airspeed handset, A. E. Reference Number 52-6863, in the B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6860 MANUFACTURER: General Electric Company. MANUFACTURER'S MODEL NUMBER: 2CH1C1

MANUFACTURER'S DRAWING NUMBER: WW-8009119, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY



DRIVE-

TAIL GUN MOUNT AZIMUTH

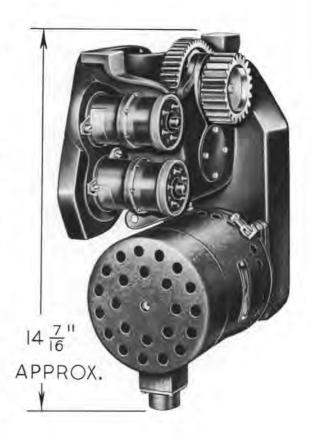
GENERAL ELECTRIC COMPANY
DRAWING NUMBER W-8258810, GROUP 1

NAME: Tail gun mount azimuth drive

DESCRIPTION: In the B-29 central station fire control system, any movement of the tail sighting station is transmitted into a like movement of the tail mount guns.

The drive, used to horizontally move the tail gun mount, consists of a drive motor, two selsyn receivers and the necessary gearing.

Indications of misalignment between the selsyns on the mount and the selsyns on the sight are sent to the servo-amplifier, causing the amplidyne field in the motor generator to become energized. Power is then sent to the drive motor, which turns the gearing and rotates the mount. When the selsyns on the mount and the selsyns on the sight are once again aligned, the signal to the servo amplifier ceases and the amplidyne field is de-energized. This cuts off the power to the drive motor, stopping the mount.



CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

Amplidyne motor-generator, G. E. model 5AM61NJ1C, A. E. Reference Number 52-3045, and selsyns, G. E. Model 2J1G1, A. E. Reference Number 52-4210, in the B-29 central station fire control system.

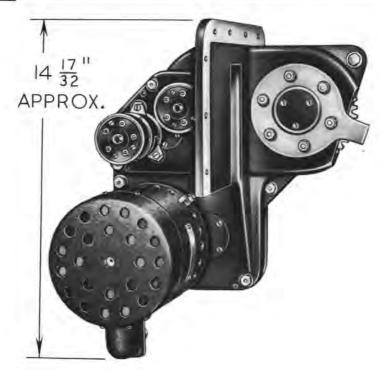
ARMY

A. E. REFERENCE NUMBER: 52-6861
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: W-8258810, Group 1.
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit, including selsyns.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY





DRIVE-TAIL GUN MOUNT ELEVATION

GENERAL ELECTRIC COMPANY DRAWING NUMBER W-8258807, GROUP 1

NAME: Tail gun mount elevation drive

DESCRIPTION: In the B-29 central station fire control system, any movement of the tail sighting station is transmitted into a like movement of the tail mount guns.

The drive, used to elevate or depress the tail gun mount, consists of a drive motor, two selsyn receivers and the necessary gearing.

Indications of misalignment between the selsyns on the mount and the selsyns on the sight are sent to the servo-amplifier, causing the amplidyne field in the motor-generator to become energized. Power is then sent to the drive motor, which turns the gearing and elevates or depresses the mount. When the selsyns on the mount and the selsyns on the sight are once again aligned, the signal to the servo amplifier ceases, and the amplidyne field is de-energized. This cuts off the power to the drive motor, stopping the mount.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

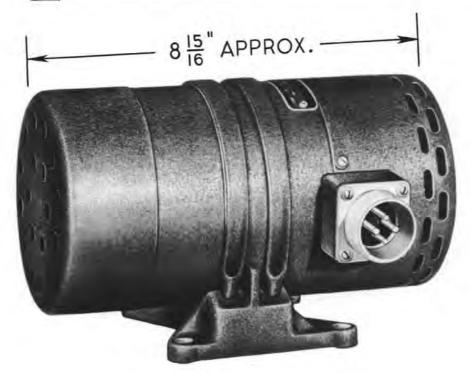
Amplidyne motor-generator, G. E. model 5AM61NJ1C, A. E. Reference Number 52-3045, and selsyns G. E. model 2J1G1, A. E. Reference Number 52-4210, in the B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6862
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: W-8258807, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit, including selsyns.

NAVY





DYNAMOTOR GENERAL ELECTRIC MODEL 5D21NJ3A

NAMES:

DESCRIPTION: This dynamotor, a six pole, 8000 revolution per minute motor-generator, furnishes alternating current at 110 volts and 400 cycles per second, for the servo-amplifier and selsyns used in the B-29 and A-26 central station fire control systems. It consists of a 24 to 28 volt direct current shunt wound motor on a common shaft with a 110 volt single phase generator. The entire assembly is enclosed in a single housing. The motor operates from the airplane's power supply.

CHARACTERISTICS:

Dimensions.....approximately 815/16 by 515/32 by 69/32 inches.

Motor:

Current......35 amperes.

Generator:

Current......4.4 amperes.

RELATIONSHIP OF PARTS: Used with:

B-29 and A-26 central station fire control systems.

ARMY

A. E. REFERENCE NUMBER: 52-2580

MANUFACTURER: General Electric Company.

MANUFACTURER'S MODEL NUMBER: 5D21NJ3A

MANUFACTURER'S DRAWING NUMBER: TT-8117016, Group 1

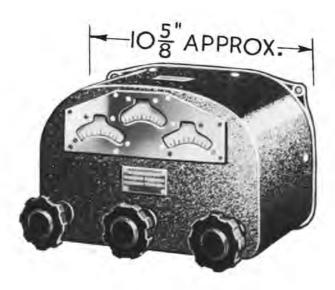
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1; GO-17397-B

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY







HAND SET-ALTITUDE AND AIR SPEED

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252908, GROUP 1

NAME: Altitude and air speed hand set

DESCRIPTION: The altitude and air speed hand set used in the B-29 central station fire control system is mounted on the airplane navigator's panel. Three knobs are provided for the navigator to set on separate dials, indicated air speed, altitude, and external air temperature. The dial for altitude is graduated from 0 to 45000 feet, the indicated air speed dial is graduated from 90 to 300 miles per hour, and the external air temperature covers a range from —75 degrees centigrade to + 52 degrees centigrade.

As these dials are moved, a gear train in the hand set combines density, altitude, and true air speed into a single function. Since this function is proportional to the windage forces acting on a projectile, it is transmitted into an electrical signal and sent to all the computers. The computers in turn automatically compensate the gun sight.

CHARACTERISTICS:

Dimensions ... approximately $10\frac{5}{8}$ by $7\frac{17}{32}$ by $5\frac{5}{16}$ inches. Weight ... approximately 9 pounds.

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6863

MANUFACTURER: General Electric Company.

MANUFACTURER'S DRAWING NUMBER: T-8252908, Group 1. MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT — GUNNERY

Motor generator





MOTOR-GENERATOR - AMPLIDYNE REMOTE CONTROL

GENERAL ELECTRIC COMPANY MODEL 5AM31NJ9

NAMES: Amplidyne remote control motor-generator Amplidyne

DESCRIPTION: This type amplidyne motor-generator, used to supply current for the operation of remotely controlled machine gun turrets, consists essentially of a direct current electric motor and a direct current output generator mounted on the same shaft. In spite of the fact that the motor operates constantly to turn the shaft, there is no output from the generator unless the generator field is excited. This field requires only a small current to produce full generator output voltage. Minute variations in the field current instantaneously produce large variations in the generator's output. When the turret's guns and sight are in exact alignment no current is transmitted to the field; thus no output to the turret drive motor takes place even though the generator armature is turning. When the sight and guns are not in alignment, current is transmitted to the field and the generator produces voltage to cause the turret drive motor to align the guns with the sight.

Two amplidyne motor-generators and two turret drive motors are required for each turret; one of each for movement of the guns in elevation and depression and the others for rotation of the turret.

CHARACTERISTICS:

Dimensions.....approximately 12 by 73/8 by 6 inches.

Weight approximately 29 pounds. Revolutions per minute 8300.

Revolutions per minute.....

Motor input:

Generator output:

Current 8.8 amperes
Power 530 watts Windingamplidyne.

RELATIONSHIP OF PARTS: Used in:

B-29 central station fire control system, P-61 central station fire control system and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-3040 A. S. C. STOCK NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

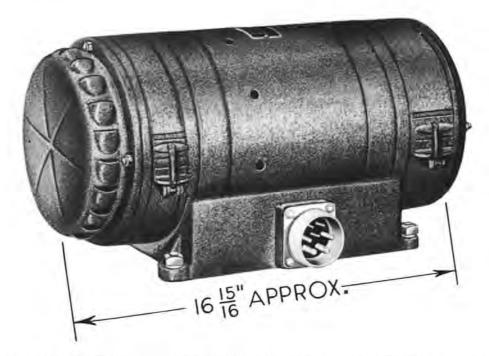
There is no Navy equivalent for the Army item.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Manufacturer's Specifi- cation |
|---|---|--|------------|--|--------------------------------------|
| General Electric Company | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | Α | 5900466500 | OST-1B |
| Marathon Electric Manufacturing Corporation | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | A | 5900466500 | OST-1B |

FIRE CONTROL SYSTEMS ARMAMENT — GUNNERY





MOTOR-GENERATOR-AMPLIDYNE REMOTE CONTROL

GENERAL ELECTRIC COMPANY MODEL 5AM61NJ1C

NAME: Amplidyne remote control motor-generator

DESCRIPTION: This type amplidyne motor-generator, used to supply current for the operation of remotely controlled tail gun mounts, consists essentially of a direct current electric motor and a direct current output generator mounted on the same shaft. In spite of the fact that the motor operates constantly to turn the shaft, there is no output from the generator unless the generator field is excited. This field requires only a small current to produce full generator output voltage. Minute variations in the field current instantaneously produce large variations in the generator's output. When the tail mount guns and sight are in exact alignment, no current is transmitted to the field, thus no output to the tail mount drive motor takes place, even though the generator armature is turning. When the sight and guns are not in alignment, current is transmitted to the field and the generator produces voltage to cause the tail mount drive to align the guns with the sight.

An amplidyne motor generator is required with each of the tail mount drives.

CHARACTERISTICS:

 $\begin{array}{ll} \text{Dimensions} & \text{approximately } 16^{15}\text{16} \text{ by } 85\text{16} \text{ by } 8^{33}\text{4} \text{ inches.} \\ \text{Weight} & \text{approximately } 73 \text{ pounds.} \\ \text{Revolutions per minute} & 6600. \end{array}$

Motor input:

Voltage.....

Current.....105 amperes

RELATIONSHIP OF PARTS: Used with: B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-3045
MANUFACTURER: General Electric Company.
MANUFACTURER'S MODEL NUMBER: 5AM61NJ1C
MANUFACTURER'S DRAWING NUMBER: TT-5818186, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





RING ASSEMBLY-UPPER SIGHT COLLECTOR

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252833, GROUP 1

NAMES: Upper sight collector ring assembly Collector ring

DESCRIPTION: This collector ring assembly, used in the upper sighting station, is installed below the gunner's chair. It consists of a number of slip rings surrounding a central column. Several of these rings provide electrical leads for the control cables used with the range finder and the computer gyroscope located on the sight. Other rings bring electrical power to azimuth and elevation selsyns on the sight, and also provide a connection from the firing trigger to the machine guns. A microphone pushbutton switch and a switch for the gunner's electrically heated suit also require slip rings.

This assembly permits the lead cables to follow the sight as it rotates. In this way, these cables cannot become fouled or twisted.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

Upper ring sighting station, A. E. Reference Number 52-6869 in the B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6864 MANUFACTURER: General Electric Company.

MANUFACTURER'S DRAWING NUMBER: T-8252833, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY



STATION-

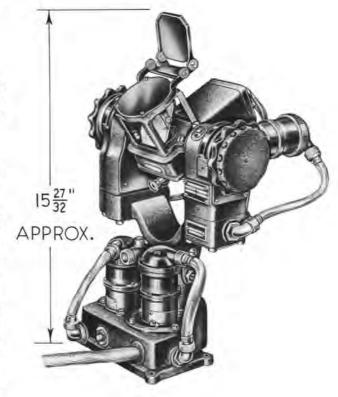
LEFT BLISTER SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSR3B2

NAME: Left blister sighting station.

DESCRIPTION: The gunner at the left blister sighting station in the B-29 airplane can sight on targets in the area at the left side of the airplane.

The base of the sight is a pedestal fixed to the airplane structure. A "Y" shaped support enables the sight, which is of the optical reflector type, to turn horizontally, using the pedestal as a pivot. The sight is moved in this manner when the gunner pushes or pulls against the two large knobs on either arm of the "Y." Elevation and depression are accomplished by turning the knobs. Adjacent to the right hand knob is a smaller knob for range adjustment to the sight. A crescentshaped firing key, near the inside of both large knobs, can be operated by either thumb. The sight uses two selsyns to indicate movement of the sight horizontally and two to indicate movement up and down. These indications are sent to receiving selsyns on the gun turret, causing the turret movements to conform to movements of the sight. Two



selsyns are used for each motion of the sight to insure accuracy.

CHARACTERISTICS:

Dimensions approximately 15¼ by 15¾ by 15¾ by 15¾, inches
Weight approximately 31 pounds
Required voltage 28 volts direct current for lamp,
110 volts alternating current for selsyns
Range 180 degrees in azimuth
30 degrees in elevation
45 degrees in depression
Lamp Type R-12; 28 volts, 50/50 candlepower
double contact bayonet base

RELATIONSHIP OF PARTS: Used with:

Lamp, Trade Number 1380, G. E. Part Number 8621274, A. E. Reference Number 88-8700; and Selsyns G. E. model 2J1F1. These items are contractor furnished in this airplane.

ARMY

A. E. REFERENCE NUMBER: 52-6865

MANUFACTURER: General Electric Company

MANUFACTURER'S DRAWING NUMBER: W-8258849, Group 1

MANUFACTURER'S MODEL NUMBER: 2CSR3B2

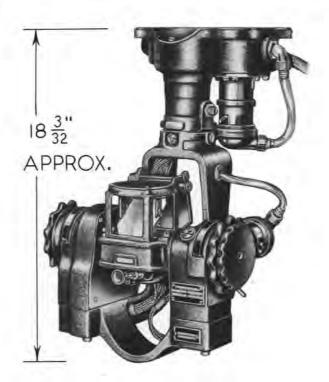
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit including lamp and selsyns.

NAVY





STATION-NOSE SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSR3C1

NAME: Nose sighting station.

DESCRIPTION: The gunner at the nose sighting station in the B-29 airplane can sight on targets in the area about the nose of the airplane.

This sight is similar to the sight at the blister and tail sighting stations, but is inverted.

The base of the sight is a pedestal suspended from the airplane structure. A "Y" shaped support enables the sight, which is of the optical reflector type, to turn horizontally, using the pedestal as a pivot. The sight is moved in this manner when the gunner pushes or pulls against the two large knobs on either arm of the "Y." Elevation and depression is accomplished by turning the knobs. Adjacent to the right hand knob is a smaller knob for range adjustment to the sight. A crescent-shaped firing key, near the inside of both large knobs, can be operated by either thumb.

The sight uses two selsyns to indicate movement of the sight horizontally and two to indicate movement vertically. These indications are sent to receiving selsyns mounted on the gun turret, causing the turret movements to conform to movements of the sight. Two selsyns are used for each motion of the sight, to insure accuracy.

CHARACTERISTICS:

Dimensions approximately 17% by 17% by 18½ inches
Weight approximately 33 pounds
Required voltage 28 volts direct current for lamp
110 volts alternating current for selsyns
Range 180 degrees in azimuth
60 degrees in elevation
45 degrees in depression

RELATIONSHIP OF PARTS: Used with:

Lamp, Trade Number 1380; G. E. Part Number 8621274, A. E. Reference Number 88-8700; and Selsyns, G. E. model 2J1F1. These items are contractor furnished in this airplane.

ARMY

A. E. REFERENCE NUMBER: 52-6866

MANUFACTURER: General Electric Company

MANUFACTURER'S DRAWING NUMBER: W-8258870, Group 1

MANUFACTURER'S MODEL NUMBER: 2CSR3C1

MANUFACTURER'S SPECIFICATION NUMBER:

GO-18393-B-1

PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit including lamp and selsyns.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY



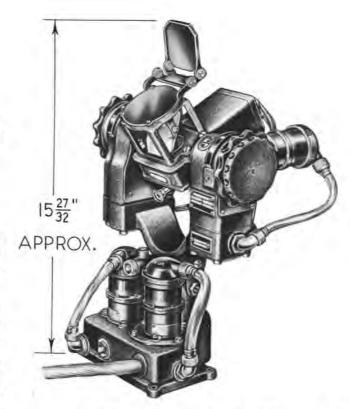
STATION— RIGHT BLISTER SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSR3B1

NAME: Right blister sighting station

DESCRIPTION: The gunner at the right blister sighting station in the B-29 airplane can sight on targets in the area at the right side of the airplane.

The base of the sight is a pedestal fixed to the airplane structure. A "Y" shaped support enables the sight, which is of the optical reflector type, to turn horizontally, using the pedestal as a pivot. The sight is moved in this manner when the gunner pushes or pulls against the two large knobs on either



arm of the "Y." Elevation and depression are accomplished by turning the knobs. Adjacent to the right hand knob is a smaller knob for range adjustment to the sight. A crescent-shaped firing key, near the inside of both large knobs, can be operated by either thumb.

The sight uses two selsyns to indicate movement of the sight horizontally, and two to indicate vertical movement. These indications are sent to receiving selsyns on the gun turret, causing the turret movements to conform to the movements of the sight. Two selsyns are used for each motion of the sight to insure accuracy.

CHARACTERISTICS:

Dimensions approximately 15¼ by 15½ by 15½ inches

Weight approximately 31 pounds

Required voltage 28 volts direct current for lamp

110 volts alternating current for selsyns

Range 180 degrees in azimuth

30 degrees in elevation

45 degrees in depression

Lamp Type R-12; 28 volts, 50/50 candlepower,

double contact base

RELATIONSHIP OF PARTS: Used with:

Lamp, Trade Number 1380, G. E. Part Number 8621274, A. E. Reference Number 88-8700; and Selsyns, G. E. model 2J1F1. These items are contractor furnished in this airplane.

ARMY

A. E. REFERENCE NUMBER: 52-6867
MANUFACTURER: General Electric Company
MANUFACTURER'S MODEL NUMBER: 2CSR3B1
MANUFACTURER'S DRAWING NUMBER: W-8258849, Group 2
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit including lamp and selsyns.

NAVY

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY



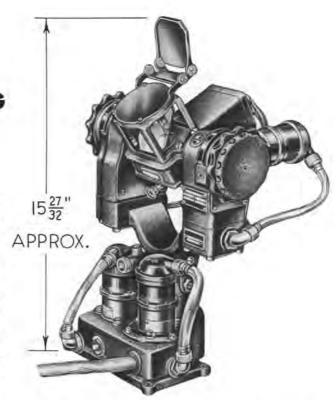
STATION - TAIL SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSR3B3

NAME: Tail sighting station.

DESCRIPTION: The gunner at the tail sighting station in the B-29 airplane can sight on targets in the area at the rear of the airplane.

The base of the sight is a pedestal fixed to the airplane structure. A "Y" shaped support enables the sight, which is of the optical reflector type, to turn horizontally, using the pedestal as a pivot. The sight is moved in this manner when the gunner pushes or pulls against the two large knobs on either arm of the "Y." Elevation and depression are accomplished by turning the knobs. Adjacent to the right hand knob is a smaller



knob for range adjustment to the sight. A crescent-shaped firing key, near the inside of both large knobs, can be operated by either thumb.

The sight uses two selsyns to indicate movement of the sight horizontally and two to indicate vertical movement. These indications are sent to receiving selsyns on the gun turret, causing the turret movements to conform to the movements of the sight. Two selsyns are used for each motion of the sight to insure accuracy.

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

Lamp, Trade Number 1380, G. E. Part Number 8621274, A. E. Reference Number 88-8700; and Selsyns, G. E. model 2J1F1. These items are contractor furnished in this airplane.

ARMY

A. E. REFERENCE NUMBER: 52-6868

MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 2CSR3B3

MANUFACTURER'S DRAWING NUMBER: W-8248849, Group 3

MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1

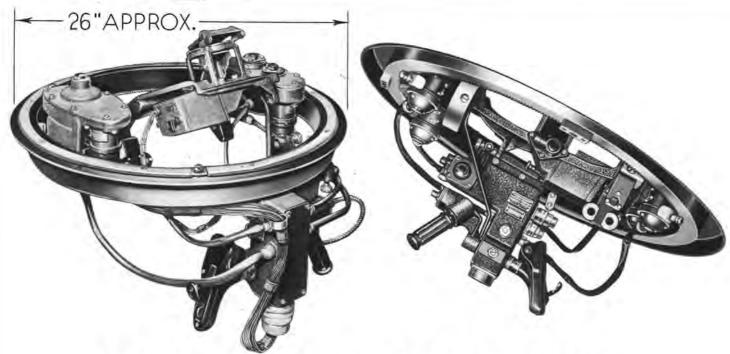
PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit including lamp and selsyns.

NAVY







STATION-UPPER RING SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSR3A1

NAMES: Upper ring sighting station

Ring sighting station

DESCRIPTION: The gunner at the upper sighting station in the B-29 airplane can see targets in the hemisphere of sky above his head. This field of vision is about a vertical axis, enabling the use of a ring type sight.

The gunner is seated in a swivel seat, and can move the sight manually along the sighting ring when he rotates his seat by pushing his feet against the floor. Under the center of the seat is a collector ring assembly through which all electrical connections to the sight are made. This assembly rotates with the seat, and prevents the cable to the sight from twisting.

The sight, which is of the optical reflector type, rides up and down on a crosspiece, or yoke, which has counterbalanced arms. When the gunner pushes forward on the control grips, the yoke and sight swing up. A pull on the handles lowers the sight. A gun firing key is provided in the right hand control grip.

This sight uses two selsyns to indicate movement of the sight horizontally, and two to indicate vertical movement. These indications are sent to receiving selsyns on the gun turret, causing the turret movements to conform to the movements of the sight. Two selsyns are used for each motion of the sight to insure accuracy.

CHARACTERISTICS:

 $\begin{array}{cccc} \text{Dimensions.} & \text{approximately 26 by 26 by } 15^{13}\!\!\!\! \%2 \text{ inches} \\ \text{Weight.} & \text{approximately 42 pounds} \\ \text{Required voltage.} & 28 \text{ volts direct current for lamp,} \\ & 110 \text{ volts alternating current for selsyns} \\ \text{Range.} & 360 \text{ degrees in azimuth} \\ & 90 \text{ degrees in elevation} \\ \text{Lamp.} & \text{Type R-12; 28 volts, } 50/50 \text{ candlepower,} \\ & & \text{double contact bayonet base} \\ \end{array}$

RELATIONSHIP OF PARTS: Used with:

Lamp, Trade Number 1380, G. E. Part Number 8621274, A. E. Reference Number 88-8700 and Selsyns, G. E. model 2J1F1.

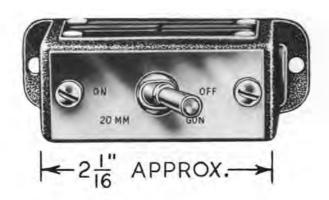
These items are contractor furnished in this airplane.

ARMY

A. E. REFERENCE NUMBER: 52-6869
MANUFACTURER: General Electric Company
MANUFACTURER'S MODEL NUMBER: 2CSR3A1
MANUFACTURER'S DRAWING NUMBER: W-8258820, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit, including lamps and selsyns.

NAVY





SWITCH-TAIL CANNON SELECTOR

ARMY TYPE B-5A

NAMES: Tail cannon selector switch Cannon firing switch

Single pole toggle switch Toggle switch

DESCRIPTION: This switch controls the firing of the 20-mm cannon in conjunction with the machine guns located in the tail gun mount. It is of the single pole, single throw, ON-OFF type, and is operated at the discretion of the tail gunner.

The case surrounding the switch is furnished by the airplane manufacturer.

CHARACTERISTICS:

Dimensions......approximately 2 by 2 by 3/4 inches (including case)

Weight.....approximately 4 ounces (including case)

RELATIONSHIP OF PARTS: Used with:

The B-29 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6650 AN DRAWING NUMBER: AN3015 TYPE DESIGNATION: B-5A

A. S. C. STOCK NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

The Navy does not use the B-29 central station fire control system, of which this switch is a part. This switch, however, is procured for other purposes.

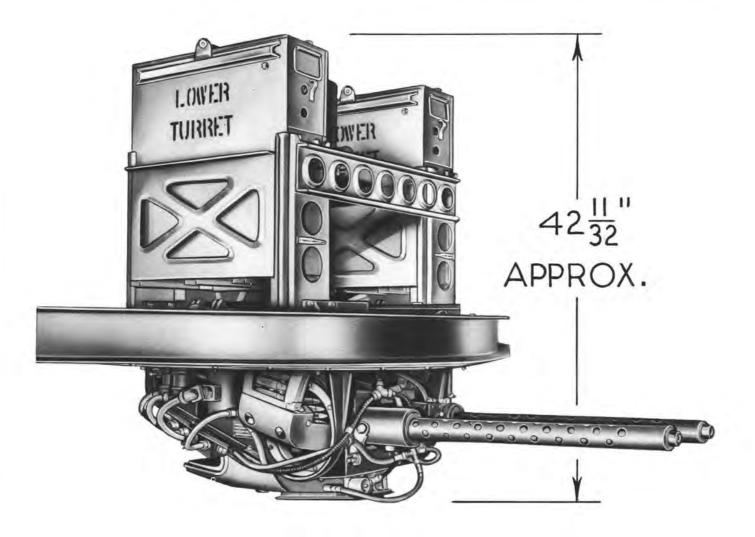
ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | British Reference Number | A. S. O. Stock Number | Remarks |
|---------------------------------|---|-------------------------------------|------------|--|--------------------------------|-----------------------------|--|
| Cutler-Hammer, | *B-5A | JAN3015 | A-N | 42578201K4 | | R17-S-28260 | Luminous tip. |
| Incorporated | | JAN3022-2 | A-N-B | 4200894750 | 105C/146 | R17-S-28266-22 | Non-luminous tip. Threaded mounting holes. |
| Air Associates, Incorporated | | ¶AN3022-2 | A-N-B | 4200894750 | 105C/146 | R17-S-28266-22 | Non-luminous tip. Threaded mounting holes. |

Note: *AAF type.

¶Army and Navy standard drawing.



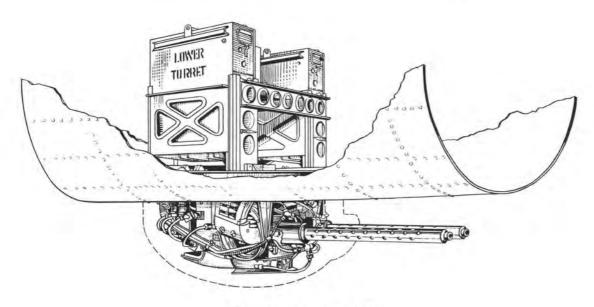


TURRET-LOWER AFT GUN

GENERAL ELECTRIC COMPANY MODEL 2CGD50LRC5

NAMES: Lower aft gun turret

Rear lower gun turret



(Continued on page 199)



TURRET-LOWER AFT GUN

(Continued from page 198)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported in the B-29 airplane by means of a mounting ring and saddle assembly. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator; one drive motor for horizontal rotation of the turret, the other for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted above the gun. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret, to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed aft. It is latched in this position to prevent accidental movement, resulting in an increase in drag.

CHARACTERISTICS:

| Dome diameter | approximately 405/16 inches |
|------------------------|------------------------------|
| Ring diameter | approximately 38 inches |
| Height to ring | approximately 2821/32 inches |
| Height overall | approximately 4211/32 inches |
| Weight | approximately 290 pounds |
| Rotation in azimuth | .360 degrees |
| Movement in depression | .95 degrees |

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065, and Amplidyne motor-generator, A. E. Reference Number 52-3040; Gun charger, A. E. Reference Number 52-1720, and Selsyns, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6870 PRODUCTION STATUS: Under procurement, SHIPPING DATA: Shipped as a complete unit,

NAVY

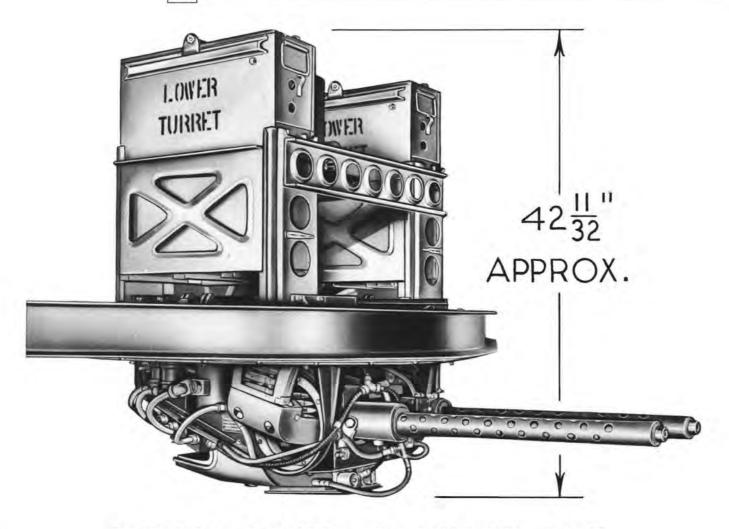
There is no Navy equivalent for the Army item.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specifi- cation | Used On Airplane | Remarks |
|---------------------|---|-------------------------------------|------------|--------------------------------------|---------------------|---|
| General | 2CGD50LRC5 | WW-8009114 Group 1 | A | GO-18393-B-1 | B-29 aft | |
| Electric Company | 2CGD50LRC4 | WW-8009113 Group 1 | A | GO-18393-B-1 | B-29 fore | Uses different contour follower and fire interrupter. |
| | 2CGD50LRC1 | WW-8019523 Group 1 | A | GO-17397-B | A-26 | Uses different contour follower and fire interrupter. |

FIRE CONTROL SYSTEMS ARMAMENT—GUNNERY



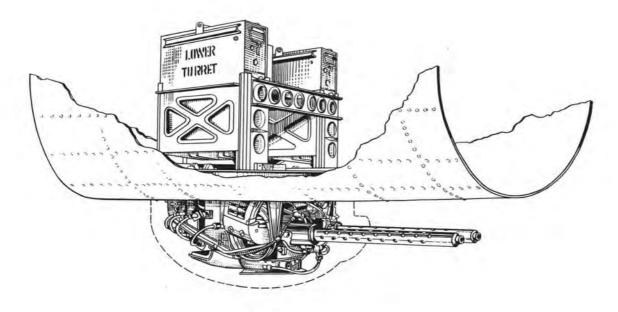


TURRET-LOWER FORWARD GUN

GENERAL ELECTRIC COMPANY MODEL 2CGD50LRC4

NAMES: Lower forward gun turret

Fore lower gun turret



(Continued on page 201)



TURRET-LOWER FORWARD GUN

(Continued from page 200)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported in the B-29 airplane by means of a mounting ring and saddle assembly. It is electrically operated by two amplidyne motor-generators; one drive motor for horizontal rotation of the turret, and another, for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted above the guns. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret, to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed aft. It is latched in this position to prevent accidental movement, resulting in an increase in drag.

CHARACTERISTICS:

| Dome diameter | approximately 40% inches |
|------------------------|------------------------------|
| Ring diameter | approximately 38 inches |
| Height to ring | |
| Height overall | approximately 4211/32 inches |
| Weight | approximately 290 pounds |
| Rotation in azimuth | |
| Movement in depression | .95 degrees |

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065; Amplidyne motor generator, A. E. Reference Number 52-3040; Gun charger, A. E. Reference Number 52-1720; and Selsyns, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6871
A. S. C. STOCK NUMBER: Refer to chart.
SHIPPING DATA: Shipped as a complete unit.

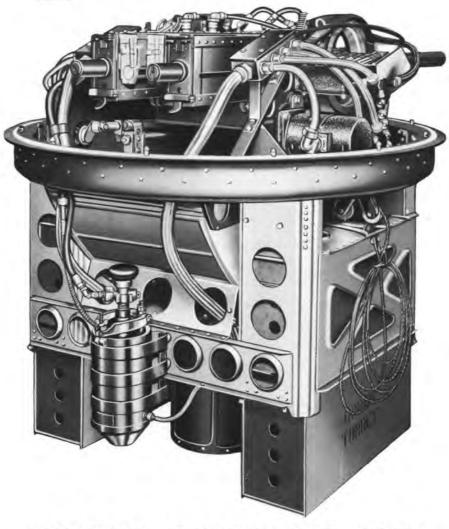
NAVY

There is no Navy equivalent for the Army item.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specifi- cation | Used On Airplane | Remarks |
|---------------------|---|-------------------------------------|------------|--------------------------------------|---------------------|--|
| General | 2CGD50LRC4 | WW-8009113 Group 1 | A | GO-18393-B-1 | B-29 fore | |
| Electric Company | 2CGD50LRC5 | WW-8009114 Group 1 | A | GO-18393-B-1 | B-29 aft | Uses different contour follower and fire interrupter |
| | 2CGD50LRC1 | WW-8019523 Group 1 | A | GO-17397-B | A-26 | Uses different contour follower and fire interrupter |



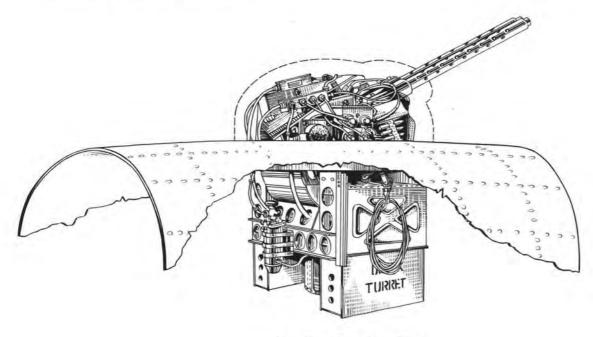


TURRET-UPPER AFT GUN

GENERAL ELECTRIC COMPANY MODEL 2CGD5OURC4

NAMES: Upper aft gun turret

Rear upper gun turret



(Continued on page 203)



TURRET-UPPER AFT GUN

(Continued from page 202)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported in the B-29 airplane by means of a mounting ring and saddle assembly. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator; one drive motor for horizontal rotation of the turret, the other, for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted below the guns. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret, to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed aft. It is latched in this position to prevent accidental movement which might result in an increase in drag.

CHARACTERISTICS:

| Dome diameter | approximately 40% inches |
|-----------------------|-------------------------------|
| Ring diameter | |
| Height to ring. | approximately 2813/32 inches |
| Height overall | |
| Weight | approximately 290 pounds |
| Rotation in azimuth | |
| Movement in elevation | from -5 degrees to +90 degree |

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065, Amplidyne motor-generator, A. E. Reference Number 52-3040, Gun charger, A. E. Reference Number 52-1720; and Selsyn, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6872 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

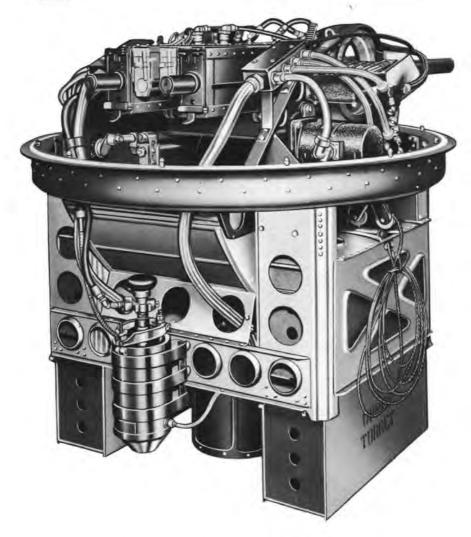
There is no Navy equivalent for the Army item.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specification | Used on Airplanes | Remarks |
|--------------------------|---|-------------------------------------|------------|---------------------------------|-------------------------|---------|
| General Electric Company | 2CGD50URC4 | WW-8009112, Group 1 | A | GO-18393-B-1 | B-29 aft | |
| | 2CGD50URC3 | WW-8009111, Group 1 | A | GO-18393-B-1 | B-29 fore | * |
| | 2CGD50URC1 | WW-8019524, Group 1 | A | GO-17397-B | A-26 | * |

^{*}Uses different contour follower and fire interrupter.



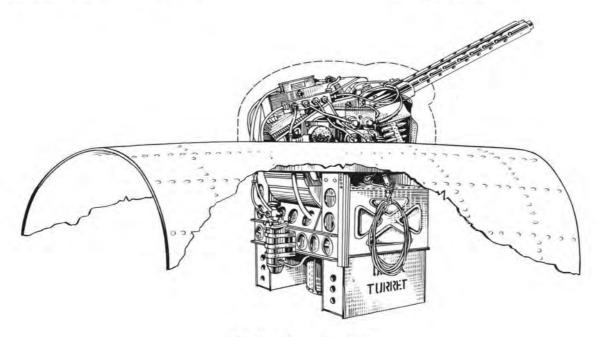


TURRET-UPPER FORWARD

GENERAL ELECTRIC COMPANY MODEL 2CGD5OURC3

NAMES: Upper forward turret

Fore upper turret



(Continued on page 205)



TURRET-UPPER FORWARD

(Continued from page 204)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported in the B-29 airplane by means of a mounting ring and saddle assembly. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator; one drive motor for horizontal rotation of the turret, the other, for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted below the guns. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed aft. It is latched in this position to prevent accidental movement, which might result in an increase in drag.

CHARACTERISTICS:

| Dome diameter | approximately 40% inches |
|-----------------------|----------------------------|
| Ring diameter | approximately 38 inches |
| Height to ring. | approximately 2813% inches |
| Height overall | |
| Weight | |
| Rotation in azimuth | |
| Movement in elevation | |

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065; Amplidyne motor-generator, A. E. Reference Number 52-3040; Gun charger, A. E. Reference Number 52-1720; and Selsyn, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6873 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

There is no Navy equivalent for the Army item.

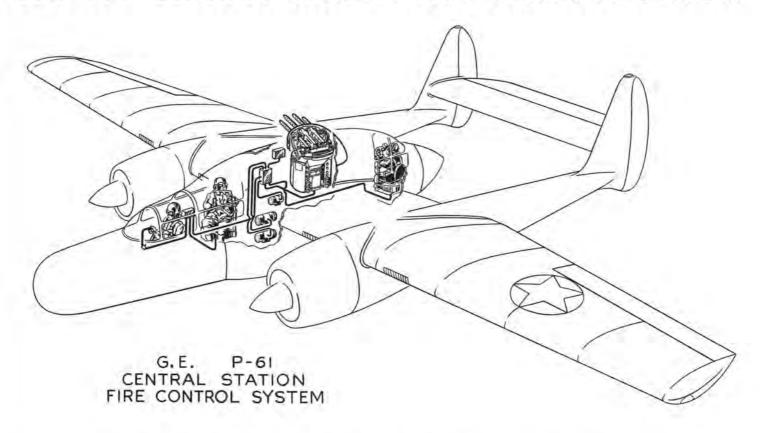
ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specification | Used on Airplanes | Remarks |
|--------------------------|---|-------------------------------------|------------|---------------------------------|-------------------------|---------|
| General Electric Company | 2CGD50URC3 | WW-8009111, Group 1 | Α | GO-18393-B-1 | B-29 fore | |
| | 2CGD50URC1 | WW-8019524, Group 1 | Α | GO-17397-B | A-26 | * |
| | 2CGD50URC4 | WW-8009112, Group 1 | Α | GO-18393-B-1 | B-29 aft | * |

^{*}Uses different contour follower and fire interrupter.



G.E. P61 CENTRAL STATION FIRE CONTROL SYSTEM



The GE Model 2CFR12A3 (P-61) central station fire control system unites the entire complement of the airplane's machine guns into a single system so that one four gun turret is remotely controlled from two sighting stations. The general arrangement of the system is shown in the accompanying illustration.

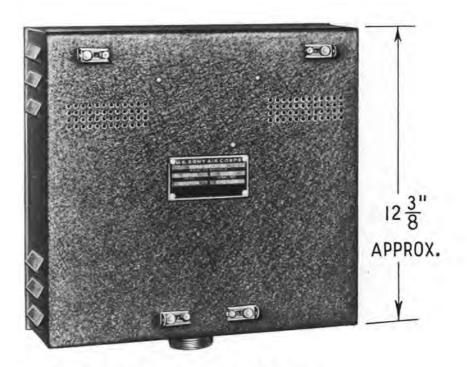
The armament consists of a turret located in the upper deck of the airplane, and carrying four .50 caliber M2 machine guns. These guns fire simultaneously, each at the rate of approximately 800 rounds per minute. The turret rotates through 360 degrees horizontally and the guns move 90 degrees in elevation.

The operation of the turret is electrically controlled from either the forward or aft sighting station. The control system enables the gunner to control all movement of the turret automatically, from a remote position, by merely moving a sight. As the sight is moved to new positions, while tracking the target, the guns follow automatically and instantaneously. The gunner in each of the sighting stations and the pilot can control the firing. The forward gunner has full control of the turret at all times, unless he chooses to transfer control to the rear gunner. The front gunner may also transfer firing control to the pilot by bringing the guns directly forward and latching the turret.

The items of government furnished equipment which comprise this system are listed in the following pages:

| A. E. Reference | | A. E. Reference | |
|-----------------|-----------------|-----------------|---------------------------|
| Number | Item | Number | Item |
| 52-6801 | Servo-amplifier | 52-3040 | Amplidyne motor-generator |
| 52-6802 | Control box | 52-4210 | Selsyn |
| 52-6803 | Junction box | 52-6804 | Upper gun turret |
| 52-2575 | Dynamotor | 52-1720 | Gun charger |





SERVO-AMPLIFIER GENERAL ELECTRIC COMPANY MODEL 2CV1B1

DESCRIPTION: The servo-amplifier, which may be located at any convenient point in the airplane, is a rectangular box containing vacuum tubes, transformers, condensers, and resistors.

This device amplifies a signal voltage from a selsyn receiver, and then rectifies it from alternating to direct current, to make it suitable for exciting the field of an amplidyne motor-generator.

This signal occurs only when there is misalignment between the sight and the guns, resulting in a small signal voltage passing between transmitter and receiver selsyns. The amount of this voltage is proportionate to the amount of the misalignment.

The servo-amplifier is constantly supplied with power from the dynamotor. In this way, it is always in readiness to respond to a signal.

CHARACTERISTICS:

RELATIONSHIP OF PARTS:

This servo-amplifier may be used as a part of the P-61 central station fire control system or the A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6801

MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 2CV1B1

MANUFACTURER'S DRAWING NUMBER: T-8007523, Group 1

MANUFACTURER'S SPECIFICATION: GO-17400-B; GO-17397-B

A. S. C. STOCK NUMBER: 5900642550 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8007519, GROUP 1

NAME: Control box

DESCRIPTION: This control box provides the forward gunner in the P-61 airplane with the necessary switches and controls for the proper operation of the fire control system. An ALTERNATING CURRENT POWER switch controls a dynamotor, a TURRET POWER switch controls the amplidyne motor-generators, and a FIRE SELECTOR switch transfers the control of firing from the gunners to the pilot. The box also contains a camera switch and three overload relays.

The alternating current power switch is of the overload circuit-breaker type. It controls the direct current power supply to the dynamotor, and furnishes positive direct current feed for other components of the system.

The turret power switch furnishes current to the contactor which controls starting of the amplidyne motor-generator. It also controls power supplied to the field coils of the two drive motors and to the gun firing solenoids in the turret.

The fire selector switch is of the double-pole, double-throw type, one side of which is in the firing circuit; the other side in the selector circuit. It has three positions, GUNNER, SAFE, and PILOT.

The camera switch is of the single-pole, single throw type and ic located on the ground side of the gun camera unit.

CHARACTERISTICS:

Dimensions approximately 9% by 61% by 4 inches Weight approximately 4 pounds

RELATIONSHIP OF PARTS:

Used in the P-61 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6802
MANUFACTURER: General Electric Company
MANUFACTURER'S DRAWING NUMBER: T-8007519, Group 1
MANUFACTURER'S SPECIFICATION: GO-17400-B
A. S. C. STOCK NUMBER: 5900092848
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-JUNCTION

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8007523, GROUP 1

NAME: Junction box

DESCRIPTION: This junction box, located between the turret and the forward gunner's compartment, contains the connector relays, the amplidyne contactor, firing contactor, and the capacitors used in the P-61 fire control system.

The purpose of the connectors is to provide easily disconnected inlets and outlets for power cable. The relays transfer control of the turret from one sighting station to the other, and open and close the contactors for the amplidynes, gun-firing and camera circuits. The capacitors prevent current fluctuations from affecting the turret amplidynes.

CHARACTERISTICS:

RELATIONSHIP OF PARTS:

This junction box is part of the P-61 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6803 MANUFACTURER: General Electric Company

MANUFACTURER'S DRAWING NUMBER: T-8007523, Group 1

MANUFACTURER'S SPECIFICATION NUMBER: GO-17400-B

A. S. C. STOCK NUMBER: 5900092849
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





DYNAMOTOR

GENERAL ELECTRIC COMPANY MODEL 5D21FJ2A

DESCRIPTION: This dynamotor, a six-pole, 8000 revolutions per minute motor-generator, furnishes alternating current at 115 volts and 400 cycles per second for the servo-amplifier and selsyns used in the P-61 fire control system. It consists of a 24 to 28 volt direct current shunt-wound motor on a common shaft with a 115 volt, 400 cycle per second generator. The entire assembly is enclosed in a single housing. The motor operates from the airplane's power supply.

CHARACTERISTICS:

Weight approximately 9 pounds

Motor:

Generator:

Current......3 to 5 amperes

RELATIONSHIP OF PARTS: Used with:

P-61 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-2575

MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 5D21FJ2A

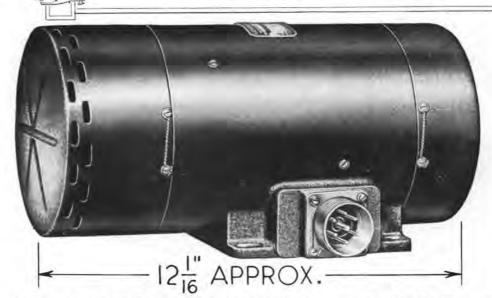
MANUFACTURER'S DRAWING NUMBER: T-5818166, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-17400-B

A. S. C. STOCK NUMBER: 5900264875

PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit.

NAVY



MOTOR-GENERATOR - AMPLIDYNE REMOTE CONTROL

GENERAL ELECTRIC COMPANY MODEL 5AM31NJ9

Amplidyne Motor generator NAMES: Amplidyne remote control motor-generator

DESCRIPTION: This type amplidyne motor-generator, used to supply current for the operation of remotely controlled machine gun turrets, consists essentially of a direct current electric motor and a direct current output generator mounted on the same shaft. In spite of the fact that the motor operates constantly to turn the shaft, there is no output from the generator unless the generator field is excited. This field requires only a small current to produce full generator output voltage. Minute variations in the field current instantaneously produce large variations in the generator's output. When the turret's guns and sight are in exact alignment no current is transmitted to the field; thus no output to the turret drive motor takes place even though the generator armature is turning. When the sight and guns are not in alignment, current is transmitted to the field and the generator produces voltage to cause the turret drive motor to align the guns with the sight.

Two amplidyne motor-generators and two turret drive motors are required for each turret; one of each for movement of the guns in elevation and depression and the others for rotation of the turret.

CHARACTERISTICS:

 $\begin{array}{ll} {\rm Dimensions} & {\rm approximately} \ 12 \ {\rm by} \ 7 \% \ {\rm by} \ 6 \ {\rm inches}. \\ {\rm Weight} & {\rm approximately} \ 29 \ {\rm pounds}. \\ {\rm Revolutions} \ {\rm per \ minute} & {\rm 8300}. \end{array}$

Motor input:

Voltage.... 27 volts, direct current

Current....

Generator output:

Voltage..... .60 volts, direct current

Current. 8.8 amperes Winding amplidyne.

RELATIONSHIP OF PARTS: Used in:

B-29 central station fire control system, P-61 central station fire control system and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-3040 A. S. C. STOCK NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

There is no Navy equivalent for the Army item.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Manufacturer's Specifi- cation |
|---|---|--|------------|--|--------------------------------------|
| General Electric Company | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | A | 5900466500 | OST-1B |
| Marathon Electric Manufacturing Corporation | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | A | 5900466500 | OST-1B |







SELSYN GENERAL ELECTRIC COMPANY MODEL 2J1G1

DESCRIPTION: Selsyns provide an electrical means of transmitting azimuth and elevation positions of the sight, relative to the guns, in the central station fire control systems.

Certain selsyns, known as generators, are mounted on the machine gun turret, and have rotors geared to the horizontal ring gear and to the elevation drive gear. Other selsyns, called control transformers, are mounted in the sighting station, and have rotors which follow the movements of the sight in azimuth and in elevation. The electrical connection between the generator and control transformer is such that, when the guns and sight are aligned on the same target, the voltage between the selsyns is zero. When the sight is moved, a voltage generated from the rotor of the control transformer is transmitted to the rotor of the generator, causing the turret to move until it is again aligned with the sight.

The selsyns operate on the output of the dynamotor, which is 115 volts, 400 cycles per second, alternating current. Connection is made through the contact plugs on the brush end of the selsyn.

CHARACTERISTICS:

Dimensions approximately 2½ by 3½ inches

Weight approximately 1 pound

Rating 115 volts, alternating current; 400 cycles per second; 3-5 amperes

RELATIONSHIP OF PARTS: Used with:

P-61 Central Station Fire Control System
 B-29 Central Station Fire Control System
 A-26 Central Station Fire Control System

ARMY

A. E. REFERENCE NUMBER: 52-4210
MANUFACTURER: General Electric Company
MANUFACTURER'S MODEL: 2J1G1
MANUFACTURER'S DRAWING NUMBER: P-6997744, Group 2

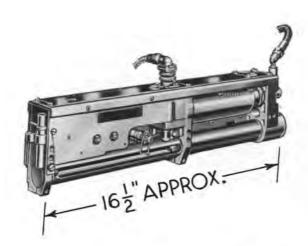
MANUFACTURER'S SPECIFICATION NUMBER: GO-17400-B

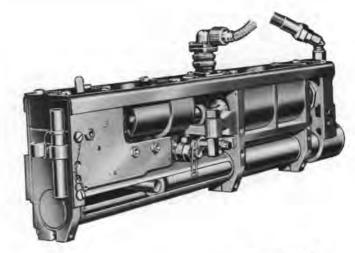
A. S. C. STOCK NUMBER: 5900642525 PRODUCTION STATUS: Under procurement.

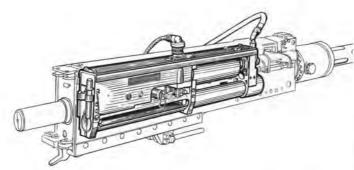
SHIPPING DATA: Shipped as a complete unit, including electrical connector.

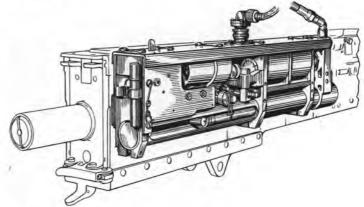
NAVY











CHARGER-GUN

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252878, GROUP 1

NAMES: Gun charger Compressed air gun charger CO₂ charger Carbon Dioxide charger

DESCRIPTION: This gun charger is mounted on the side of a .50 caliber M2 machine gun used in the G. E. central station fire control systems. It is electrically controlled, so that when a firing key is closed, the gun fires. The charger automatically operates to cock or charge the gun in the event of a misfire. Five or six cocking operations are repeated in rapid succession, after which the charger will stop, indicating difficulty due to causes other than defective ammunition.

To actuate the gun bolt, a piston acts against a stud that extends outward from the side of the gun. This stud is carried by the gun bolt, and projects through a guide slot into a cylinder. To operate the cylinder piston, compressed air, or gas, under a pressure of 1000 pounds per square inch, is admitted to the cylinder. The admission of the gas is controlled by a valve mechanism, which in turn is operated by an electromagnet known as the charging solenoid.

CHARACTERISTICS:

Dimensions ... approximately $16\frac{1}{2}$ by $4\frac{3}{4}$ by $2\frac{3}{8}$ inches. Weight ... approximately $10\frac{1}{2}$ pounds.

RELATIONSHIP OF PARTS: Used with:

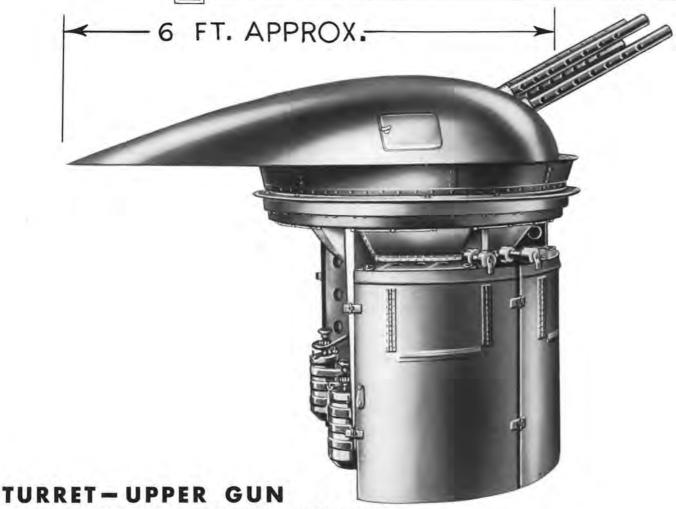
B-29 central station fire control system, P-61 central station fire control system, and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-1720
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: T-8252878, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1; GO-17400-B; and GO-17397-B.
A. S. C. STOCK NUMBER: 5900170000
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





GENERAL ELECTRIC COMPANY MODEL 2CGQ5OURA4

NAME: Upper gun turret

DESCRIPTION: This remote controlled turret, housing four .50 caliber M2 machine guns, is supported in the P-61 airplane by means of a ring and saddle assembly secured to the fuselage structure. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator. One drive motor is for horizontal rotation of the turret, the other for the elevation and depression of the guns. Four ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted beneath the guns on the frame and chute assembly. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret, to furnish power to the various units.

CHARACTERISTICS:

Diameter.....approximately 43½ inches Height approximately 5515/6 inches Weight approximately 483 pounds

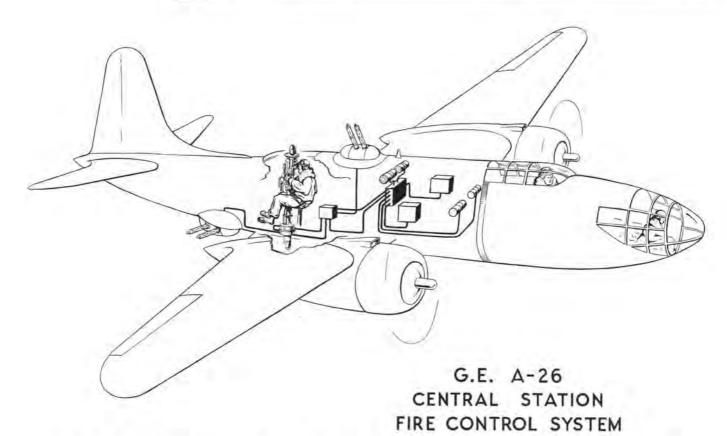
RELATIONSHIP OF PARTS: Used with: P-61 central station fire control system

ARMY

A. E. REFERENCE NUMBER: 52-6804 MANUFACTURER: General Electric Company
MANUFACTURER'S MODEL NUMBER: 2CGQ5OURA4
MANUFACTURER'S DRAWING NUMBER: WW-8019517, Group 3
MANUFACTURER'S SPECIFICATION NUMBER: GO-17400-B A. S. C. STOCK NUMBER: 5900883000 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





G. E. A-26 CENTRAL STATION FIRE CONTROL SYSTEM

The G. E. Model 2CFR21B3 central station fire control system is installed in the A-26 airplane. The system consists of an upper and a lower turret, each mounting two .50 caliber machine guns, and both controlled from one double end periscopic sighting station. The upper head of the periscope sight can follow a target from straight overhead down to ten degrees below the horizontal, whereupon the line of sight is automatically switched to the lower head. The lower head can then follow the target to a position vertically below the airplane. As the heads are capable of complete rotation, the sight coverage is two complete overlapping hemispheres. The gunner is, therefore, able to scan the sky through a plexiglass window, pick out the target, align the head with it and then track it.

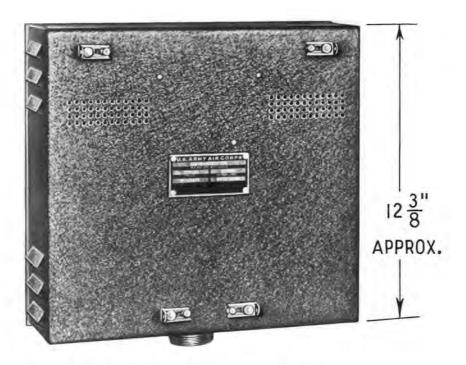
The system is divided into an upper and a lower turret control circuit. The two circuits are similar, except that the pilot can also fire the upper turret. This is possible only when the gunner transfers fire control to him by bringing the guns directly forward and then latching the turret.

The operation of either turret is electrically controlled by the gunner, simply by moving his sight. As the sight is moved in tracking the target, the guns follow, automatically and instantaneously.

The items of government furnished equipment which comprise this system are listed in the following pages:

| A. E. Referenc | e | A. E. Reference | e |
|----------------|----------------------------|-----------------|-------------------|
| Number | Item | Number | Item |
| 42-6801 | Servo-amplifier | 52-6703 | Sighting station |
| 52-6701 | Control box | 52-6704 | Lower gun turret |
| 52-6702 | Junction box | 52-6705 | Upper gun turret |
| 52-2580 | Dynamotor | 52-1720 | Gun charger |
| 52-3040 | Amplidyne, motor-generator | | O' AND A PARTY OF |





SERVO-AMPLIFIER

GENERAL ELECTRIC COMPANY MODEL 2CV1B1

DESCRIPTION: The servo-amplifier, which may be located at any convenient point in the airplane, is a rectangular box containing vacuum tubes, transformers, condensers, and resistors.

This device amplifies a signal voltage from a selsyn receiver, and then rectifies it from alternating to direct current, to make it suitable for exciting the field of an amplidyne motor-generator.

This signal occurs only when there is misalignment between the sight and the guns, resulting in a small signal voltage passing between transmitter and receiver selsyns. The amount of this voltage is proportionate to the amount of the misalignment.

The servo-amplifier is constantly supplied with power from the dynamotor. In this way, it is always in readiness to respond to a signal.

CHARACTERISTICS:

Dimensions approximately $12\frac{3}{8}$ by $11\frac{1}{2}$ by $5\frac{1}{16}$ inches Weight approximately 14 pounds

RELATIONSHIP OF PARTS:

This servo-amplifier may be used as a part of the P-61 central station fire control system or the A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6801 MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 2CV1B1

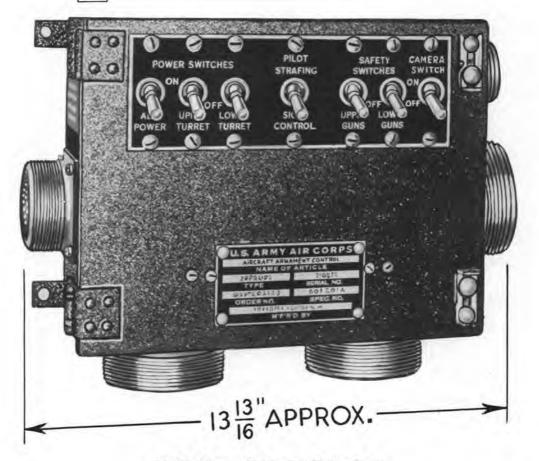
MANUFACTURER'S DRAWING NUMBER: T-8007523, Group 1

MANUFACTURER'S SPECIFICATION: GO-17400-B; GO-17397-B

A. S. C. STOCK NUMBER: 5900642550 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-CONTROL

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252925, GROUP 1

NAMES: Control box

Switch box

DESCRIPTION: This control box provides the gunner at the periscopic sight in the A-26 airplane with the necessary switches and controls for the proper operation of the fire control system.

There are two power switches, one for each turret, which control starting of the amplidyne motor generator and power supplied to the field coils of the two drive motors.

The fire selector switch permits firing of the upper turret by the pilot, or firing of either of the turrets by the gunner. When the upper turret is latched in the forward position, it may be used for offensive "strafing."

Two safety switches control the power to the gun firing solenoids in the turrets.

Another power switch controls a tell-tale indicator. This indicator, located on the cockpit dash panel, informs the pilot that his gunner is endeavoring to fire at a target which is obscured by the airplane's tail. The pilot then shifts the ship about to enable the guns to be fired at the target.

CHARACTERISTICS:

RELATIONSHIP OF PARTS:

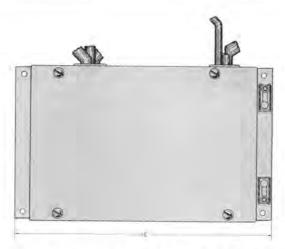
Used in the A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6701
MANUFACTURER: General Electric Company
MANUFACTURER'S DRAWING NUMBER: T-8252925, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-17397-B
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





BOX-JUNCTION

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252853, GROUP 1

NAME: Junction box

DESCRIPTION: This junction box contains the connector relays, the amplidyne contactors, fire contactors, and the overload circuit breakers used in the A-26 central station fire control system. The relays permit the gunner to control either the upper or lower turret, and also to open or close the amplidyne contactors and gun firing circuits. The circuit breakers prevent overloading of the amplidyne and dynamotors for the turrets.

CHARACTERISTICS:

RELATIONSHIP OF PARTS:

Used in the A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6702

MANUFACTURER: General Electric Company

MANUFACTURER'S DRAWING NUMBER: T-8252853, Group 1 MANUFACTURER'S SPECIFICATION NUMBER: GO-17397-B

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





DYNAMOTOR GENERAL ELECTRIC MODEL 5D21NJ3A

NAMES:

DESCRIPTION: This dynamotor, a six pole, 8000 revolution per minute motor-generator, furnishes alternating current at 110 volts and 400 cycles per second, for the servo-amplifier and selsyns used in the B-29 and A-26 central station fire control systems. It consists of a 24 to 28 volt direct current shunt wound motor on a common shaft with a 110 volt single phase generator. The entire assembly is enclosed in a single housing. The motor operates from the airplane's power supply.

CHARACTERISTICS:

Dimensions ... approximately $8^{1}\%_{16}$ by $5^{1}\%_{2}$ by $6\%_{2}$ inches. Weight ... approximately 14 pounds.

Motor:

Voltage......27 volts direct current.

Current......35 amperes.

Generator:

RELATIONSHIP OF PARTS: Used with:

B-29 and A-26 central station fire control systems.

ARMY

A. E. REFERENCE NUMBER: 52-2580

MANUFACTURER: General Electric Company.

MANUFACTURER'S MODEL NUMBER: 5D21NJ3A

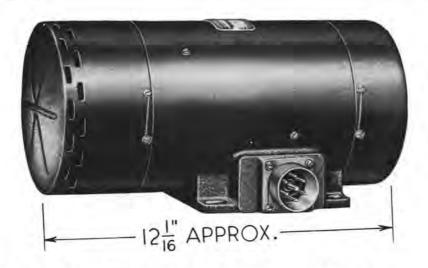
MANUFACTURER'S DRAWING NUMBER: TT-8117016, Group 1

MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1; GO-17397-B

PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY





REMOTE MOTOR-GENERATOR - AMPLIDYNE CONTROL

GENERAL ELECTRIC COMPANY MODEL 5AM31NJ9

NAMES: Amplidyne remote control motor-generator Amplidyne Motor generator

DESCRIPTION: This type amplidyne motor-generator, used to supply current for the operation of remotely controlled machine gun turrets, consists essentially of a direct current electric motor and a direct current output generator mounted on the same shaft. In spite of the fact that the motor operates constantly to turn the shaft, there is no output from the generator unless the generator field is excited. This field requires only a small current to produce full generator output voltage. Minute variations in the field current instantaneously produce large variations in the generator's output. When the turret's guns and sight are in exact alignment no current is transmitted to the field; thus no output to the turret drive motor takes place even though the generator armature is turning. When the sight and guns are not in alignment, current is transmitted to the field and the generator produces voltage to cause the turret drive motor to align the guns with the sight.

Two amplidyne motor-generators and two turret drive motors are required for each turret; one of each for movement of the guns in elevation and depression and the others for rotation of the turret.

CHARACTERISTICS:

Weight approximately 12 by 73% by 6 inches.

Revolutions per minute 8300.

Motor input:

Generator output:

Current 8.8 amperes
Power 530 watts Winding

RELATIONSHIP OF PARTS: Used in:

B-29 central station fire control system, P-61 central station fire control system and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-3040 A. S. C. STOCK NUMBER: Refer to chart. PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

There is no Navy equivalent for the Army item.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Air Service Command Stock Number | Manufacturer's Specifi- cation |
|---|---|--|------------|--|--------------------------------------|
| General Electric Company | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | Α | 5900466500 | OST-1B |
| Marathon Electric Manufacturing Corporation | 5AM31NJ9 | P-8111135 outline TT-5818156 assembly | Α | 5900466500 | OST-1B |



STATION-SIGHTING

GENERAL ELECTRIC COMPANY MODEL 2CSD1C1

NAMES: Sighting station

Periscopic sighting station

DESCRIPTION: The gunner at the periscopic sighting station in the A-26 airplane can see targets above or below the airplane, but he cannot see both at the same time.

The sight itself is a double-end periscope, having a rotating eyepiece located just below the top mounting flange. This eyepiece transfers the line of sight into the tube of the periscope either up or down, depending upon the area to be scanned. The gunner needs only to aim his sight at the target, and the selection of the line of sight is made automatically within the sighting station. A changeover mirror is rotated to change the line of sight from the upper periscope head to the lower head, or vice versa. This mirror is turned by a changeover motor whenever the line of sight intersects the fuselage, thus allowing the gunner to follow his target without pausing to shift the line of sight when the target moves above or below him.

The selsyn transmitters, indicating horizontal motion of the sight, are located near the bottom end of the periscope tube. The selsyns indicating vertical movement are located just behind the gunner's control grips. A firing trigger is incorporated in one of these grips.

A collector ring assembly, located near the base of this sighting station, enables the sight to be rotated 360 degrees without twisting the power cables. This supplies electric power while the sight is rotated.

CHARACTERISTICS:

Dimensions approximately 771/8 by 171/2 by 24 inches

Weight.....approximately 135 pounds

Required voltage 28 volts direct current for lamp

110 volts alternating current for selsyns

Range 360 degrees in azimuth

90 degrees in elevation

90 degrees in depression

Field of view at

any one time...70 degree cone

Lamp...... Kollsman 71-A-O

RELATIONSHIP OF PARTS: Used with:

A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-6703

MANUFACTURER: General Electric Company

MANUFACTURER'S MODEL NUMBER: 2CSD1C1

MANUFACTURER'S DRAWING NUMBER: W-8009100, Group 1

MANUFACTURER'S SPECIFICATION NUMBER: GO-17397-B

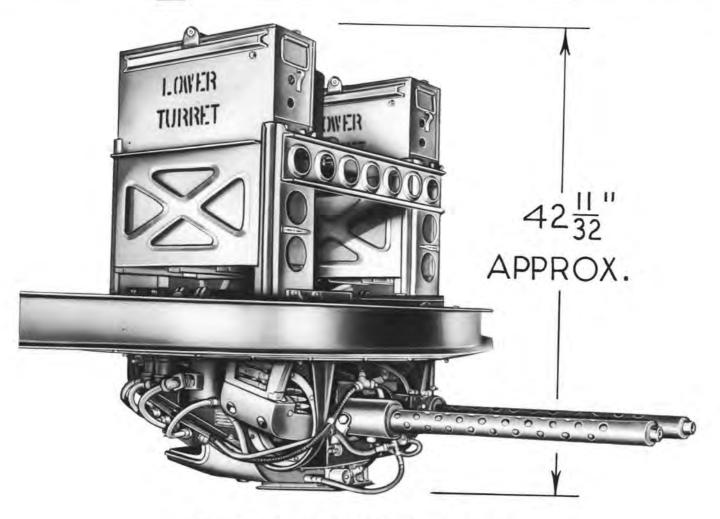
PRODUCTION STATUS: Under procurement.

SHIPPING DATA: Shipped as a complete unit, including lamp and selsyns.

NAVY



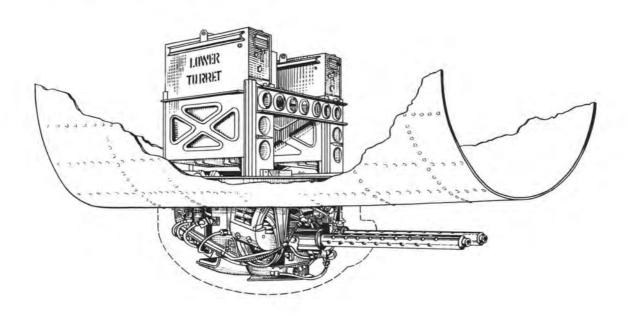




TURRET-LOWER GUN

GENERAL ELECTRIC COMPANY MODEL 2CGD5OLRC1

NAME: Lower gun turret



(Continued on page 223)



TURRET-LOWER GUN

(Continued from page 222)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported, in the A-26 airplane, by a mounting ring and saddle assembly. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator; one drive motor for horizontal rotation of the turret, the other for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted above the guns. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed aft. It is latched in this position to prevent accidental movement, which might result in an increase in drag,

CHARACTERISTICS:

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065; Amplidyne motor-generator, A. E. Reference Number 52-3040; Gun charger, A. E. Reference Number 52-1720; and Selsyns, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6704
A. S. C. STOCK NUMBER: Refer to chart.
TECHNICAL ORDER NUMBER: Refer to chart.
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY

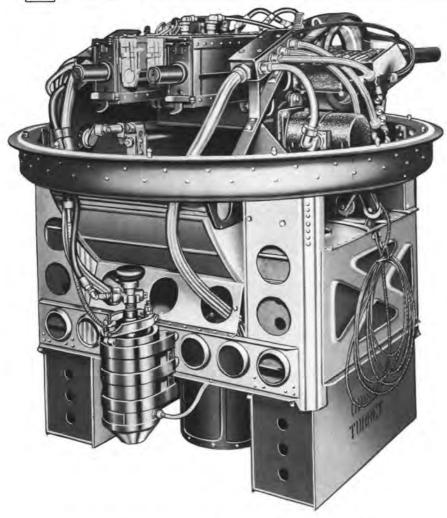
There is no Navy equivalent for the Army item.

ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specification | Used on Airplanes | Romarks |
|--------------------------|---|-------------------------------------|------------|---------------------------------|-------------------------|---------|
| General Electric Company | 2CGD5OLRC1 | WW-8019523 | Α | GO-17397-B | A-26 | |
| | 2CGD50LRC5 | WW-8009114, Group 1 | Α | GO-18393-B-1 | B-29 aft | * |
| | 2CGD50LRC4 | WW-8009113, Group 1 | Α | GO-18393-B-1 | B-29 fore | * |

^{*}Uses different contour follower and fire interrupter.

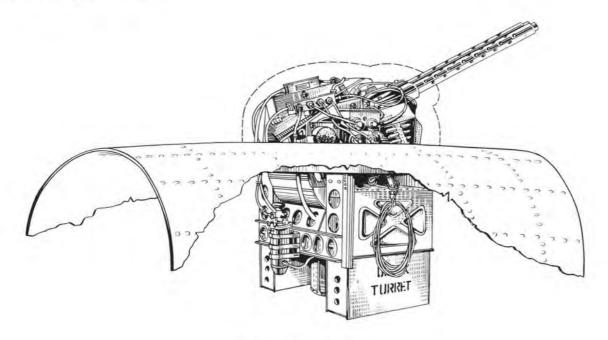




TURRET-UPPER GUN

GENERAL ELECTRIC COMPANY MODEL 2CGD5OURC1

NAME: Upper gun turret



(Continued on page 225)



TURRET-UPPER GUN

(Continued from page 224)

DESCRIPTION: This remotely controlled turret, housing two .50 caliber M2 machine guns, is supported, in the A-26 airplane, by a mounting ring and saddle assembly. It is electrically operated by two drive motors, each powered by an amplidyne motor-generator; one drive motor for horizontal rotation of the turret, the other for movement of the guns in elevation and depression. Two ammunition cases, each with a capacity of approximately 560 rounds of .50 caliber ammunition, are mounted below the guns. A collector unit with twenty-five slip rings is mounted on the axis of rotation of the turret, to furnish electrical power to the various units in it.

When not in use, the turret is turned so the guns are horizontal and pointed forward. It is latched in this position, and may be fired by the pilot when he aims the airplane at a target.

CHARACTERISTICS:

| Dome diameter | approximately 40 1/16 inches |
|-----------------------|------------------------------|
| Ring diameter | approximately 38 inches |
| Height to ring | |
| Height overall | approximately 411/8 inches |
| Weight | approximately 275 pounds |
| Rotation in azimuth | .360 degrees |
| Movement in elevation | |

RELATIONSHIP OF PARTS: Used with:

Turret drive motor, A. E. Reference Number 52-3065; Amplidyne motor-generator, A. E. Reference Number 52-3040; Gun charger, A. E. Reference Number 52-1720; and Selsyn, A. E. Reference Number 52-4210.

ARMY

A. E. REFERENCE NUMBER: 52-6705 PRODUCTION STATUS: Under procurement. SHIPPING DATA: Shipped as a complete unit.

NAVY

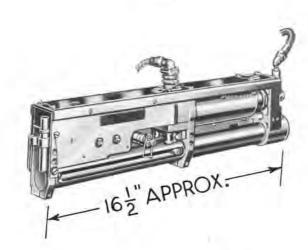
There is no Navy equivalent for the Army item.

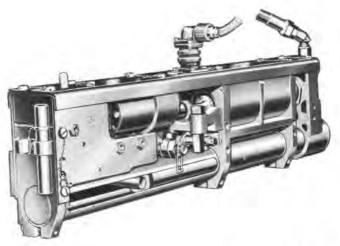
ALL MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

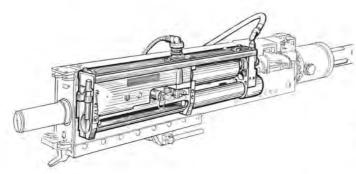
| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specification | Used in Airplanes | Remarks |
|--------------------------|---|-------------------------------------|------------|---------------------------------|----------------------|---------|
| General Electric Company | 2CGD50URC1 | WW-8019524 | Α | GO-17397-B | A-26 | |
| | 2CGD50URC3 | WW-8009111 Group 1 | A | GO-18393-B-1 | B-29 fore | * |
| | 2CGD50URC4 | WW-8009112 Group 1 | A | GO-18393-B-1 | B-29 aft | * |

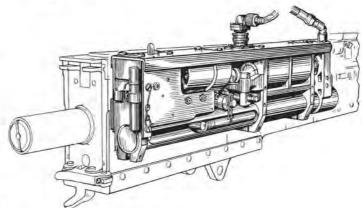
^{*}Uses different contour follower and fire interrupter.











CHARGER-GUN

GENERAL ELECTRIC COMPANY DRAWING NUMBER T-8252878, GROUP 1

NAMES: Gun charger Compressed air gun charger CO₂ charger Carbon Dioxide charger

DESCRIPTION: This gun charger is mounted on the side of a .50 caliber M2 machine gun used in the G. E. central station fire control systems. It is electrically controlled, so that when a firing key is closed, the gun fires. The charger automatically operates to cock or charge the gun in the event of a misfire. Five or six cocking operations are repeated in rapid succession, after which the charger will stop, indicating difficulty due to causes other than defective ammunition.

To actuate the gun bolt, a piston acts against a stud that extends outward from the side of the gun. This stud is carried by the gun bolt, and projects through a guide slot into a cylinder. To operate the cylinder piston, compressed air, or gas, under a pressure of 1000 pounds per square inch, is admitted to the cylinder. The admission of the gas is controlled by a valve mechanism, which in turn is operated by an electromagnet known as the charging solenoid.

CHARACTERISTICS:

Dimensions ... approximately $16\frac{1}{2}$ by $4\frac{3}{4}$ by $2\frac{3}{8}$ inches. Weight ... approximately $10\frac{1}{2}$ pounds.

RELATIONSHIP OF PARTS: Used with:

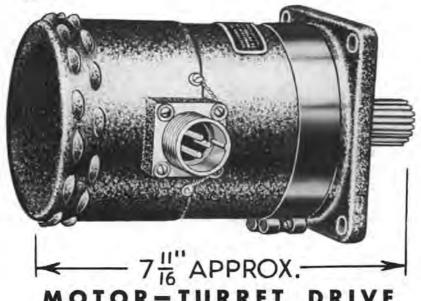
B-29 central station fire control system, P-61 central station fire control system, and A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-1720
MANUFACTURER: General Electric Company.
MANUFACTURER'S DRAWING NUMBER: T-8252878, Group 1
MANUFACTURER'S SPECIFICATION NUMBER: GO-18393-B-1; GO-17400-B; and GO-17397-B.
A. S. C. STOCK NUMBER: 5900170000
PRODUCTION STATUS: Under procurement.
SHIPPING DATA: Shipped as a complete unit.

NAVY





MOTOR - TURRET DRIVE GENERAL ELECTRIC COMPANY MODEL 5BA5OLJ2A

NAMES: Turret drive motor Drive motor Universal turret drive motor

DESCRIPTION: This ½ horsepower universal turret drive motor is of the four-pole, two-brush type, with a separately excited field. When used to rotate a turret (azimuth drive), it is connected to a 533 to 1 reduction gear train. When used to elevate or depress a two gun turret gun carriage, (elevation drive) it is connected to an 800 to 1 reduction gear; for a four gun turret gun carriage, it is connected to a 600 to 1 reduction gear. The motor is bolted to the turret, and the extended armature shaft engages the drive pinion of the gear train used in the reduction mechanism. This motor is equipped with sealed type ball bearings containing enough low temperature lubricant to last throughout normal operational life. One amplidyne motor-generator is required to furnish power for the operation of each turret drive motor.

CHARACTERISTICS:

 $\begin{array}{lll} \text{Dimensions} & \text{approximately } 734 \text{ by } 558 \text{ by } 414 \text{ inches} \\ \text{Weight} & \text{approximately 8 pounds} \\ \text{Type} & 12 \text{ horsepower direct current} \\ \text{Full load revolutions per minute} & 4000 \\ \text{Field current} & 2.3 \text{ amperes} \\ \text{Field voltage} & 24 \text{ volts, direct current} \\ \text{Field resistance} & 9.4 \text{ ohms} \\ \end{array}$

RELATIONSHIP OF PARTS: Used with:

Amplidyne motor generator G. E. model 5AM31NJ9, A. E. Reference Number 52-3040 in Army type B-29 central station fire control system, Army type P-61 central station fire control system, and Army type A-26 central station fire control system.

ARMY

A. E. REFERENCE NUMBER: 52-3065 PRODUCTION STATUS: Under procurement.

SHIPPING DATA: This unit is normally a component part of the turrets used in the fire control systems but may be shipped as a separate unit when required.

NAVY

There is no Navy equivalent for the Army item.

MODELS BELOW ARE INTERCHANGEABLE Models are used in services as noted in column 4 A-Army, N-Navy, B-British

| Manufacturer | Manufacturer's Model Identification | Manufacturer's Drawing Number | Used By | Manufacturer's Specifi- cation | Remarks |
|------------------------------------|---|-------------------------------------|------------|--------------------------------------|---|
| General Electric Company | 5BA5OLJ2A | TT-8117000 | A | OST-1B | GE model 5BA5OLJ2A supersedes and is interchange able with GE model 5BA5OLJ2. |
| Electric Vacuum Cleaner Company | 5BA5OLJ2A | TT-8117000 | A | OST-1B | |

(RESTRICTED)



BOMB ARMING CONTROLS ARMAMENT—BOMBING